[redacted]

[redacted]

[redacted]

Tēnā koe [redacted]

Request for Information under the Local Government Official Information and Meetings Act 1987 (the Act) (the LGOIMA)

Thank you for your email of **24 July 2023** requesting the following information:

1. ***All correspondence, negotiations with Land Developers, and contract details regarding the purchase of land for the proposed Ōtaki Reservoir. (Note - we understand that this cannot now be considered as commercially sensitive as the purchase of the property has been completed).***

   Please find the following documentation enclosed as Attachment 1:

   - Letter from The Property Group dated 29 October 2021 entitled Reverse Brief: Infrastructure Accelerator Fund – Land Acquisition Strategy
   - Short form agreement for Consultant Engagement between Kapiti Coast District Council and The Property Group dated 27 June 2022
   - Letter from The Property Group dated 20 June 2022 entitled Kapiti Coast District Council – New Water Reservoir Sites, Otaki
   - Update on progress with Otaki Reservoir Site, draft meeting notes with Landowner dated 5 July 2022 from meeting of 4 July 2022
   - Email trail from 18 July 2022 to 25 July 2022 between KCDC officials, The Property Group and Landowner regarding update on progress
   - Draft (v2) Memorandum of Agreement Pursuant to the Public Works Act 1981 between Council and Westleigh Developments Limited (Owner)
   - Draft (v4) Memorandum of Agreement Pursuant to the Public Works Act 1981 between Council and Westleigh Developments Limited (Owner)
   - Report from The Property Group dated 7 March 2023 entitled Kapiti Coast District Council – Otaki Water Reservoir Project – Westleigh Developments Limited
   - Signed Memorandum of Agreement Pursuant to the Public Works Act 1981 between Council and Westleigh Developments Limited (Owner) dated 9 March 2023

Please note that any information provided in response to your request may be published on the Council website, with your personal details removed.

- Compensation Certificate Under Section 19 of the Public Works Act 1981 dated 9 March 2023.

Please note the following:

- In some instances, the personal details of other parties have been withheld from this information. The decision to withhold this information is made under section 7(2)(a) of the Act which allows for Council to withhold information in order to protect the privacy of natural persons, including that of deceased natural persons.
- Some of the information provided in the attachment has been redacted, this is because it is considered to be commercially sensitive. On that basis we must withhold this information under section 7(2)(b)(ii) of the LGOIMA in order to protect information where the making available of the information would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information.
- In the Council's view the reasons for withholding these details are not outweighed by public interest considerations in section 7(1) favouring their release.

2. ***All technical reports, analyses and recommendations of engineers and consultants relating to elevation (height above sea level) size and siting requirements for the proposed Ōtaki Reservoir, in particular the information that restricts/recommends the siting at 45 m aSL***

   Please find the following documentation enclosed as Attachment 2:

   - KCDC Water Supply – Otaki Reservoir Options draft v1.1 from SKM dated 3 December 2007
   - Kapiti Coast Water Modelling Phases 4+5 – Water Network Development Plan from MWH/Stantec dated January 2017
   - Otaki Master Plan Update Stantec dated 30 July 2019
   - Eligible Infrastructure Services Planning Report – Otaki Housing Development Robert Bird Group dated 16 December 2021.
   - Internal memo relating to the proposed Otaki Reservoir Site dated 8 March 2023, including:

     - public excluded report to Council dated 12 May 2011,
     - email from MWH Global dated 1 February 2012
     - KCDC Water Supply – Otaki Reservoir Options draft v1.1 from SKM dated 3 December 2007
     - Otaki Reservoir and Mains Upgrades - Stantec - dated 19 August 2022.

Ngā mihi

Sean Mallon
Group Manager Infrastructure Services
Te Kaihautū Ratonga Pakiaka

29 October 2021
Our reference 717882-5003

The Property Group Limited
Wellington Office
PO Box 2874 Wellington 6140
Level 11, Cornerstone House
36 Customhouse Quay
Wellington 6011

Ramesh Sharma
Water & Wastewater Assets Manager
Kāpiti Coast District Council

Email: Ramesh.Sharma@kapiticoast.govt.nz

Tēnā koe Ramesh

Reverse brief: Infrastructure Accelerator Fund – Land Acquisition Strategy

The Property Group Limited (TPG) is excited about the prospect of supporting Kāpiti Coast District Council (Council) with its responses to the Infrastructure Accelerator Funding Request for Proposal (RFP) stage. Please see below TPG's proposal to deliver on your requirements.

Brief appreciation

Cabinet has agreed that at least $1 billion will be invested through the Infrastructure Accelerator Fund (IAF). The IAF is designed to allocate funding to new or upgraded infrastructure (such as transport, three waters and flood management infrastructure) that unlocks housing development in the short- to medium- term and enables a meaningful contribution to housing outcomes in areas of need.

The funding application process is administered by Kāinga Ora Homes and Communities (Kāinga Ora). The process comprises multiple stages, including an Expression of Interest (EOI) stage (complete), the current RFP stage, a Negotiation stage and a Contractual Close stage. Council's 'Ōtaki housing developments' EOI response has successfully moved through to the RFP stage.

A Land Acquisition Strategy (LAS) is required for the proposed new reservoirs under Council's RFP response which is due to be submitted to Kāinga Ora on 17 December 2021.

Scope of work

1. Desktop review of the proposed reservoir site options (maximum of two sites) including:
    a. Title status, ownership and review of registered interests
    b. Current zoning and land use and potential reverse sensitivity issues
    c. Consider availability of access and services and whether associated easements may be required.
2. Desktop assessment of compensation payable under the Public Works Act 1981 including:
    a. Base compensation
    b. Injurious affection
    c. Additional compensation
    d. Landowner's costs
    e. Council's acquisition costs
    f. Reinstatement items (fences etc)
    g. Easements (if required)
    h. Disposal recovery of surplus land (if applicable)
    i. Recommended contingency to allow for cost escalation and market uplift.
3. Desktop identification and assessment of risks and opportunities
4. Comparison of the proposed site against the existing reservoir site, which we understand to be Lots 1 and 2 DP 25782, comprised in RT WNC4/758
5. Set out a high-level acquisition strategy, process and timeframe.

Output

A brief LAS report with an executive summary suitable for supporting the land acquisition component of Council's IAF application.

We acknowledge this project is currently confidential. We will ensure confidentiality is maintained within TPG by isolating the project file in a restricted One Drive folder.

Timeframe

We have commenced work in accordance with the above scope and targeting delivery of the draft report on 6 December 2021

Fee estimate

Given the uncertainty regarding which property is to be assessed, we propose a monitoring budget of $5,700 plus GST and disbursements to complete the above scope of work.

We will let Council know if any complexities arise during our desktop investigations that may require more time to consider.

Assumptions

- Council will identify two specific properties for the proposed reservoir site
- Access and services will be via existing roads/easements wherever possible
- Land/easements will be acquired under the Public Works Act 1981
- Disbursements will comprise title and instrument searches from Landonline at a rate of $22.00 each plus GST.

Conclusion

Thank you again for engaging with TPG to explore this opportunity. We look forward to discussing this project further with you at your earliest convenience. In the meantime, please contact me if you require further clarification or information.

Ngā mihi nui

Clinton Fisher

Senior Property Consultant -
Property Development

[redacted]

the propertygroup

Short Form Agreement for Consultant Engagement

Between: Kapiti Coast District Council (Council)
(Client)

and: The Property Group (TPG)
(Consultant)

Collectively referred to herein as the "Parties" and individually as a "Party"

Project: New Water Reservoir Sites	**Location:** Otaki

Scope & nature of the Services: As outlined in the attached proposal to Council dated 20 June 2022

Programme for the Services: As outlined in the attached proposal to Council dated 20 June 2022

Fees & timing of payments: As outlined in the attached proposal to Council dated 20 June 2022

Information or services to be provided by the Client: As outlined in the attached proposal to Council dated 20 June 2022

The Client engages the Consultant to provide the Services described above and the Consultant agrees to perform the Services for the remuneration provided above. Both Parties agree to be bound by the provision of the Short Form Model Conditions of Engagement (overleaf), including clauses 2, 11 and 12 and any variations noted below. Once signed, this agreement, together with the conditions overleaf and any attachments, will replace all or any oral agreement previously reached between the Parties.

Variations to the Short Form Model Conditions of Engagement (overleaf):

Client authorised signatory (ies):	**Consultant authorised signatory (ies):**
Print name: RAMESH SHARMA	**Print name:** Karyn-Maree Johnson
Date: 27/6/2022	**Date:** 22 June 2022

ACENZ

the propertygroup

Short Form Model Conditions of Engagement

1. The Consultant shall perform the Services as described in the attached documents.
2. The Client and the Consultant agree that where all or any of, the Services are acquired for the purposes of a business the provisions of the Consumer Guarantees Act 1993 are excluded in relation to those Services. However, nothing in this Agreement shall restrict, negate, modify or limit any of the Client's rights under the Consumer Guarantees Act 1993 where the Services acquired are of a kind ordinarily acquired for personal, domestic or household use or consumption and the Client is not acquiring the Services for the purpose of a business.
3. In providing the Services, the Consultant must use the degree of skill, care and diligence reasonably expected of a professional consultant providing services similar to the Services.
4. The Client shall provide to the Consultant, free of cost, as soon as practicable following any request for information, all information in the Client's power to obtain which may relate to the Services. The Consultant shall not, without the Client's prior consent, use information provided by the Client for purposes unrelated to the Services. In providing the information to the Consultant, the Client shall ensure compliance with the Copyright Act 1994 and shall identify any proprietary rights that any other person may have in any information provided.
5. As soon as either Party becomes aware of anything that will materially affect the scope or timing of the Services, the Party must notify the other Party in writing and where the Consultant considers a direction from the Client or any other circumstance is a variation the Consultant shall notify the Client accordingly.
6. ~~The Client may order variations to the Services in writing or may request the Consultant to submit proposals for variations to the Services.~~
7. The Client shall pay the Consultant for the Services the fees and expenses at the times and in the manner set out in the attached documents. Where this Agreement has been entered by an agent (or a person purporting to act as agent) on behalf of the Client, the agent and Client shall be jointly and severally liable for payment of all fees and expenses due to the Consultant under this Agreement.
8. All amounts payable by the Client shall be due on the 20th of the month following the month of issue of each GST Invoice or at such other timing as stated elsewhere in this Agreement. If the Client fails to make the payment that is due and payable and that default continues for 14 days, the Consultant may provide written notice to the Client specifying the default and requiring payment within 7 days from the date of the notice. Unless payment has been made by the Client in full, the Consultant may suspend performance of the Services any time after expiration of the notice period. The Consultant must promptly lift the suspension after the Client has made the payment. Regardless of whether or not the Consultant suspends the performance of the Services in accordance with this clause, the Consultant may charge interest on overdue amounts from the date payment falls due to the date of payment at the rate of the Consultant's overdraft rate plus 2% and in addition the costs of any actions taken by the Consultant to recover the debt.
9. Where the nature of the Services is such that it is covered by the Construction Contracts Act 2002 (CCA) and the Consultant has issued a payment claim in accordance with the CCA, the provisions

of the CCA shall apply. In all other cases, if the Client, acting reasonably, disputes an invoice, or part of an invoice, the Client must promptly give the reasons for withholding the disputed amount and pay any undisputed amount in accordance with clause 8.

10. Where Services are carried out on a time charge basis, the Consultant may purchase such incidental goods and/or Services as are reasonably required for the Consultant to perform the Services. The cost of obtaining such incidental goods and/or Services shall be payable by the Client. The Consultant shall maintain records which clearly identify time and expenses incurred.

11. Where the Consultant breaches this Agreement, the Consultant is liable to the Client for reasonably foreseeable claims, damages, liabilities, losses or expenses caused directly by the breach. The Consultant shall not be liable to the Client under this Agreement for the Client's indirect, consequential or special loss, or loss of profit, however arising, whether under contract, in tort or otherwise.

12. The maximum aggregate amount payable, whether in contract, tort or otherwise, in relation to claims, damages, liabilities, losses or expenses, shall be five times the fee (exclusive of GST and disbursements) with a minimum of $100,000 and a maximum limit of $NZ500,000.

13. Without limiting any defences a Party may have under the Limitation Act 2010, neither Party shall be considered liable for any loss or damage resulting from any occurrence unless a claim is formally made on a Party within 6 years from completion of the Services.

14. The Consultant shall take out and maintain for the duration of the Services a policy of Professional Indemnity insurance for the amount of liability under clause 12. The Consultant undertakes to use all reasonable endeavours to maintain a similar policy of insurance for six years after the completion of the Services.

15. If either Party is found liable to the other (whether in contract, tort or otherwise), and the claiming Party and/or a Third Party has contributed to the loss or damage, the liable Party shall only be liable to the proportional extent of its own contribution.

16. Intellectual property prepared or created by the Consultant in carrying out the Services, and provided to the Client as a deliverable, ("New Intellectual Property") shall be jointly owned by the Client and the Consultant. The Client and Consultant hereby grant to the other an unrestricted royalty-free license in perpetuity to copy or use New Intellectual Property. The Clients' rights in relation to this New Intellectual Property are conditional upon the Client having paid all amounts due and owing to the Consultant in accordance with clauses 7 and 8. Intellectual property owned by a Party prior to the commencement of this Agreement (Pre-existing Intellectual Property) and intellectual property created by a Party independently of this Agreement remains the property of that Party. The Consultant accepts no liability for the use of New Intellectual Property or Pre-existing Intellectual Property other than to the extent reasonably required for the intended purposes.

~~17. The Consultant has not and will not assume any duty imposed on the Client pursuant to the Health and Safety at Work Act 2015 ("the Act") in connection with the Agreement.~~

18. The Client may suspend all or part of the Services by notice to the Consultant who shall immediately make arrangements to stop the Services and minimise further expenditure. The Client and the Consultant may (in the event the other Party is in material default that has not been

remedied within 14 days of receiving the other Party's notice of breach) either suspend or terminate the Agreement by notice to the other Party. If the suspension has not been lifted after 2 months the Consultant has the right to terminate the Agreement and claim reasonable costs as a result of the suspension. Suspension or termination shall not prejudice or affect the accrued rights or claims and liabilities of the Parties.

~~19. The Parties shall attempt in good faith to settle any dispute by mediation.~~

20. This Agreement is governed by the New Zealand law, the New Zealand courts have jurisdiction in respect of this Agreement, and all amounts are payable in New Zealand dollars.

Further Terms

The Short Form Model Conditions of Agreement are added to or substituted by the following clauses.

3A. Other Consultants

The Consultant must direct and/or co-ordinate the work of Other Consultants where required by the Services. The Consultant shall not be responsible for the services and/or work of Other Consultants.

3B. Ordering Client Materials and Services

The Consultant must obtain the Clients written approval before purchasing or ordering any good or services, materials or equipment on behalf of the Client.

4B. Consultant Obligations

The Consultant must:

4B1. identify Confidential Information at the time it is supplied to the Client; and

4B2. keep all Confidential Information relating to the Client or the Client's project confidential and only use it for the purposes it was made available; and

4B3. not disclose any Confidential Information relating to the Client or the Client's project or the Works without the Client's written approval, unless it is necessary for the purposes of the Services or Works to disclose it to any appropriate third party, or as required by law.

4C. Exclusions

Information shall cease to be Confidential Information when the Information is publicly available through no unauthorised act of either Party. If either Party is legally bound to disclose Confidential Information, that Party must first advise the other Party what information will be provided and limit the information that is required by law.

4D. Return of Confidential Information

Upon request the Consultant must promptly return to the Client or destroy all Confidential Information which is in the Consultant's possession or control.

6. Variations

6.1 Variations to the Services

6.1.1 The Consultant must notify the Client in writing within 10 Working Days if the Consultant thinks a Client direction is a Variation, and as soon as practicable if the Consultant thinks any other circumstance is a Variation. The notice shall include details of the estimated cost of the Services, likely or estimated impact on the programme and completion date for the Services and make recommendations on how to proceed.

6.1.2 The client may order a variation to the Services in writing, or may ask the Consultant to propose a Variation to the Services, the impact of which on the cost, programme and completion date for the Services shall be agreed as in 6.2.

6.1.3 Where the Consultant notifies the Client under clause 6.1.1 that any direction or circumstance should be treated as a Variation, the Client shall as soon as practicable after receiving such notice, but within 10 Working Days, notify the Consultant in writing whether or not it considers the direction or other circumstances to be a Variation.

6.1.4 If the Client does not consider the direction or other circumstance to be a Variation then the Client and Consultant shall attempt to resolve the matter as soon as practicable, and if a Variation entitlement is agreed, proceed as in 6.2.

6.2 Agreement of Variations

6.2.1 The Client and the Consultant shall agree, in writing, the value of the Variation and its impact on the programme and completion date for the Services, or the mechanism under which the value and impact on the programme and the completion date for the Services will be derived.

6.2.2 Where practicable the value of the Variation and impact on the programme and completion date for the Services shall be agreed between the Parties' prior to the Variation works progressing.

6.2.3 Where the value of the Variation cannot practicable be agreed between the Parties prior to the Variation works commencing, the parties shall agree to a budget for the Variation works that shall not exceed without further agreement between the Parties.

6.3 Failure to Agree

In the event that the Parties are unable to reach agreement on the value and impact on the programme and completion date for the Services, the matter shall be treated as a dispute and resolved in accordance with clause 18.

17. Health and Safety

17. The Consultant must comply at all times comply with the requirements of the Health and Safety at Work Act 2015 (HSW Act) and its regulations and subsequent amendments and in particular but without limitation the Consultant must:

17.1 Ensure that appropriate health and safety systems and processes are in place and effectively managed in accordance with the HSW Act;

17.2 Promptly bring to the Clients attention any notice issued under the HSW Act and take whatever action is necessary to comply with any notice, following consultation with, and subject to the express approval of, the Client;

17.3 Where undertake a role as a PCBU (person conducting a business or undertaking) to provide a primary duty of care by ensuring, so far as is reasonably practicable, the health and safety of workers and other people are not put at risk by their work;

17.4 Update its health and safety systems and processes in response to any legislative changes, changes recommended by WorkSafe New Zealand or as otherwise reasonably required by the Client from time to time.

19. Disputes

19.1 Any dispute, which may arise between the parties concerning the interpretation of this agreement or relating to any other matter arising under this agreement will be actively and in good faith negotiated by the parties with a view to a speedy resolution of such disputes.

19.2 If the dispute is not resolved within 10 working days of the dispute arising, the dispute shall be referred to the Chief Executives of the parties for negotiation and resolution.

21. Conflicts of Interest

21.1 The Consultant must try to ensure that conflicts of interest do not arise, and notify the Client immediately in writing if it is thought that a conflict of interest may arise or has arisen.

21.2 Where a conflict of interest is identified and the Client has given informed consent, the Consultant must establish structures and practices which:

20.2.1 ensure that the conflict is avoided in practice; or

20.2.2 if avoidance is not practicable, ensure that the effects of the conflict are minimised.

In either situation, the Consultant must inform the Client of the structures and practices that have been established.

22. Delay

If at any time the Consultant's performance falls behind the programme (as amended from time to time in accordance with the Agreement), the Consultant shall notify the Client and, where due to matters within the control of the Consultant, shall take all practicable steps to remedy such delay.

The Property Group Limited
Palmerston North Office
PO Box 12066 Palmerston North 4444
Level 7, TSB Tower
7-21 Fitzherbert Ave
Palmerston North 4410

20 June 2022

Lynda Edwardson
Senior Corporate Property Advisor
Kapiti Coast District Council
175 Rimu Road
Paraparaumu 5032

Dear Lynda

Kapiti Coast District Council – New Water Reservoir Sites, Otaki

Thank you for the opportunity to assist the Kapiti Coast District Council (Council) on the proposed new Water Reservoir Sites at Otaki (Project) at 71 Te Manuao Road, Otaki and 351 Waitohu Valley Road, Otaki.

The Property Group Limited (TPG) would assist the Council by undertaking initial landowner consultation to ascertain the landowner's willingness to sell land for the Project, and subject to a favourable response, obtaining a land entry agreement for the purposes of geotechnical investigations on the sites. We note the Council's preference to acquire the land as a 'willing buyer/willing seller' and not using the provisions of the Public Works Act 1981 (PWA).

Background

The land located at 71 Te Manuao Road, Otaki is owned by Cabrach Holdings Limited. Cabrach Holdings Limited is in the process of subdividing their land and we understand received subdivision consent dated 8 July 2021. The preferred location for the water reservoir is Lot 17 on the subdivision plan, but Lots 1, 18 and 19 could also suitable.

The second site is situated at 351 Waitohu Valley Road, Otaki and owned by John Alexander Fluker and Graeme Joseph Bagrie.

Scope of Work

Our scope of work includes:

Stage One: Landowner Consultation

- Discussion with Council on extent of works and Council's requirements.
- Initial contact and meet with the owner (with Council engineer) to discuss extent of works and Council's requirements.
- Report to Council on the owner's initial response to Project and issues raised at the meeting.

Stage Two (Land Entry Agreement)

- Liaise with Council on land entry requirements (geotechnical investigations to be undertaken)
- Prepare Land Entry Agreement for Council approval.
- Negotiate with owner and obtain owner agreement to Land Entry Agreement.
- Prepare a short form report and recommend Land Entry Agreement to Council for approval.

Fee Estimate

Based on the Scope of Work, we propose to complete this work on a time-write basis and provide a fee estimate **per owner**, plus GST and all external disbursements of:

Stage One – Landowner Consultation	7(2)(h)
Stage Two – Land Entry Agreement (for geotechnical investigations)	Com

The above fee estimates have been based on the following hourly rates, which are subject to review on 1 April each year.

Senior Property Consultant	$7(2)
Intermediate Property Consultant	$7(2)
Mapping	$7(2)
Senior Corporate Counsel	$7(2)

Assumptions

Please note, the above Scope of Work is based upon the following assumptions:

- The consultation relates to the acquisition of land for the purposes of a water reservoir from two landowners.
- Our fee estimate is based on one landowner meeting (per owner) and includes travel time to Otaki, if required. If further meetings are required, we can provide an

updated estimate. We may be able to meet with the Owner via video call however a meeting in person is preferred.

- While we note the Council's preference to acquire the land on a willing buyer/willing seller basis, not using the provisions of the PWA, our recommendation is that Council acquires land (by agreement) under the PWA (on a willing seller/willing buyer process), if matters proceed.
- We have not provided a fee estimate for the land acquisition. Should Council require TPG to assist with land acquisition, we would be happy to provide a further fee estimate. It is worth noting that should Council engage TPG to assist with the land acquisition, if land acquisition is not under the PWA, we would require supervision from Council's solicitors to ensure compliance with the Lawyers and Conveyancers Act. We have worked under this type of arrangement several times before with Council on its projects.

Commercial Arrangements

TPG's proposal is subject to the following commercial qualifications:

- Our estimate is valid for a period of three months from the date of this proposal.
- We will invoice Council monthly on work reported and completed to that date, with payment due on the 20th of the month following the date of that invoice.
- Should this proposal be accepted, we suggest that a formal Contract of Services based on the agreed scope of works be entered into in accordance with the terms and conditions of the IPENZ/ACENZ Short Form Consultancy Agreement.

Summary

Thank you for the opportunity for TPG to provide Council with a proposal to undertake initial landowner consultation required for the Project.

If you have any questions or wish to discuss further, please do not hesitate to contact me.

Yours sincerely

Karyn-Maree Johnson
Senior Property Consultant

Peter Bollmann

From: Ken Billing [redacted]
Sent: Tuesday, 5 July 2022 5:09 pm
To: [redacted]; Nick Urlich; Bruce Nesbitt
Cc: Sarah Busuttin
Subject: RE: KCDC - Otaki reservoir and water bore and Treatment Project
Attachments: 20220705 Draft Landowner Meeting Minutes.docx

Hi Alistair

Further to our telecom, I have just spoken to Nick and added in the top water level. All changes made are in red.

Is everyone happy with the meeting notes? Anything more to add/ amend?

Kind regards

Ken

Ken Billing
Senior Property Consultant

the propertygroup

Mobile: [redacted]
Reception: 06 834 1232

Level 7, TSB Bank Tower, 7 - 21 Fitzherbert Ave, Palmerston North 4410
PO Box 12066, Palmerston North 4444

From: Ken Billing
Sent: Tuesday, 5 July 2022 4:31 PM
To: [redacted] 'Nick.Urlich[redacted] <Nick.Urlich[redacted]; Bruce Nesbitt <[redacted]
Cc: Sarah Busuttin [redacted]
Subject: KCDC - Otaki reservoir and water bore and Treatment Project

Hi Alistair

Thanks for meeting with myself, Sarah, Nick and Bruce yesterday. It was a productive meeting.

Here is the draft meeting minutes for your review.

Kind regards

Ken

Ken Billing
Senior Property Consultant

the propertygroup

Mobile: [redacted]
Reception: 06 834 1232

Level 7, TSB Bank Tower, 7 - 21 Fitzherbert Ave, Palmerston North 4410
PO Box 12066, Palmerston North 4444

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Meeting minutes: Water Reservoir - Otaki

Date	Monday, 4 July 2022
Time	1pm
Location	71 Te Manuao Road, Otaki
Attendees	Alastair Seyb (Trustee of Cabrach Holdings Ltd), Nick Urlich (Senior Asset Planning Engineer - KCDC), Bruce Nesbitt (Water Treatment Plants Manager - KCDC), Ken Billing (Senior Property Consultant - TPG), Sarah Busuttin (Property Consultant - TPG)

Strictly confidential

Item	Discussion point and action
1.	Kapiti Coast District Council is investigating sites for a new water reservoir and a water bore and water treatment plant in Otaki. They have identified possible locations at 71 Te Manuao Road, Otaki where a proposed subdivision is planned and managed by Alistair Seyb, a trustee of Cabrach Holdings Ltd. The meeting was to present Council's proposal for Alistair to consider.
2.	The possible location of the water reservoir was reviewed on site and it was agreed that the site shown as lot 20 on the owner's scheme plan, which offers some existing screening from adjoining properties, the required elevation and road access, could be the most suitable site for the reservoir. The potential location for a water treatment plant could be the rural zoned portion of the owner's land located at the original site historically proposed by WSP. The water bore could be located either on the site adjacent to the reservoir site or alternatively on the proposed water treatment site. The Council advised that the water reservoir was needed as soon as practical due to the growth of Otaki township. The water bore and water treatment plant were considered stage two but it would be prudent to acquire the land for that purpose "up front" to secure it.
3.	Dimensions of the water reservoir are approximately 35 metres in diameter and 6 metres high. It is likely to be a concrete structure. The structure would need to be built-into the ground at this site to

achieve the desired reservoir water levels and this would have added benefit of minimising visual impact. It could be screened by plants to minimise the visual impact to surrounding properties and sections. A landscape plan would be prepared. Nick has subsequently advised that based on the existing hydrology they are looking at a design top water level of 52 metres (subject to final design confirmation).

4. The property is currently run as a working farm. The farm managers name is Andy Walker [redacted]

5. The Council would like to undertake site investigations. This involves drilling to determine the suitability of a water bore on the two proposed sites and geotechnical investigations (likely to be test pits) for the water reservoir. The testing of the water bore option would involve either discharging water to the Otaki River catchment from the proposed treatment site and to the existing pond in respect to the reservoir site. This water discharge will require investigation of capacity and any consenting issues. Alastair also advised that from his experience the soils have high moisture consent/plasticity and could pose some challenges.

6. Alistair questioned whether the Council had fully considered the market value of this land which could have a significant impact on the project costs, that Council needed to complete a feasibility study inclusive of the land costs to evaluate the projects viability in this location and consider the consenting implications. It was also suggested by Alistair that Council should get some planning advice around the reservoir site location that we agreed with. Nick has subsequently advised that the Council will need to assess drawdown impact on any other nearby bores along with the discharge consenting issues.

   Alistair advised that the rural zoned land would be more cost effective for the Council. Nick advised that proximity to town and contour was important for an ideal site. We discussed the use of the Public Works Act 1981 (PWA), that the value of the land would be market value based and that there could be some advantages using the PWA given that subdivision development and titling of the lots was some time away.

7. Alistair advised that earthworks could commence next summer and Nick advised that they would like to construct the water reservoir next summer and there would be some benefits in working together in regard to earthworks and services.

8. The stream (through the plantation) was viewed on site and Alistair advised that there were consenting issues with the wetland and stream that required monitoring. It was generally accepted that given the expected flows from reservoir, the reservoir scouring/ overflow is unlikely to be able to use this stream outlet. Nick suggested there was an opportunity to take an overflow/scour pipeline back to the Council stormwater reticulation that he had subsequently investigated and looks promising.

9. Alastair was supportive of Council's proposal but needs to discuss the Council's proposal with the other trustee and family interests. The Council is to review the consenting issues and matters raised at the meeting,

10. Contact Information of attendees:

Alastair Seyb – [redacted]

Nick Urlich – [redacted]

Bruce Nesbitt – [redacted]

Ken Billing – [redacted]

Sarah Busuttin – [redacted]

Peter Bollmann

From: Nick Urlich
Sent: Monday, 25 July 2022 3:26 pm
To: Ken Billing
Cc: Lynda Edwardson
Subject: RE: [#CCL22739] - 71 Te Manuao Road, Otaki - Earthworks Design - Reservoir Lot 18
Attachments: KCDC New Water Reservoir sites - Otaki SFA_signed_220627.pdf

Hi Ken,

Hope you didn't get too saturated tramping in the Ruahines last week, it's pretty rugged from memory, although its at least 20 years since I've been through.

Can you please provide an Offer Of Service to carry out land acquisition for the reservoir site at 71 Te Manuao Road as a variation to the Otaki Reservoir SFA?

Considerations and next steps in relation to the acquisition of the land will be:

- The purchase is under provisions of the PWA based on an 'Acquisition by agreement' (s17 PWA).
- Any initial offer from Council must get CE approval prior to be presented to the landowner. Here we will get an indication from CE of price range we are able to work within;
- The agreement for sale and purchase of the land, will be conditional on final approval by Council. This will require a report to Council; and
- The Strategic Property team will assist with the above administrative steps.

Note that 'Easements' will also be required on the western boundary as per note on Cuttriss Earthworks Plan (22739 ENG)
' EASEMENT D TO BE UTILISED FOR RESERVOIR SERVICES AND BE IN FAVOUR OF KAPITI COAST DISTRICT COUNCIL. EASEMENT TO BE CONTINUED OVER LOT 20 TO PROPOSED ROAD.'

Contact details of preferred valuers are below. Most seem to be quite under the pump at the moment, so best to get an indication early as to availability. Lynda is happy to assist with the valuations

Bryce Grant
Kāpiti Valutions Limited
(b) (1) (A)

Main area of focus is Waikanae, Otaki and Levin. Values all types of properties including residential industrial/ commercial and lifestyle blocks.

Amelia Kirton
Telfer Young Ltd
(b) (1) (A)

Residential and commercial valuations throughout the greater Wellington region, mainly in the Kapiti Coast region.

- **We have not provided a fee estimate for the land acquisition. Should Council require TPG to assist with land acquisition, we would be happy to provide a further fee estimate. It is worth noting that should Council engage TPG to assist with the land acquisition, if land acquisition is not under the PWA, we would require supervision from Council's solicitors to ensure compliance with the Lawyers and Conveyancers Act. We have worked under this type of arrangement several times before with Council on its projects.**

Cheers

Nick Urlich
Senior Asset Planning Engineer
Te Kaipūhanga Matua Whakamahere Rawa

Kāpiti Coast District Council
[redacted]

www.kapiticoast.govt.nz

From: Ken Billing [redacted]
Sent: Wednesday, 20 July 2022 9:05 am
To: Nick Urlich [redacted]
Subject: Re: [#CCL22739] - 71 Te Manuao Road, Otaki - Earthworks Design - Reservoir Lot 18

Hi Nick
Apologies for the late reply I was tramping in the Ruahines yesterday. Yes I saw Lynda's email and yes I see KCDC will employ the valuer if we get to the stage of negotiations with Alistair, at that stage I will need to provide a new OOS to Lynda.
Regards
Ken

Sent from my iPhone

On 19/07/2022, at 12:58 PM, Nick Urlich [redacted] wrote:

Hi Ken,

Please note clarification around the formal valuation process, this is not in scope for TPG.

The KCDC Property Team manage this process as noted below.

Cheers

Nick Urlich
Senior Asset Planning Engineer
Te Kaipūhanga Matua Whakamahere Rawa

Kāpiti Coast District Council
[redacted]

www.kapiticoast.govt.nz

From: Lynda Edwardson <[redacted]
Sent: Tuesday, 19 July 2022 12:20 pm
To: Nick Urlich <[redacted]
Subject: RE: [#CCL22739] - 71 Te Manuao Road, Otaki - Earthworks Design - Reservoir Lot 18

Ki ora Nick

Thank you for the update.

Please refer to your comment I have highlighted in yellow below.

We will instruct/arrange the valuation from our list of preferred registered valuers once we are in a position to do so. Can you please advise TPG.

Give me a call if you wish to discuss further.

Ngā mihi
Lynda

Lynda Edwardson
Senior Corporate Property Advisor

Kāpiti Coast District Council
[redacted]

www.kapiticoast.govt.nz

From: Nick Urlich <[redacted]
Sent: Tuesday, 19 July 2022 9:19 am
To: Lynda Edwardson <[redacted]>; Ramesh Sharma <Ramesh.Sharma@kapiticoast.govt.nz>
Subject: FW: [#CCL22739] - 71 Te Manuao Road, Otaki - Earthworks Design - Reservoir Lot 18

Fyi, update on correspondence with Otaki Reservoir property owner

Nick Urlich
Senior Asset Planning Engineer
Te Kaipūhanga Matua Whakamahere Rawa

Kāpiti Coast District Council
[redacted]

www.kapiticoast.govt.nz

From: Nick Urlich
Sent: Tuesday, 19 July 2022 9:16 am
To: [redacted]
Cc: Ken Billing [redacted] Sarah Busuttin [redacted]
Bruce Nesbitt <[redacted]
Subject: RE: [#CCL22739] - 71 Te Manuao Road, Otaki - Earthworks Design - Reservoir Lot 18

Hi Alastair,

Thank you very much for sending through Earthworks plan, I'm really pleased with the way it is looking.

A quick update on progress.

- A Strategic Property Acquisitions Board Paper has been prepared for the next Public Excluded Council Meeting on 28 July 2022 with recommendation to 'Approve the acquisition of an area of land (subject to final survey) at 71 Te Manuao Road, Ōtaki, suitable for a potential water reservoir, to support the increased potable water capacity and provide increased resilience'
- The Property Group have also been requested to provide some high-level planning advice to consider the consenting risks at this site, notably for the reservoir adjoining a developed residential area.
- The Property Group will be starting desktop process to review property valuation in the vicinity with intent to carry out formal valuation including any easements if/when acquisition is approved.
- Stantec have been engaged to confirm sizing and key parameters for the Otaki Reservoir.
- AWA have been requested for proposal to confirm in the stormwater model what flows are achievable from potential overflow/scour pipe at Te Manuao Street reservoir site and discharging into exiting council manhole in Pohatu Lane.
- A meeting has been arranged this Thursday morning with Richard Webb Limited – Well Drilling to assess site for potential bores and res site.

Other steps in terms of going forward assuming no issues with approval of property purchase I am keen to explore the opportunity of working in with your earthworks programme and I'm also thinking that working with Cuttriss Consultants Limited to get the Resource Consent Application would be most efficient based on their knowledge of site.

Happy to discuss

Nick Urlich
Senior Asset Planning Engineer
Te Kaipūhanga Matua Whakamahere Rawa

Kāpiti Coast District Council
[redacted]

www.kapiticoast.govt.nz

From: [redacted]
Sent: Monday, 18 July 2022 4:39 pm
To: Nick Urlich <[redacted]; Ken Billing [redacted]
Sarah Busuttin [redacted]; Bruce Nesbitt
<[redacted]
Subject: Fwd: [#CCL22739] - 71 Te Manuao Road, Otaki - Earthworks Design - Reservoir Lot 18

Nick,

We enclose a working earth-works design for discussion.

We await your comments.

Regards

Alastair Seyb

[redacted]

[redacted]

---------- Original Message ----------
From: Tom Schrader [redacted]
To: [redacted]
Date: 18/07/2022 16:02
Subject: [#CCL22739] - 71 Te Manuao Road, Otaki - Earthworks Design

Hi Alastair,

Final changes as requested.

Ngā mihi nui | Thank you

Tom Schrader | Licensed Cadastral Surveyor | BSurv | MS+SNZ |
Cuttriss Consultants Limited

| (b) (1) (A) | [redacted]
| http://www.cuttriss.co.nz

We have moved our Kāpiti office to 17 Ihakara Street!

Facebook | Instagram | Linkedin

Positively Influencing Our Environment By Design

Memorandum of Agreement Pursuant to the Public Works Act 1981

File Reference: 718379

Date:
(This agreement will be dated once signed by the Council)

Between: **Kapiti Coast District Council** *(Council)*

And: **Westleigh Developments Limited** *(Owner)*

Agreement

1. The Owner is the registered owner of an estate in Fee Simple comprising 22.5393 hectares more or less being legally described as Lot 2 Deposited Plan 427946 being all that land contained in Record of Title 510970 (Wellington Registry) **(Owner's Land)**.

2. The Council wishes to construct for water supply purposes a reservoir on part of the Owner's Land as part of the Otaki Reservoir Project **(the Works)**.

3. The Council requires for water supply purposes for the Works:

   (a) that part of the Owner's Land being 0.8560 hectares (subject to survey) shown outlined in red on the Land and Easement Requirement Plan **(Plan A)** attached as Schedule B to this Agreement **(Required Land)**;

   (b) a right of way easement over the following parts of the Owner's Land:

      (i) that part of the Owner's Land shown outlined in blue on Plan A **(ROW Easement Area 1)**; and

      (ii) that part of the Owner's Land shown shaded pink and labelled "ROW AREA OVER LOT 17 717m²" **(ROW Easement Area 2)** on the Cuttriss Overall Layout Plan **(Plan B)** attached as Schedule C to this Agreement; and

      (iii) that part of the Owner's Land shaded orange and labelled "ROW AREA OVER LOT 16 1395m²" on Plan B **(ROW Easement Area 3)**;

   (ROW Easement Area 1, ROW Easement Area 2 and ROW Easement Area 3 together referred to as **the ROW Easement Area**)

   to be forever appurtenant to the Required Land **(the ROW Easement)**;

   (c) a right to convey electricity, right to convey water and a right to drain water to be forever appurtenant to the Required Land **(the Service Easements)**. over the following parts of the Owner's Land:

      (i) that part of the Owner's Land shown outlined in blue on Plan A; and

(ii) that part of the Owner's Land shown shaded purple and labelled "EASEMENT AREA 368m²" on Plan B; and

(iii) that part of the Owner's Land shown shaded light blue and labelled "EASEMENT AREA 361m²" on Plan B

(the areas in clause 3(c)(i)(ii)(iii) together referred to as **the Service Easement Area**).

The ROW Easement and the Service Easements together referred to as **'the Required Easements'** and the ROW Easement Area and the Service Easement Area together referred to as **'the Easement Areas'**.

4. The Owner offers to sell the Required Land, the ROW Easement and the Service Easements to the Council for water supply purposes for the Works for the compensation set out in Clause 2 of Schedule A to this agreement (**Compensation**) discharged from all encumbrances and requisitions and free of all leases and tenancies on and subject to the conditions set out below and in the attached Schedule/s to this agreement.

5. The Owner agrees to:

   (a) the Required Land being acquired by Declaration under the Public Works Act 1981 (**PWA**); and to

   (b) the Required Easements being acquired by Declaration under the PWA pursuant to sections 20 and 28 or, alternatively, at the option of Council, to grant the Required Easements by Easement Instrument under the Land Transfer Act 2017 (**LTA**); and to

   (c) accept the Compensation together with the other payments detailed in the Schedule/s to this agreement in full and final settlement of all claims under the PWA.

6. The Owner acknowledges the Council may retain and pay (if demanded) to the persons entitled the whole or a sufficient portion of the Compensation to release the Required Land from all encumbrances securing money.

7. The Owner further agrees to adduce a good title to the Required Land and the Easement Areas and to comply with the requirements set out in the Schedule/s to this agreement.

8. This agreement is not binding on Council or the Owner until signed on behalf of the Council and the Owner, respectively.

Signed by Westleigh Developments Limited
by its directors:

Christine Anne DOUGLAS (Director)

Alastair Morgan SEYB (Director)

I confirm the above agreement to take by Declaration.

Signed for and on behalf of **Kapiti Coast District Council**

In the presence of:

_____

Darren Edwards
Chief Executive

_____

Witness Signature

_____

Name of witness

_____

Address of witness

_____

Occupation of witness

Schedule A:

Acquisition of Title and Compensation Certificate

1. The Council will take the Required Land and the Required Easements by Declaration or, alternatively, at the option of Council, will register the Required Easements by Easement Instrument under the LTA. Council may register a compensation certificate pursuant to section 19 of the PWA against the Record of Title to the Owner's Land pending issue of the Declaration to facilitate settlement. The Council will prepare the compensation certificate and forward it for registration as soon as practicable following the date this agreement is signed by both parties. The Council will notify the Owner as soon as the compensation certificate has been registered.

Compensation

2. The Compensation comprises:

Required Land	$ incl or plus GST (if any)
ROW Easement	$ incl or plus GST (if any)
Service Easements	$ incl or plus GST (if any)
Injurious Affection	$ (GST)
Total compensation to be paid	**$[insert figure] (including or plus GST, if any)**

Additional Compensation

3. In addition to the Compensation, the Council will pay to the Owner on the Settlement Date the sum of **$[insert figure]** (**Additional Compensation**) being the amount payable to the Owner pursuant to Section 72C of the PWA. The Additional Compensation is not subject to the imposition of GST. The Council will pay the Additional Compensation to the Owner on the Settlement Date in the manner described in clause 7 below. Payment of the Additional Compensation is subject to section 72D of the PWA.

Settlement Date

4. The date of settlement will be within 20 working days of the date the Council notifies the Owner that the Compensation Certificate has been registered or within 10 working days of the Council receiving an appropriate GST invoice from the Owner, whichever is the later

5. To facilitate settlement, the Owner or the Owner's solicitor will provide the Council with the settlement statement and a GST invoice (if applicable) for payment of the Compensation, the Additional Compensation and any other amounts payable under this agreement on the Settlement Date no later than 10 working days before the Settlement Date.

Payment and Possession

6. On the Settlement Date:

   (a) Subject to clauses 11 and 12 of this Schedule A, the Council will pay the Compensation, and the Additional Compensation to the Owner in the manner set out in clause 7

   (b) the Owner will give vacant possession of the Required Land to the Council.

7. The Owner acknowledges that the Council will tender settlement by way of an electronic transfer of funds drawn on the account of the Council pursuant to any protocol subsequently agreed between the parties.

Rates and Insurance

8. Net rates (including any water rates, and/or charges for water supply) will not be apportioned on the Settlement Date.

9. Insurance premiums payable in connection with the Required Land will not be apportioned on the Settlement Date and the Required Land will remain at the sole risk of the Owner until possession is given and taken.

10. Prior to settlement the Owner must at the Owner's expense maintain the Required Land in the same order and condition as at the date of this agreement, fair wear and tear excepted.

11. If any damage is done to the Required Land prior to settlement other than by the Council such damage is, at the option of the Council, to be made good by the Owner prior to settlement or the cost of making good such damage may be deducted by the Council from the Compensation.

Mortgagees' and Charge holders' Statements

12. As the issue of the Declaration will clear or has cleared the Required Land of any encumbrance the Owner must advise whether the Required Land is, or was, at the Settlement Date, subject to any registered or unregistered mortgage, lien, charge, or any other encumbrance securing money. If the Required Land is/was so subject the Owner or the Owner's solicitor must forward to the Council statements signed by each mortgagee and holder of the lien or charge setting out the amount required to be paid to it in discharge or reduction of the mortgage debt or for the release of the lien, charge or other encumbrance securing money.

GST

13. The parties agree that the supplies made pursuant to this agreement are subject to the provisions of the Goods and Services Tax Act 1985 (GST Act), and zero rated by virtue of Section 11(1) (mb) of the GST Act.

14. The Owner warrants that it is a registered person as required by the GST Act in respect of the supply to be made pursuant to this agreement and the Owner will still be a registered person at the Settlement Date.

15. The Council warrants that at the date of this agreement:

    (a) it is a registered person as required by the GST Act;

    (b) it is acquiring the Required Land and Required Easements for the purpose of making taxable supplies;

    (c) the Required Land and the Required Easements will not be used as a principal place of residence by the Council or a person associated with it under Section 2A(1)(c) of the GST Act; and

    (d) that the warranties provided in clause 15(a) to (c) will remain correct up until and including the Settlement Date.

16. Each party reserves its right to seek compensation from the other party and reserves all its remedies at common law and equity if the other party breaches any warranty granted in clause 14 and clause15.

Other payments and reimbursements

17. The Council will reimburse the Owner's reasonable legal and valuation costs incurred in the negotiation and settlement of this agreement on production of accounts or receipts in accordance with section 66(1)(a)(ii) PWA.

18. The Owner acknowledges that the disturbance payments payable in accordance with clause 17 of this Schedule A are part of the total compensation payable under the PWA. The Owner must provide a tax invoice with respect to such payments in accordance with section 24 of the GST Act. Where the Owner is not registered for GST, the Owner must provide an invoice for the full amount of the disturbance payments referred to in that clause.

Construction Works – ROW Easement

19. The parties acknowledge and agree that:

    (a) The Owner has obtained resource consent to subdivision (Resource Consent Number RM210003) to subdivide the Owner's Land;

    (b) As part of the subdivision that part of the Owner's Land shown as Lot 100 on Plan A (Lot 100) is to be vested in Kapiti District Council as road;

    (c) ROW Easement Area 1 is part of Lot 100 and is already formed access providing access to properties contained in Records of Title 759253, 759254 and 510969.

20. Pursuant to the rights and powers under the ROW Easement, the easement facility to be constructed by the Council over ROW Easement Area 2 and ROW Easement Area 3 comprises the construction of an access track (to the Required Land **(Access Works)**.

21. For the Access Works, Council will, in a good and workmanlike manner:

    (a) Construct a 10m wide access track over ROW Easement Area 2 and ROW Easement Area 3.

    (b) The access track shall be designed by suitably qualified engineers, including any cut and batter slopes, drainage and gradient and constructed by a suitably experienced construction contractor.

    (c) As part of construction, Council shall lay a metalled running surface on ROW Easement Area 2 and ROW Easement Area 3.

22. Prior to the commencement of construction of the Works the Council will in good faith, liaise with the Owner to advise the timing of the Works and the likely duration of the Works.

23. The Council will endeavour to complete the Works as soon as reasonably practicable and undertakes to cause as little damage and disturbance as is reasonably possible to the balance of the Owner's Land and the Owner's use of the land throughout construction of the Works.

24. Following completion of the Works, the Council will ensure that the surrounding land is left in a clean and tidy state and where appropriate tracks, or access routes affected by the Works will be re-sealed or re-grassed to a standard that was in place prior to the commencement of the Works.

Fencing

25. The Council will fence the boundary between the Required Land and the balance of the Owner's Land at no cost to the Owner. The fencing shall be constructed using new materials comprising of a high tensile wire post and batten fence (**Fencing Works**).

26. The Council shall be entitled to undertake physical works necessary to enable the Fencing Works to be constructed on the boundary between the Required Land and the balance of the Owner's Land including, but not limited to, the right to excavate land for the purpose of construction, the removal of vegetation as necessary and any other earthworks required for the purposes of construction of the Fencing Works.

27. The Council will erect the fencing using materials commonly used for such fences at the time of construction and to the standard generally accepted by the fencing industry in New Zealand.

Required Easements

28. In consideration of the compensation to be paid to the Owner under Clause 2 of this Schedule A, the Owner grants to the Council the ROW Easement over the ROW Easement Area and the Service Easements over the Service Easement Area to be forever appurtenant to the Required Land.

29. The grant of the ROW Easement and the Service Easements is an acquisition by agreement under Section 17 and 28 of the PWA.

30. The Council will be responsible for obtaining the consent of the Local Authority to the grant of the ROW Easement, as required by section 348 Local Government Act 1974, including the carrying out of any physical works necessary to obtain the same.

31. The ROW Easement and the Service Easements shall be on the terms, and shall contain the rights and powers, set out in Schedule D of this agreement (**Rights and Powers**).

Survey and Legalisation

32. The Council will, at its cost as soon as reasonably practicable after completion of construction of the Works (or earlier, at the sole discretion of the Council):

    (a) Survey the Required Land and the Easement Areas and have the Survey Office Plan approved as to survey; and

    (b) As soon as reasonably practicable after completion of the survey, carry out all legalisation actions including:

        i) take the Required Land for water supply purposes pursuant to section 20 PWA;

        ii) registration of the Required Easements and obtaining consents (if any) for registration actions.

33. For the purposes of this agreement, the Owner consents to the Required Land being acquired for water supply purposes pursuant to section 20 PWA.

34. If, following completion of the survey, the survey shows that the Required Land has an area of more than 10% greater than the area stated in this agreement, then the Owner is to be paid further compensation at the rate of $**[insert amount]** including GST/plus GST* if any, for each square metre in excess of 8,560 square metres, together with interest to be calculated in accordance with

Schedule Two of the Interest on Money Claims Act 2016, in full and final settlement of all compensation under the PWA for such additional land.

Legalisation Required Easements

35. The Council may implement the acquisition of the Required Easements by way of declaration under section 20 of the PWA, or alternatively, at the Council's option, by way of Easement Instrument/s under the LTA.

36. Where the Required Easements are to be granted by way of Easement Instrument under the LTA, the Owner covenants with the Council, when called upon to do so by the Council, to grant the Required Easements by way of Easement Instrument/s which shall be effected by:

    (a) Council's solicitor preparing an Easement Instrument in a Landonline workspace created for the transaction;

    (b) Council's solicitor certifying, signing and pre-validating the Easement Instrument in such Landonline Workspace;

    (c) Council's solicitor providing to the Owner or the Owner's solicitor the dealing number allocated by LINZ; and

    (d) The Owner's solicitor certifying, signing and releasing the Easement Instrument so that Council's solicitor can then submit it thereafter for registration.

37. The Owner covenants with the Council, when called upon to do so by the Council, in accordance with clause 35 to:

    (a) Grant the ROW Easement over the ROW Easement Area and the Service Easements over the Service Easement Area by way of Easement Instrument; and

    (b) Procure the Owner's solicitor to certify, sign and release the Easement Instrument in accordance with clause 35(d) to enable the Required Easements to be registered; and

    (c) Forthwith sign and produce any other plans and documents required to enable the Easement Instrument to be registered against the balance of Owner's Land; and

    (d) Obtain the consent of any mortgagee, caveator, encumbrance or other person having a prior registered interest in respect of the Owner's Land necessary to enable the Easement Instrument to be registered against the Record of Title of the balance Owner's Land, or to authorise the Council to obtain such consent; and

    (e) Provide the Council with written evidence of the registration of the Required Easements.

38. The Council shall meet all costs of creating and registering the Required Easements and including without limitation obtaining any resource consents and all legal, registration and survey costs.

Consent for Entry

39. The Council is entitled to enter and re-enter the balance of the Owner's Land at all times with or without such assistants, machinery, vehicles and equipment as are reasonably necessary for the carrying out and completion of the construction works, survey and fencing required pursuant to this agreement. When entering the balance of the Owner's Land the Council agrees to:

(a) Comply with all relevant legislation, regulations and bylaws affecting the balance of the Owner's Land.

(b) Do all things necessary to comply with the Health and Safety at Work Act 2015 including:

i. Ensuring, so far as is reasonably practicable, that the balance of the Owner's Land and anything arising from the balance of the Owner's Land are without risks to the health and safety of any person; and

ii. Notifying the Owner immediately if the Council becomes aware of any hazard or risk on the balance of the Owner's Land, or in the vicinity of the balance of the Owner's Land, which might, or may have the potential to, harm any person.

Warranties

40. The Owner warrants and undertakes that at the date of this agreement:

(a) the Owner has no knowledge of any requirement and has not received any notice from any tenant or any local or government authority which affects the Required Land in any way and which has not been disclosed to the Council;

(b) where the Owner has undertaken any work on the Required Land for which a permit or building consent was required by law, the Owner obtained the permit or building consent, completed the work in accordance therewith, obtained a Code Compliance Certificate (if applicable) and complied with the provisions of the Building Act 2004 at all times;

(c) the Owner has not given any consent or waiver under the Resource Management Act 1991, which directly or indirectly affects the Required Land; and

(d) the Required Land is not subject to a "short-term lease", the term "short-term lease" being defined by section 207 of the Property Law Act 2007. The Owner further warrants and undertakes that as at the Settlement Date the Required Land will not be subject to a short-term lease.

41. The Owner warrants and undertakes that at settlement:

(a) the Owner has delivered to the Council all notices and requirements received after the date of the agreement from any local or government authority unless the Owner has satisfied the notice or requirement. If the Owner has failed to deliver to the Council or satisfy the notice or demand, then the Owner shall be liable for any costs or penalties arising from such failure;

(b) the Owner has not given any consent or waiver in relation to any application under the Resource Management Act 1991 which directly or indirectly affects the Required Land;

(c) where, under Section 100 of the Building Act 2004, any building on the Required Land requires a compliance schedule, all obligations imposed on the Owner under the Building Act 2004 have been complied with; and

(d) there will be no arrears of water rates or charges, or, that any arrears at the Settlement Date will be paid in full by the Owner on that date.

42. The Owner warrants to the best of the Owner's knowledge:

(a) there are no contaminants (as the term is defined in the Resource Management Act 1991) present on the Required Land;

(b) the Owner has not dealt with any contaminant on the Required Land except in accordance with the Resource Management Act 1991;

(c) no one has ever used any part of the Required Land as a landfill or waste dump except for occasional and immaterial disposal of non-toxic domestic waste; and

(d) there are not currently, nor have there been in the past, any storage tanks on the Required Land.

43. Settlement will not be deferred, but the Council reserves its rights to seek compensation from the Owner and reserves all its remedies at common law and equity if the Owner breaches any warranty granted in clause 40 to clause 42 (inclusive).

No Objection

44. The Owner agrees that the Owner will not lodge any submission in opposition to the Works or participate in any objection or appeal which opposes any designation, resource consent or notice of requirement or take any other action which may have the effect of preventing or interfering with the Council's future plans in relation to the Works. This condition is not to merge upon settlement but will remain enforceable to the fullest possible extent.

General

45. The parties agree and acknowledge that:

(a) where any obligation or agreement hereunder remains unperformed at settlement then that obligation or agreement, notwithstanding any rule of law or equity to the contrary, is to ensure until fully discharged by performance and in no circumstance, whatsoever is to merge upon settlement of this agreement.

(b) reference to the Council includes the NZ Transport Agency, its contractors and invitees where the context requires this and vice versa.

46. The Owner acknowledges and agrees that until accepted in writing, this document is only an offer to sell to the Council and its acceptance is not to be anticipated and the Owner is not to enter into any consequential commitments in reliance of this offer being accepted by the Council. This agreement is not binding on the Council until signed on the Council's behalf. Any variation of this agreement is not binding on the Council unless signed on behalf of the Council.

Electronic Execution

47. The parties agree that:

(a) this agreement may be executed in two or more counterparts, all of which will together be deemed to constitute one and the same agreement. A party may enter into this agreement by signing a counterpart copy and sending it to the other party, including or email.

(b) the production of an emailed copy or copies of the agreement signed by all parties is to be deemed to be sufficient to satisfy the requirements of the Property Law Act 2007.

(c) in the case of email, any notice or document is deemed to have been received when acknowledged by the party or by the lawyer orally or by return email or otherwise in writing, except that return emails generated automatically do not constitute an acknowledgement.

(d) in accordance with the Contract and Commercial Law Act 2017, the parties agree that any notice or document that must be given in writing by one party to the other may be given in electronic form and by means of electronic communication.

Schedule B: **Land and Easement Requirement Plan**

Schedule C: **Easement Requirement Plan**

	REVISION DETAILS	NAME	DATE
A	EASEMENT ADDED	BDH	09.22
B	EASEMENT UPDATED	BDH	09.22
C	WORDING UPDATED ADDED	BDH	09.22

Cuttriss
Surveyors. Engineers. Planners.
www.cuttriss.co.nz

PROJECT
PROPOSED SUBDIVISION OF LOT 2 DP 427946
71 TE MANUAO ROAD, ŌTAKI
OVERALL LAYOUT

CLIENT
KAPITI COAST DISTRICT COUNCIL

SCALE A1 1:500			REDUCED SCALE A3 - 1:1000
	NAME	DATE	DRAWING NUMBER
FIELDWORK	TLS	10/20	23099 ENG
DESIGNED	AMS	07/22	
DRAWN	TLS	07/22	SHEET 1 OF 3 SHEETS
CHECKED	AMS	07/22	REVISION C

Schedule D: **Rights and Powers of Required Easements**

The rights and powers implied in the specified classes of easements are those prescribed by the Land Transfer Regulations 2018 and/or Schedule 5 of the Property Law Act 2007.

The implied rights and powers are hereby **added to** by the following:

1. Any terms used in this easement that are defined in the Land Transfer Regulations 2018 shall take those meanings unless otherwise modified by the terms set out in this instrument.

2. Where there is a conflict between the provisions of Schedule 5 of the Land Transfer Regulations 2018 and the modifications in this instrument, the modifications must prevail.

3. The Grantor acknowledges that this easement instrument is entered into by the Grantee in its capacity as owner and administering body of the easement facility and not as a regulatory authority. The two roles of the Grantee are different and any consent or approval given by the Grantee in its capacity as land owner under this easement instrument will not be deemed to waive or imply the Grantee's consent or approval in its capacity as regulatory authority or owner of other land and similarly any consent given in its capacity as a regulatory authority will not be deemed to waive or imply its consent or approval in its capacity as owner of the easement facility under this easement instrument or elsewhere.

Memorandum of Agreement Pursuant to the Public Works Act 1981

File Reference: 718379

Date:
(This agreement will be dated once signed by the Council)

Between: **Kapiti Coast District Council** *(Council)*

And: **Westleigh Developments Limited** *(Owner)*

Agreement

1. The Owner is the registered owner of an estate in Fee Simple comprising 22.5393 hectares more or less being legally described as Lot 2 Deposited Plan 427946 being all that land contained in Record of Title 510970 (Wellington Registry) **(Owner's Land)**.

2. The Council wishes to construct for water supply purposes a reservoir **(Reservoir)** on part of the Owner's Land as part of the Otaki Reservoir Project **(the Works)**.

3. The Council requires for water supply purposes for the Works:

   (a) that part of the Owner's Land being 0.8560 hectares (subject to survey) shown outlined in red on the Land and Easement Requirement Plan **(Plan A)** attached as Schedule B to this Agreement **(Required Land)**;

   (b) a right of way easement over the following parts of the Owner's Land:

      (i) that part of the Owner's Land shown outlined in blue on Plan A **(ROW Easement Area 1)**; and

      (ii) that part of the Owner's Land shown shaded pink and labelled "ROW AREA OVER LOT 17 717m²" **(ROW Easement Area 2)** on the Cuttriss Overall Layout Plan **(Plan B)** attached as Schedule C to this Agreement; and

      (iii) that part of the Owner's Land shaded orange and labelled "ROW AREA OVER LOT 16 1395m²" on Plan B **(ROW Easement Area 3)**;

   (ROW Easement Area 1, ROW Easement Area 2 and ROW Easement Area 3 together referred to as **the ROW Easement Area)**

   to be forever appurtenant to the Required Land **(the ROW Easement)**;

   (c) a right to convey electricity, right to convey water and a right to drain water to be forever appurtenant to the Required Land **(the Service Easements)**. over the following parts of the Owner's Land:

      (i) that part of the Owner's Land shown outlined in blue on Plan A; and

(ii) that part of the Owner's Land shown shaded purple and labelled "EASEMENT AREA 368m²" on Plan B; and

(iii) that part of the Owner's Land shown shaded light blue and labelled "EASEMENT AREA 361m²" on Plan B

(the areas in clause 3(c)(i)(ii)(iii) together referred to as **the Service Easement Area**).

The ROW Easement and the Service Easements together referred to as **'the Required Easements'** and the ROW Easement Area and the Service Easement Area together referred to as **'the Easement Areas'**.

4. The Owner offers to sell the Required Land, the ROW Easement and the Service Easements to the Council for water supply purposes for the Works for the compensation set out in Clause 2 of Schedule A to this agreement (**Compensation**) discharged from all encumbrances and requisitions and free of all leases and tenancies on and subject to the conditions set out below and in the attached Schedule/s to this agreement.

5. The Owner agrees to:

   (a) the Required Land being acquired by Declaration under the Public Works Act 1981 (**PWA**); and to

   (b) the Required Easements being acquired by Declaration under the PWA pursuant to sections 20 and 28 or, alternatively, at the option of Council, to grant the Required Easements by Easement Instrument under the Land Transfer Act 2017 (**LTA**); and to

   (c) accept the Compensation together with the other payments detailed in the Schedule/s to this agreement in full and final settlement of all claims under the PWA.

6. The Owner acknowledges the Council may retain and pay (if demanded) to the persons entitled the whole or a sufficient portion of the Compensation to release the Required Land from all encumbrances securing money.

7. The Owner further agrees to adduce a good title to the Required Land and the Easement Areas and to comply with the requirements set out in the Schedule/s to this agreement.

8. This agreement is not binding on Council or the Owner until signed on behalf of the Council and the Owner, respectively.

Signed by Westleigh Developments Limited
by its directors:

Christine Anne DOUGLAS (Director)

Alastair Morgan SEYB (Director)

I confirm the above agreement to take by Declaration.

Signed for and on behalf of **Kapiti Coast District Council**

In the presence of:

_____

Darren Edwards
Chief Executive

_____

Witness Signature

_____

Name of witness

_____

Address of witness

_____

Occupation of witness

Schedule A:

Acquisition of Title and Compensation Certificate

1. The Council will take the Required Land and the Required Easements by Declaration or, alternatively, at the option of Council, will register the Required Easements by Easement Instrument under the LTA. Council may register a compensation certificate pursuant to section 19 of the PWA against the Record of Title to the Owner's Land pending issue of the Declaration to facilitate settlement. The Council will prepare the compensation certificate and forward it for registration as soon as practicable following the date this agreement is signed by both parties. The Council will notify the Owner as soon as the compensation certificate has been registered.

Compensation

2. The Compensation comprises:

Required Land	$ incl or plus GST (if any)
ROW Easement	$ incl or plus GST (if any)
Service Easements	$ incl or plus GST (if any)
Injurious Affection	$ (GST)
Total compensation to be paid	**$[insert figure] (including or plus GST, if any)**

Additional Compensation

3. In addition to the Compensation, the Council will pay to the Owner on the Settlement Date the sum of **$[insert figure] (Additional Compensation)** being the amount payable to the Owner pursuant to Section 72C of the PWA. The Additional Compensation is not subject to the imposition of GST. The Council will pay the Additional Compensation to the Owner on the Settlement Date in the manner described in clause 7 below. Payment of the Additional Compensation is subject to section 72D of the PWA.

Settlement Date

4. The date of settlement will be within 20 working days of the date the Council notifies the Owner that the Compensation Certificate has been registered or within 10 working days of the Council receiving an appropriate GST invoice from the Owner, whichever is the later

5. To facilitate settlement, the Owner or the Owner's solicitor will provide the Council with the settlement statement and a GST invoice (if applicable) for payment of the Compensation, the Additional Compensation and any other amounts payable under this agreement on the Settlement Date no later than 10 working days before the Settlement Date.

Payment and Possession

6. On the Settlement Date:

   (a) Subject to clauses 11 and 12 of this Schedule A, the Council will pay the Compensation, and the Additional Compensation to the Owner in the manner set out in clause 7

   (b) the Owner will give vacant possession of the Required Land to the Council.

7. The Owner acknowledges that the Council will tender settlement by way of an electronic transfer of funds drawn on the account of the Council pursuant to any protocol subsequently agreed between the parties.

Rates and Insurance

8. Net rates (including any water rates, and/or charges for water supply) will not be apportioned on the Settlement Date.

9. Insurance premiums payable in connection with the Required Land will not be apportioned on the Settlement Date and the Required Land will remain at the sole risk of the Owner until possession is given and taken.

10. Prior to settlement the Owner must at the Owner's expense maintain the Required Land in the same order and condition as at the date of this agreement, fair wear and tear excepted.

11. If any damage is done to the Required Land prior to settlement other than by the Council such damage is, at the option of the Council, to be made good by the Owner prior to settlement or the cost of making good such damage may be deducted by the Council from the Compensation.

Mortgagees' and Charge holders' Statements

12. As the issue of the Declaration will clear or has cleared the Required Land of any encumbrance the Owner must advise whether the Required Land is, or was, at the Settlement Date, subject to any registered or unregistered mortgage, lien, charge, or any other encumbrance securing money. If the Required Land is/was so subject the Owner or the Owner's solicitor must forward to the Council statements signed by each mortgagee and holder of the lien or charge setting out the amount required to be paid to it in discharge or reduction of the mortgage debt or for the release of the lien, charge or other encumbrance securing money.

GST

13. The parties agree that the supplies made pursuant to this agreement are subject to the provisions of the Goods and Services Tax Act 1985 (GST Act), and zero rated by virtue of Section 11(1) (mb) of the GST Act.

14. The Owner warrants that it is a registered person as required by the GST Act in respect of the supply to be made pursuant to this agreement and the Owner will still be a registered person at the Settlement Date.

15. The Council warrants that at the date of this agreement:

    (a) it is a registered person as required by the GST Act;

    (b) it is acquiring the Required Land and Required Easements for the purpose of making taxable supplies;

    (c) the Required Land and the Required Easements will not be used as a principal place of residence by the Council or a person associated with it under Section 2A(1)(c) of the GST Act; and

    (d) that the warranties provided in clause 15(a) to (c) will remain correct up until and including the Settlement Date.

16. Each party reserves its right to seek compensation from the other party and reserves all its remedies at common law and equity if the other party breaches any warranty granted in clause 14 and clause15.

Other payments and reimbursements

17. The Council will reimburse the Owner's reasonable legal and valuation costs incurred in the negotiation and settlement of this agreement on production of accounts or receipts in accordance with section 66(1)(a)(ii) PWA.

18. The Owner acknowledges that the disturbance payments payable in accordance with clause 17 of this Schedule A are part of the total compensation payable under the PWA. The Owner must provide a tax invoice with respect to such payments in accordance with section 24 of the GST Act. Where the Owner is not registered for GST, the Owner must provide an invoice for the full amount of the disturbance payments referred to in that clause.

Construction Works

19. The parties acknowledge and agree that:

    (a) The Owner has obtained resource consent to subdivision (Resource Consent Number RM210003) to subdivide the Owner's Land (**Subdivision**);

    (b) As part of the Subdivision that part of the Owner's Land shown as Lot 100 on Plan A (Lot 100) is to be vested in Kapiti District Council as road;

    (c) ROW Easement Area 1 is part of Lot 100 and is already formed access providing access to properties contained in Records of Title 759253, 759254 and 510969.

20. Pursuant to the rights and powers under the ROW Easement, the easement facility to be constructed by the Council over ROW Easement Area 2 and ROW Easement Area 3 comprises the construction of an access track to the Required Land (**Access Works**).

21. For the Access Works, Council will, in a good and workmanlike manner:

    (a) Construct a 10m wide access track over ROW Easement Area 2 and ROW Easement Area 3.

    (b) The access track shall be designed by suitably qualified engineers, including any cut and batter slopes, drainage and gradient and constructed by a suitably experienced construction contractor.

    (c) As part of construction, Council shall lay a metalled running surface on ROW Easement Area 2 and ROW Easement Area 3.

22. Prior to the commencement of construction of the Access Works the Council will supply the Cuttriss design plan and civil works contract for the Access Works to be approved by the Owner, which approval shall not be unreasonably withheld or delayed.

23. Prior to the commencement of construction of the Works the Council will in good faith, liaise with the Owner to advise the timing of the Works and the likely duration of the Works.

24. The Council will undertake earthworks on the Required Land and the balance of the Owner's Land as shown on the Cuttriss Earthworks Design Plan (**Plan C**) attached as Schedule D to this agreement.

25. The Council will undertake extensive landscaping surrounding the Reservoir to provide screening from the balance of the Owner's Land as shown on the Cuttriss Landscaping Plan (**Plan D**) attached as Schedule E to this agreement.

26. The Council will endeavour to complete the Works as soon as reasonably practicable and undertakes to cause as little damage and disturbance as is reasonably possible to the balance of the Owner's Land and the Owner's use of the land throughout construction of the Works.

27. Following completion of the Works, the Council will ensure that the surrounding land is left in a clean and tidy state and where appropriate tracks, or access routes affected by the Works will be re-sealed or re-grassed to a standard that was in place prior to the commencement of the Works.

Fencing

28. Prior to construction of the Works, the Council will fence the boundary between the Required Land and the balance of the Owner's Land at no cost to the Owner. The fencing shall be constructed using new materials comprising eight high tensile wire post and batten fence (**Fencing Works**).

29. Upon completion of the Works (or earlier at its sole discretion) the Council will, at its cost erect an internal fence and gate around the perimeter of the Reservoir within the Required Land in the location approximately shown hatched pink on the Fencing Plan (**Plan E**) attached as Schedule F to this agreement. The fencing shall be constructed using new materials comprising 1.8-metre-high security fence specifications pictured in Plan E.

30. The Council shall be entitled to undertake physical works necessary to enable the Fencing Works to be constructed on the boundary between the Required Land and the balance of the Owner's Land including, but not limited to, the right to excavate land for the purpose of construction, the removal of vegetation as necessary and any other earthworks required for the purposes of construction of the Fencing Works.

31. The Council will erect the fencing using materials commonly used for such fences at the time of construction and to the standard generally accepted by the fencing industry in New Zealand.

Reinstatement Planting

32. The parties acknowledge that there are plants (**Plants**) located on the balance of the Owner's Land in the vicinity of the Works which may require removal to accommodate the Works. The parties agree that the Council may remove the Plants from the balance of the Owner's Land, if required to accommodate the Works, at the Council's cost (**Plant Removal Works**).

33. The Council agrees to reinstate any Plants located within the balance of the Owner's Land which are affected as part of the Plant Removal Works (**Reinstatement Planting**). The exact size and species of the Reinstatement Planting to be determined in consultation with the Owner.

34. The parties acknowledge that the Council's obligation is to complete the Reinstatement Planting and that the Owner acknowledges and agrees that the Owner is responsible for the ongoing maintenance and care of the Reinstatement Planting once the Reinstatement Planting is completed. The parties acknowledge and agree that the Council has no ongoing responsibility for the Reinstatement Planting, including watering obligations and that all ongoing maintenance is the Owner's responsibility.

Required Easements

35. In consideration of the compensation to be paid to the Owner under Clause 2 of this Schedule A, the Owner grants to the Council the ROW Easement over the ROW Easement Area and the Service Easements over the Service Easement Area to be forever appurtenant to the Required Land.

36. The grant of the ROW Easement and the Service Easements is an acquisition by agreement under Section 17 and 28 of the PWA.

37. The Council will be responsible for obtaining the consent of the Local Authority to the grant of the ROW Easement, as required by section 348 Local Government Act 1974, including the carrying out of any physical works necessary to obtain the same.

38. The ROW Easement and the Service Easements shall be on the terms, and shall contain the rights and powers, set out in Schedule G of this agreement (**Rights and Powers**).

Survey and Legalisation

39. The Owner acknowledges and agrees:

    (a) it is the intention of both parties that the Council will complete the survey and legalisation actions in respect of the Required Land and the Required Easements prior to the Owner's Subdivision; and

    (b) the Owner will not lodge any plans in respect of the Subdivision prior to the Council completing survey and legalisation in respect of the Required Land and the Required Easements.

40. The parties agree to liaise and coordinate the lodgement of survey plans at LINZ to avoid either party being unable to further action their respective plans due to LINZ Rules and requirements.

41. The Council will, at its cost as soon as reasonably practicable after completion of construction of the Works (or earlier, at the sole discretion of the Council):

    (a) Survey the Required Land and the Easement Areas and have the Survey Office Plan approved as to survey; and

    (b) As soon as reasonably practicable after completion of the survey, carry out all legalisation actions including:

        i) take the Required Land for water supply purposes pursuant to section 20 PWA;

        ii) registration of the Required Easements and obtaining consents (if any) for registration actions.

42. The Council agrees to act with due haste to publish any necessary Gazette Notice/s formalising the acquisition of the Required Land, once the survey plan has been approved by LINZ.

43. For the purposes of this agreement, the Owner consents to the Required Land being acquired for water supply purposes pursuant to section 20 PWA.

44. The Owner acknowledges that on completion of the Council taking the Required Land that the balance of the Owner's Land may have new appellations based on the survey office plan prepared for the Council's acquisition of the Required Land and the Required Easements. If so, the Owner

will be provided with a new Record of Title for the balance of the Owner's Land based on those new appellations, at no cost to the owner.

45. If, following completion of the survey, the survey shows that the Required Land has an area of more than 10% greater than the area stated in this agreement, then the Owner is to be paid further compensation at the rate of $**[insert amount]** including GST/plus GST* if any, for each square metre in excess of 8,560 square metres, together with interest to be calculated in accordance with Schedule Two of the Interest on Money Claims Act 2016, in full and final settlement of all compensation under the PWA for such additional land.

Legalisation Required Easements

46. The Council may implement the acquisition of the Required Easements by way of declaration under section 20 of the PWA, or alternatively, at the Council's option, by way of Easement Instrument/s under the LTA.

47. Where the Required Easements are to be granted by way of Easement Instrument under the LTA, the Owner covenants with the Council, when called upon to do so by the Council, to grant the Required Easements by way of Easement Instrument/s which shall be effected by:

    (a) Council's solicitor preparing an Easement Instrument in a Landonline workspace created for the transaction;

    (b) Council's solicitor certifying, signing and pre-validating the Easement Instrument in such Landonline Workspace;

    (c) Council's solicitor providing to the Owner or the Owner's solicitor the dealing number allocated by LINZ; and

    (d) The Owner's solicitor certifying, signing and releasing the Easement Instrument so that Council's solicitor can then submit it thereafter for registration.

48. The Owner covenants with the Council, when called upon to do so by the Council, in accordance with clause 47 to:

    (a) Grant the ROW Easement over the ROW Easement Area and the Service Easements over the Service Easement Area by way of Easement Instrument; and

    (b) Procure the Owner's solicitor to certify, sign and release the Easement Instrument in accordance with clause 47(d) to enable the Required Easements to be registered; and

    (c) Forthwith sign and produce any other plans and documents required to enable the Easement Instrument to be registered against the balance of Owner's Land; and

    (d) Obtain the consent of any mortgagee, caveator, encumbrance or other person having a prior registered interest in respect of the Owner's Land necessary to enable the Easement Instrument to be registered against the Record of Title of the balance Owner's Land, or to authorise the Council to obtain such consent; and

    (e) Provide the Council with written evidence of the registration of the Required Easements.

49. The Council shall meet all costs of creating and registering the Required Easements and including without limitation obtaining any resource consents and all legal, registration and survey costs.

Consent for Entry

50. The Council is entitled to enter and re-enter the balance of the Owner's Land at all times with or without such assistants, machinery, vehicles and equipment as are reasonably necessary for the carrying out and completion of the construction works, survey and fencing required pursuant to this agreement. When entering the balance of the Owner's Land the Council agrees to:

    (a) Comply with all relevant legislation, regulations and bylaws affecting the balance of the Owner's Land.

    (b) Do all things necessary to comply with the Health and Safety at Work Act 2015 including:

        i. Ensuring, so far as is reasonably practicable, that the balance of the Owner's Land and anything arising from the balance of the Owner's Land are without risks to the health and safety of any person; and

        ii. Notifying the Owner immediately if the Council becomes aware of any hazard or risk on the balance of the Owner's Land, or in the vicinity of the balance of the Owner's Land, which might, or may have the potential to, harm any person.

Warranties

51. The Owner warrants and undertakes that at the date of this agreement:

    (a) the Owner has no knowledge of any requirement and has not received any notice from any tenant or any local or government authority which affects the Required Land in any way and which has not been disclosed to the Council;

    (b) where the Owner has undertaken any work on the Required Land for which a permit or building consent was required by law, the Owner obtained the permit or building consent, completed the work in accordance therewith, obtained a Code Compliance Certificate (if applicable) and complied with the provisions of the Building Act 2004 at all times;

    (c) the Owner has not given any consent or waiver under the Resource Management Act 1991, which directly or indirectly affects the Required Land; and

    (d) the Required Land is not subject to a "short-term lease", the term "short-term lease" being defined by section 207 of the Property Law Act 2007. The Owner further warrants and undertakes that as at the Settlement Date the Required Land will not be subject to a short-term lease.

52. The Owner warrants and undertakes that at settlement:

    (a) the Owner has delivered to the Council all notices and requirements received after the date of the agreement from any local or government authority unless the Owner has satisfied the notice or requirement. If the Owner has failed to deliver to the Council or satisfy the notice or demand, then the Owner shall be liable for any costs or penalties arising from such failure;

    (b) the Owner has not given any consent or waiver in relation to any application under the Resource Management Act 1991 which directly or indirectly affects the Required Land;

    (c) where, under Section 100 of the Building Act 2004, any building on the Required Land requires a compliance schedule, all obligations imposed on the Owner under the Building Act 2004 have been complied with; and

(d) there will be no arrears of water rates or charges, or, that any arrears at the Settlement Date will be paid in full by the Owner on that date.

53. The Owner warrants to the best of the Owner's knowledge:

(a) there are no contaminants (as the term is defined in the Resource Management Act 1991) present on the Required Land;

(b) the Owner has not dealt with any contaminant on the Required Land except in accordance with the Resource Management Act 1991;

(c) no one has ever used any part of the Required Land as a landfill or waste dump except for occasional and immaterial disposal of non-toxic domestic waste; and

(d) there are not currently, nor have there been in the past, any storage tanks on the Required Land.

54. Settlement will not be deferred, but the Council reserves its rights to seek compensation from the Owner and reserves all its remedies at common law and equity if the Owner breaches any warranty granted in clause 51 to clause 53 (inclusive).

No Objection

55. The Owner agrees that the Owner will not lodge any submission in opposition to the Works or participate in any objection or appeal which opposes any designation, resource consent or notice of requirement or take any other action which may have the effect of preventing or interfering with the Council's future plans in relation to the Works. This condition is not to merge upon settlement but will remain enforceable to the fullest possible extent.

General

56. The parties agree and acknowledge that:

(a) where any obligation or agreement hereunder remains unperformed at settlement then that obligation or agreement, notwithstanding any rule of law or equity to the contrary, is to ensure until fully discharged by performance and in no circumstance, whatsoever is to merge upon settlement of this agreement.

(b) reference to the Council includes the NZ Transport Agency, its contractors and invitees where the context requires this and vice versa.

57. The Owner acknowledges and agrees that until accepted in writing, this document is only an offer to sell to the Council and its acceptance is not to be anticipated and the Owner is not to enter into any consequential commitments in reliance of this offer being accepted by the Council. This agreement is not binding on the Council until signed on the Council's behalf. Any variation of this agreement is not binding on the Council unless signed on behalf of the Council.

Electronic Execution

58. The parties agree that:

(a) this agreement may be executed in two or more counterparts, all of which will together be deemed to constitute one and the same agreement. A party may enter into this agreement by signing a counterpart copy and sending it to the other party, including or email.

(b) the production of an emailed copy or copies of the agreement signed by all parties is to be deemed to be sufficient to satisfy the requirements of the Property Law Act 2007.

(c) in the case of email, any notice or document is deemed to have been received when acknowledged by the party or by the lawyer orally or by return email or otherwise in writing, except that return emails generated automatically do not constitute an acknowledgement.

(d) in accordance with the Contract and Commercial Law Act 2017, the parties agree that any notice or document that must be given in writing by one party to the other may be given in electronic form and by means of electronic communication.

Schedule B: **Plan A: Land and Easement Requirement Plan**

Schedule C: **Plan B: Easement Requirement Plan**

NOTES

1. THIS PLAN IS TO BE USED FOR DISCUSSION PURPOSES ONLY & IS NOT TO BE RELIED UPON FOR ANY OTHER PURPOSE WITHOUT THE CONSENT OF CUTTRISS CONSULTANTS LIMITED.
2. DIMENSIONS AND AREAS SHOWN ON THIS SCHEME PLAN WILL BE SUBJECT TO FINAL LAND TRANSFER SURVEY.
3. COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC 2000 DATUM, WANGANUI CIRCUIT.
4. LEVELS ARE IN TERMS OF WELLINGTON VERTICAL DATUM 1953. ORIGIN OF LEVELS: IT VM DP 356329 [P2K3] RL=44.80m, SOURCED FROM LINZ ELLIPSOIDAL HEIGHT CONVERSION OCTOBER 2020.
5. SERVICES HAVE BEEN LOCATED ON SITE WHERE POSSIBLE. OTHERWISE SHOWN FROM KCDC GIS, AND SHOULD BE VERIFIED ON SITE.
6. ALL LOTS SHALL HAVE INDIVIDUAL ATTENUATION TANKS TO PROVIDE STORMWATER NEUTRALITY IN ACCORDANCE WITH POLICY 11.16 OF THE KCDC PROPOSED DISTRICT PLAN.
7. BOUNDARY LEVELS FOR DETERMINATION OF CRITICAL RECESSION PLANES MUST BE CONFIRMED PRIOR TO ANY APPLICATION FOR BUILDING CONSENT.
8. BOUNDARY INFORMATION HAS BEEN SOURCED FROM INFORMATION PROVIDED BY GRP LTD & HAS NOT BEEN VERIFIED ON SITE.
9. ALL ELECTRONIC CAD DATA MUST BE READ IN CONJUNCTION WITH THESE NOTES.
10. ANY EXCESS UNSUITABLE CUT MATERIAL SHALL BE USED FOR LANDSCAPING OF BATTERS.
11. ALL BATTERS TO BE 1 IN 3 MAX.
12. PROPOSED EASEMENTS SHOWN (C, D, F, G, H, I, J, K) REFLECT EASEMENTS APPROVED UNDER EXISTING CONSENT RM210003. SEE CONSENT SCHEME PLAN FOR FURTHER DETAILS.

LEGEND

BOUNDARY EXISTING
BOUNDARY PROPOSED
CUT
FILL

0 10 20 30 40 50m
SCALE BAR

	REVISION DETAILS	NAME	DATE
A	EASEMENT ADDED	EOM	09.22
B	EASEMENT UPDATED	EOM	09.22
C	WORDING UPDATED/ADDED	EOM	09.22

Cuttriss
Surveyors. Engineers. Planners.
www.cuttriss.co.nz

PROJECT

PROPOSED SUBDIVISION OF LOT 2 DP 427946
71 TE MANUAO ROAD, ŌTAKI
OVERALL LAYOUT

CLIENT

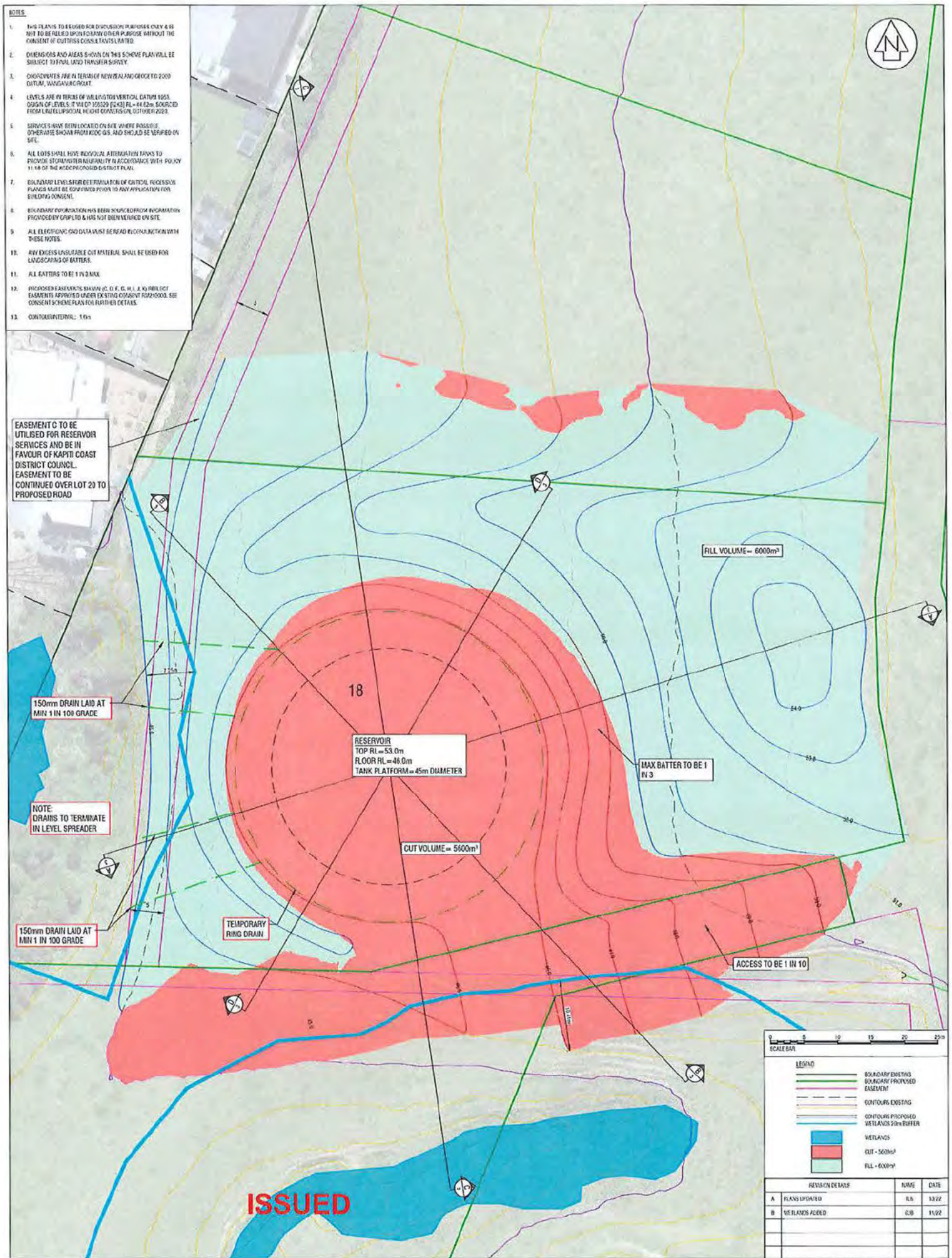
KAPITI COAST DISTRICT COUNCIL

SCALE A1 1:500 — REDUCED SCALE A3 - 1:1000

	NAME	DATE
FIELDWORK	TLS	10/20
DESIGNED	AMS	07/22
DRAWN	TLS	07/22
CHECKED	AMS	07/22

DRAWING NUMBER 23099 ENG
SHEET 1 OF 3 SHEETS
REVISION C

Schedule D: **Plan C: Earthworks Design Plan**



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PROJECT
PROPOSED SUBDIVISION OF LOT 2 DP 427946
71 TE MANUAO ROAD, ŌTAKI
EARTHWORKS DESIGN FOR RESERVOIR - LOTS 16, 17, 18 & 19

CLIENT
KAPITI COAST DISTRICT COUNCIL

SCALE	A1 1:250		REDUCED SCALE A3 - 1:500
	NAME	DATE	DRAWING NUMBER
FIELDWORK	TLS	10/20	23099 SCH
DESIGNED	AMS	07/22	
DRAWN	TLS	07/22	SHEET 1 OF 2 SHEETS
CHECKED	AMS	07/22	REVISION B

NOTES.

1. THIS PLAN IS TO BE USED FOR DISCUSSION PURPOSES ONLY & IS NOT TO BE RELIED UPON FOR ANY OTHER PURPOSE WITHOUT THE CONSENT OF CUTTRISS CONSULTANTS LIMITED.
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3. COORDINATES ARE IN TERMS OF NEW ZEALAND GEODETIC 2000 DATUM, WANGANUI CIRCUIT.
4. LEVELS ARE IN TERMS OF WELLINGTON VERTICAL DATUM 1953 ORIGIN OF LEVELS. IT VIII DP 355326 [F2+0] RL = 11.82m, SOURCED FROM LINZ ELLIPSOIDAL HEIGHT CONVERSION, OCTOBER 2020.
5. SERVICES HAVE BEEN LOCATED ON SITE WHERE POSSIBLE, OTHERWISE SHOWN FROM KCDC GIS. AND SHOULD BE VERIFIED ON SITE.
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7. BOUNDARY LEVELS FOR DETERMINATION OF CRITICAL RECESSION PLANES MUST BE CONFIRMED PRIOR TO ANY APPLICATION FOR BUILDING CONSENT.
8. BOUNDARY INFORMATION HAS BEEN SOURCED FROM INFORMATION PROVIDED BY GRIP LTD & HAS NOT BEEN VERIFIED ON SITE.
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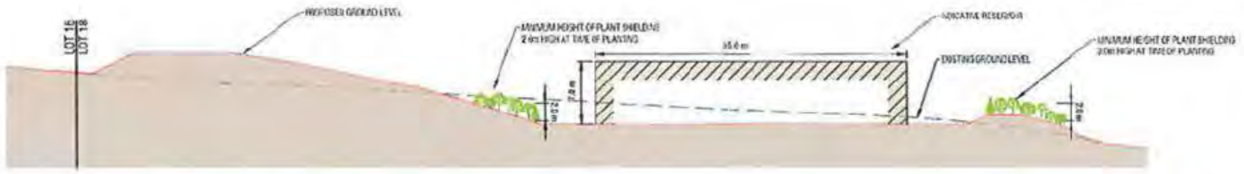
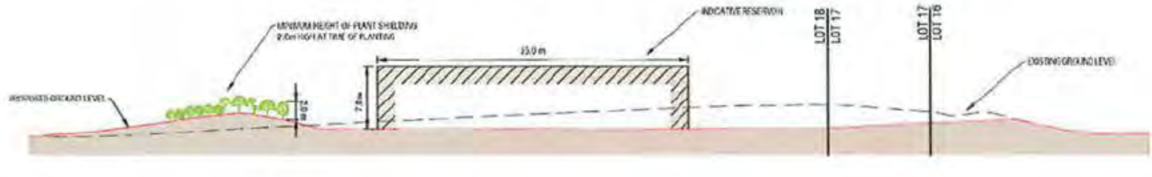
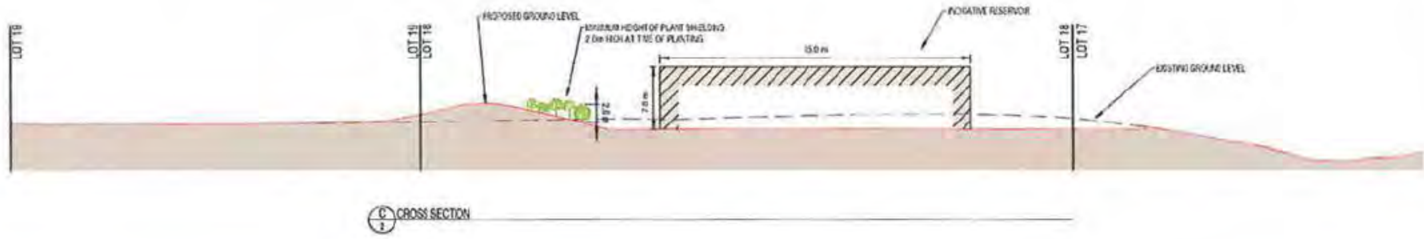
11. ALL BATTERS TO BE 1 IN 3 MAX.
12. PROPOSED EASEMENTS SHOWN (C, D, F, G, H, I, J, K) REFLECT EASEMENTS APPROVED UNDER EXISTING CONSENT RM210003. SEE CONSENT SCHEME PLAN FOR FURTHER DETAILS.
13. CONTOUR INTERVAL: 1.0m



A CROSS SECTION

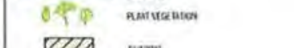


B CROSS SECTION



C CROSS SECTION

D CROSS SECTION



LEGEND

- PROPOSED GROUND LEVEL
- EXISTING GROUND LEVEL
- BOUNDARY
- PLANT VEGETATION
- BUILDING
- PROPOSED GROUND

	REVISION DETAILS	NAME	DATE
A	PLANS UPDATED	TLS	10/22
B	WETLANDS ADDED	CJB	11/22

ISSUED

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PROJECT

PROPOSED SUBDIVISION OF LOT 2 DP 427946
71 TE MANUAO ROAD, ŌTAKI
EARTHWORKS DESIGN FOR RESERVOIR - LOTS 16, 17, 18 & 19

CLIENT

KAPITI COAST DISTRICT COUNCIL

SCALE	A1 1:300		REDUCED SCALE A3 - 1:600
	NAME	DATE	DRAWING NUMBER
FIELDWORK	TLS	10/20	23099 SCH
DESIGNED	AMS	07/22	
DRAWN	TLS	07/22	SHEET 2 OF 2 SHEETS
CHECKED	AMS	07/22	REVISION B

Schedule E: **Plan D: Landscaping Plan**

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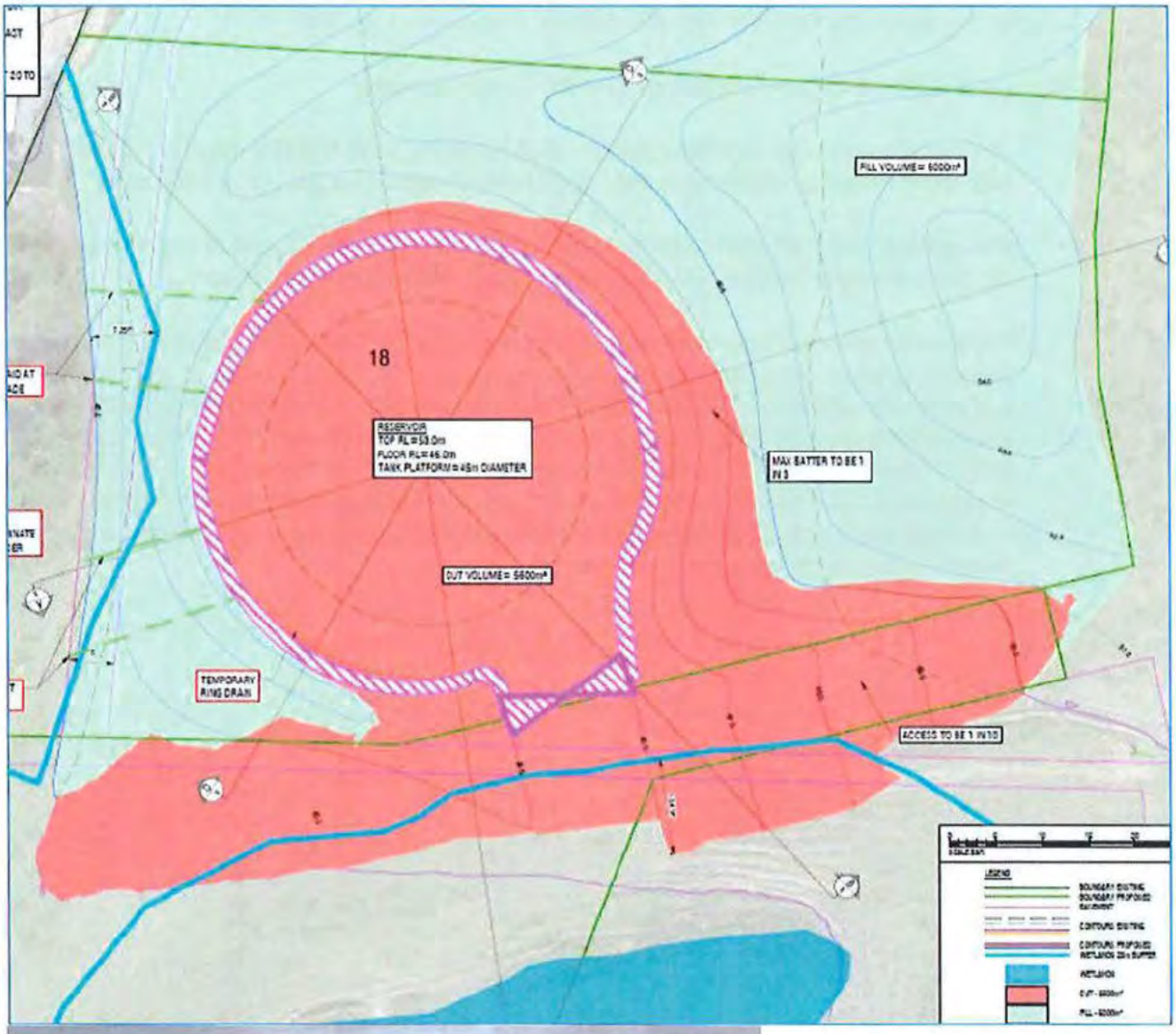
PROPOSED SUBDIVISION
LOT 2 DP 427946, 71 TE MANUAO ROAD, ŌTAKI
LANDSCAPING PLAN
KAPITI COAST DISTRICT COUNCIL

SCALE	A1 1:250		
	NAME	DATE	
DESIGNED			23099 LS
DRAWN			
CHECKED			

Schedule F: **Plan E: Fencing Plan**



Schedule G: **Rights and Powers of Required Easements**

The rights and powers implied in the specified classes of easements are those prescribed by the Land Transfer Regulations 2018 and/or Schedule 5 of the Property Law Act 2007.

The implied rights and powers are hereby **added to** by the following:

1. Any terms used in this easement that are defined in the Land Transfer Regulations 2018 shall take those meanings unless otherwise modified by the terms set out in this instrument.

2. Where there is a conflict between the provisions of Schedule 5 of the Land Transfer Regulations 2018 and the modifications in this instrument, the modifications must prevail.

3. The Grantor acknowledges that this easement instrument is entered into by the Grantee in its capacity as owner and administering body of the easement facility and not as a regulatory authority. The two roles of the Grantee are different and any consent or approval given by the Grantee in its capacity as land owner under this easement instrument will not be deemed to waive or imply the Grantee's consent or approval in its capacity as regulatory authority or owner of other land and similarly any consent given in its capacity as a regulatory authority will not be deemed to waive or imply its consent or approval in its capacity as owner of the easement facility under this easement instrument or elsewhere.

7 March 2023
Our Job No. 718379

The Property Group Limited
Palmerston North Office
PO Box 12066 Palmerston North 4444
Level 7, TSB Bank Tower
7 - 21 Fitzherbert Ave
Palmerston North 4410

Lynda Edwardson
Senior Corporate Property Advisor
Kapiti Coast District Council
175 Rimu Road
PARAPARAUMU 5032

Dear Lynda,

Kapiti Coast District Council – Otaki Water Reservoir Project – Westleigh Developments Limited

A Memorandum of Agreement Pursuant to the Public Works Act 1981 (MOA) has been reached with Westleigh Developments Limited (Owner) in connection with land to be acquired from the Owner's property for the Kapiti Coast District Council's (Council) Otaki Water Reservoir Project (Project).

The Project involves the acquisition of land and easements to construct and house a water reservoir due to the expansion of the Otaki township and the constraints on the existing system.

The MOA provides for the Council to acquire 8,560 square metres subject to survey (Required Land) from the Owner for water supply purposes and records the Owner's agreement to the payment of compensation.

TPG Job Number	718379
Acquiring Authority	Kapiti Coast District Council
Authority to Act	Instructions received from Council (Lynda Edwardson) to proceed in August 2022.
Purpose	Land required for water supply purposes vested in Council.
Confirmation that the Purpose is a Public Work	Section 2 of the Public Works Act 1981 defines a public work as every Government work or local work that the Crown or any local authority is authorised to construct, undertake, establish, manage, operate, or maintain, and every use of land for any Government work or local work which the Crown or any local authority is authorised to construct, undertake, establish, manage, operate, or maintain by or under this or any other Act; and include anything required directly or indirectly for any such Government work or local work or use. The proposed works fit within this definition.

Owner	Westleigh Developments Limited c/- Hudson Taylor Chartered Accountants Level 3 44 Victoria Street Wellington 6011
Owner's Legal Representative	Miranda Squire Izard Weston PO Box 5348 Wellington 6140
Interest(s) to be Acquired	Freehold, to be acquired for water supply purposes Right of way Right to convey electricity, convey and drain water
Other Interests in Land	Not applicable.
Legal Description	An estate in Fee Simple comprising 22.5393 hectares more or less being Lot 2 Deposited Plan 427946 contained in Record of Title 510970 (Wellington Registry).
Encumbrances	B308242.6 The property is subject to a right of way over parts marked D & E on DP 427946. These areas are remote from the land to be acquired; however, Council require a right of way and service easements over part of Area D. The easement created by Transfer B308242.6 is subject to Section 309 (1) (a) Local Government Act 1974 (since repealed) and provides for easements to be established upon subdivision. The easements are unable to be surrendered without the consent of Council (in its regulatory capacity). 5086388.11 The property is subject to a right of way over parts marked A & B on DP 427946. These areas are remote from the land to be acquired; however, Council require a right of way and service easements over Areas A and B. The easements created by Transfer 5086388.11 are subject to Section 243 (a) Resource Management Act 1991. This memorial Indicates that the easement created by easement instrument 5086388.11 was required by Council and cannot be surrendered without the consent of Council (in its regulatory capacity). Subject to a right (in gross) to drain sewage over part marked X on DP 427946 in favour of Kapiti District Council created by Easement Instrument 8191250.2. Area X is remote from the land to be acquired – this is therefore unaffected by the acquisition.

The property is subject to a Consent Notice 8409664.1 pursuant to Section 221 Resource Management Act 1991. It requires that foundation design, construction for any new building or additions and alterations, on-site stormwater, wastewater disposal system designs and construction and water supply shall take into account the findings and recommendations within the soil test report, stormwater disposal report and site assessment for effluent disposal report and water supply report dated January 2010 prepared by Cuttriss Consultants Limited and submitted to Council in relation to application no RM090175. A minimum storage of 7,000 litres of water for firefighting purposes shall be provided to each habitable building. Council will be constructing a building onsite with design plans from Cuttriss Consultants Limited who submitted the report mentioned in the consent notice.

8409664.5 Subject to a right of way and right to convey electricity, telecommunications and computer media over parts marked A, B & D on DP 427946. This is in favour of Record of Title 510971. These areas are remote from the land to be acquired; however, Council require a right of way and service easements over part Area A, B and D.

The easements created by Easement Instrument 8409664.5 are subject to Section 243 (a) Resource Management Act 1991. This memorial Indicates that the easement created by easement instrument 8409664.5 was required by Council and cannot be surrendered without their consent.

Land Covenant in Easement Instrument 8409664.6. Land covenant specifying that the grantees cannot object to the grantor's subdivision or development and the right of way may be declared road. This does not affect Council's project.

Partial surrender of the right of way easement appurtenant to part formerly part Lot 1 DP 75327 now contained in Lot 3 DP 427946 created by Transfers B308242.6 and 5086388.1.

Subject to a right to convey water over part marked A, B and D on DP 427946 created by Easement Instrument 11566543.6. This is in favour of Record of Titles 759254 and 758253. These areas are remote from the land to be acquired; however, Council require a right of way and service easements over part Area A, B and D.

The easements created by Easement Instrument 11566543.6 are subject to Section 243 (a) Resource Management Act 1991. This memorial Indicates that the easement created by easement

	instrument 11566543.6 was required by Council and cannot be surrendered without their consent. The above encumbrances are not considered to be an impediment to the Project proceeding.
Physical Description	The Subject Land comprises a 22.5393-hectare lifestyle property which is made up of pastoral land utilised for grazing. It is situated 2 kilometres east of Otaki town centre. 
Area to be Acquired	The land to be acquired is approximately 8,560 square metres (subject to survey) and is shown outlined in red below. It comprises a slightly irregular shaped rear lot, declining gently from the shared accessway before continuing to decline through to the western boundary.  An easement requirement to convey electricity, convey water and drain water is approximately 729m² (subject to survey). The required easement areas are shown shaded light blue and purple below. A right of way easement requirement is approximately 2,112m² (subject to survey). The required easement area is shown shaded orange and pink below.

Zoning	The property is zoned Rural Lifestyle under the Kapiti Coast District Council District Plan.
Statutory Authority	Negotiations to acquire this land have been undertaken in accordance with the following specific authorities: 1. S4B Public Works Act 1981 (Execution of contract for local works) 2. S17 Public Works Act 1981 (Acquisition by agreement) 3. S19 Public Works Act 1981 (Compensation Certificate) 4. S20 Public Works Act 1981 (Declaration may give effect to Agreement) 6. S60 Public Works Act 1981 (Basic entitlement to compensation) 7. S62 Public Works Act 1981 (Assessment of Compensation) 8. S66 Public Works Act 1981 (Disturbance payments) 9. S72 Public Works Act 1981 (Additional Compensation)
Valuation	**For Council:** Chris Price, Registered Valuer of Morgans Property Advisors *Date of Assessment: 3 October 2022*

Required Land	$640,000 incl GST, if any
Right of Way Easement	$26,900 incl GST, if any
Service Easements	$54,675 incl GST, if any
Injurious Affection	$30,000 incl GST, if any
Total:	**$751,575 incl GST, if any**

For the Owner:

	Tim Truebridge, Registered Valuer of Truebridge Valuations	
	Date of Assessment:	
	Required Land	$353,000 plus GST, if any
	Right of Way Easement	$19,000 plus GST, if any
	Service Easements	$5,000 plus GST, if any
	Injurious Affection	$218,000 plus GST, if any
	Total:	**$595,000 plus GST, if any**

Valuation Comment

After a lengthy delay in receiving Owner's valuation advice, the Owner was presented with Council's valuation which was accepted by the Owner. The Owner initially withheld his valuation advice from negotiations as is allowed under the LINZ guidelines for Property Acquisition, but disclosed after the offer of compensation was confirmed by Council, subject to his valuation being within an acceptable range of Council's value.

After the owner disclosed his valuation, it was summarised that Council's valuation assessment is 9% higher than the Owner's assessment with a difference of $58,543.48 plus GST, if any. The key differences between the two assessments relates to the valuer's interpretation of value apportioned between the required land and injurious affection.

Injurious affection is the diminution in value of the balance land resulting from the public work.

After careful consideration, taking into account the time in negotiations to date and the urgency of the project, Council agreed to pay the higher valuation.

Compensation Agreed

Compensation is agreed as follows (adjusted for GST):

Required Land	$556,521.74 plus GST, if any
Right of Way Easements	$23,391.30 plus GST, if any
Service Easements	$47,543.48 plus GST, if any
Injurious Affection	$26,086.96 plus GST, if any
Total Compensation	**$653,543.48 plus GST, if any**

The additional compensation payable for the Required Land is a solatium payment of 10% of the compensation payable, the minimum amount payable being $250, up to a maximum of $25,000 pursuant to Section 72C of the Public Works Act 1981. Section 72 of the Public Works Act 1981 was recently enacted by the Resource Legislation Amendment Act 2017.

	Under Section 72C Public Works Act 1981, the Owner is entitled to the maximum payment of **$25,000** and this is recorded in the agreement at Schedule A Clause 3 of the MOA.
Reimbursement of Fees	The Owners are entitled to seek reimbursement of fair and reasonable valuation and legal fees incurred in the negotiation in accordance with section 66(1)(a)(ii) PWA and settlement of this agreement (Schedule 17, Clause 14 of the MOA). The Owner has engaged Truebridge Valuation and Izard Weston Solicitors to provide valuation and legal advice as part of the acquisition process and we expect to receive claims from the Owner's advisors. We will consider these claims once received and provide invoices to Council with our recommendation, or otherwise as to payment.
Special Conditions	**Settlement Date – Schedule A, Clause 4** The date of settlement will be within 20 working days of the date the Council notifies the Owner that the Compensation Certificate has been registered or within 10 working days of the Council receiving an appropriate GST invoice from the Owner, whichever is the later. **GST – Schedule A, Clauses 20 - 27** The parties agree that the supplies made pursuant to this agreement are subject to the provisions of the Goods and Services Tax Act 1985 and zero rated by virtue of Section 11(1) (mb) of the GST Act. **Construction Works – Schedule A, Clause 19** For the construction of the right of way, Council will, in a good and workmanlike manner: (a) Construct a 10m wide access track over the right of way easement areas. (b) The access track shall be designed by suitably qualified engineers, including any cut and batter slopes, drainage and gradient and constructed by a suitably experienced construction contractor. (c) As part of construction, Council shall lay a metalled running surface on the right of way easement areas. Prior to the commencement of construction of the access track the Council will supply the Cuttriss design plan and civil works contract for the right of way works to be approved by the Owner, which approval shall not be unreasonably withheld or delayed. Prior to the commencement of construction of the works the Council will in good faith, liaise with the Owner to advise the timing of the works and the likely duration of the works.

The Council will undertake earthworks on the Required Land and the balance of the Owner's land as shown on the Cuttriss Earthworks Design Plan attached to the MOA.

The Council will undertake extensive landscaping on the completed earthworks surrounding the reservoir to provide screening from the balance of the Owner's land as shown on the Cuttriss Landscaping Plan attached to the MOA.

The Council will endeavour to complete the works as soon as reasonably practicable and undertakes to cause as little damage and disturbance as is reasonably possible to the balance of the Owner's land and the Owner's use of the land throughout construction of the works.

Following completion of the works, the Council will ensure that the surrounding land is left in a clean and tidy state and where appropriate, tracks, or access routes affected by the works will be re-sealed or re-grassed to a standard that was in place prior to the commencement of the Works.

Temporary Fencing – Schedule A, Clause 28

Prior to construction of the works, the Council will erect temporary fencing between the area where the works and construction are taking place and the balance of the Owner's land for the duration of the works to provide adequate security to the balance of the Owner's land. Such temporary fencing will be constructed in consultation with the Owner.

Permanent Fencing – Schedule A, Clauses 29 - 30

Upon completion of the earthworks, the Council will fence the boundary between the required land and the balance of the Owner's land at no cost to the Owner. The fencing shall be constructed using new materials comprising eight high tensile wire post and batten fence .

Upon completion of the works (or earlier at its sole discretion) the Council will, at its cost erect an internal fence and gate around the perimeter of the reservoir within the required land in the location approximately shown hatched pink on the Fencing Plan attached as Schedule F to the MOA. The fencing shall be constructed using new materials comprising 1.8-metre-high security fence specifications pictured in Plan E.

Reinstatement Planting – Schedule A, Clauses 33 - 35

	The parties acknowledge that there are plants located on the balance of the Owner's land in the vicinity of the works which may require removal to accommodate the works. The Council may remove the plants from the balance of the Owner's land, if required to accommodate the works, at the Council's cost. The Council agrees to reinstate any plants which are affected, the exact size and species of the planting to be determined in consultation with the Owner. The parties acknowledge that the Council's obligation is to complete the reinstatement planting and that the Owner is responsible for the ongoing maintenance and care of the plants once completed. **Required Easements – Schedule A, Clause 38** The Council will be responsible for obtaining consents of the Local Authority to the grant of the right of way easement, as required by section 348 Local Government Act 1974, including the carrying out of any physical works necessary to obtain the same. **Variation on Survey – Schedule A, Clause 46** If, following completion of the survey, the survey shows that the required land has an area of more than 10% greater than the area stated in the agreement, then the Owner is to be paid further compensation at the rate of $74.76 including GST if any, for each square metre in excess of 8,560 square metres, together with interest to be calculated in accordance with Schedule Two of the Interest on Money Claims Act 2016, in full and final settlement of all compensation under the PWA for such additional land. **Consent for Entry – Schedule A, Clause 25** The Council is entitled to enter and re-enter the balance of the Owner's land to carry out completion of the construction works, survey and fencing required by the MOA.
Compensation Certificate	Attached for the Council's execution. Section 19(8) of the Public Works Act 1981 requires that compensation certificates entered into by a local authority are signed by the Chief Executive of the local authority. If the compensation certificate is not signed by the Chief Executive, we require confirmation of the signatory's delegation.
Survey and Legalisation	On completion of construction, the Council will survey the Required Land and easement areas from the balance of the Owner's Land and

	have the Survey Office Plan approved as to survey, at the Council's cost (Schedule A, Clause 42 (b) i) of the MOA). As soon as practicable following completion of survey the Council will take the required land for water supply purposes pursuant to section 20 PWA (Schedule A, Clause 42 (b) ii) of the MOA).
Comments	The Owners were generally supportive of the Project and have been accommodating in signing and returning the MOA. We consider the proposed settlement is fair and reasonable and accordingly, it is recommended for your approval subject to the terms and conditions on the attached agreement.

Kapiti Coast District Council – Otaki Water Reservoir Project – Westleigh Developments Limited

Conclusion

1. That the compensation detailed in the report and recited in the Memorandum of Agreement Pursuant to Public Works Act 1981 attached, be approved by the Council in accordance with Sections 4B, 17, 19, 60, 66 and 72 of the Public Works Act 1981;

2. That a compensation certificate is registered against Record of Title 510970 to protect the Council's interest in the land until legalisation is complete, in accordance with S19 Public Works Act 1981.

If the Council accept the recommendations, please sign and return the Owner's copy of the Memorandum of Agreement Pursuant to the Public Works Act 1981 and the compensation certificate to me. The Property Group Limited will arrange for the lodgement of the compensation certificate, on the Council's behalf.

Yours Sincerely

SARAH BUSUTTIN

Property Consultant

Date: 7 March 2023

Attachments

Copy of Memorandum of Agreement with Land Requirement Plan	✓
Record of Title	✓
Compensation Certificate	✓

Memorandum of Agreement Pursuant to the Public Works Act 1981

File Reference: 718379

Date: 9 March 2023
(This agreement will be dated once signed by the Council)

Between: **Kāpiti Coast District Council** *(Council)*

And: **Westleigh Developments Limited** *(Owner)*

Agreement

1. The Owner is the registered owner of an estate in Fee Simple comprising 22.5393 hectares more or less being legally described as Lot 2 Deposited Plan 427946 being all that land contained in Record of Title 510970 (Wellington Registry) (**Owner's Land**).

2. The Council wishes to construct for water supply purposes a reservoir (**Reservoir**) on part of the Owner's Land as part of the Otaki Reservoir Project (**the Works**).

3. The Council requires for water supply purposes for the Works:

   (a) that part of the Owner's Land being 0.8560 hectares (subject to survey) shown outlined in red on the Land and Easement Requirement Plan (**Plan A**) attached as Schedule B to this Agreement (**Required Land**);

   (b) a right of way easement over the following parts of the Owner's Land:

      (i) that part of the Owner's Land shown outlined in blue on Plan A (**ROW Easement Area 1**); and

      (ii) that part of the Owner's Land shown shaded pink and labelled "ROW AREA OVER LOT 17 717m²" (**ROW Easement Area 2**) on the Cuttriss Overall Layout Plan (**Plan B**) attached as Schedule C to this Agreement; and

      (iii) that part of the Owner's Land shaded orange and labelled "ROW AREA OVER LOT 16 1395m²" on Plan B (**ROW Easement Area 3**);

   (ROW Easement Area 1, ROW Easement Area 2 and ROW Easement Area 3 together referred to as **the ROW Easement Area**)

   to be forever appurtenant to the Required Land (**the ROW Easement**);

   (c) a right to convey electricity, right to convey water and a right to drain water to be forever appurtenant to the Required Land (**the Service Easements**) over the following parts of the Owner's Land:

      (i) that part of the Owner's Land shown outlined in blue on Plan A; and

(ii) that part of the Owner's Land shown as part Lot 20 and shaded purple and labelled "EASEMENT AREA 368m²" on Plan B; and

(iii) that part of the Owner's Land shown as part Lot 19 and shaded light blue and labelled "EASEMENT AREA 361m²" on Plan B

(the areas in clause 3(c)(i)(ii)(iii) together referred to as **the Service Easement Area**).

The ROW Easement and the Service Easements together referred to as **'the Required Easements'** and the ROW Easement Area and the Service Easement Area together referred to as **'the Easement Areas'**.

4. The Owner offers to sell the Required Land, the ROW Easement and the Service Easements to the Council for water supply purposes for the Works for the compensation set out in Clause 2 of Schedule A to this agreement (**Compensation**) discharged from all encumbrances and requisitions and free of all leases and tenancies on and subject to the conditions set out below and in the attached Schedule/s to this agreement.

5. The Owner agrees to:

   (a) the Required Land being acquired by Declaration under the Public Works Act 1981 (**PWA**); and to

   (b) the Required Easements being acquired by Declaration under the PWA pursuant to sections 20 and 28 or, alternatively, at the option of Council, to grant the Required Easements by Easement Instrument under the Land Transfer Act 2017 (**LTA**); and to

   (c) accept the Compensation together with the other payments detailed in the Schedule/s to this agreement in full and final settlement of all claims under the PWA.

6. The Owner acknowledges the Council may retain and pay (if demanded) to the persons entitled the whole or a sufficient portion of the Compensation to release the Required Land from all encumbrances securing money.

7. The Owner further agrees to adduce a good title to the Required Land and the Easement Areas and to comply with the requirements set out in the Schedule/s to this agreement.

8. This agreement is not binding on Council or the Owner until signed on behalf of the Council and the Owner, respectively.

Signed by Westleigh Developments Limited
by its directors:

Christine Anne DOUGLAS (Director)

Alastair Morgan SEYB (Director)

I confirm the above agreement to take by Declaration.

Signed for and on behalf of **Kāpiti Coast District Council**

Darren Edwards
Chief Executive

In the presence of:

Witness Signature

Amanda Yannetta
Name of witness

175 Rimu Road, Paraparaum
Address of witness

Executive Assistant
Occupation of witness

Schedule A:

Acquisition of Title and Compensation Certificate

1. The Council will take the Required Land and the Required Easements by Declaration or, alternatively, at the option of Council, will register the Required Easements by Easement Instrument under the LTA. Council may register a compensation certificate pursuant to section 19 of the PWA against the Record of Title to the Owner's Land pending issue of the Declaration to facilitate settlement. The Council will prepare the compensation certificate and forward it for registration as soon as practicable following the date this agreement is signed by both parties. The Council will notify the Owner as soon as the compensation certificate has been registered.

Compensation

2. The Compensation comprises:

Required Land	$556,521.74 plus GST, if any
ROW Easement	$ 23,391.30 plus GST, if any
Service Easements	$ 47,543.48 plus GST, if any
Injurious Affection	$ 26,086.96 plus GST, if any
Total compensation to be paid	**$653,543.48 plus GST, if any**

Additional Compensation

3. In addition to the Compensation, the Council will pay to the Owner on the Settlement Date the sum of **$25,000 (Additional Compensation)** being the amount payable to the Owner pursuant to Section 72C of the PWA. The Additional Compensation is not subject to the imposition of GST. The Council will pay the Additional Compensation to the Owner on the Settlement Date in the manner described in clause 7 below. Payment of the Additional Compensation is subject to section 72D of the PWA.

Settlement Date

4. The date of settlement will be within 20 working days of the date the Council notifies the Owner that the Compensation Certificate has been registered or within 10 working days of the Council receiving an appropriate GST invoice from the Owner, whichever is the later

5. To facilitate settlement, the Owner or the Owner's solicitor will provide the Council with the settlement statement and a GST invoice (if applicable) for payment of the Compensation, the Additional Compensation and any other amounts payable under this agreement on the Settlement Date no later than 10 working days before the Settlement Date.

Payment and Possession

6. On the Settlement Date:

   (a) Subject to clauses 11 and 12 of this Schedule A, the Council will pay the Compensation, and the Additional Compensation to the Owner in the manner set out in clause 7

   (b) the Owner will give vacant possession of the Required Land to the Council.

7. The Owner acknowledges that the Council will tender settlement by way of an electronic transfer of funds drawn on the account of the Council pursuant to any protocol subsequently agreed between the parties.

Rates and Insurance

8. Net rates (including any water rates, and/or charges for water supply) will not be apportioned on the Settlement Date.

9. Insurance premiums payable in connection with the Required Land will not be apportioned on the Settlement Date and the Required Land will remain at the sole risk of the Owner until possession is given and taken.

10. Prior to settlement the Owner must at the Owner's expense maintain the Required Land in the same order and condition as at the date of this agreement, fair wear and tear excepted.

11. If any damage is done to the Required Land prior to settlement other than by the Council such damage is, at the option of the Council, to be made good by the Owner prior to settlement or the cost of making good such damage may be deducted by the Council from the Compensation.

Mortgagees' and Charge holders' Statements

12. As the issue of the Declaration will clear or has cleared the Required Land of any encumbrance the Owner must advise whether the Required Land is, or was, at the Settlement Date, subject to any registered or unregistered mortgage, lien, charge, or any other encumbrance securing money. If the Required Land is/was so subject the Owner or the Owner's solicitor must forward to the Council statements signed by each mortgagee and holder of the lien or charge setting out the amount required to be paid to it in discharge or reduction of the mortgage debt or for the release of the lien, charge or other encumbrance securing money.

GST

13. The parties agree that the supplies made pursuant to this agreement are subject to the provisions of the Goods and Services Tax Act 1985 (GST Act), and zero rated by virtue of Section 11(1) (mb) of the GST Act.

14. The Owner warrants that it is a registered person as required by the GST Act in respect of the supply to be made pursuant to this agreement and the Owner will still be a registered person at the Settlement Date.

15. The Council warrants that at the date of this agreement:

    (a) It is a registered person as required by the GST Act;

    (b) it is acquiring the Required Land and Required Easements for the purpose of making taxable supplies;

    (c) the Required Land and the Required Easements will not be used as a principal place of residence by the Council or a person associated with it under Section 2A(1)(c) of the GST Act; and

    (d) that the warranties provided in clause 15(a) to (c) will remain correct up until and including the Settlement Date.

16. Each party reserves its right to seek compensation from the other party and reserves all its remedies at common law and equity if the other party breaches any warranty granted in clause 14 and clause15.

Other payments and reimbursements

17. The Council will reimburse the Owner's reasonable legal, consultancy and valuation costs incurred in the negotiation and settlement of this agreement on production of accounts or receipts in accordance with section 66(1)(a)(ii) PWA.

18. The Owner acknowledges that the disturbance payments payable in accordance with clause 17 of this Schedule A are part of the total compensation payable under the PWA. The Owner must provide a tax invoice with respect to such payments in accordance with section 24 of the GST Act. Where the Owner is not registered for GST, the Owner must provide an invoice for the full amount of the disturbance payments referred to in that clause.

Construction Works

19. The parties acknowledge and agree that:

    (a) The Owner has obtained resource consent to subdivision (Resource Consent Number RM210003) to subdivide the Owner's Land (**Subdivision**);

    (b) As part of the Subdivision that part of the Owner's Land shown as Lot 100 on Plan A (Lot 100) is to be vested in Kāpiti District Council as road;

    (c) ROW Easement Area 1 is part of Lot 100 and is already formed access providing access to properties contained in Records of Title 759253, 759254 and 510969.

20. Pursuant to the rights and powers under the ROW Easement, the easement facility to be constructed by the Council over ROW Easement Area 2 and ROW Easement Area 3 comprises the construction of an access track to the Required Land (**Access Works**).

21. For the Access Works, Council will, in a good and workmanlike manner:

    (a) Construct a 10m wide access track over ROW Easement Area 2 and ROW Easement Area 3.

    (b) The access track shall be designed by suitably qualified engineers, including any cut and batter slopes, drainage and gradient and constructed by a suitably experienced construction contractor.

    (c) As part of construction, Council shall lay a metalled running surface on ROW Easement Area 2 and ROW Easement Area 3.

22. Prior to the commencement of construction of the Access Works the Council will supply the Cuttriss design plan and civil works contract for the Access Works to be approved by the Owner, which approval shall not be unreasonably withheld or delayed.

23. Prior to the commencement of construction of the Works the Council will in good faith, liaise with the Owner to advise the timing of the Works and the likely duration of the Works.

24. The Council will undertake earthworks on the Required Land and the balance of the Owner's Land as shown on the Cuttriss Earthworks Design Plan (**Plan C**) attached as Schedule D to this agreement.

25. The Council will undertake extensive landscaping on the completed earthworks surrounding the Reservoir to provide screening from the balance of the Owner's Land as shown on the Cuttriss Landscaping Plan (**Plan D**) attached as Schedule E to this agreement.

26. The Council will endeavour to complete the Works as soon as reasonably practicable and undertakes to cause as little damage and disturbance as is reasonably possible to the balance of the Owner's Land and the Owner's use of the land throughout construction of the Works.

27. Following completion of the Works, the Council will ensure that the surrounding land is left in a clean and tidy state and where appropriate tracks, or access routes affected by the Works will be re-sealed or re-grassed to a standard that was in place prior to the commencement of the Works.

Fencing

28. Prior to construction of the Works, the Council will erect temporary fencing between the area where the Works and construction are taking place and the balance of the Owner's Land for the duration of the Works to provide adequate security to the balance of the Owner's Land. Such temporary fencing will be constructed in consultation with the Owner.

29. Upon completion of the earthworks, the Council will fence the boundary between the Required Land and the balance of the Owner's Land at no cost to the Owner. The fencing shall be constructed using new materials comprising eight high tensile wire post and batten fence (**Fencing Works**).

30. Upon completion of the Works (or earlier at its sole discretion) the Council will, at its cost erect an internal fence and gate around the perimeter of the Reservoir within the Required Land in the location approximately shown hatched pink on the Fencing Plan (**Plan E**) attached as Schedule F to this agreement. The fencing shall be constructed using new materials comprising 1.8-metre-high security fence specifications pictured in Plan E.

31. The Council shall be entitled to undertake physical works necessary to enable the Fencing Works to be constructed on the boundary between the Required Land and the balance of the Owner's Land including, but not limited to, the right to excavate land for the purpose of construction, the removal of vegetation as necessary and any other earthworks required for the purposes of construction of the Fencing Works.

32. The Council will erect the fencing using materials commonly used for such fences at the time of construction and to the standard generally accepted by the fencing industry in New Zealand.

Reinstatement Planting

33. The parties acknowledge that there are plants (**Plants**) located on the balance of the Owner's Land in the vicinity of the Works which may require removal to accommodate the Works. The parties agree that the Council may remove the Plants from the balance of the Owner's Land, if required to accommodate the Works, at the Council's cost (**Plant Removal Works**).

34. The Council agrees to reinstate any Plants located within the balance of the Owner's Land which are affected as part of the Plant Removal Works (**Reinstatement Planting**). The exact size and species of the Reinstatement Planting to be determined in consultation with the Owner.

35. The parties acknowledge that the Council's obligation is to complete the Reinstatement Planting and that the Owner acknowledges and agrees that the Owner is responsible for the ongoing maintenance and care of the Reinstatement Planting once the Reinstatement Planting is completed. The parties acknowledge and agree that the Council has no ongoing responsibility for

the Reinstatement Planting, including watering obligations and that all ongoing maintenance is the Owner's responsibility.

Required Easements

36. In consideration of the compensation to be paid to the Owner under Clause 2 of this Schedule A, the Owner grants to the Council the ROW Easement over the ROW Easement Area and the Service Easements over the Service Easement Area to be forever appurtenant to the Required Land.

37. The grant of the ROW Easement and the Service Easements is an acquisition by agreement under Section 17 and 28 of the PWA.

38. The Council will be responsible for obtaining consents of the Local Authority and Regional Council to the grant of the ROW Easement, as required by section 348 Local Government Act 1974, including the carrying out of any physical works necessary to obtain the same.

39. The ROW Easement and the Service Easements shall be on the terms, and shall contain the rights and powers, set out in Schedule G of this agreement **(Rights and Powers)**.

Survey and Legalisation

40. The Owner acknowledges and agrees:

    (a) it is the intention of both parties that the Council will complete the survey and legalisation actions in respect of the Required Land and the Required Easements prior to the Owner's Subdivision; and

    (b) the Owner will not lodge any plans in respect of the Subdivision prior to the Council completing survey and legalisation in respect of the Required Land and the Required Easements.

41. The parties agree to liaise and coordinate the lodgement of survey plans at LINZ to avoid either party being unable to further action their respective plans due to LINZ Rules and requirements.

42. The Council will, at its cost as soon as reasonably practicable after completion of construction of the Works (or earlier, at the sole discretion of the Council):

    (a) Survey the Required Land and the Easement Areas and have the Survey Office Plan approved as to survey; and

    (b) As soon as reasonably practicable after completion of the survey, carry out all legalisation actions including:

        i) take the Required Land for water supply purposes pursuant to section 20 PWA;

        ii) registration of the Required Easements and obtaining consents (if any) for registration actions.

43. The Council agrees to act with due haste to publish any necessary Gazette Notice/s formalising the acquisition of the Required Land, once the survey plan has been approved by LINZ.

44. For the purposes of this agreement, the Owner consents to the Required Land being acquired for water supply purposes pursuant to section 20 PWA.

45. The Owner acknowledges that on completion of the Council taking the Required Land that the balance of the Owner's Land may have new appellations based on the survey office plan prepared for the Council's acquisition of the Required Land and the Required Easements. If so, the Owner will be provided with a new Record of Title for the balance of the Owner's Land based on those new appellations, at no cost to the owner.

46. If, following completion of the survey, the survey shows that the Required Land has an area of more than 10% greater than the area stated in this agreement, then the Owner is to be paid further compensation at the rate of $65.01 plus GST if any, for each square metre in excess of 8,560 square metres, together with interest to be calculated in accordance with Schedule Two of the Interest on Money Claims Act 2016, in full and final settlement of all compensation under the PWA for such additional land.

Legalisation Required Easements

47. The Council may implement the acquisition of the Required Easements by way of declaration under section 20 of the PWA, or alternatively, at the Council's option, by way of Easement Instrument/s under the LTA.

48. Where the Required Easements are to be granted by way of Easement Instrument under the LTA, the Owner covenants with the Council, when called upon to do so by the Council, to grant the Required Easements by way of Easement Instrument/s which shall be effected by:

    (a) Council's solicitor preparing an Easement Instrument in a Landonline workspace created for the transaction;

    (b) Council's solicitor certifying, signing and pre-validating the Easement Instrument in such Landonline Workspace;

    (c) Council's solicitor providing to the Owner or the Owner's solicitor the dealing number allocated by LINZ; and

    (d) The Owner's solicitor certifying, signing and releasing the Easement Instrument so that Council's solicitor can then submit it thereafter for registration.

49. The Owner covenants with the Council, when called upon to do so by the Council, in accordance with clause 48 to:

    (a) Grant the ROW Easement over the ROW Easement Area and the Service Easements over the Service Easement Area by way of Easement Instrument; and

    (b) Procure the Owner's solicitor to certify, sign and release the Easement Instrument in accordance with clause 48(d) to enable the Required Easements to be registered; and

    (c) Forthwith sign and produce any other plans and documents required to enable the Easement Instrument to be registered against the balance of Owner's Land; and

    (d) Obtain the consent of any mortgagee, caveator, encumbrance or other person having a prior registered interest in respect of the Owner's Land necessary to enable the Easement Instrument to be registered against the Record of Title of the balance Owner's Land, or to authorise the Council to obtain such consent; and

    (e) Provide the Council with written evidence of the registration of the Required Easements.

50. The Council shall meet all costs of creating and registering the Required Easements and including without limitation obtaining any resource consents and all legal, registration and survey costs.

Consent for Entry

51. The Council is entitled to enter and re-enter the balance of the Owner's Land at all times with or without such assistants, machinery, vehicles and equipment as are reasonably necessary for the carrying out and completion of the construction works, survey and fencing required pursuant to this agreement. When entering the balance of the Owner's Land the Council agrees to:

    (a) Comply with all relevant legislation, regulations and bylaws affecting the balance of the Owner's Land.

    (b) Do all things necessary to comply with the Health and Safety at Work Act 2015 including:

        i. Ensuring, so far as is reasonably practicable, that the balance of the Owner's Land and anything arising from the balance of the Owner's Land are without risks to the health and safety of any person; and

        ii. Notifying the Owner immediately if the Council becomes aware of any hazard or risk on the balance of the Owner's Land, or in the vicinity of the balance of the Owner's Land, which might, or may have the potential to, harm any person.

Warranties

52. The Owner warrants and undertakes that at the date of this agreement:

    (a) the Owner has no knowledge of any requirement and has not received any notice from any tenant or any local or government authority which affects the Required Land in any way and which has not been disclosed to the Council;

    (b) where the Owner has undertaken any work on the Required Land for which a permit or building consent was required by law, the Owner obtained the permit or building consent, completed the work in accordance therewith, obtained a Code Compliance Certificate (if applicable) and complied with the provisions of the Building Act 2004 at all times;

    (c) the Owner has not given any consent or waiver under the Resource Management Act 1991, which directly or indirectly affects the Required Land; and

    (d) the Required Land is not subject to a "short-term lease", the term "short-term lease" being defined by section 207 of the Property Law Act 2007. The Owner further warrants and undertakes that as at the Settlement Date the Required Land will not be subject to a short-term lease.

53. The Owner warrants and undertakes that at settlement:

    (a) the Owner has delivered to the Council all notices and requirements received after the date of the agreement from any local or government authority unless the Owner has satisfied the notice or requirement. If the Owner has failed to deliver to the Council or satisfy the notice or demand, then the Owner shall be liable for any costs or penalties arising from such failure;

    (b) the Owner has not given any consent or waiver in relation to any application under the Resource Management Act 1991 which directly or indirectly affects the Required Land. The parties acknowledge that the Owner's Land has the benefit of Land Covenant 8409664.6 which

provides that the neighbouring properties in Records of Title 759253 and 759254 are unable to object to the development of the Owner's Land;

(c) where, under Section 100 of the Building Act 2004, any building on the Required Land requires a compliance schedule, all obligations imposed on the Owner under the Building Act 2004 have been complied with; and

(d) there will be no arrears of water rates or charges, or, that any arrears at the Settlement Date will be paid in full by the Owner on that date.

54. The Owner warrants to the best of the Owner's knowledge:

(a) there are no contaminants (as the term is defined in the Resource Management Act 1991) present on the Required Land;

(b) the Owner has not dealt with any contaminant on the Required Land except in accordance with the Resource Management Act 1991;

(c) no one has ever used any part of the Required Land as a landfill or waste dump except for occasional and immaterial disposal of non-toxic domestic waste; and

(d) there are not currently, nor have there been in the past, any storage tanks on the Required Land.

55. Settlement will not be deferred, but the Council reserves its rights to seek compensation from the Owner and reserves all its remedies at common law and equity if the Owner breaches any warranty granted in clause 51 to clause 53 (inclusive).

No Objection

56. The Owner agrees that the Owner will not lodge any submission in opposition to the Works or participate in any objection or appeal which opposes any designation, resource consent or notice of requirement or take any other action which may have the effect of preventing or interfering with the Council's future plans in relation to the Works. This condition is not to merge upon settlement but will remain enforceable to the fullest possible extent.

General

57. The parties agree and acknowledge that:

(a) where any obligation or agreement hereunder remains unperformed at settlement then that obligation or agreement, notwithstanding any rule of law or equity to the contrary, is to ensure until fully discharged by performance and in no circumstance, whatsoever is to merge upon settlement of this agreement.

(b) reference to the Council includes the Council, its contractors and invitees where the context requires this and vice versa.

58. The Owner acknowledges and agrees that until accepted in writing, this document is only an offer to sell to the Council and its acceptance is not to be anticipated and the Owner is not to enter into any consequential commitments in reliance of this offer being accepted by the Council. This agreement is not binding on the Council until signed on the Council's behalf. Any variation of this agreement is not binding on the Council unless signed on behalf of the Council.

Electronic Execution

59. The parties agree that:

    (a) this agreement may be executed in two or more counterparts, all of which will together be deemed to constitute one and the same agreement. A party may enter into this agreement by signing a counterpart copy and sending it to the other party, including or email.

    (b) the production of an emailed copy or copies of the agreement signed by all parties is to be deemed to be sufficient to satisfy the requirements of the Property Law Act 2007.

    (c) in the case of email, any notice or document is deemed to have been received when acknowledged by the party or by the lawyer orally or by return email or otherwise in writing, except that return emails generated automatically do not constitute an acknowledgement.

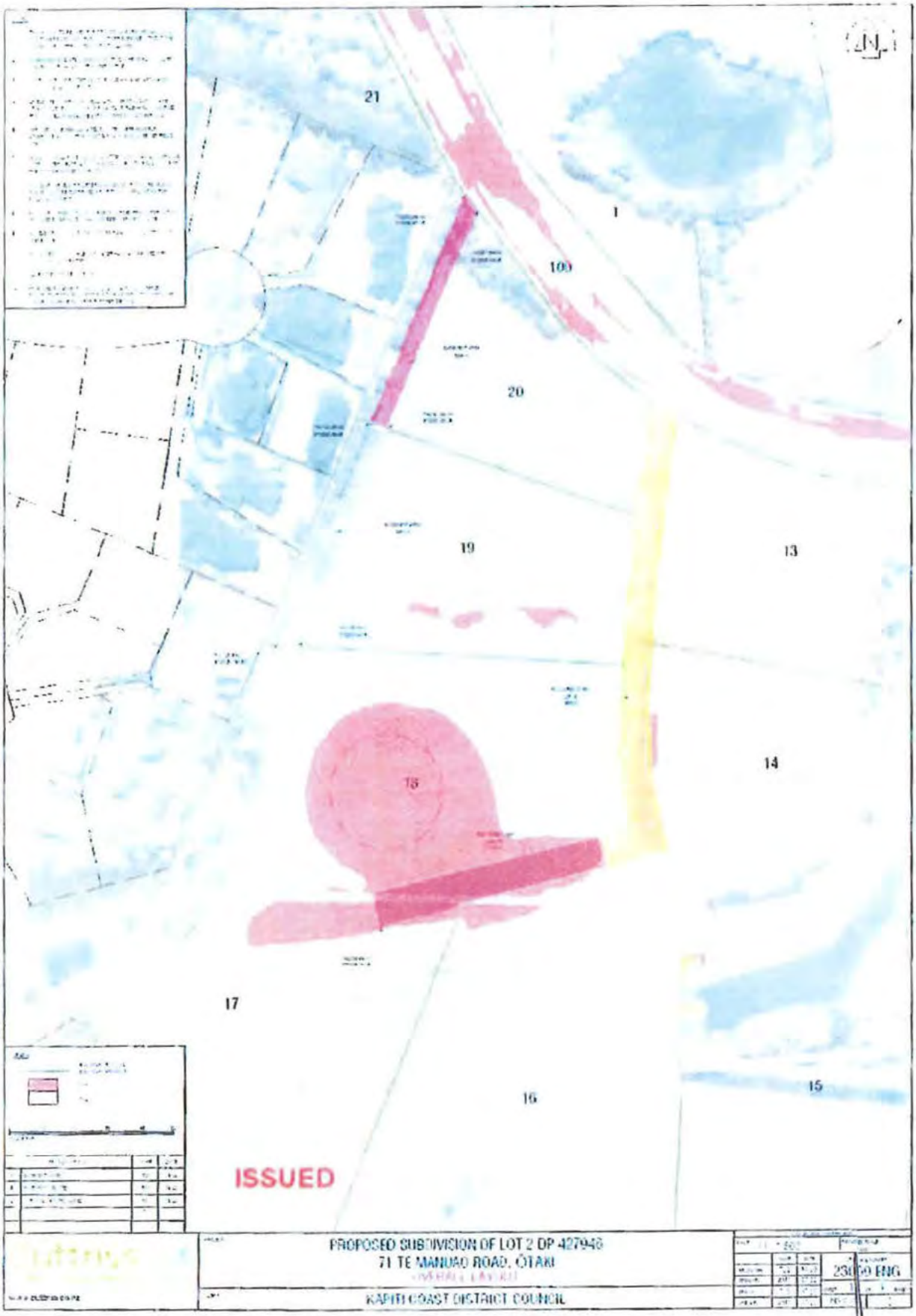
    (d) in accordance with the Contract and Commercial Law Act 2017, the parties agree that any notice or document that must be given in writing by one party to the other may be given in electronic form and by means of electronic communication.

Council Capacity

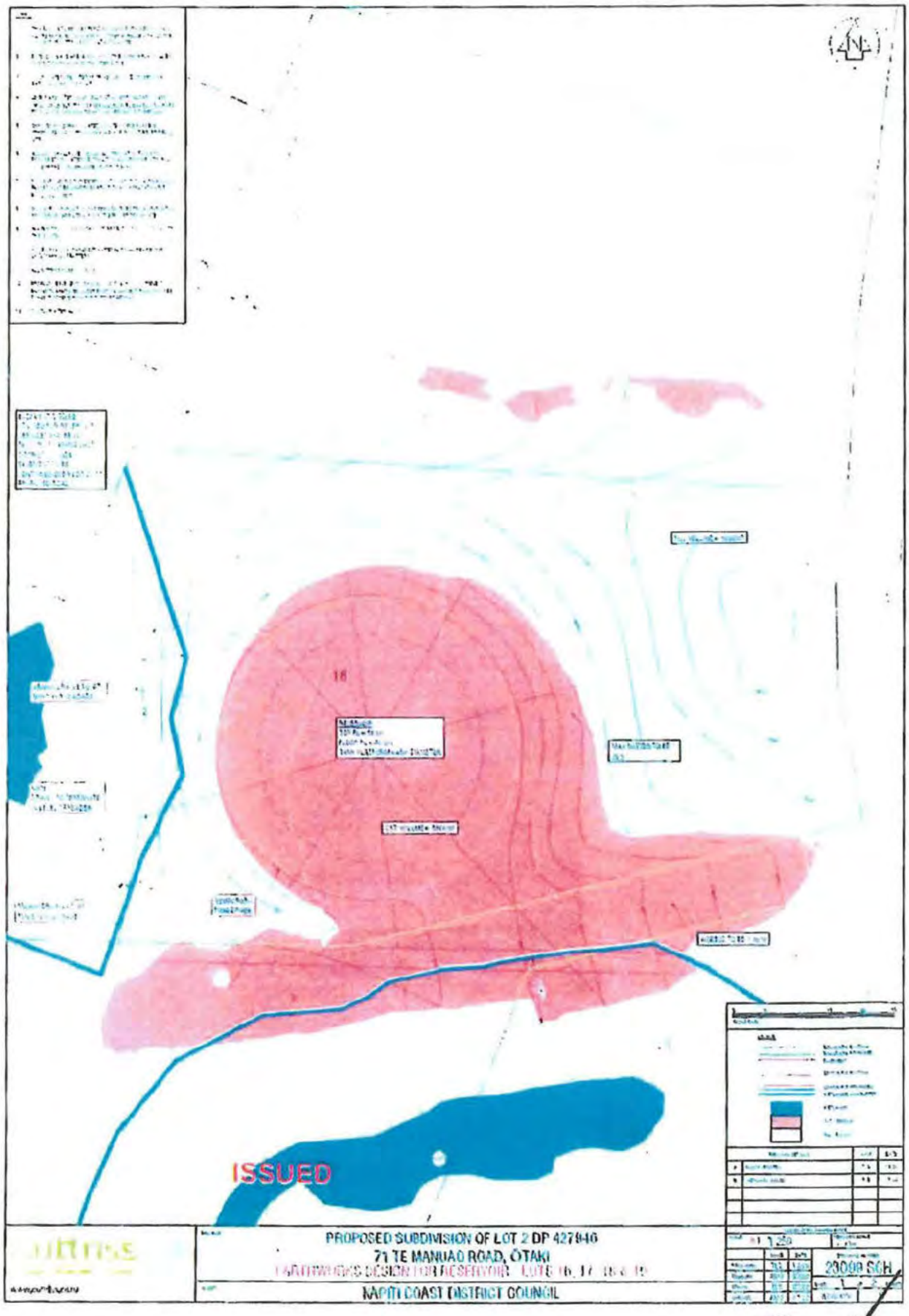
60. The Council has entered into this agreement in its non-regulatory capacity. This agreement does not bind the Council in its capacity as a regulatory authority in any way, and any consent or agreement the Council gives under this agreement is not an agreement or consent in its regulatory capacity, and vice versa. When acting in its regulatory capacity, the Council is entitled to consider all applications to it without regard to this agreement. The Council will not be liable to any other party if, in its regulatory capacity, the Council declines or imposes conditions on any consent or permission any party seeks for any purpose associated with this agreement.

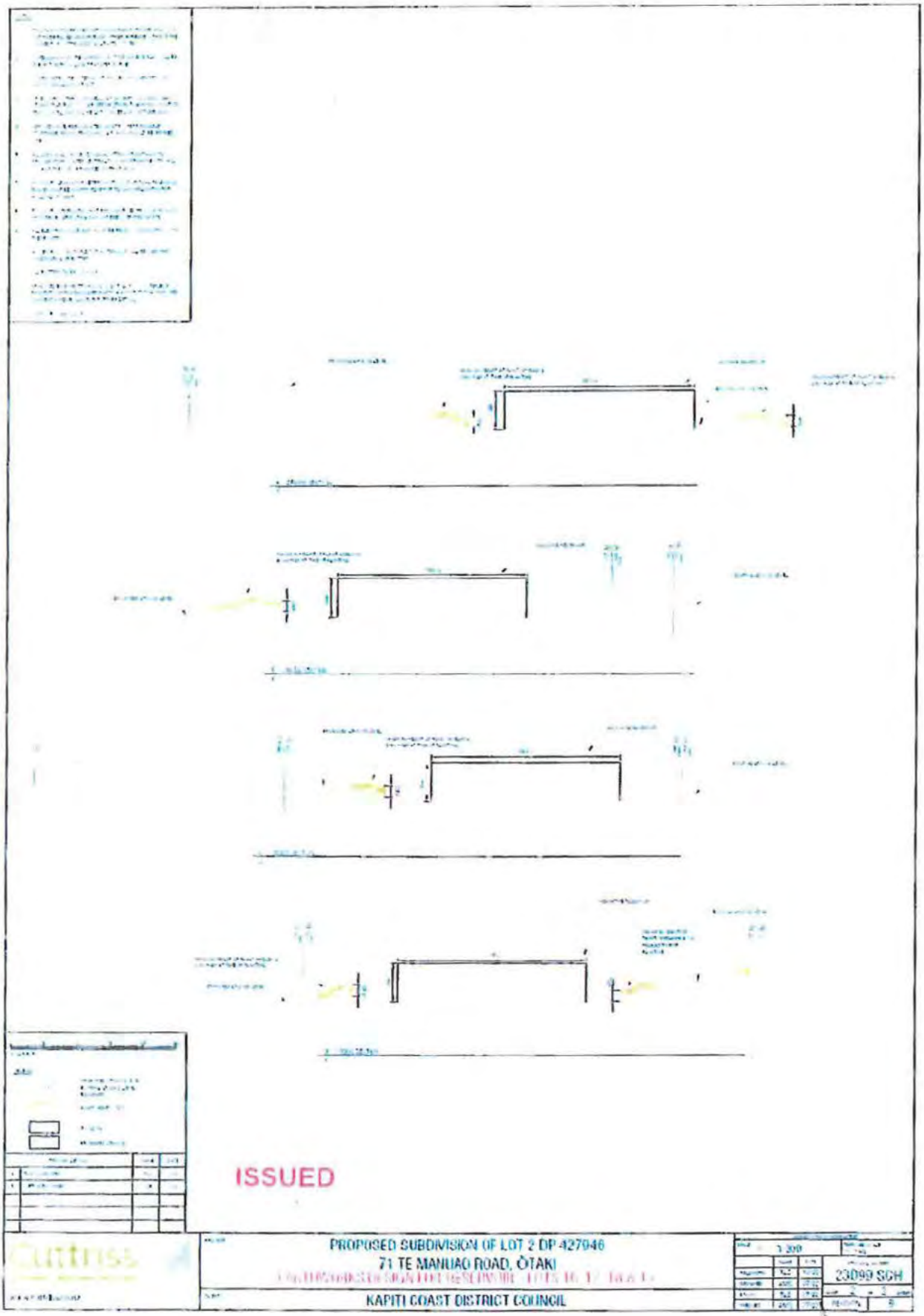
Schedule B: **Plan A: Land and Easement Requirement Plan**

Schedule C: **Plan B: Easement Requirement Plan**

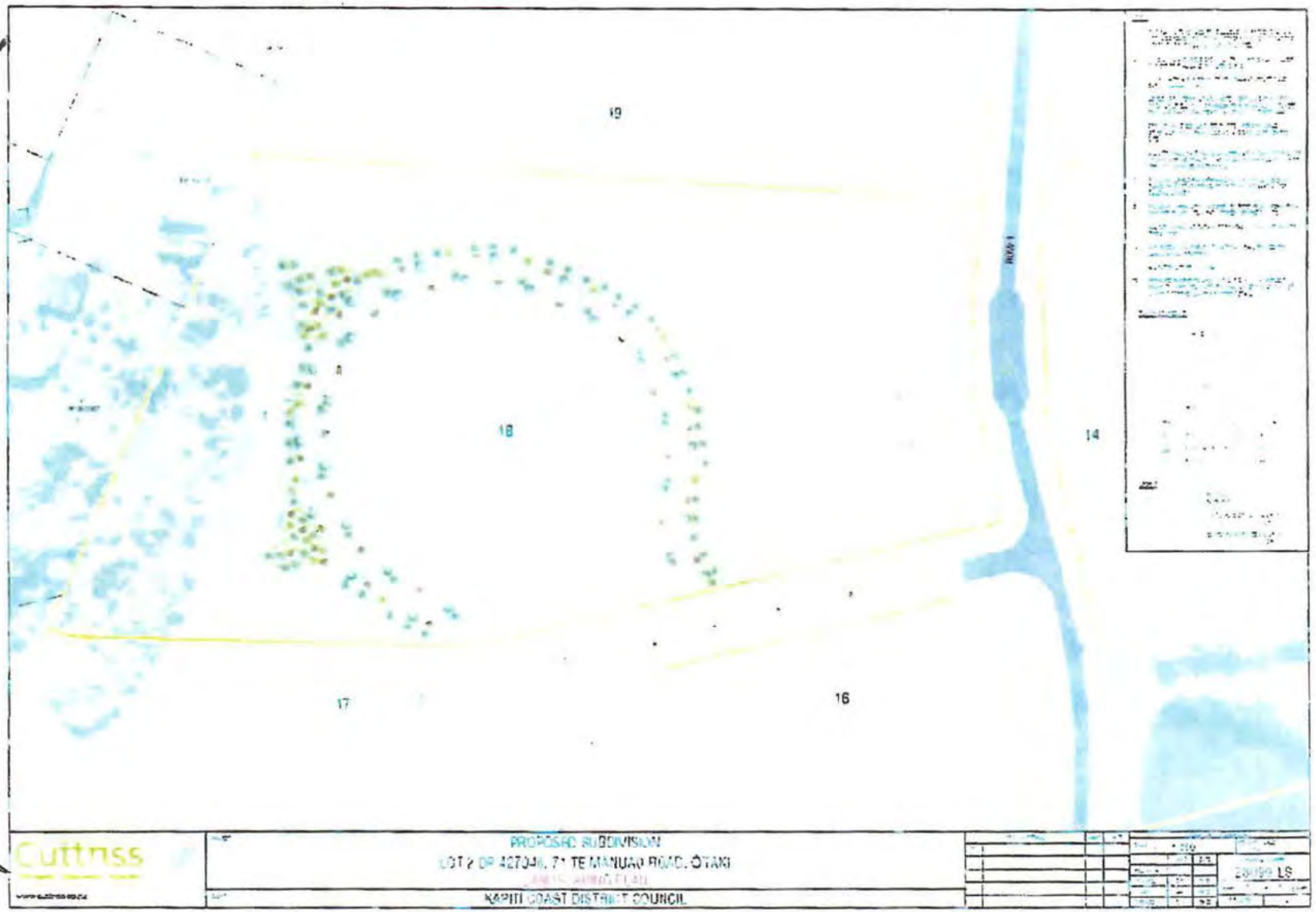


Schedule D: **Plan C: Earthworks Design Plan**




ISSUED
PROPOSED SUBDIVISION OF LOT 2 DP 427946
71 TE MANUAO ROAD, ŌTAKI
KAPITI COAST DISTRICT COUNCIL
23099 SCH

Schedule E: **Plan D: Landscaping Plan**



Schedule F: **Plan E: Fencing Plan**

Schedule G: **Rights and Powers of Required Easements**

The rights and powers implied in the specified classes of easements are those prescribed by the Land Transfer Regulations 2018 and/or Schedule 5 of the Property Law Act 2007.

The implied rights and powers are hereby **added to** by the following:

1. Any terms used in this easement that are defined in the Land Transfer Regulations 2018 shall take those meanings unless otherwise modified by the terms set out in this instrument.

2. Where there is a conflict between the provisions of Schedule 5 of the Land Transfer Regulations 2018 and the modifications in this instrument, the modifications must prevail.

3. The Grantor acknowledges that this easement instrument is entered into by the Grantee in its capacity as owner and administering body of the easement facility and not as a regulatory authority. The two roles of the Grantee are different and any consent or approval given by the Grantee in its capacity as land owner under this easement instrument will not be deemed to waive or imply the Grantee's consent or approval in its capacity as regulatory authority or owner of other land and similarly any consent given in its capacity as a regulatory authority will not be deemed to waive or imply its consent or approval in its capacity as owner of the easement facility under this easement instrument or elsewhere.

To Registrar-General of Land
Wellington Land Registration District

COMPENSATION CERTIFICATE UNDER SECTION 19 OF THE PUBLIC WORKS ACT 1981

Unique Identifier(s)	All/Part	Area/Description of part or stratum
510970	All	

This Compensation Certificate is forwarded to you under section 19(1) of the Public Works Act 1981 to be registered against the record(s) of title to the land affected by it.

File reference	718379
Agreement reference	71 Te Manuao Road, Otaki
Date of agreement	9 March 2023
Inspection location	Kapiti Coast District Council 175 Rimu Road Paraparaumu 5032 Phone: +64 4 296 4700
Hours for inspection	8am to 5pm, Monday to Friday (except public holidays)
Names / addresses of affected parties *[ie other than the Council]*	Westleigh Developments Limited c/- Hudson Taylor Chartered Accountants Level 3 44 Victoria Street Wellington 6011
Brief particulars	Kapiti Coast District Council has reached a Memorandum of Agreement with the Owner to acquire • 0.8560 hectares (subject to survey) for water supply purposes in relation to the Otaki Water Reservoir Project. • A right of way easement to be forever appurtenant to the Required Land. • A right to convey electricity, right to convey water and a right to drain water to be forever appurtenant to the Required Land. The Owner agrees to $653,543.48 plus GST (if any) as full and final compensation pursuant to the Public Works Act 1981 and $25,000.00 as additional compensation pursuant to Section 72C of the Public Works Act 1981. In the event of there being an increase of 10% in the area of the Required Land on completion of survey, a rate of $65.01/m² plus GST (if any) shall be paid as further compensation for the acquisition of the additional land.

Dated at ..... this 9 day of March 2023

Executed by the
KAPITI COAST DISTRICT COUNCIL
by its duly authorised Chief Executive

.....
Darren Edwards

In the presence of:

.....
Name of witness

.....
Address of witness

.....
Occupation of witness

SINCLAIR KNIGHT MERZ
SKM

capacity

KCDC Water Supply

OTAKI RESERVOIR OPTIONS

- DRAFT v1.1
- 3 December 2007

SKM

Document history and status

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1.1	3 December	SPN			

Distribution of copies

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1. Introduction

The Otaki town water supply comprises a bore-fed, two zone reticulation system supplying the main town, Otaki Beach and the plateau area to the east of State Highway 1. The system includes one small reservoir at Waitohu, east of town and at the highest point of the system. However this tank has inadequate storage capacity, is too high for most of the demand area and is distant from the main town. It has long been recognised that additional storage would be beneficial and previous studies have been completed by others. The combination of the near term implementation of a new production bore at County Road and the availability of a newly calibrated water supply network model (SKM 2007) has precipitated further investigation of the reservoir options.

Kapiti Coast District Council (KCDC) have commissioned Sinclair Knight Merz (SKM) to investigate options for siting a new service reservoir for Otaki. A number of site have been previously assessed of which two continued to hold interest. These two sites are termed Options 1 and 2 in this report. Site 1 is located close to town, approximately 120 metres northwest of the junction of SH1 and Waitohu Valley Road. Site 2 is located at some distance and is south of the Otaki River, 100 metres south of the junction of Old Hautere Road and Otaki Gorge Road. It is required that the reservoir will be able to maintain pressures above 25 m in the Otaki Bore zone during periods of peak demand without the need of the Tasman and Rangiuru Road Bores.

This report makes use of studies completed using the newly calibrated water model. The existing options have been reconsidered along with an examination of some new potential sites. Consideration of viable pipeline connections has also been made.

The option of linking Te Horo and Hautere to the Otaki water reticulation system was also considered.

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2. Geography

The township of Otaki covers an area of approximately 4000 ha and has a usually resident population of 5,466, based on Census 2006. The township includes Otaki Beach to the west and the so called plateau area, an urban development on higher ground to the east of State Highway 1 (SH1). SH1 and the main railway run north-south effectively splitting the plateau area from the main town.

The land is undulating with ancient sand dunes adjacent to the coast peaking at around 40m aMSL and the land rising in excess of 60m east of the plateau. The main town is around 20maMSL.

Hautere and Te Horo lie to the south side of the Otaki River. Hautere is a dispersed agricultural area with scattered farms. Te Horo is split between a road side settlement alongside SH1 and a beach community.

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3. Existing Water supply system

The water reticulation system at Otaki is split into 2 zones, the Bore Supply Zone and the Plateau Zone. The Bore Supply Zone consists of the section of the town to the west of State Highway 1 including Otaki Beach. The Plateau zone consists of the urban area to the east of State Highway 1 extending eastwards to the Waitohu Reservoir. The two zones are separated by a 150mm diameter permanently closed valve, located on the junction of County Road and Rahui Road. Water from the 2 bores is boosted to the Waitohu Service Reservoir through 3 booster pumps located in County Road. The pumps operate on a time and pressure control regime as follows:

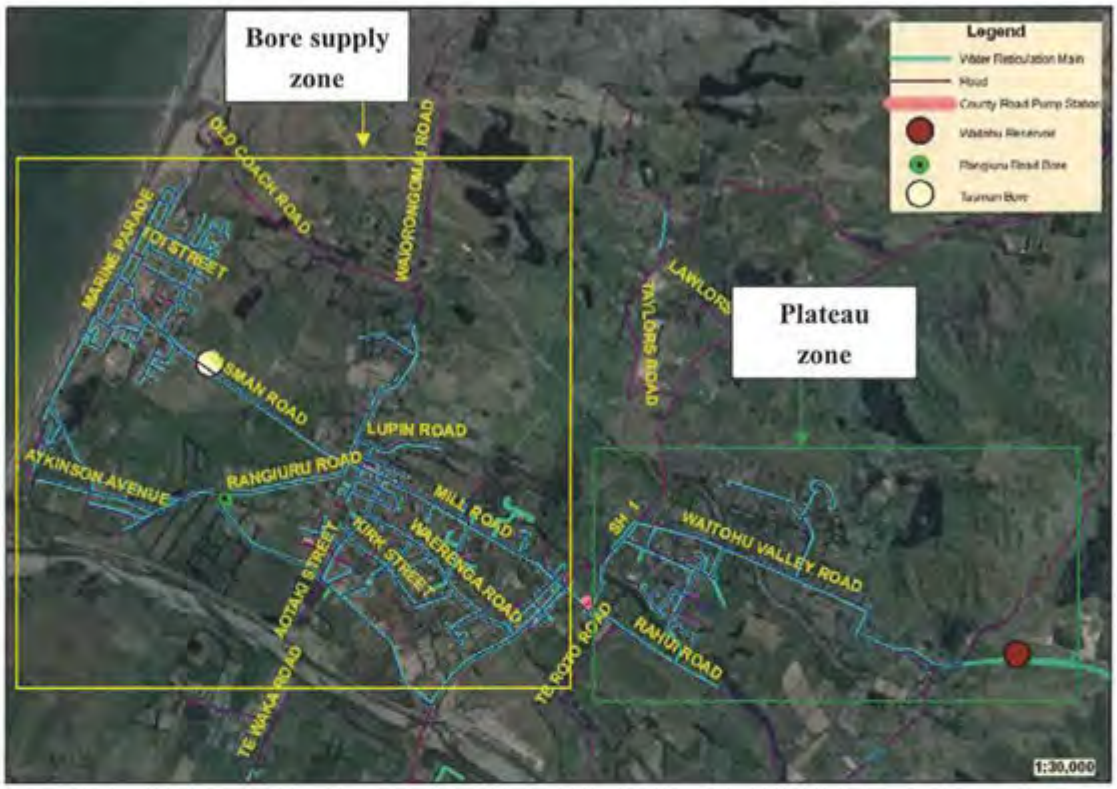
1) Pumping is only allowed between 10:00 pm and 7:00 am and between 10:30 am and 4:00 pm.
2) Pumps start within those times when the level in the Waitohu Service Reservoir falls to 65% of level and stops when it reaches 92%.

The time controls ensure that the mains pressure in the bore supply zone does not fall below 25m during periods of peak demand.

The current sources for the Otaki area water supply are two groundwater bores located in Tasman Road and Rangiuru Road. Given the absence of any storage, pressures within the bore supply zone are totally dependent on the bore pumps. Accordingly a generator and a second bore are provided at Tasman Road to cover the eventuality of electricity supply failure.

The Plateau zone is supplied from the same bores further boosted through the County Road Booster pumps. The booster pumps lift into the Plateau area supply with surplus water filling Waitohu Service Reservoir. When the County Road Booster pumps are not operating, the plateau zone is fed by gravity from the Waitohu Service Reservoir.

Figure 1 shows the extents of the bore supply zone and the plateau zone.



- **Figure 1 Otaki Water reticulation system**

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4. Options

4.1 Otaki water demand

Based on flow data obtained from KCDC of the Tasman, Rangiuru Road bores and the Waitohu Service Reservoir from 22nd August 2007 – 3rd September 2007, the average daily water demand of Otaki stands at 4037 m^3. Industrial and commercial water consumption makes up 4% of the total water demand, indicating that the majority of the town's water supply is consumed domestically.

The report entitled "Otaki – New Bore and Reservoir Investigation" by Jeff Booth Consulting Ltd dated June 2005 analysed flow records from 2004 - 2005 obtained from the Kapiti Coast District Council. No exact time period was given for the flow records, however, the results indicate that the peak to average ratio of daily demand is 1.6, with peak summer demand occurring in February 6, 2005 at 6246 m3 / day. The URS report entitled "Waikanae Borefield – Assessment of Environmental Effects" dated July 2004 indicates that the ratio for Waikanae, Paraparaumu and Raumati for the years of 1999 – 2004 was in the range of 1.34 to 1.57. Given the significantly larger proportion of horticultural activity present in Otaki, it would not be unusual for the peak to average demand for Otaki to be higher than the surrounding townships.

Results of median population projections using the 2001 population as a base by Monitoring and Evaluation Research Associates Ltd (MERA) in 2004 are presented in table 1.

The population of Hautere has not been included in these estimates for reservoir provision as they are currently supplied from dedicated tanks at a high level. If Hautere is to be supplied from Otaki consideration to a rising main to Hautere tanks should be considered. Given the low population of Hautere any additional storage requirement would be small and probably not significant given the nature of the overall population projection assessments.

Table 1 Projected 2011 – 2026 population for Otaki

	2011	2016	2021	2026
Otaki	6,417	6,791	8,165	8,414
Otaki + Te Horo	7,146	7,566	9,018	9,296

It is normal practice to provide 24 hour storage capacity at the end of the projected life of the tank. Table 2 shows the 24 hour demand average and peak daily demand from 2011 – 2026. The average water demand was calculated by multiplying the ratio of the projected population and the

current population by the current demand 4,037 m3/day. Peak daily demand was obtained by multiplying the average daily demand by a peak-to-average ratio of 1.6.

- **Table 2 24 hour storage capacity required for average and peak daily demand and KCDC storage requirements**

	2011		2016		2021		2026	
	Average (m3)	Peak (m3)	Average (m3)	Peak (m3)	Average (m3)	Peak (m3)	Average (m3)	Peak (m3)
Otaki (24 hour storage)	4,739	7,583	5,016	8,025	6,030	9,649	6,214	9,943
Otaki (600l/hd)	3900		4100		4950		5100	
Otaki + Te Horo (24 hour)	5,278	8,444	5,588	8,941	6,660	10,657	6,866	10,985
Otaki and Te Horo (600l/hd)	4300		4600		5500		5600	

The results indicate that the population is set to increase by 54% between now and 2026. Assuming specific consumption stays similar, average daily demand is set to increase to 6200 m3 per day by 2026. Taking Te Horo into consideration would result in a demand figure of approximately 6900 m3 per day.

KCDC's development requirements require a storage provision of 600 l/head with additional storage to comply with the fire code. Based on the year 2026 projections noted above this would require storage of c5100 for Otaki and 5600 with the addition of Te Horo. Given that the reservoir life should be well beyond 2026, the possible addition of Hautere and an operational desire to have 24 hours storage, the previous 6000m3 of new storage figure looks a reasonable basis on which to proceed.

Population figures from the 2006 Census for Otaki indicate that the usually resident population stands at 5,466. Based on this figure, the average water demand for Otaki stands at 739 l / person / day. This is significantly higher than that the results obtained for 1999 - 2004 for Waikanae, Paraparaumu and Raumati which range from 432 to 481 l / person / day from the URS report.

The demand diagram for Otaki, constructed from field test data from 22nd August 2007 – 3rd September 2007 indicates an unusually high overnight demand factor of between 0.75 – 0.8 for the period of 12:00 am to 5:00 am. The demand diagram is shown in figure 2.

- Figure 2 Otaki Demand diagram

In the absence of industries consuming large quantities of water over a 24 hour period, this could possibly be due to physical losses in the form of background leaks in pipes. It is recommended that further investigations be conducted to determine the root cause.

It is possible that the combinations of universal metering, further leakage investigations and continued mains replacement programmes could yield a major saving in leakage or other un accounted for water. Investigations into these matters should be pursued and if successful a smaller reservoir could be considered. However, for the purposes of this report it has been assumed that any gains from further leakage reduction work will be offset by continued deterioration of the overall network.

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4.2 Modelling scenarios

Two scenarios were modelled for each potential reservoir option:

1. At average daily demand
2. At peak daily demand

Demand figures used were calculated based on field testing done by SKM and KCDC in August 2007. The average and peak daily demand figures are listed below in table 3:

Table 3 Average and peak daily demand

Average daily demand (l / property / day)	Peak daily demand (l / property / day)
1146	1833

The number of private households used in the model was obtained from MERA projections for the year 2026. The breakdown of the projected number of occupied private households for Te Horo and Otaki is shown in table 4 below:

Table 4 Projected number of occupied private households in 2026

Heading	Otaki	Te Horo
Number of occupied private households	3704	402

The calibrated Infoworks WS model used in this exercise lists 3534 customer points in Otaki with 2924 of those located in the Otaki bore zone and 610 located in the plateau region. The customer points were obtained from importing parcel centroid positions from GIS. The additional 170 properties simulating growth to 2026, were added to the model as a demand node entitled "Otaki Beach" located 200 metres to the north of at the end of Moana Street. This area was selected to represent the additional growth as a worst case scenario and is not intended to represent real new housing locations. Demand to the Te Horo properties was represented by a new node at the end of a 7.5km pipeline (355 mm MDPE 100 PN 10 pipe) entitled "Te Horo". The additions to the network are shown in figures 3 and 4.

Figure 3 Additions to network for Moana Road

Figure 4 Additions to network at Te Horo

The dimensions of the 6000 m3 reservoir were in accordance to the BECA Stevens report "Otaki Reservoir Supply – Geotechnical Walkover of Proposed Reservoir Sites". Allowable top and bottom water levels at the reservoir were assumed to follow the convention of the Waitohu Service Reservoir. The figures used are shown in table 5 below.

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Table 5 Reservoir dimensions

Depth (m)	Top Water Level	Lowest Operating level
6.75	92% of reservoir depth	62.5% of reservoir depth

The rising / falling main connecting the reservoir to the reticulation system has been modelled as a 400 mm PE 100 medium density polyethylene pipeline. Polyethylene was chosen because of its high resistivity to soils containing high pH and alkalinity, which is representative of the soil characteristics in Otaki and also due to its high low modulus of elasticity which minimises the use of bends. A size of 400 mm was chosen because it is able to adhere to NZS 4404:2004 clause 6.3.9.4 which indicates that the maximum headloss in a pipeline cannot exceed 3 m / km for pipe sizes greater than 200mm.

4.3 Options description

4.3.1 Option 1

Option 1 comprises one of the original options from previous studies. It consists of locating the reservoir northwest of the junction of SH1 and Waitohu Valley Road on an old sand dune at c45m aMSL. The reservoir is connected to the reticulation system in the Otaki bore zone through a 1 kilometre rising / falling main at the SH1 roundabout. The proposed additions to the system are shown in figure 5.

- Figure 5 Option 1 additions

4.3.2 Option 2

Option 2 was also selected in previous studies. This option consists of locating the reservoir south of the Otaki River 100 metres south of the junction of Old Hautere Road and Otaki Gorge Road. A 3.5 km pipeline connects the reservoir to the Otaki bore zone at the junction of Riverbank Road and SH1. The proposed additions to the system are shown in figure 6.

- Figure 6 Option 2 additions

4.3.3 Option 3

This is a new option where the reservoir is located on the 67.5 m RL contour line at the end of the private road off Te Manuao Road. The reservoir is connected to the reticulation system by a 2.7 km pipeline running through the private road into Te Manuao Road before making a left turn into Freeman's Street and finally into Rahui Road before connecting to the tee at the junction of Rahui Road and County Road. The proposed additions are shown in figure 7.

- Figure 7 Option 3 additions

4.3.4 Option 4

The reservoir is located on the 67.5m RL contour line at 4, Ringawhati Road and is connected to the reticulation system through a 3.5 km pipeline running from Ringhwhati Road, turning right at Rahui Road before connecting at the junction of Rahui Road and County Road. The proposed additions are shown in figure 8.

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- Figure 8 Option 4 additions

4.4 Scenario analysis

4.4.1 Scenario 1 - Pump failure

The calibrated model has been used to simulate scenarios to demonstrate the viability of each option The first scenario will determine whether the combination of the new reservoir, new connections and the existing reticulation system is capable of supplying the Otaki bore zone with a pressure of 25m without the need of the Tasman and Rangiuru Road pumps operating eg in a pump failure condition. This simulation includes for the projected 2026 demands.

The results for the node with the lowest pressure, "Otaki Beach" at average daily demand and peak daily demand are presented in table 6.

- Table 6 Nodes with lowest pressure at average and peak daily demand

	Average daily demand	Peak daily demand
	Pressure (m)	Pressure (m)
Option 1	14.74	-19.61
Option 2	-2.68	-63.78
Option 3	30.88	-11.40
Option 4	29.74	-13.79

The results indicate that options 1 and 2, where the reservoir is at c 45m aMSL, cannot meet the residual pressure criteria even at average daily demand. Therefore, no further analysis will be conducted on both the options. Options 3 and 4 meet the required residual pressure criteria at periods of average daily demand but not during periods of peak day demand. Either one of the

Tasman or Rangiuru Road pumps would have to operate to sustain the pressure in the system at peak times.

The model was used to assess what new mains would be required to maintain pressures at peak without the bore pump running.

Figure 8 indicates the regions where head losses are greater than 5 m, highlighted in red, are experienced in the reticulation system during peak daily demand.

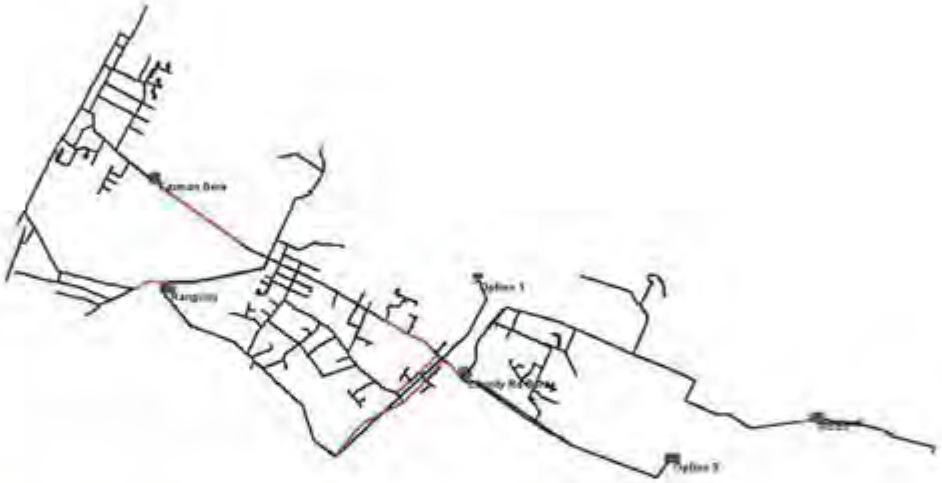

Figure 9 Areas of high head losses in reticulation system

It can be seen that the section of the trunk main immediately after the connection to the reservoir experiences very high head losses when conveying peak daily demand flow.

Two upgrade options have been investigated to rectify this problem. Option A ensures that a minimum pressure of 25m is maintained throughout the whole reticulation system during peak demand. Option B sustains a minimum pressure of at 10m throughout the whole reticulation system.

4.4.1.1 Option A upgrade

This option entails upgrading the existing trunk main to ensure that the pressure at the node "Otaki Beach" is able to meet 25m at peak demand during the event of pump failure.

Tables 7 and 8 presents the asset identification numbers for the pipes that require upgrades for Reservoir options 3 and 4 respectively. The proposed upgrades are in all cases to a 400 mm dia. PN 10 MDPE pipe.

- **Table 7 Proposed trunk main upgrades for Option 3**

Asset ID	Original dia (mm)	Proposed dia (mm)	Existing Material	Length (m)	Year of installation
OWG00007	200	400	AC	42.36	1980
OWG00033	200	400	AC	417.7	1980
OWG00069	200	400	AC	344.9	1980
OWG00109	200	400	AC	186.39	1980
OWG00111	200	400	PVC	38.76	1980
OWG00149	200	400	AC	2.2	1980
OWG00151	200	400	AC	99.85	1980
OWG00152	200	400	AC	1.23	1980
OWG00273	200	400	AC	252.15	1980
OWG00285	200	400	AC	197.76	1980
OWG00286	200	400	AC	7.88	1980
OWG00287	200	400	AC	229.32	1980
OWG00296	200	400	AC	25.94	1980
OWG00301	200	400	AC	62.95	1980
OWG00305	200	400	AC	22.15	1980
OWG00306	200	400	AC	71.65	1986
OWG00307	225	400	AC	59.81	1986
OWG00309	225	400	UPVC	191.2	1980

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- Table 8 Proposed trunk main upgrades for Option 4

Asset ID	Original dia (mm)	Proposed dia (mm)	Material	Length (m)	Year of installation
OWG00033	150	355	AC	417.7	1980
OWG00007	200	400	AC	42.36	1980
OWG00033	200	400	AC	417.7	1980
OWG00069	200	400	AC	344.9	1980
OWG00109	200	400	AC	186.39	1980
OWG00111	200	400	PVC	38.76	1980
OWG00121	200	400	AC	7.89	1980
OWG00148	200	400	AC	183.58	1980
OWG00149	200	400	AC	2.2	1980
OWG00151	200	400	AC	99.85	1980
OWG00152	200	400	AC	1.23	1980
OWG00273	200	400	AC	252.15	1980
OWG00285	200	400	AC	197.76	1980
OWG00286	200	400	AC	7.88	1980
OWG00287	200	400	AC	229.32	1980
OWG00296	200	400	AC	25.94	1980
OWG00301	200	400	AC	62.95	1980
OWG00305	200	400	AC	22.15	1980
OWG00306	200	400	AC	71.65	1986

OWG00307	225	400	AC	59.81	1986
OWG00309	225	400	UPVC	191.2	1980

The total length of pipeline of each diameter to be upgraded is summarised in table 9 for both options.

- **Table 9 Summation of total length of pipeline required**

Option	Nom pipe dia (mm) to be replaced	Total length (m)
Option 3	200	2003
	225	251
Option 4	150	418
	200	2011
	225	251

The minimum pressure experienced at the node "Otaki Beach" after the pipeline upgrades is shown in table 9.

- **Table 10 Minimum pressures at Otaki Beach node**

Option	Pressure (m)
Option 3	25.9
Option 4	25.5

4.4.1.2 Option B Upgrade

This option ensures that the furthest node of the reticulation system is served by a minimum pressure of 10m in the event of pump failure. For this option, the length of trunk main upgrades is similar for both options. Table 11 shows the proposed upgrades for both options.

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- Table 11 Proposed trunk main upgrades for option 3 and 4

Asset ID	Original dia (mm)	Proposed dia (mm)	Original Pipe Material	Length (m)	Year of installation
OWG00152	200	400	AC	1.23	1980
OWG00285	200	400	AC	197.76	1980
OWG00287	200	400	AC	7.88	1980
OWG00296	200	400	AC	229.32	1980
OWG00301	200	400	AC	25.94	1980
OWG00305	200	400	AC	62.95	1980
OWG00306	200	400	AC	22.15	1980
OWG00307	225	400	AC	59.81	1986
OWG00309	225	400	UPVC	191.2	1980

Table 12 presents the total length of pipe of each diameter to be upgraded.

- Table 12 Summary of total length of pipe to be upgraded

Nom pipe dia (mm)	Total length (m)
200	547.23
225	251.01

The minimum pressure experienced at the node "Otaki Beach" is shown in table 13.

- Table 13 Minimum pressure at node "Otaki Beach"

Option	Pressure (m)
Option 3	13.2
Option 4	10.7

4.4.2 Options Discussion

Tables 14 and 15 list the pros and cons for option 3 and 4.

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Table 14 Pros and Cons for Reservoir Option 3

Pros	Cons
• Shortest pipeline connections and shortest length of upgraded mains • Proximity to demand areas • Good access via existing track • Potential for using existing trees as screening • Potential for shorter cross country pipeline routes • Slope. The surrounding land where the reservoir is to be located has a 1 in 10 slope.	• Access to the reservoir is via a private road located off Te Manuao Road. • The potential route of the rising / falling main lies in front of residential properties along Freeman's Road. • The presence of other services located along Freemans Road would result in increased difficulty in pipe laying which has an impact on the construction costs • A site visit to the proposed location in July 2007 revealed the presence of a new residential development which was not present in the KCDC GIS system. There needs to be further discussion with the land owner to confirm future development plans within the site

Table 15 Pros and Cons for Option 4

Pros	Cons
• Construction costs. The absence of buried services along Ringawhati Road and the section of Rahui Road immediately after the junction of the two makes it easier for pipe laying. • The surrounding land where the reservoir is to be located has a 1 in 20 slope. • Site Aesthetics. The proposed location is far away from any current development which would make this a relatively minor issue • Easy access for maintenance. The proposed location of the reservoir is along Ringawhati Road. • Proximity to Hautere. The reservoir could potentially serve the Hautere area through a pipe link over the Otaki River given the closeness of the two locations. Although the feasibility of a crossing would be required.	• Capital costs. The length of the rising / falling main is considerably longer • a longer section of the existing trunk reticulation system needs to be upgraded.

4.4.3 Scenario 2 - Addition of proposed new bore in system

The calibrated model has been used to check operation of the new County Road Bore connection to the new reservoir. The scenario determines whether the new bore is able to keep filled the proposed

6000 m3 reservoir. It has been assumed that the new bore will be connected immediately upstream of the County Road Booster pumps, that is on or near the 225mm dia uPVC pump suction main.

The bore pump to be used was modelled based on pump curve information provided by KCDC personnel. The duty point of the bore pump is shown in table 14.

- Table 16 Duty point of bore pump

Flow (l/s)	Head (m)
39	85

The bore rising main is assumed to be a 10m 225mm nom dia. PE100 PN10 pipe. The pumps are assumed to be as per the existing three County Road boosters and were set to operate on level control based on the allowable top and bottom water levels in the reservoir.

No change was made to the control regime of the County Road pump station.

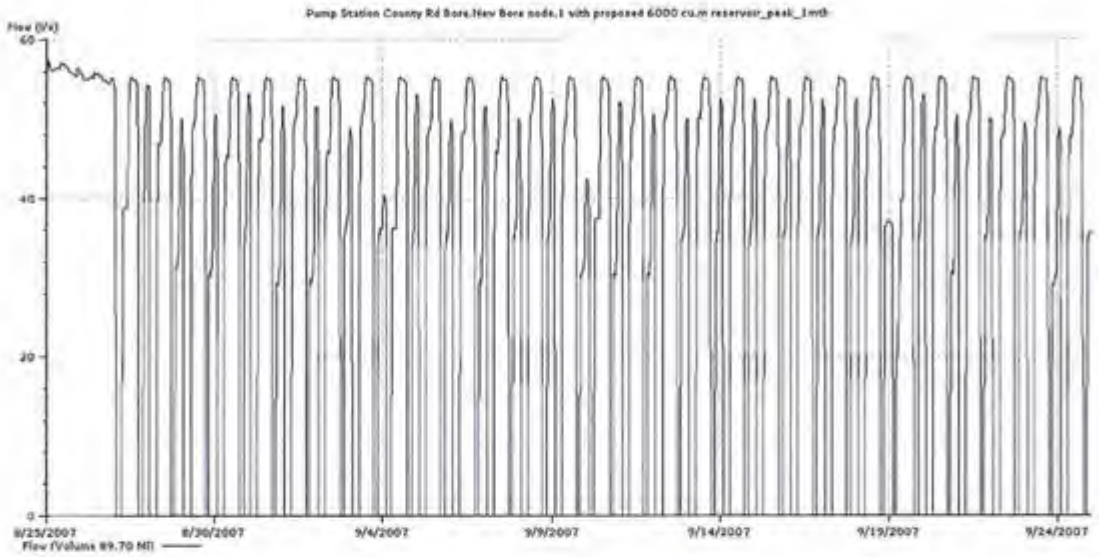
The scenario was run for 1 month to determine the time taken to fill the reservoir.

Results discussion

Modelling results indicate that only the Tasman Road pump station needs to be in operation to ensure the functionality of the scenario. The operating regimes of the pump station are shown in table 17.

- Table 17 Operating regime of pump stations

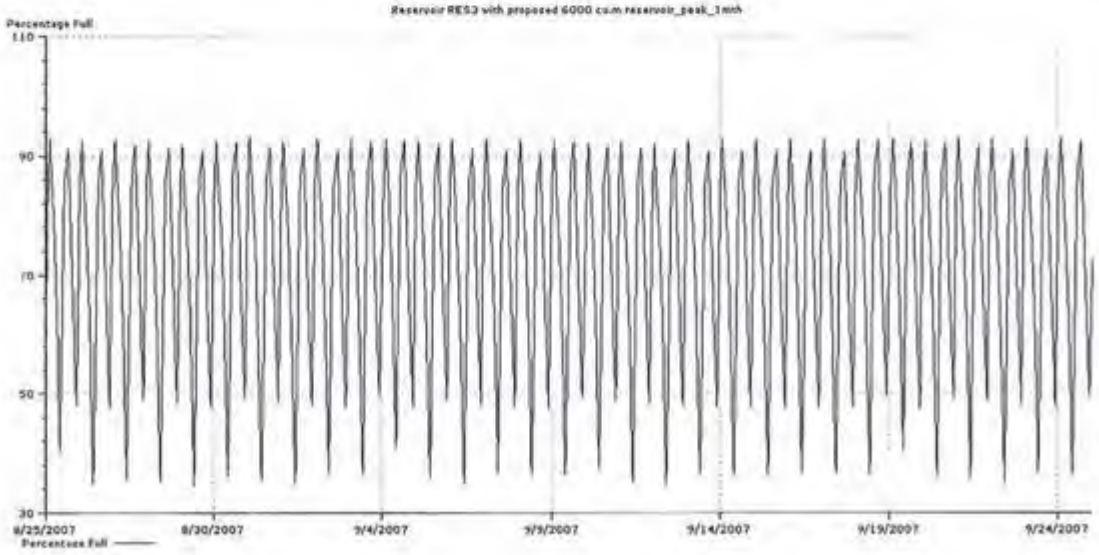
Pump Station	Operating hours	Pressure at control node (m)
Tasman Road pump	24	70
Rangiuru Road pump	0	62
New bore pump	24	N.A.



- **Figure 10 Flow required from new bore pump**

No data is currently available on the yield of the new bore opposite the County Road pump station. Modelling results, as shown in figure 10, indicate that the yield of this new bore needs to be around 55 l / s for the whole system to work.

Based on the current pumping regime of the County Road Booster pump station, the levels of the Waitohu Service Reservoir will fall far below the 62.5% of reservoir depth. This is shown in figure 11.



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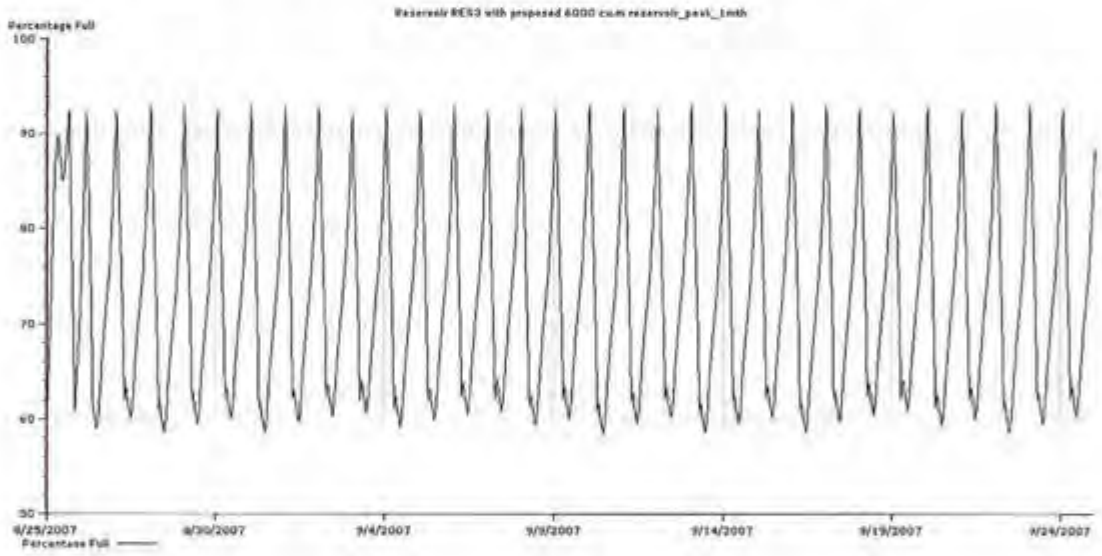
- Figure 11 Waitohu Service Reservoir Levels

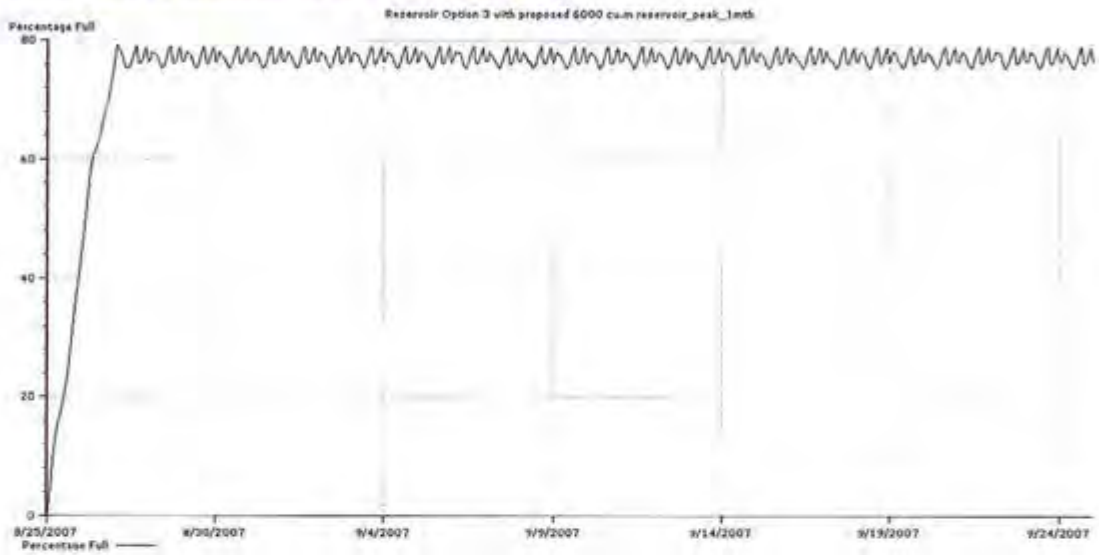
To resolve this, the current time and level control pumping regime of the County Road Booster pump station could be altered to a pure level control regime. The time controls in the regime were put in place to ensure that the Otaki bore zone has sufficient pressure in times of peak demand. With the presence of the 6000 m3 reservoir to act as a pressure regulator in times of peak demand in the system, the time controls can be removed. The next modelling scenario shows the results when the time controls are removed.

4.4.4 Scenario 3 - Removal of time control in County Road Booster Pump station

Figures 12 and 13 show the levels at the Waitohu Service Reservoir and the 6000 m3 reservoir after removal of the time controls at the County Road Booster pump station.

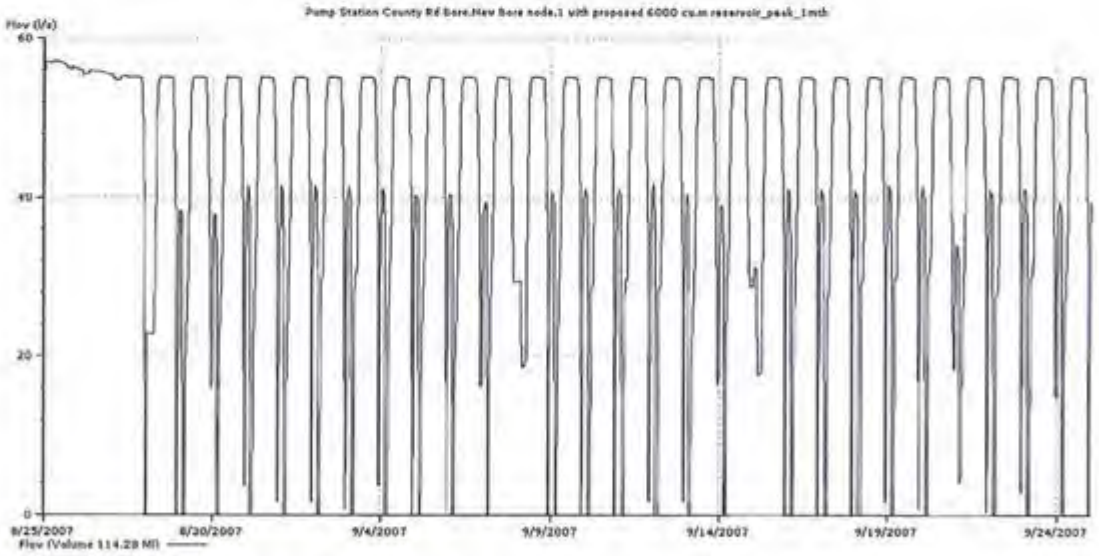


- **Figure 12 Waitohu Service Reservoir level**



- **Figure 13 6000 m3 reservoir level**

Results indicate that a pure level control regime is able to maintain the water levels at both the Waitohu Service Reservoir and the proposed 6000 m3 reservoir without affecting the pumping rate for the new bore pump which remains the same, as shown in figure 14.



- **Figure 14 New bore pump flow rate**

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5. Conclusions and Recommendations

- The calibrated model is a good tool for assessing options.
- A new c6000m3 service reservoir is of the right order of size to meet future demands of the Otaki area. The required size can only be confirmed when a decision is made on water supplies to Te Horo and Hautere.
- There are a number of possible sites along high ground north of the racecourse. We have considered two particular sites but a number of viable locations could be possible between Te Manuao rd and Ringawwhati Rd.
- Locating the reservoir at 45m aMSL will not provide sufficient pressure to maintain residuals above 25m during periods of average demand at 2026 population levels.
- Constructing the reservoir at 67.5m aMSL allows the reticulation system to be maintained at acceptable pressures during periods of average demand but not during peak demand in 2026. To enable satisfactory pressures under all flow conditions some 2km of the trunk main along Mill Road has to be upgraded.
- The yield of the new bore at County Road should be confirmed. Once confirmed storage and reticulation needs can be confirmed using the calibrated model. Initial modelling indicates that a yield of 55l/s is sufficient for needs up to 2026.
- The current time and pressure control regime operating for the County Road Booster Pump Station will need modification once the system is connected to a new reservoir. Simple changes to the regime indicate that it will be possible to keep both reservoirs filled over a medium term cycle.
- There are still some issues to be resolved regarding operation of the water supply model – these need to be resolved before any further scenario assessment is undertaken.
- There are wider issues relating to the operation of the Otaki system which need to be investigated before major investment in storage is made. In particular the apparently high over night use.
- Initial enquiries regarding land ownership needs to be made in respect of the potential sites identified. These enquiries should be extended to include for any site in the area between options 3 and 4 provided that the ground level is above 60m.
- Following discussion with potential landowners a first sweep of ground condition should be made to further fine tune the preferred site in advance of major spend on site investigation.
- Initial meetings should be held with the Planning Authority to highlight any other potential constraints or clashes with other developments. Mitigation measures could be explored including planting, use of existing trees as screening, cross country pipeline routes etc.

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KAPITI COAST WATER MODELLING PHASES 4+5 - WATER NETWORK DEVELOPMENT PLAN

Prepared for Kapiti Coast District Council

January 2017

QUALITY STATEMENT

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
DRAFT	26.01.17	Draft for Client Review	BD	CP	TW	TW

Executive Summary

This report outlines the process and outcomes of a master planning exercise carried out to identify capital requirements for water network development in Otaki, Waikanae and Paraparaumu/Raumati out to 2046.

The water network model built in phases 1-3 of the KCDC Water Modelling Project has been used as a base to develop a 30-year water networks capital investment programme. This involved creation of future planning horizon demand scenarios, assessment of the network in relation to performance criteria for pressure, fire flow and storage, and identification of capital projects to address deficiencies. Unit rates were used to assign potential high level costs to these projects.

A summary of the costs of the recommended capital works are summarised in Table 1-1. It was found that with expenditure to bring the network up to standard spread over the next 10 years, the network would require no additional capital investment between 2026 and 2046 with the currently expected population growth.

Table 1-1 : Cost Overview

Upgrade Type	2016	2026	2036	2046	Total
Greenfields	$2,550,000	$1,700,000	$0	$0	$4,250,000
Strategic	$13,500,000	$4,150,000	$0	$0	$17,650,000
Pressure	$2,300,000	$1,800,000	$0	$0	$4,100,000
Fire	$7,350,000	$1,000,000	$0	$0	$8,350,000
Total	**$25,700,000**	**$8,650,000**	**$0**	**$0**	**$34,350,000**

The recommended upgrades are listed in Table 1-2, and plans giving an overview of the upgrades are shown in Figure 1-1, Figure 1-2 and Figure 1-3.

Some alternative upgrade options are discussed in detail, which could reduce costs or provide other benefits. These may be investigated further if required.

Table 1-2 : Upgrades Summary

Upgrade Ref	Upgrade Type	Report Section	Upgrade name	Description	Upgrade Quantities	Cost	Planning Horizon	Deficiencies addressed
UPG01	Greenfields	7.3.1	Ngarara Supply Main	Connects the Ngarara development to the existing network	650m of 200mm ID main	$650,000	2026	N/A
UPG02	Greenfields	7.3.2	Waikanae North Supply Main	Connects the remaining Waikanae North development to the existing network	500m of 200mm ID main	$500,000	2026	N/A
UPG03	Greenfields	7.3.3	Airport Industrial Supply Main	Connects the Airport Industrial development to the existing network	500m of 300mm ID main	$550,000	2026	N/A
UPG04	Greenfields	7.3.4	159 Winara Avenue Development	WPS, rising main, reservoir and gravity distribution network for 80 properties	1 x pump station, 1 x 250m^3 reservoir, 500m of 100mm ID rising main, 800m 150mm ID reticulation	$2,550,000	2016	N/A
UPG05	Strategic	7.4.1	Tasman Road Trunk Main	Connects Tasman Road bores to Otaki Main Street	1,500m of 250mm ID main	$1,600,000	2016	F2 (severe) & Security of Supply
UPG06	Strategic	7.4.2	Otaki Reservoir	New reservoir and combined inlet/outlet main connecting to Otaki network upstream of County Road WPS	1 x 2,500 m^3 reservoir, 1,750m of 250mm ID main	$11,900,000	2016	F2 (severe) & Security of Supply
UPG07a	Strategic	7.4.3	Ngarara Loop Stage 1	Connection from Elizabeth Street to Ngarara supply main. Installation of a new PRV at intersection of Ngarara Road and Ferndale Drive set to deliver 67m HGL.	350m of 250mm ID main, 2,050m of 200mm ID main, 1 x new 200mm diam PRVs	$2,650,000	2026	P1 (severe) P4 (moderate) P5 (moderate)
UPG07a	Strategic	7.4.3	Ngarara Loop Stage 2	Connection from Ngarara development through to Waikanae Beach. Installation of a new PRV delivering 53m HGL between Ngarara and the Waikanae Beach zone.	1,150m of 200mm ID main, 1 x new 200mm diam PRVs	$1,500,000	2026	P1 (severe) P5 (moderate) & Security of Supply
UPG08	Pressure	7.5.1	Tui High Level Extension	Extension of Tui High Level from Tui Crescent to the end of Kotare Street (feeding the WPS to supply the 159 Winara development). Also includes reconnection of around 90 properties in Kotare Street to the new Tui HL main.	650m of 100mm ID main, approx. 90 customer reconnections	$1,050,000	2016	P2 (moderate)

Upgrade Ref	Upgrade Type	Report Section	Upgrade name	Description	Upgrade Quantities	Cost	Planning Horizon	Deficiencies addressed
UPG09	Pressure	7.5.2	Ngaio Street Valve	Open Ngaio Street boundary valve to increase supply from Kakariki DMA into Hemi DMA. Will require new flow meter	1 x new 150mm diam flow meter	$50,000	2016	P2 (moderate) F1 (severe)
UPG10	Pressure	7.5.3	Riwai High Level Alterations	Extension of Riwai High Level to supply high-elevation properties. Also involves reconnection of three existing mains to high level and reconnection of around 90 customers to new and existing high level reticulation.	3 x distribution main reconnections, approx. 90 customer reconnections, 120m of 100mm ID main, 260m of 50mm ID main	$1,100,000	2016	P3 (moderate) F12 (minor)
UPG11	Pressure	7.5.4	Te Moana PRV	Installation of new PRV at intersection Te Moana Road and Korimiko Road.	1 x new 200mm diam PRV	$100,000	2016	P4 (moderate)
UPG12	Pressure	7.5.5	Peka Peka	New 150mm ID main in Rutherford Drive between Pharazyn Avenue and Marram Way	2,050m of 150mm ID main	$1,800,000	2026	P5 (moderate)
UPG13	Fire	7.6.1	Otaki Loop Fire Main	Connection from Otaki Reservoir to the Riverbank industrial zone, connecting trhough to the 200mm diam main from Rangiuru bore in Riverbank Road.	250m of 250mm ID main, 2,850m of 200mm ID main	$3,350,000	2016	F2 (severe)
UPG14	Fire	7.6.2	Kapiti Road Fire Main	New 250mm ID main in Kapiti Road between Te Roto Drive and the estimated point of supply to Airport Industrial (near Cedar Drive)	950m of 250mm ID main	$1,000,000	2026	F3 (severe) F4 (moderate)
UPG15	Fire	7.6.3	Hurley Road and Magrath Avenue Fire Mains	New mains in Hurley Road and Magrath Avenue	350m of 150mm ID main	$300,000	2016	F4 (moderate)
UPG16	Fire	7.6.4	Rangiuru	New mains from Rangiuru bores to Old Coach Road and in The Ave	600m of 150mm ID main	$650,000	2016	F5 (severe)
UPG17	Fire	7.6.5	Mountain View Terrace	New main in Robert McKeen Street from Tasman Road to Mountain View Terrace	250m of 150mm ID main	$250,000	2016	F6 (moderate)
UPG18	Fire	7.6.6	Lupin Street	New main in Matene Street between Main Street and Hadfield Street, continuing in Hadfield Street to Tamihana Street	480m of 150mm ID main	$450,000	2016	F7 (moderate)
UPG19	Fire	7.6.7	Otaki Sports ground	New main from sports field gates in Mill Road to sports fields.	300m of 150mm ID main	$300,000	2016	F8 (minor)

Upgrade Ref	Upgrade Type	Report Section	Upgrade name	Description	Upgrade Quantities	Cost	Planning Horizon	Deficiencies addressed
UPG20	Fire	7.6.8	Freemans Road	New mains in Elphick Street, Te Manuao Road and Freemans Road bertween Waitohu Valley Road and Rahui Road. Also in Tararua Crescent and Renata Road	1,550m of 150mm ID main	$1,400,000	2016	F9 (severe)
UPG21	Fire	7.6.9	Puriri Road	New 150mm mains in Greenaway Road from Te Moana Road to Puriri Road, and continuing in Puriri Road to just short of Kauri Road	560m of 150mm ID main	$500,000	2016	F10 (moderate)
UPG22	Fire	7.6.10	Groves Road	New 150mm main in Kohutuhutu Road between Matatua Road and The Palms	120m of 150mm ID main	$150,000	2016	F11 (minor)
Total						**$34,350,000**		

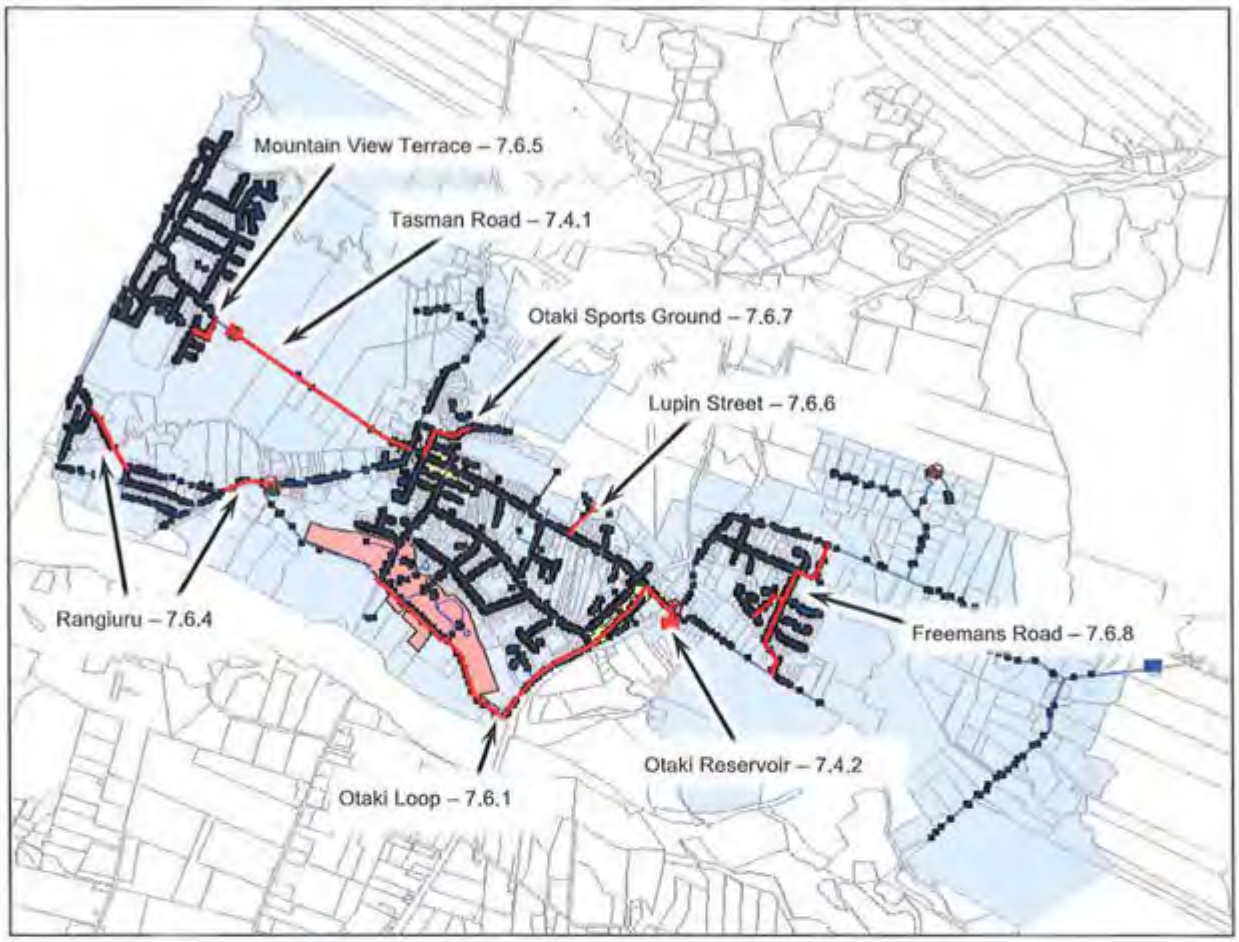

Figure 1-1 - Otaki Upgrades

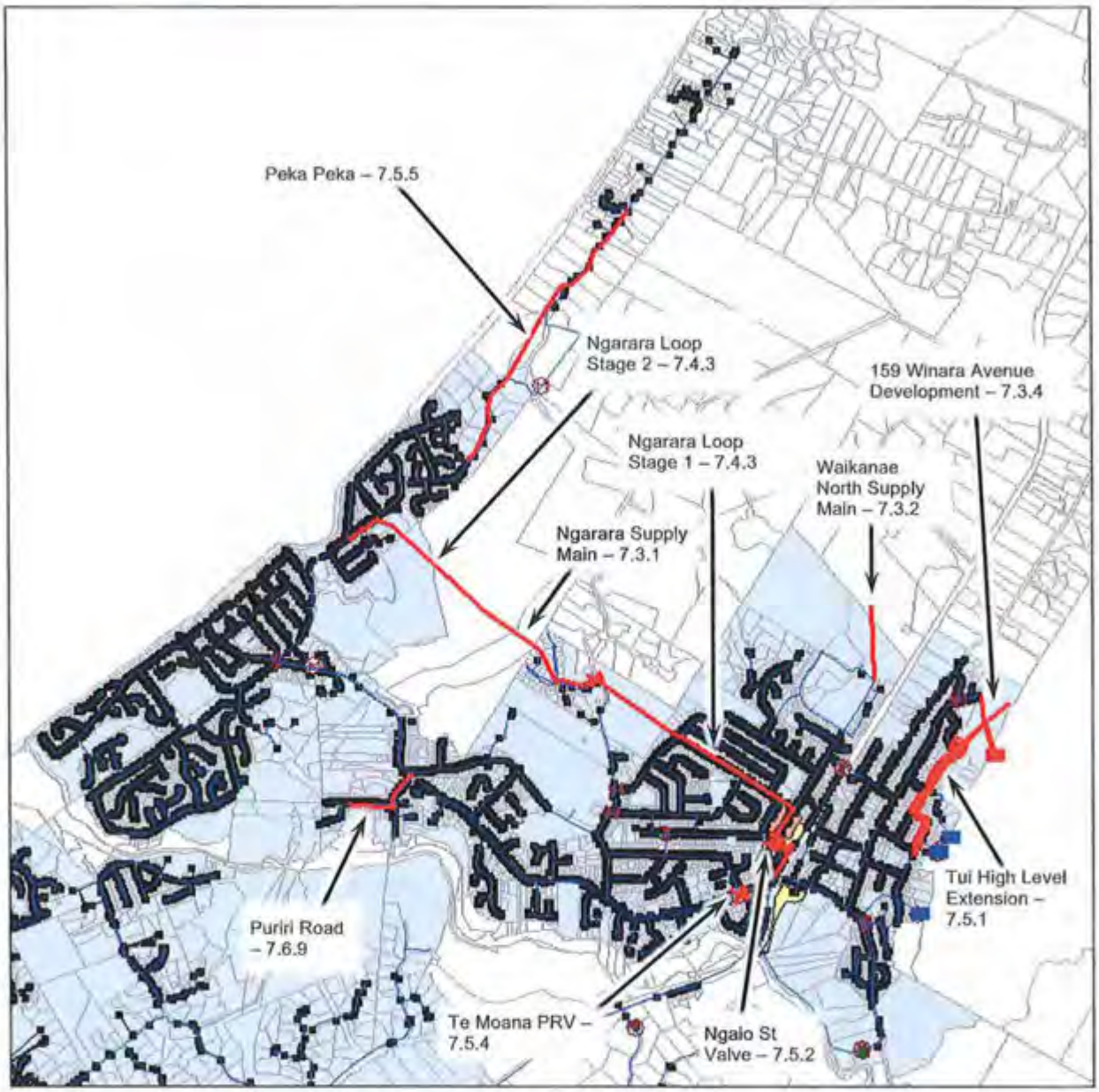

Figure 1-2 - Waikanae Upgrades

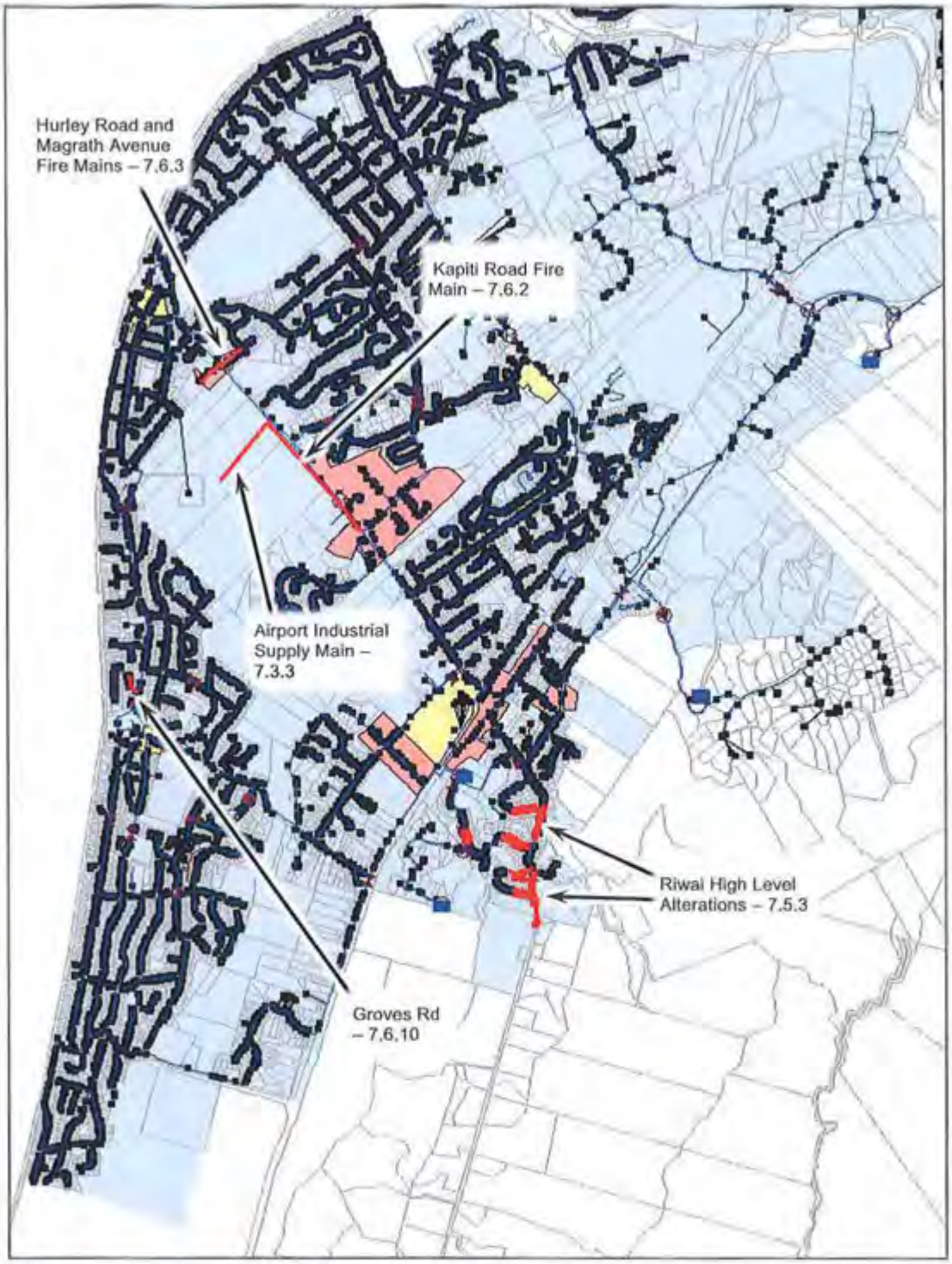

Figure 1-3 – Paraparaumu / Raumati Upgrades

Kapiti Coast District Council

KAPITI COAST WATER MODELLING
PHASES 4+5 - WATER NETWORK DEVELOPMENT PLAN

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APPENDICES

1 Introduction

In 2009, MWH NZ Ltd. were first engaged by Kapiti Coast District Council (KCDC) to update the KCDC water models and use them for various network design projects. This process created the models WPR M03 (simulating the Waikanae / Paraparaumu / Raumati network), and Otaki M02 (representing Otaki).

In May 2016, Kapiti Coast District Council (KCDC) engaged MWH to undertake a full rebuild of the water network model from base data, followed by phases of network development planning and calibration. This project is intended to confirm major capital works in KCDCs long-term asset management plan for water supply.

The Kapiti Coast Water Modelling project comprises 6 phases. Phases 1 to 3 included rebuild of the model network, rebuild of the model demand and model verification. The processes and outcomes from these phases of the project are outlined in the Model Build and Verification report (MWH, August 2016).

This report contains details of Phases 4 and 5, including the development of a Planning Model and identification of future network upgrades to produce a Water Network Development Plan (WNDP), outlining water networks capital investment required to maintain levels of service out to 2046.

Phase 6 of the project relates to model calibration, and will be addressed in a separate report.

1.1 Objectives

The objectives of Phase 1 to 3 of the project have already been completed and are covered in the previous Model Build and Verification report (MWH, August 2016). The objectives were:

- Process asset data kept in the InfoNet asset management system and identify any critical issues before import to the model network.
- Derive categorised demands on a District Metered Area (DMA) level from billing and bulk flow data, including residential, commercial and water loss categories.
- Create Annual Average and Average Day Peak Week (ADPW) demand sets, based on daily flows from the 2014/15 financial year.
- Define model boundary conditions and develop controls based on any available data, to ensure the model produces similar outputs to field data.
- Save the model as KCDC WS MOP04.

The objectives for phases 4 and 5 relate to development of the WNDP. This report documents the processes and outcomes of the work to achieve these objectives, as outlined below.

- Develop future demand scenarios.
- Undertake a system performance assessment for the future scenarios.
- Prepare a water network development plan.

Phase 6 objectives will be addressed in a separate document, and include:

- Prepare and oversee a calibration field test.
- Undertake a calibration of the model.

1.2 Specifications

No specifications have been developed for KCDC, but work was based on the Wellington Water's *Regional Water Model Specifications 2014 v6*.

1.3 Software

The modelling software used is InfoWorks WS version 16.5, supplied by Innovyze.

2 Study Area

Kapiti Coast District lies on the west coast of the North Island, just north of Wellington. The district is part of the Greater Wellington region, and consists of four major towns – Otaki, Waikanae, Paraparaumu/Raumati and Paekakariki.

The district lies on the slopes of the Tararua ranges to the east and slopes down to sea level in the west. The towns generally sit on the coast, with elevations up to around 100m. Otaki and Paekakariki have separate water networks, and Waikanae, Paraparaumu and Raumati have a combined network known as the WPR network. This study deals only with the Otaki and WPR networks, excluding Paekakariki.

The Otaki network is supplied from the Tasman and Rangiuru bores, which sit between the main township (on SH1) and the beach. Water is pumped through reticulation down to the beach and up to the township, and at SH1 water is boosted up through a higher supply zone to the Waitohu Reservoir.

The WPR network is fed from the Water Treatment Plant (WTP) on the Waikanae River. From there water is pumped along separate trunk mains, north to Waikanae and south to Paraparaumu/Raumati. The Waikanae trunk main feeds into the Kakariki Reservoir. This supplies all of the Waikanae township with water gravitating down to SH1 and the town centre, then on down through twin trunk mains to Waikanae beach. From there water also feeds north to the Peka Peka rural community, which comprises a number of fixed volume restricted-flow customers.

Paraparaumu/Raumati trunk main heads south to the Otaihanga Reservoir, and then on to the Riwai Reservoir which is the main supply for all of Paraparaumu/Raumati. A number of restricted supply rural customers are serviced off the trunk main. A small number of high-elevation customers receive water via a booster station at Riwai Reservoir, but the remainder of the network is supplied via gravity from Riwai Reservoir. Water flows across SH1 and through central Paraparaumu, before the network splits into four main supply routes, each supplying a DMA.

Figure 2-1 and Figure 2-2 show overviews of the reticulation networks including DMA extents. Figure 2-4 and Figure 2-3 show operational schematics of the WPR and Otaki water supply networks, including reservoirs, DMAs, district flow meters, pump stations and exports.

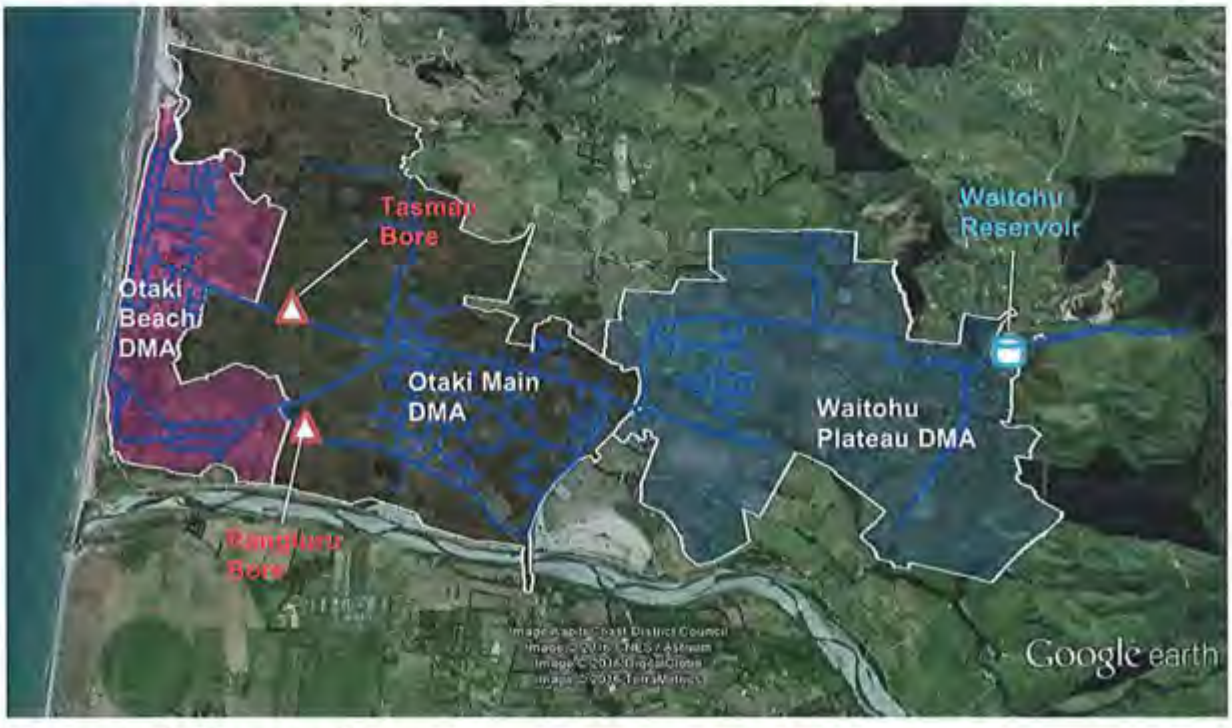

Figure 2-1 : Otaki Network Overview

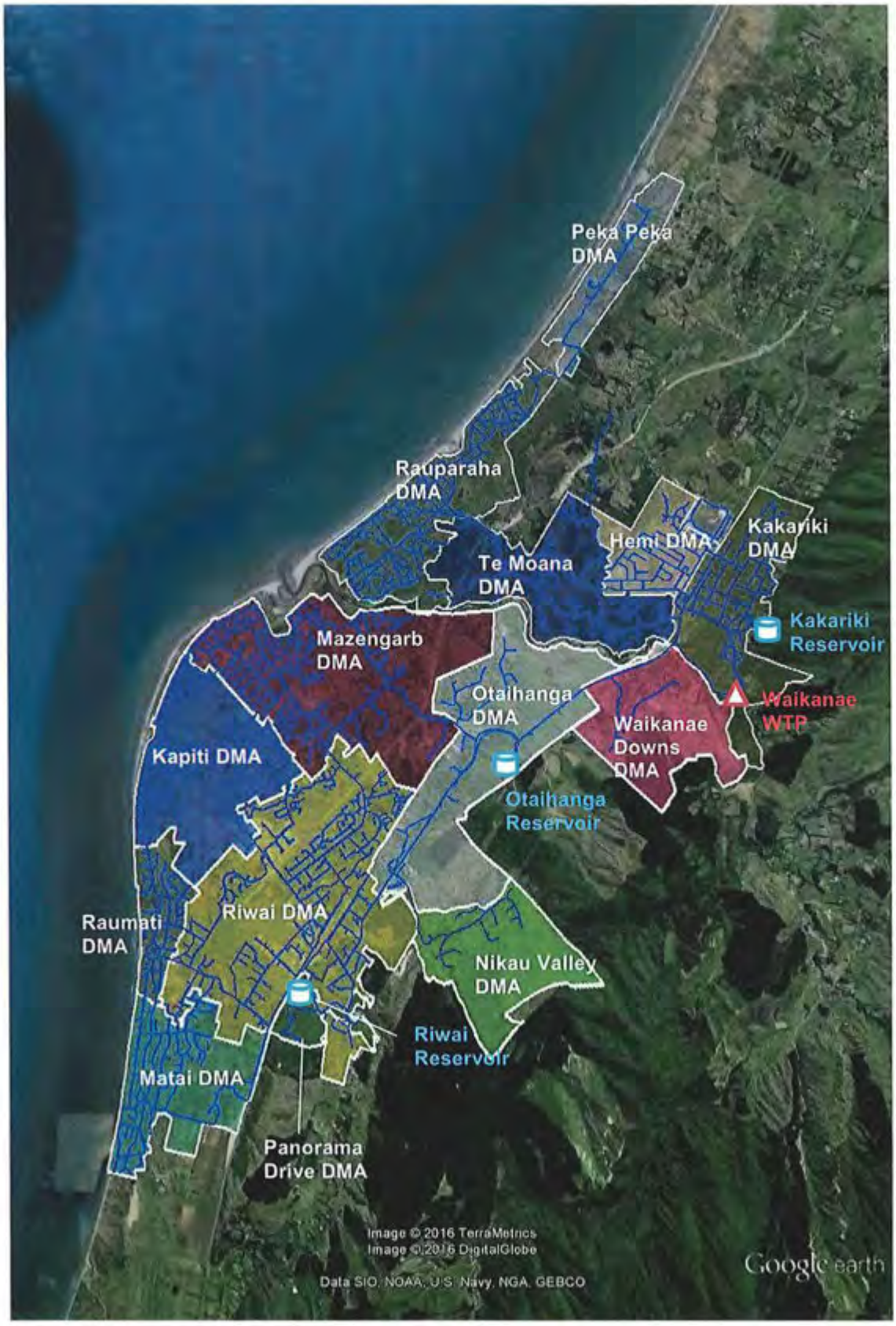

Figure 2-2 : WPR Network Overview

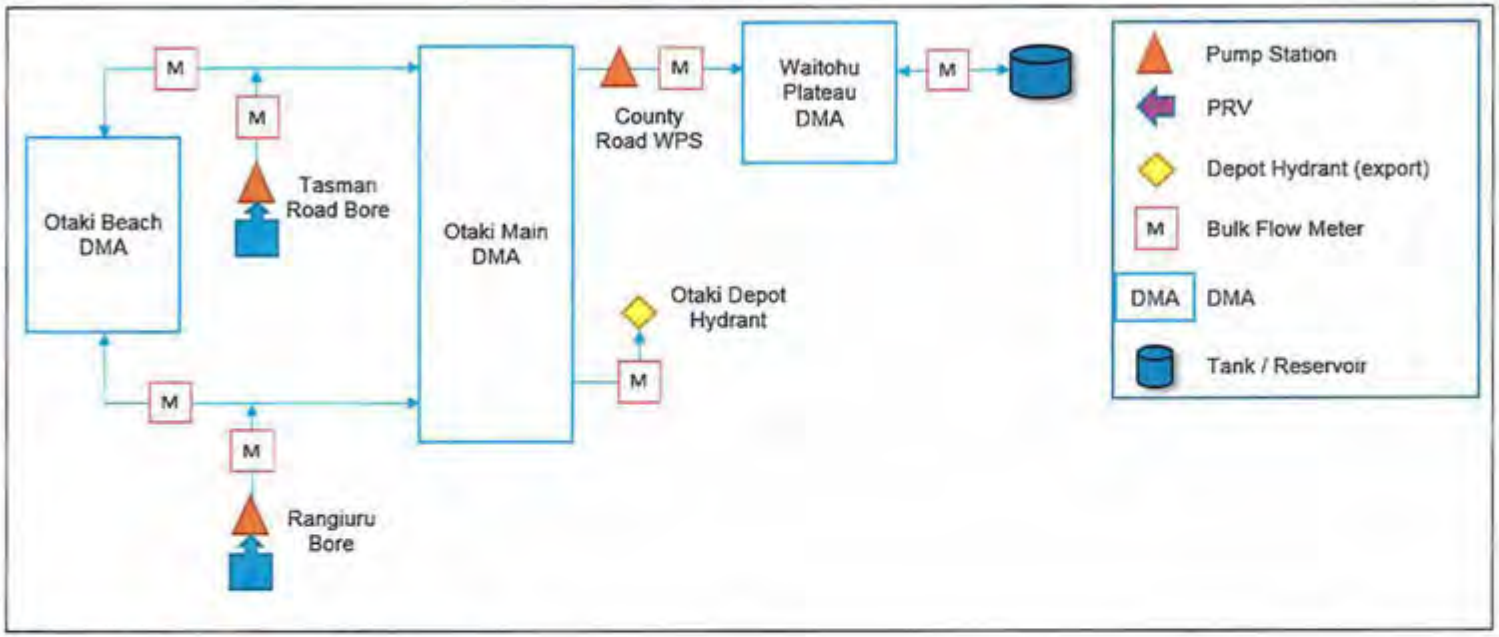

Figure 2-3 : Otaki Network Configuration

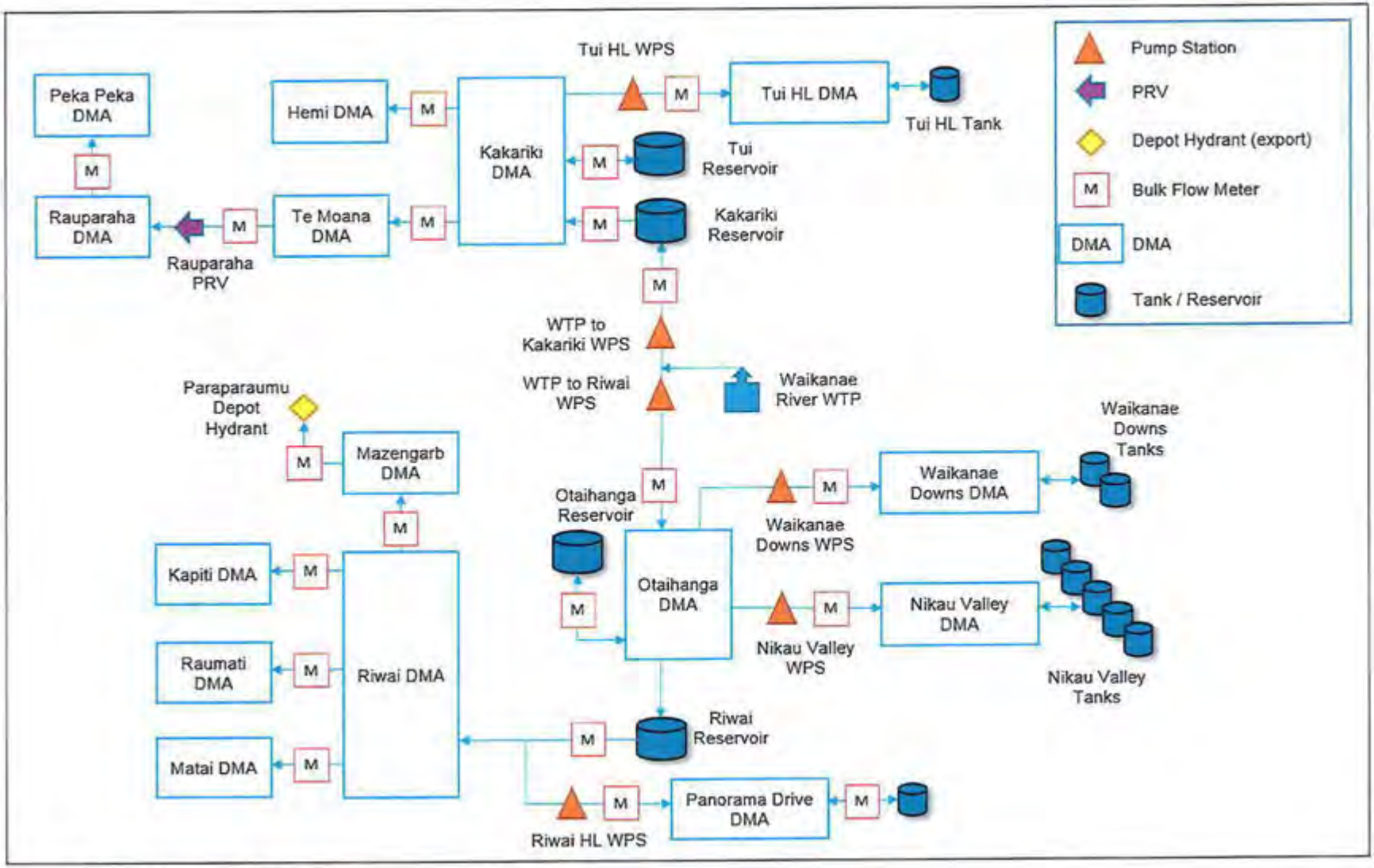

Figure 2-4 : WPR Network Configuration

3 Data Sources

KCDC provided the following data for use in development of future planning horizons:

- The Kāpiti Coast Water Conservation Report (2015/16), containing current water use and target water use figures.
- Population projections document "2014 Kapiti Coast District projections Update: revision to a 2013 census base and updated net migration and household formation assumptions." (Monitoring and Evaluation Research Associates Ltd, June 2014)
- Greenfields development areas (as shown in the District Plan land use zones)

These data sets were used in combination with the Master Operational Model KCDC MOP04 to create the Water Network development Plan.

In addition to data sets, KCDC operations staff were consulted regarding network operational philosophy and control rules governing pumps and reservoirs.

4 Population and Demand Growth

4.1 Design Demand Target

The Kapiti Coast Water Conservation Report 2015/16 provides information on current water use, and sets out a target peak summer demand of 490 l/person/day. This figure includes residential demand, commercial / industrial demand and water loss. The report shows that the WPR network is already achieving this target, and water use on the Otaki network is just above this rate but reducing rapidly.

It was therefore agreed with KCDC that 490 l/person/day would be an appropriate design demand for use in the WNDP.

Using this assumption, population projections provided by KCDC were used to calculate the design demand for the total system, which includes the residential, commercial and leakage demands. It has been assumed that commercial and leakage demands associated with the existing network will not increase into the future. The increase in future demand has therefore been split between greenfields industrial developments, greenfields residential demand and infill demand.

4.2 Population Projections

Projected populations for the Kapiti Coast area were provided by Kapiti Coast District Council and sourced from *"2014 Kapiti Coast District projections Update: revision to a 2013 census base and updated net migration and household formation assumptions."* (11 June 2014, Monitoring and Evaluation Research Associates Ltd), and were supplied by sub-district from 2013 to 2038 in 5 year intervals.

The populations were interpolated to align with the water network planning horizons and extrapolated past 2038 using the 2033 to 2038 growth factor to attain a figure for 2046.

Table 4-1: Population Projections

Water Supply Zone	2016	2026	2036	2046
Waikanea	11,426	13,056	14,669	16,207
Paraparaumu/Raumati	27,249	28,636	29,458	29,954
Otaki	5,883	5,912	5,771	5,547
Total	44,558	47,603	49,898	51,708

Otaki is forecasted to decrease in population after 2026, however for modelling purposes it was assumed that demand in Otaki will remain constant after 2026.

4.3 Design Demand

The total system design demand for the planning horizons has been calculated in a top-down manner, starting from the assumption of 490 l/person/day total system demand derived from the Kapiti Coast Water Conservation Report 2015/16.

Table 4-2 shows the total demand figures in each supply zone, calculated from the population projections.

Table 4-2: Design Demand

Water Supply Zone	2016 (m^3/day)	2026 (m^3/day)	2036 (m^3/day)	2046 (m^3/day)
Waikanae	5,599	6,397	7,188	7,942
Paraparaumu/Raumati	13,352	14,031	14,434	14,677
Otaki	2,883	2,897	2,897	2,897
Total	21,834	23,325	24,519	25,516

The design demand figures for each planning horizon were then broken down into the following categories:

- Existing residential demand
- Existing commercial and leakage demand
- Greenfields development demand (commercial and industrial)
- Residential infill development demand

4.3.1 Greenfields Developments

Areas planned for future development are shown in Figure 4-1, along with the levels of development in each planning horizon. The proposed property numbers were sourced from the current consent applications that have been received by KCDC as of October 2016.

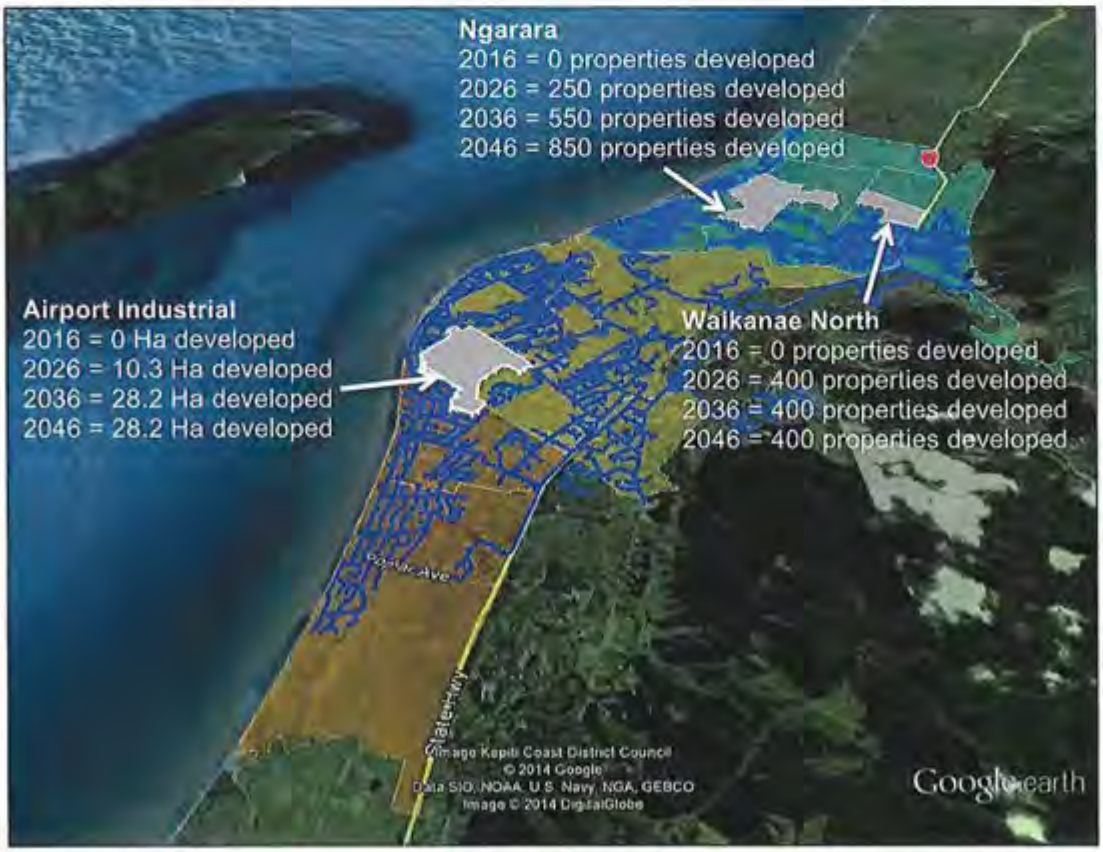

Figure 4-1: Greenfields Development Areas

As can be seen, Ngarara and Waikanae North will both form part of the Waikanae network. The airport industrial area will be supplied from Paraparaumu. Table 4-3 and Table 4-4 show the size and demand associated with the greenfields development areas.

Table 4-3: Future Greenfields Develpoment Units

Development	2016	2026	2036	2046
Waikanae North	0	400 Properties	400 Properties	400 Properties
Ngarara	0	250 Properties	550 Properties	850 Properties
Airport Industrial	0	10.3 Ha	28.2 Ha	28.2 Ha

Table 4-4: Future Greenfields Development Demand

Development	2016 (m^3/day)	2026 (m^3/day)	2036 (m^3/day)	2046 (m^3/day)
Waikanae North	0	490	490	490
Ngarara	0	306	674	1,041
Airport Industrial	0	445	1,218	1,218

These demands are subtracted from the total system design demand figures presented in Table 4-2 to facilitate calculation of infill demand.

4.3.2 Existing and Residential infill Demand

The base demands in the model have been based on billing data from 2014/15, and represent annual average demands. Table 4-5 shows these demands.

Table 4-5: Existing Average Demands

Water Supply Zone	Existing Commercial Demand (m^3/day)	Existing Leakage Demand (m^3/day)	Existing Residential Demand (m^3/day)
Waikanae	599	1,877	2,264
Paraparaumu/Raumati	1,277	1,672	5,104
Otaki	395	732	1,320

The existing commercial and leakage components of demand are assumed to remain constant into the future. These are therefore also removed from the total system demand. What remains represents residential demand on the existing network, including infill growth, and scaled to represent peak summer day.

Both infill growth and seasonal increase in demand are assumed to be distributed across the network relative to the existing residential demand, so a combined scaling factor is used to represent both summer peak scaling and infill growth.

The breakdown of the design demand and residential demand scaling factors are shown in Table 4-6.

Table 4-6: Future Residential Infill and Seasonal Demand Scaling Factors

Water Supply Zone	Design and Infill Residential Demand (m^3/day)				Residential Demand Scaling Factor			
	2016	2026	2036	2046	2016	2026	2036	2046
Waikanae	3,123	3,125	3,549	3,935	1.380	1.381	1.567	1.738
Paraparaumu/Raumati	10,403	10,638	10,267	10,510	2.038	2.084	2.012	2.059
Otaki	1,756	1,770	1,770	1,770	1.330	1.341	1.341	1.341

4.4 Peka Peka and 159 Winara Development Demands

Based on discussions with KCDC, two additional sets of demand were applied to the model to represent particular developments with a high likelihood of occurrence. As these are small localised developments demand for the remainder of the network was not recalculated.

4.4.1 Peka Peka

KCDC advised they wished to upgrade the supply for Peka Peka residential properties from fixed-volume trickle-feeds to full on-demand supply. It was thought this might create the potential for growth in Peka Peka which has not been accounted for in the overall methodology.

The following changes were made to the model to ensure the network would be capable of supplying this increased demand:

- Current per-property demand in Peka Peka is low in comparison to other KCDC DMAs, so to ensure any change in water use habits which might be caused by a change to on-demand supply was accounted for, Peka Peka demand was increased to 490 l/person/day, the same figure used for greenfields residential demand. Assuming occupancy of 2.5 people per property this equates to 1,225 l/prop/day. With 72 properties this amounted to a total demand of 1.02 l/s, 88 m3/day.
- The demand pattern from the adjacent Rauparaha DMA was used to represent demand distribution across the day, with a daily peaking factor of 2.2 at 7:20am.
- The demand was scaled by a factor of 2 in the demand scaling data set, representing a doubling of the population was doubled from 180 people to 360 people to represent maximum potential growth.
- Leakage on the network was not altered.

The resulting total Peka Peka daily design demand is 176 m^3/day, with a peak demand of 5.1 l/s at 7:20am.
The previous Peka Peka demand of 59 m^3/day, with a maximum demand of 0.7 l/s was left in place in 2016, but was replaced with the new higher demand in the 2026, 2036 and 2046 planning horizons.

4.4.2 159 Winara Development

A new development on the eastern side of Winara Avenue in Waikanae is currently in the consenting stage. It is anticipated that this development will consist of 81 residential properties. These were therefore added to the model, on a single node in the centre of the development area.

The resulting total Winara Development daily design demand is 99 m^3/day, with a peak demand of 2.5 l/s at 7:20am. This demand was assigned in the 2016 planning horizon and remained unchanged in all following planning horizons.

4.5 Demand Summary

The demands used in the model for the WNDP are summarised in Table 4-7.

Table 4-7 : Demand Summary

Supply Zone / Category	2016 (m^3/day)	2026 (m^3/day)	2036 (m^3/day)	2046 (m^3/day)
Waikanae	**5,698**	**6,708**	**7,499**	**8,253**
Existing Commercial	599	599	599	599
Existing Leakage	1,877	1,877	1,877	1,877
Existing Residential + Infill	3,123	3,125	3,548	3,935
Greenfields	99	1,107	1,475	1,842
Paraparaumu/Raumati	**13,352**	**14,031**	**14,434**	**14,677**
Existing Commercial	1,277	1,277	1,277	1,277
Existing Leakage	1,672	1,672	1,672	1,672
Existing Residential + Infill	10,403	10,637	10,267	10,510
Greenfields	0	445	1,218	1,218
Otaki	**2,883**	**2,897**	**2,897**	**2,897**
Existing Commercial	395	395	395	395
Existing Leakage	732	732	732	732
Existing Residential + Infill	1,756	1,770	1,770	1,770
Greenfields	0	0	0	0
Total	**21,933**	**23,636**	**24,830**	**25,827**

5 Performance Criteria

Performance criteria have been specified for storage, minimum and maximum pressures and fire flows. Security of supply has not been specifically assessed, but known issues have been considered in the selection of upgrades where required. These are discussed in the individual upgrade descriptions in Section 7.

5.1 Storage

KCDC requires reservoirs to have sufficient storage for 24 hours of average demand for the area they service, plus storage sufficient for firefighting according to the New Zealand Fire Service Firefighting Water Supplies Code Of Practice SNZ:PAS 4509:2008 (known as the Fire Code).

5.2 Pressures

The KCDC AMP 2015 states that pressures at the point of supply for properties connected ot the KCDC water network should be above 25m at all times. There are some rural areas where the customer supply is maintained through fixed-volume trickle-feed supply – in these areas minimum pressure is only required to stay above zero.

There is no requirement in the AMP for maximum pressure, but to reduce mains breaks from high pressure and water loss through leakage, areas where pressure exceeds 80m have been identified.

To ensure upgrades focus on areas where investment will have the best results, areas where less than 5 properties are affected have not necessarily been addressed.

Appendix B contains plans showing minimum pressures across the network in each planning horizon **BEFORE** any upgrades have been put in place.

Appendix C contains plans showing minimum pressures across the network in each planning horizon **AFTER** upgrades have been implemented.

5.3 Fire Flows

The KCDC AMP 2015 states that they will meet the requirements of the Fire Code.

The Fire Code states that the required fire flow depends on the fire class of a building, which in turn depends on a number of characteristics which will vary from building to building, including the size of rooms (fire cells) and what that building will be used for. As every building has its own fire class (including buildings which have not yet been built), it was necessary to set limits on what fire class the council is required to supply.

Fire class plans were developed, based on land use zoning. These plans were used as a base for discussion with the New Zealand Fire Service (NZFS), in which suggestions and alterations to the plans were made. The final fire class plans are shown in Figure 5-1, Figure 5-2 and Figure 5-3.

Buildings may exist now or in the future with a higher fire class than the area they are in. The fire class plans are an indication that these buildings may not have sufficient cover for firefighting. It is thought that this may form the basis for discussions with the building owner, to ensure they are aware they need to either provide additional firefighting capabilities (on-site storage or sprinkler systems) or reduce their fire class (through reduction in fire cell size or a change in use of the building).

The Fire Code requires that the specified fire flows should be available at 2/3 of peak demand. In the KCDC network demand is 2/3 peak demand at 8pm – this is when fire flows have been assessed.

Appendix D contains plans showing the available fire flow at every node on the network in the 2043 planning horizon after upgrades have been implemented.

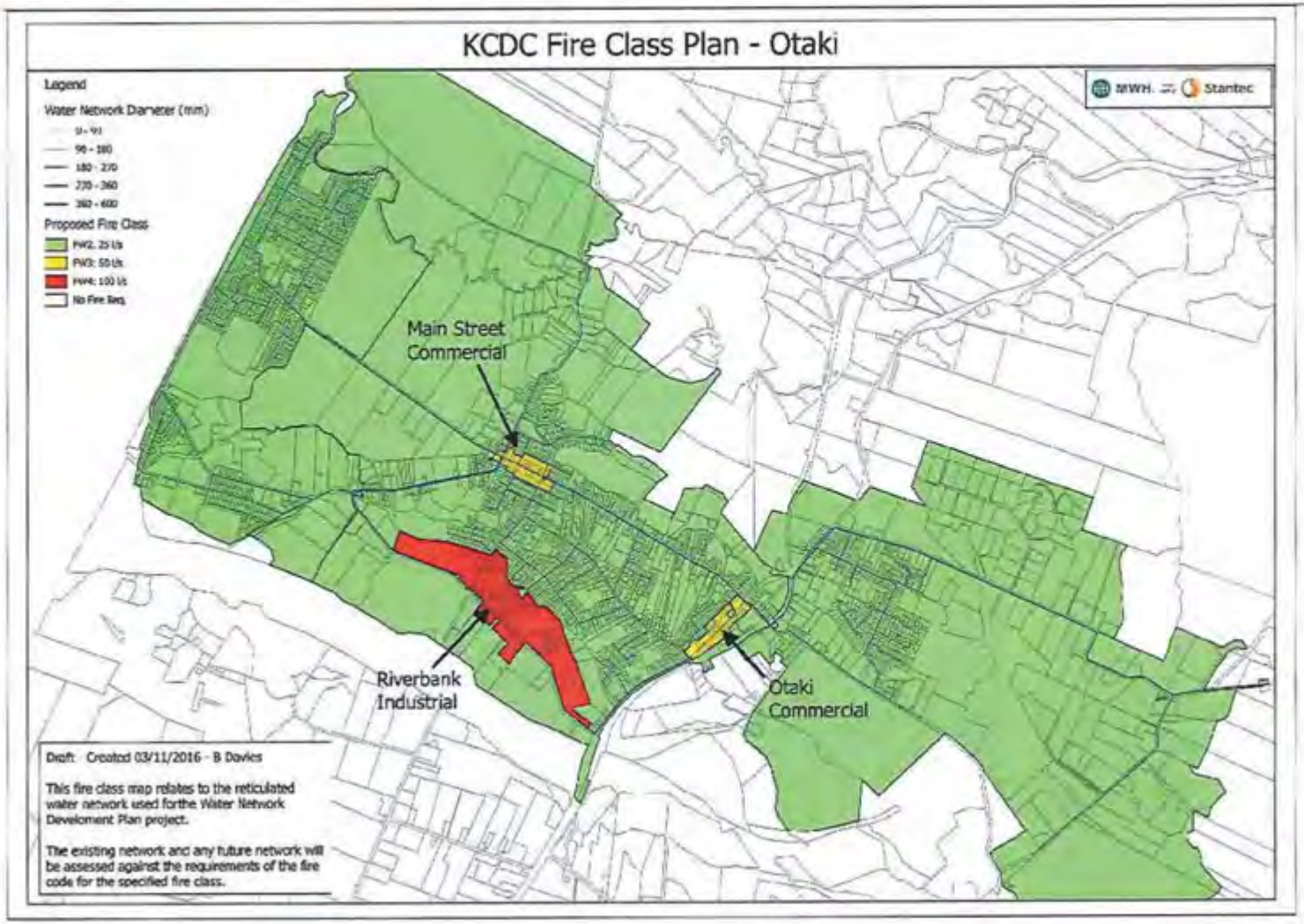

Figure 5-1 : Otaki Fire Class Plan

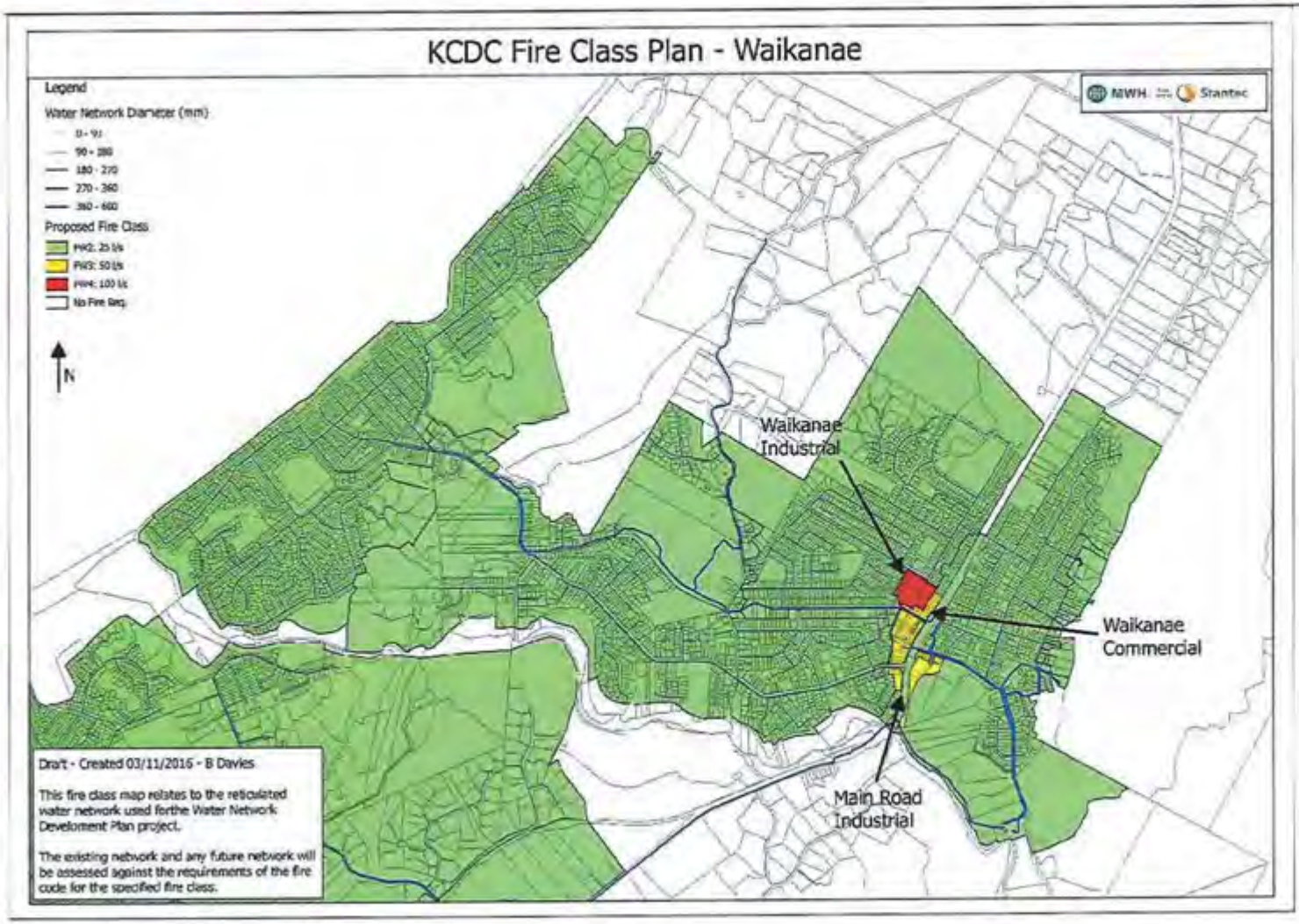

Figure 5-2 : Waikanae Fire Class Plan

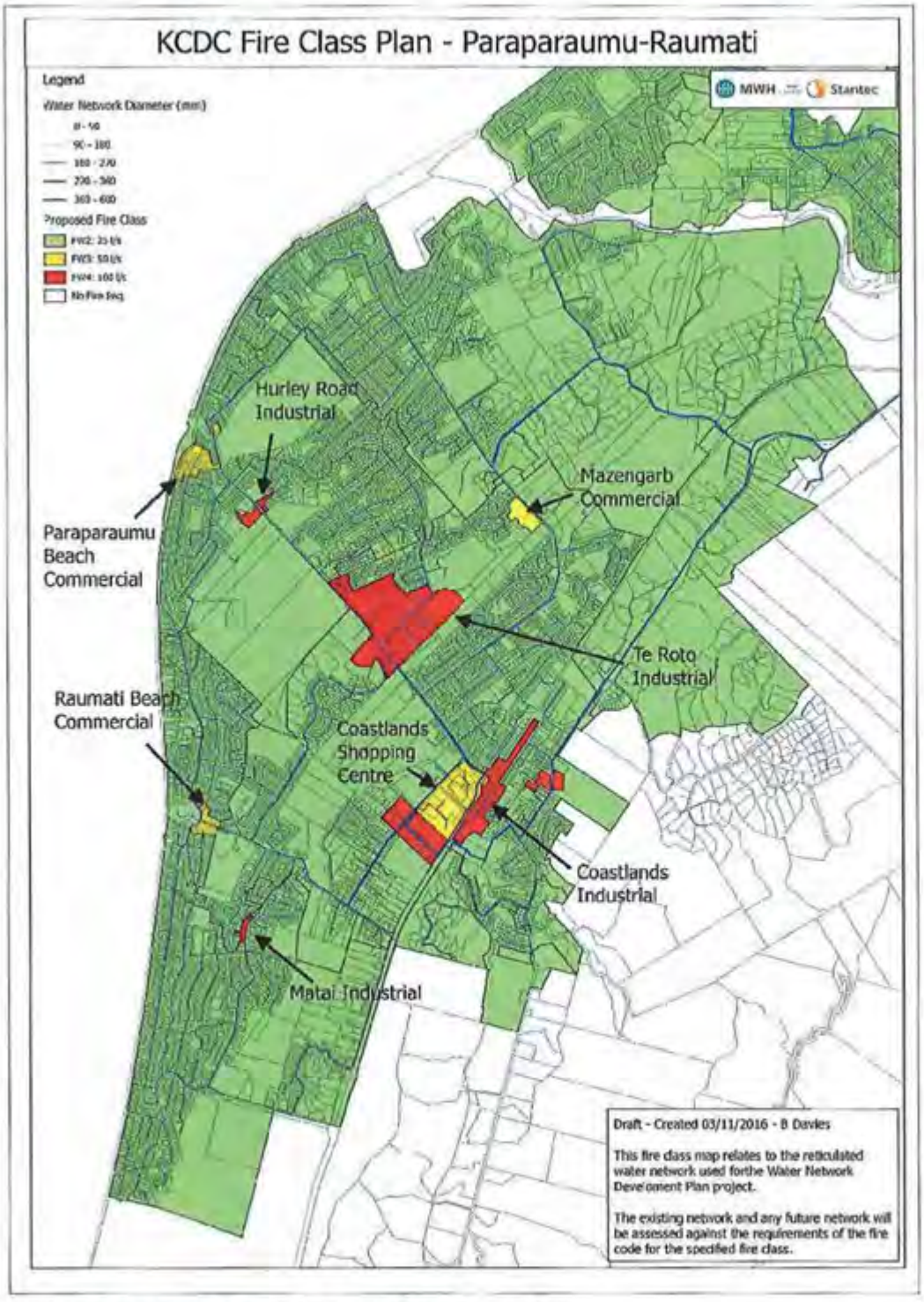

Figure 5-3 : Paraparaumu / Raumati Fire Class Plan

6 Performance Assessment

The initial performance assessment was carried out in 2046, to ensure that all areas with levels of service deficiencies could be identified in one pass. Once upgrades had been identified, progressive planning horizons were tested without the upgrades to identify what planning horizon they would first be required in.

6.1 Summary

Figure 6-1, Figure 6-2, and Figure 6-3 show areas where levels of service for pressure and fire flow are not met. Storage is addressed in Section 6.2, and details on the pressure and fire flow deficiencies are provided in Sections 6.3 and 6.4. Areas where levels of service are not required (e.g. rural areas) are also shown but it is noted that these have been excluded from further assessment once it has been determined they do not experience negative pressures.

Table 6-1 summarises the pressure deficiencies and Table 6-2 summarises the fire flow deficiencies in tabular form.

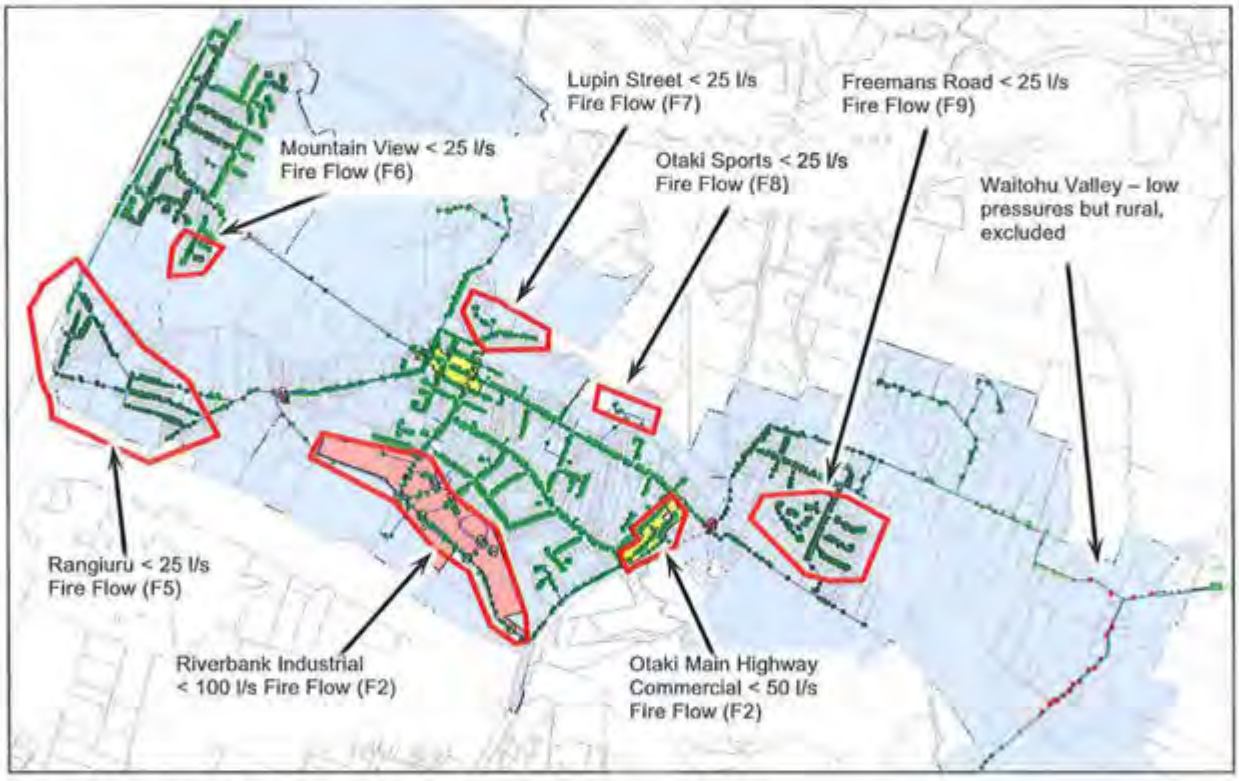

Figure 6-1 : Otaki Pressure and Fire Flow Deficiencies (2046)

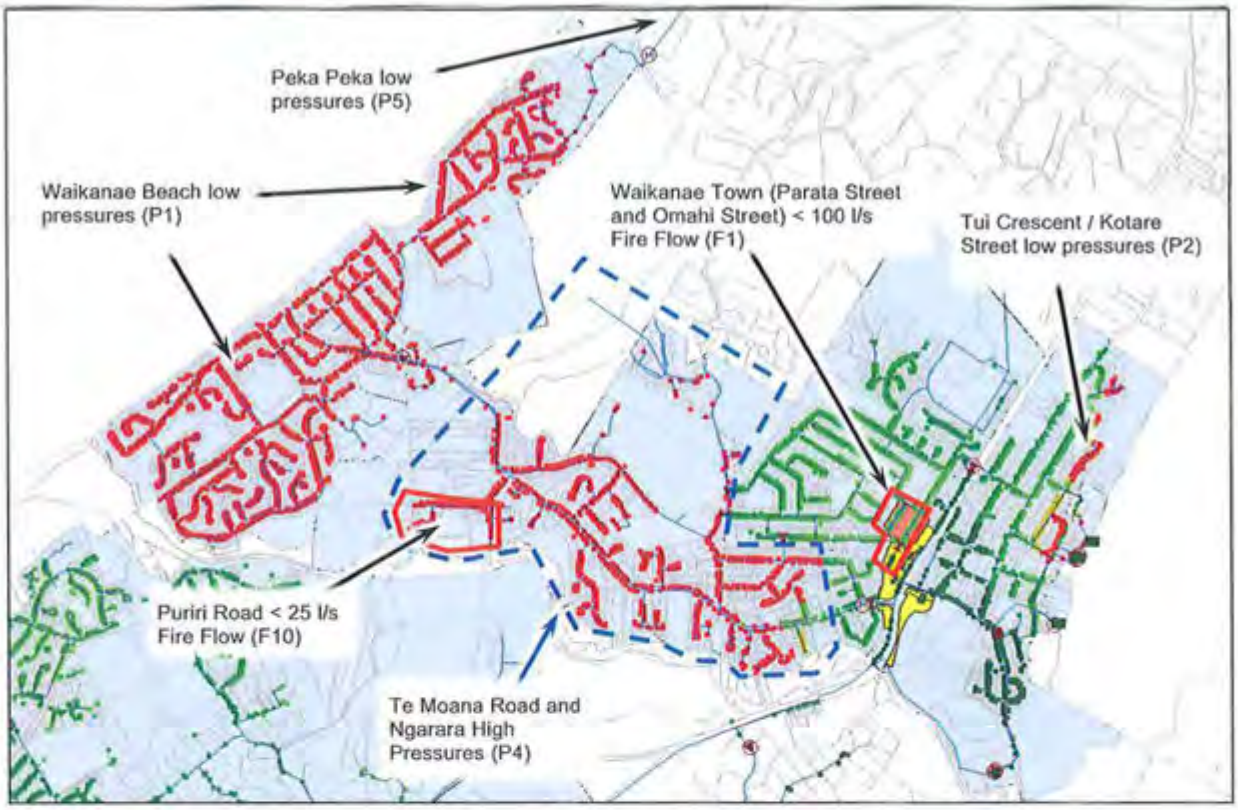

Figure 6-2 : Waikanae Pressure and Fire Flow Deficiencies (2046)

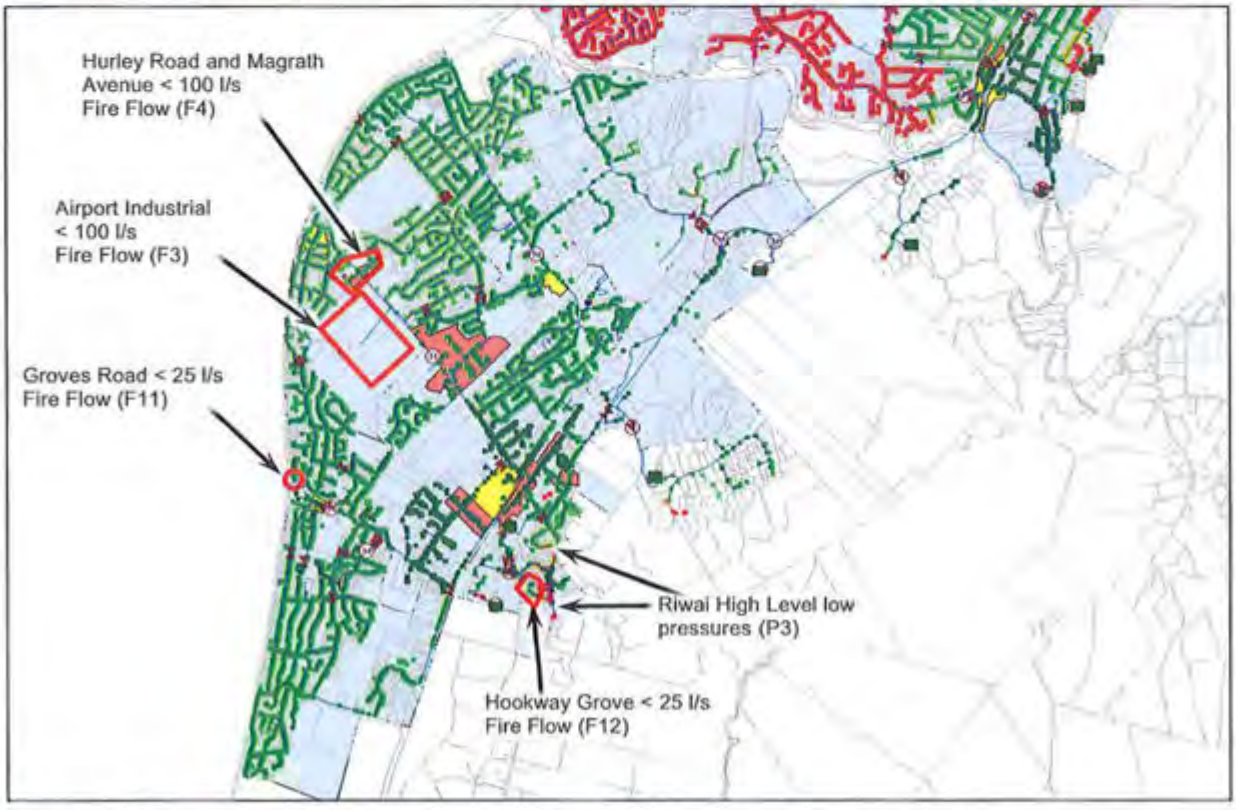

Figure 6-3 : Paraparaumu-Raumati Pressure and Fire Flow Deficiencies (2046)

Table 6-1 : Pressure Deficiencies

Deficiency	Description / Reference	# Props with Pressure < 25m or > 80m	Comments	Severity	Addressed by
P1	Ngarara and Waikanae Beach low pressures (Section 6.3.1)	Approx. 3,800 props (including Ngarara)	Low pressures due to extreme head losses in existing Te Moana Road mains	Severe	UPG07 - Ngarara Loop (Section 7.4.3)
P2	Hemi Street DMA, Tui Crescent Kotare Street low pressures (Section 6.3.2)	137 existing props	Low pressures – connected to low level reticulation	Moderate	UPG08 - Tui High Level Extension (Section 7.5.1)
P3	Riwai High Level low pressures (Section 6.3.3)	84 existing props	Low pressures – connected to low level reticulation	Moderate	UPG09 - Riwai High Level Alterations (Section 7.5.3)
P4	Te Moana Road high pressures (Section 6.3.4)	Approx. 1,750 props (including Ngarara)	High pressures at night	Moderate	UPG11 - Rauparaha PRV Relocation to Te Moana Road (Section 7.5.4)
P5	Peka Peka low pressures (Section 6.3.5)	144 props (on-demand, including growth)	Low pressures due to high head loss in existing Rutherford Drive main	Moderate	UPG12 - Rutherford Drive Upgrade (Section 7.5.5)

Table 6-2 : Fire Flow Deficiencies

Deficiency	Description / Reference	# Props Not Covered	Fire Class	Severity	Addressed by
F1	Waikanae Town (Parata Street and Omahi Street) (Section 6.4.1)	Approx. 60 Commercial and Industrial	FW3 and FW4	Severe	UPG09 - Ngaio Street Valve (Section 7.5.2)
F2	Riverbank Road and Otaki Main Highway (Section 6.4.2)	Approx. 145 Commercial and Industrial	FW3 and FW4	Severe	UPG05 - Tasman Road Trunk Main, Otaki Reservoir & Otaki Loop Fire Main (Sections 7.4.1, 0 & 7.6.1)
F3	Airport Industrial (Section 6.4.3)	Unknown – up to 28.2 Ha	FW4	Severe	UPG14 - Kapiti Road Fire Main (Section 7.6.2)

Deficiency	Description / Reference	# Props Not Covered	Fire Class	Severity	Addressed by
F4	Hurley Road and Magrath Avenue (Section 6.4.4)	Approx. 20 Industrial	FW4	Moderate	UPG14 - Kapiti Road Fire Main & UPG15 - Hurley Road and Magrath Avenue Fire Mains (Sections 7.6.2 & 7.6.3)
F5	Rangiuru (Section 6.4.5)	Approx. 200 Residential	FW2	Severe	UPG16 - Rangiuru Mains (Section 7.6.4)
F6	Mountain View Terrace (Section 6.4.6)	Approx. 60 Residential	FW2	Moderate	UPG17 - Mountain View Terrace (Section 7.6.5)
F7	Lupin Road (Section 6.4.7)	Approx. 60 Residential	FW2	Moderate	UPG18 - Lupin Road (Section 7.6.6)
F8	Otaki Sports ground (Section 6.4.8)	Approx. 10 Residential	FW2	Minor	UPG19 - Otaki Sports Ground (Section 7.6.7)
F9	Freemans Road (Section 6.4.9)	Approx. 200 Residential	FW2	Severe	UPG20 - Freemans Road (Section 7.6.8)
F10	Puriri Road (Section 6.4.10)	Approx. 75 Residential	FW2	Moderate	UPG21 - Puriri Road (Section 7.6.9)
F11	Groves Road (Section 6.4.11)	Approx. 10 Residential	FW2	Minor	UPG22 - Groves Road (Section 7.6.10)
F12	Hookway Grove (Section 6.4.12)	Approx. 35 Residential	FW2	Minor	UPG09 - Riwai High Level Alterations (Section 7.5.3)

6.2 Storage Deficiencies

Storage Calculations are shown in Table 6-3 for 2046. As can be seen, Otaki is the only area where storage is required before this time. A new reservoir is proposed to make up the shortfall (UPG06), and based on the 2016 population of Otaki, this reservoir is required as soon as possible. Section 7.4.2 has details of the proposed reservoir.

Table 6-3 : Reservoir Storage Assessment

Required Storage	Waikanae	Paraparaumu / Raumati	Otaki
2016 Residential Demand (m^3/day)	2264	5104	1320
2016 Population	11,426	27,249	5,883
Average Residential Per Capita Demand (l/cap/day)	**198**	**187**	**224**
2046 Population	16,207	29,954	5,912
2046 Annual Average Residential Demand (m^3/day)	3,211	5,611	1,327
2046 Airport Industrial Demand (m^3/day)		1,218	
2046 Average Day Total Supply (m^3/day)	5,687	9,778	2,454
Fire Storage Requirement (with max fire class FW4) (m^3)	270	270	270
2046 Required Capacity (24 hours average day demand + fire storage) (m^3)	5,957	10,048	2,724
Current storage	**Waikanae**	**Paraparaumu / Raumati**	**Otaki**
Kakariki	5,700	-	-
Tui	1,400	-	-
Riwai	-	11,250	-
Otaihanga	-	5,680	-
Waitohu	-	-	675
Total	**7,100**	**16,930**	**675**
Shortfall	**-1,143**	**-6,882**	**2,049**
Additional Storage Required	**0**	**0**	**2,500**

6.3 Pressure Deficiencies

6.3.1 Ngarara and Waikanae Beach Low Pressures (P1)

In 2046, it was found that head losses in the existing Te Moana Road mains was extremely high. This is largely due to the increase in demand at Ngarara greenfields development, which is supplied from these mains.

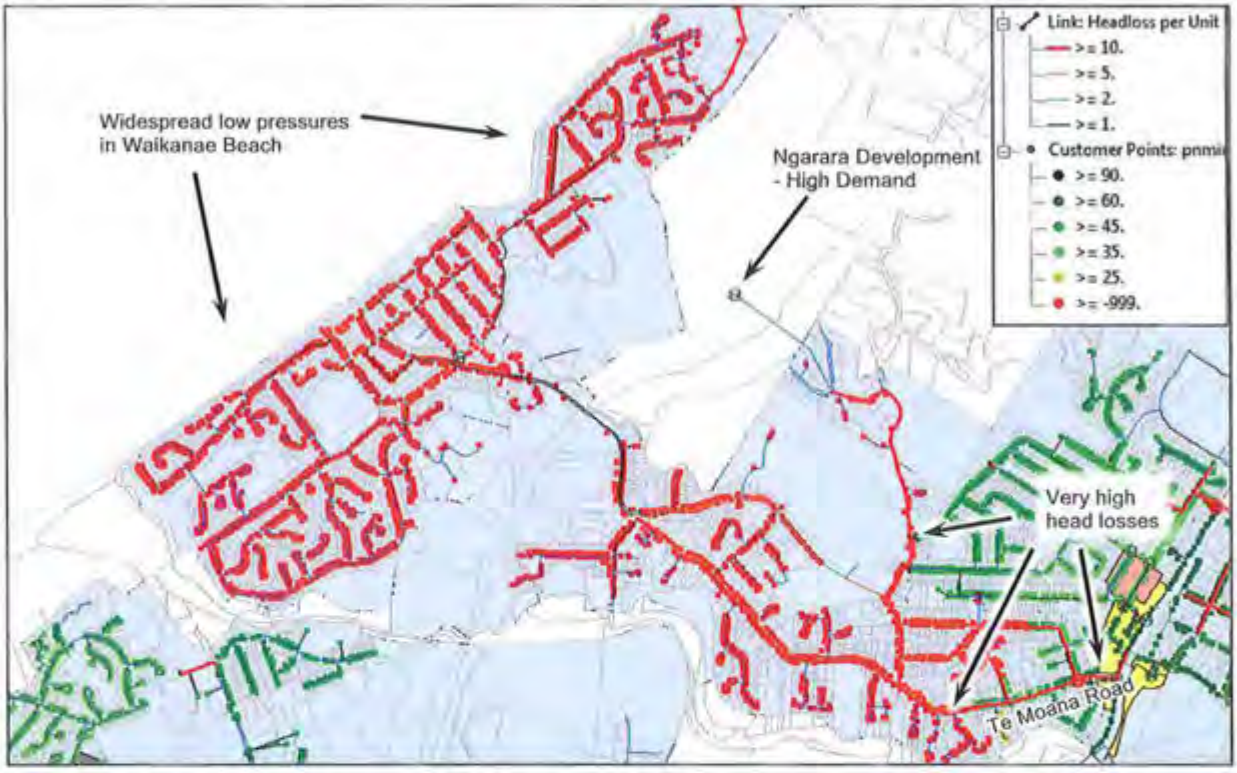

Figure 6-4 : Waikanae Pressures - 2046 Non-upgraded

6.3.2 Hemi Street DMA, Tui Crescent and Kotare Street Low Pressures (P2)

Low pressures throughout the Hemi Street DMA together with extreme low pressures in Kotare Street and Tui Crescent were found to be partly due to head loss upstream of Hemi Street flow meter.

To ensure all flow into the Hemi Street DMA is metered, a valve in Ngaio Street has been closed. This creates a boundary for the Hemi Street DMA, and forces all flow into the DMA to go through the Hemi Street flow meter. However, the network upstream of this flow meter is not designed for this high flow and causes high head loss.

Figure 6-5 : Hemi Street DMA, Tui Crescent and Kotare Street Pressures - 2046 Non-upgraded

6.3.3 Riwai High Level Low Pressures (P3)

There are groups of properties in the hills to the east of Paraparaumu where pressures never reach the required 25m. Pressure at some properties drops as low as 12m. This is due to the elevation difference between these properties and the Riwai Reservoir which supplies them.

In many cases these properties are on roads in which reticulation supplied by the Riwai High Level Reservoir is already in place. Properties in these same roads which are connected to the Riwai High Level pressure zone experience good pressure.

Figure 6-6 : Riwai High Level Pressures – 2046 Non-upgraded

6.3.4 Te Moana Road and Waikanae Beach High Pressures (P4)

Due to the elevation difference between properties in Te Moana Road and the Kakariki Reservoir which supplies them, around 1,750 properties experience pressures greater than 80m. This includes the 850 properties predicted in the Ngarara Development.

Pressures reach 94m at some properties. Due to high head losses in the upstream network during the day, the high pressures occur mostly at night.

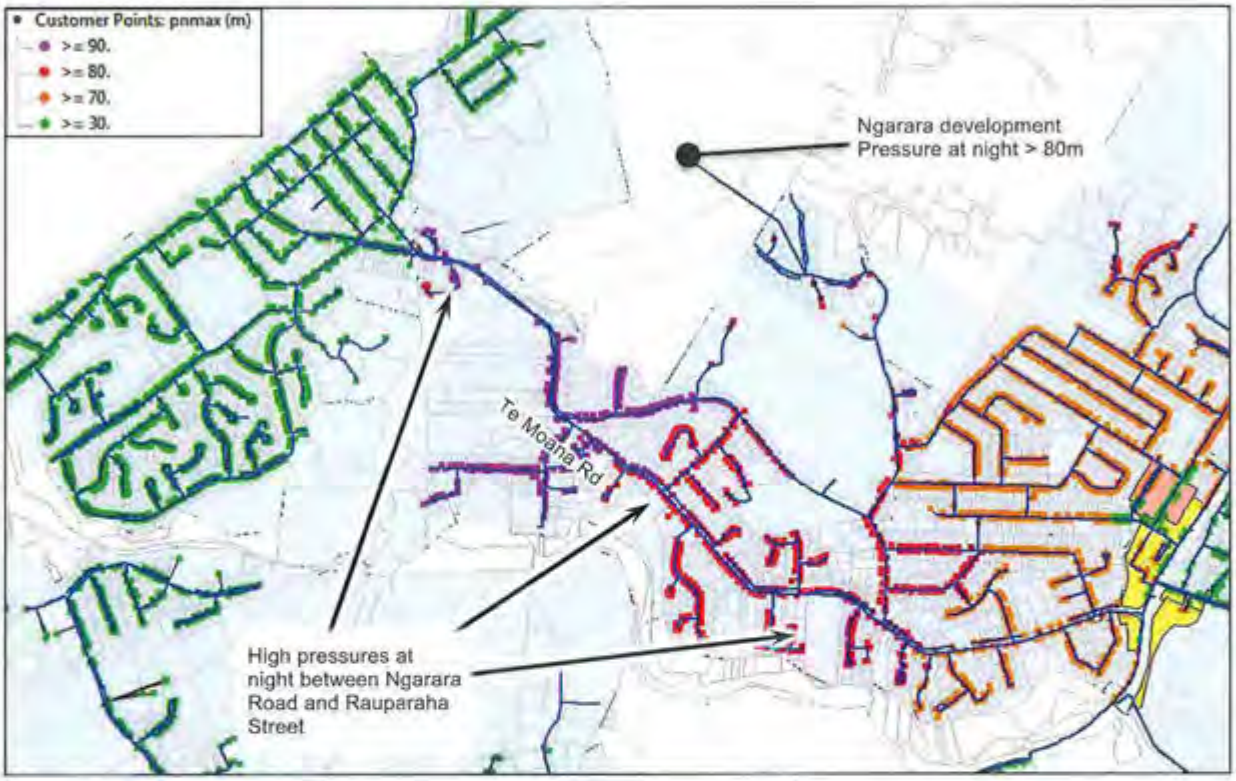

Figure 6-7 : Te Moana Road Pressures – 2046 Non-upgraded

6.3.5 Peka Peka (P5)

Under the increased demand outlined in Section 4.4 pressures in Peka Peka drop 50m further than the rest of Waikanae Beach under peak demand. This 50m additional head loss occurs in the 80mm diameter main running along Rutherford Drive and alongside the lagoons to the east of Rutherford Drive.

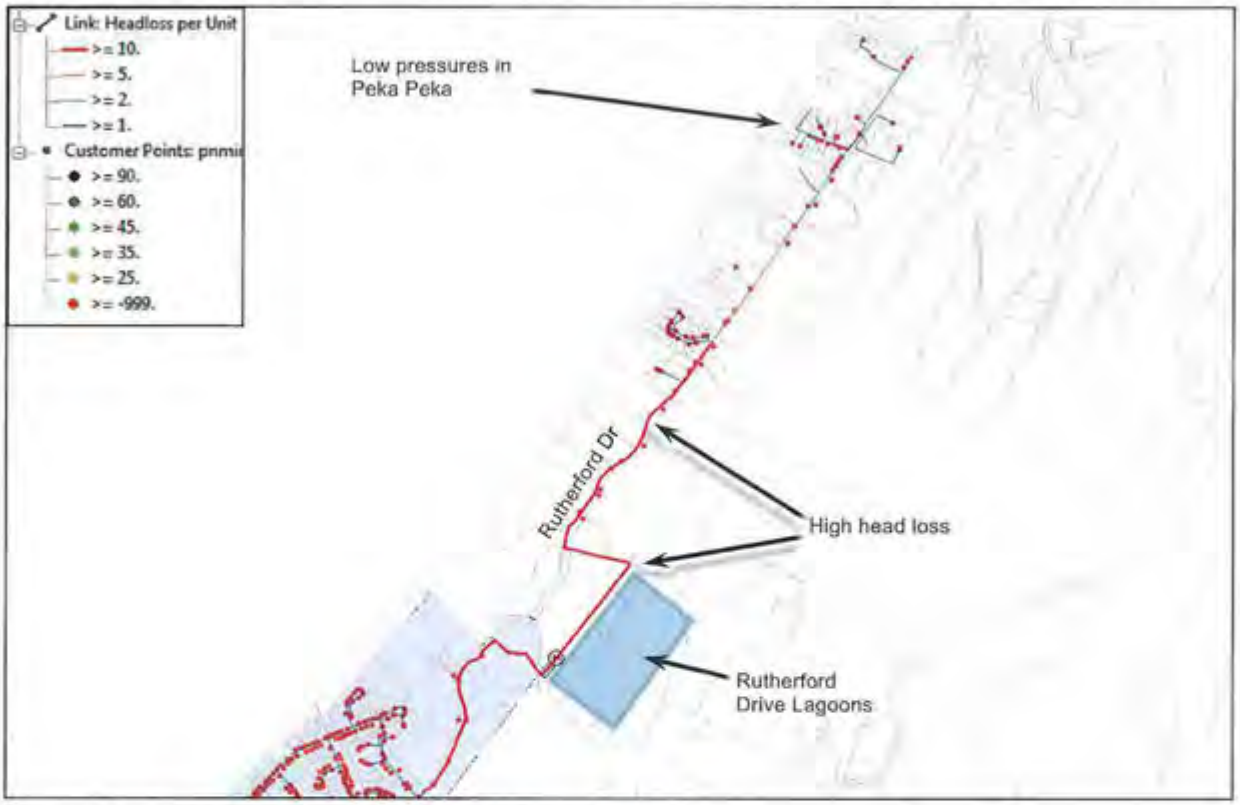

Figure 6-8 : Peka Peka Pressures – 2046 Non-upgraded

6.4 Fire Flow Deficiencies

Fire flows were assessed after strategic and pressure upgrades had been put in place.

6.4.1 Waikanae Town (Parata Street and Omahi Street) (F1)

Parts of the commercial and industrial areas area in Central Waikanae struggle to achieve the 50 l/s total fire flow required for FW3. As the commercial area requires FW4 coverage, this is a significant problem.

A closed DMA boundary valve in Ngaio Street separates the problem areas in the west from available fire flows of over 200 l/s in State Highway 1 and the east.

Figure 6-9 : Waikanae Town Fire Flow Deficiency

6.4.2 Riverbank Road and Otaki Main Highway (F2)

The Otaki commercial area on State Highway 1 receives marginally less than the 50 l/s required to meet the FW3 fire class requirement. The industrial area in Riverbank Road also achieves less than 50 l/s available fire flow, but requires 100 l/s to meet the FW4 fire class requirement for industrial areas.

These areas (along with all of the Otaki Main DMA) are reliant on flow from the Rangiuru and Tasman bores. Rangiuru can supply 30 l/s, but although Tasman has pumps capable of supplying a total of 110 l/s, network restrictions in Tasman Road prevent this being delivered to these areas at the required pressure.

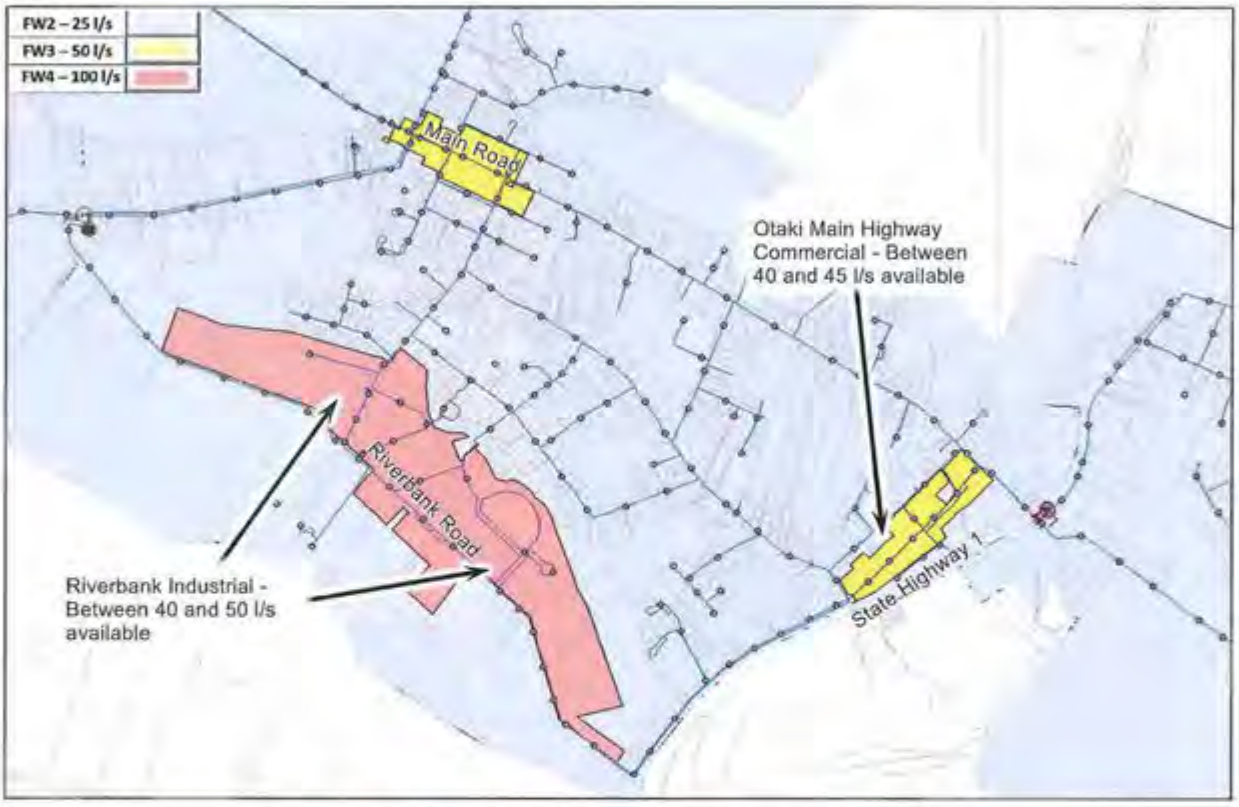

Figure 6-10: Riverbank Road and Otaki Main Highway Fire Flow Deficiency

6.4.3 Airport Industrial (F3)

As an industrial area the proposed Airport Industrial development will require FW4 coverage. With the current network, only 85 l/s is available at the point where connection to the existing network is assumed.

The existing Te Roto industrial area is compliant with FW4, but the network is unable to deliver 100 l/s any further than the northern end of this area at the required pressure.

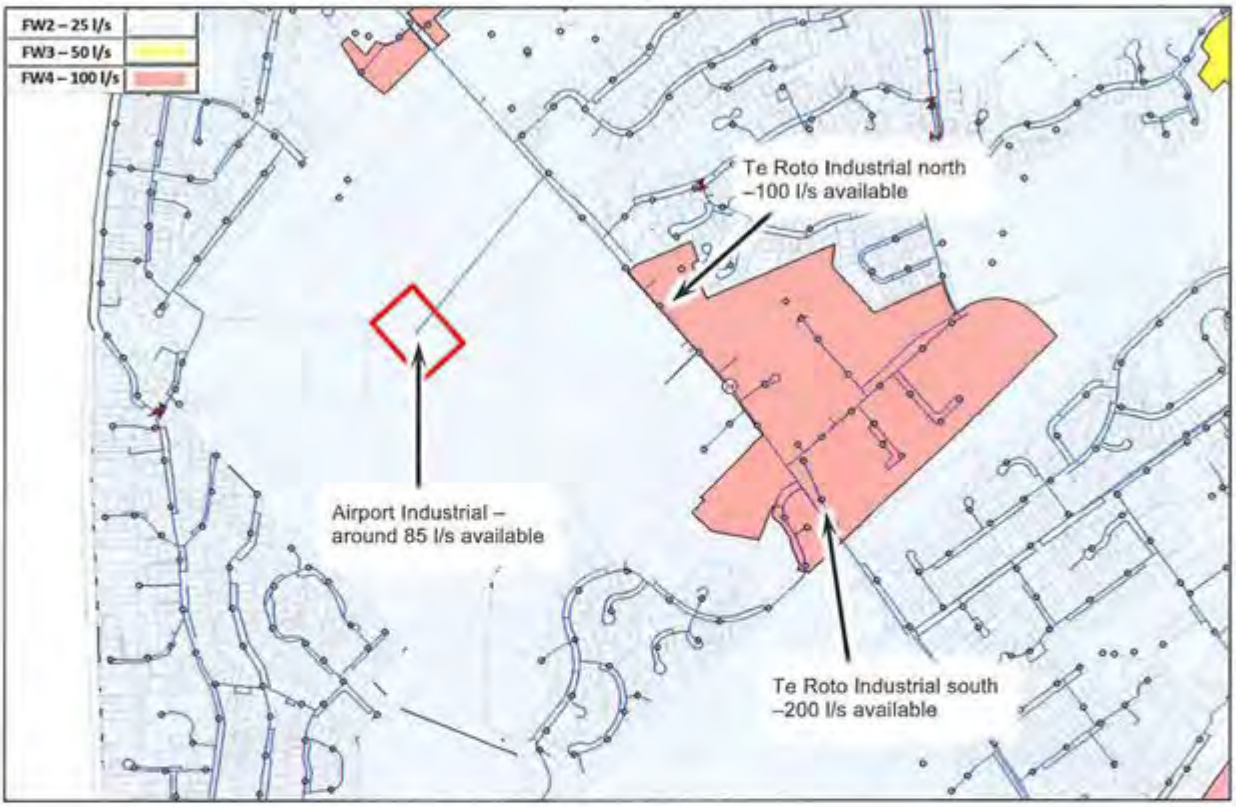

Figure 6-11: Airport Industrial Fire Flow Deficiency

6.4.4 Hurley Road and Magrath Avenue (F4)

As an industrial zone, these two streets require FW4 coverage. The Fire Code states that for FW4, 50 l/s must be available within 135m of every property, with a further 50 l/s available within 270m.

As with Airport Industrial (Section 6.4.3), the existing network is unable to deliver 100 l/s past the northern end of the Te Roto industrial area.

Additionally, the mains in Magrath Avenue and Hurley Road are single-ended 100mm diameter mains. These are unable to deliver 50 l/s fire flow down these roads, and properties at the south end of Magrath Avenue and the north end of Hurley Road are more than 135m from Kapiti Road.

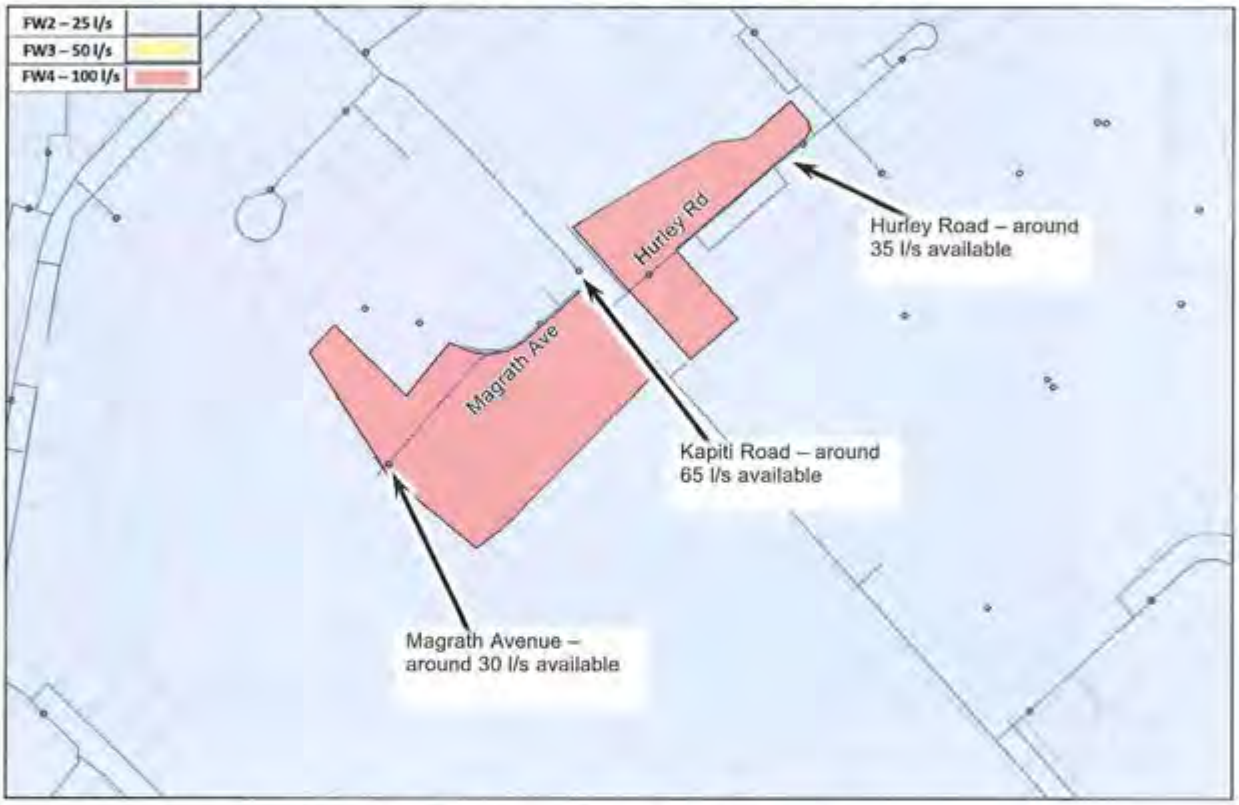

Figure 6-12: Hurley Road and Magrath Avenue Fire Flow Deficiency

6.4.5 Rangiuru (F5)

Around 200 properties near the beach at the end of Rangiuru Road do not have FW2 (residential) fire flow coverage. The cause is that the area is fed from the northern and eastern ends by long stretches of 100mm diameter main.

Figure 6-13: Rangiuru Fire Flow Deficiency

6.4.6 Mountain View Terrace (F6)

Around 60 properties do not receive FW2 coverage in Mountain View Terrace. All reticulation in this area is 100mm diameter, and is a single-ended feed at Tasman Road.

Figure 6-14: Mountain View Terrace Fire Flow Deficiency

6.4.7 Lupin Road (F7)

Around 60 properties do not receive FW2 coverage in Lupin Road. All reticulation in this area is 100mm diameter, and is supplied from a single-ended feed at the junction of Hadfield Street and Matene Street.

Figure 6-15: Lupin Road Fire Flow Deficiency

6.4.8 Otaki Sports Ground (F8)

The sports ground is fed from Mill Road, but as the 100mm diameter main is long and supplied from a single-ended feed, FW2 fire flow is not able to be supplied.

Figure 6-16: Otaki Sports Ground Fire Flow Deficiency

6.4.9 Freemans Road (F9)

A large portion of the Waitohu residential reticulation is all 100mm diameter. Even though it is not a single-ended feed, the reticulation is too small to deliver the 25 l/s required for FW2 to around 200 properties.

Figure 6-17: Freemans Road Fire Flow Deficiency

6.4.10 Puriri Road (F10)

Around 75 properties do not receive FW2 coverage in Puriri Road and Kauri Road. All reticulation in this area is 100mm diameter, and is supplied from a single-ended feed at Te Moana Road.

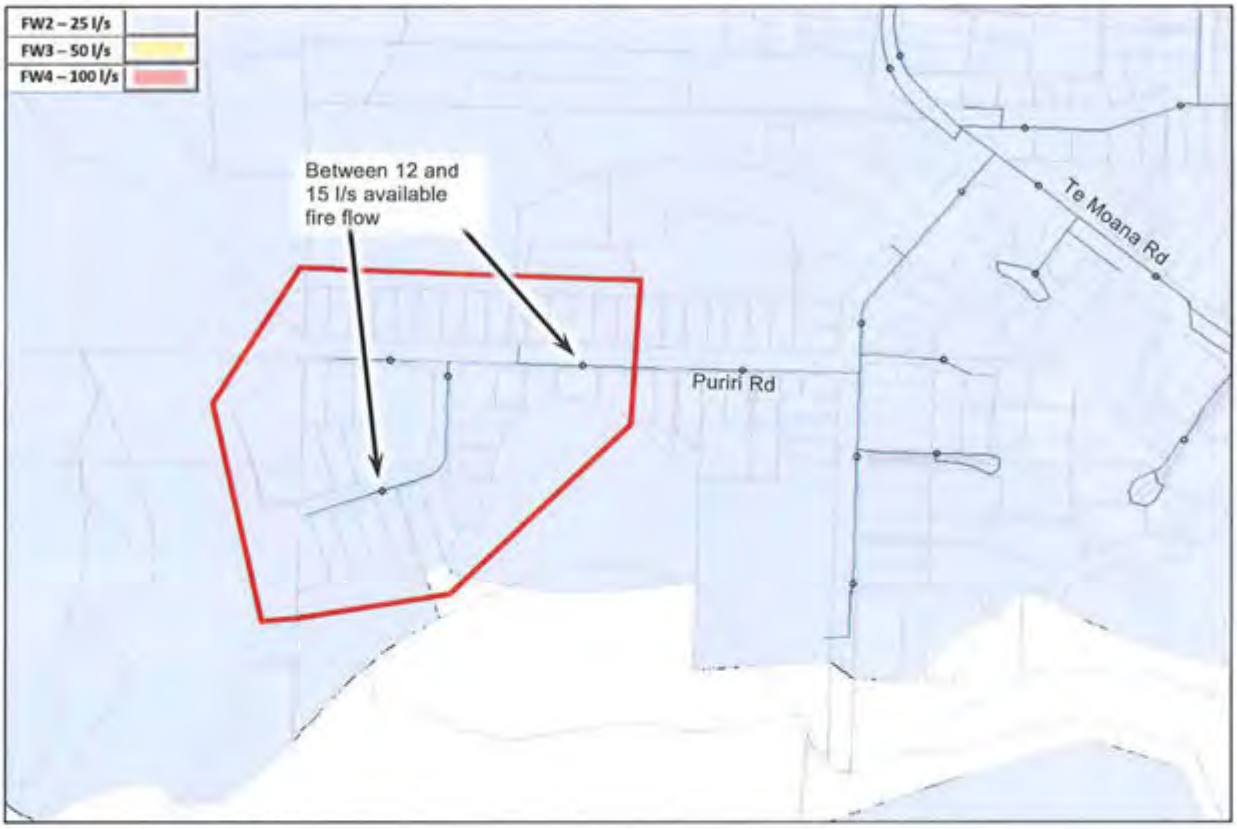

Figure 6-18: Puriri Road

6.4.11 Groves Road (F11)

Around 10 properties do not receive FW2 coverage at the end of Groves Road as reticulation is 100mm diameter, and is supplied from a single-ended feed at Matatua Road.

Figure 6-19: Groves Road Fire Flow Deficiency

6.4.12 Hookway Grove (F12)

Around 35 properties do not receive FW2 coverage in Hookway Grove. The main in this road is fed from Ruapehu Street as a single-ended and 100mm diameter, and pressure is low which limits the available flow.

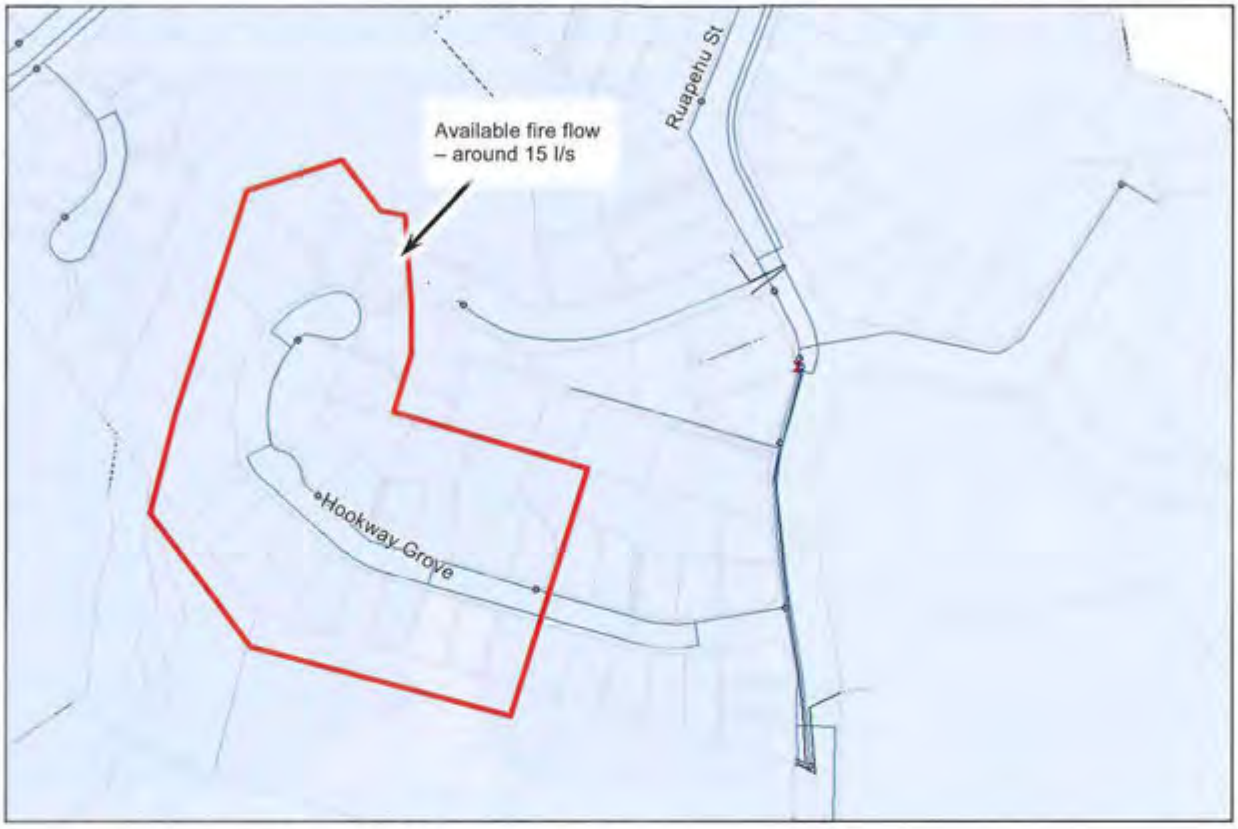

Figure 6-20: Hookway Grove Fire Flow Deficiency

6.4.13 Fire Flow Exceptions

There are some points on the network where fire flow is not able to be supplied. These are mostly in rural areas or other points where customers are expected to provide their own fire cover.

Figure 6-21, Figure 6-22 and Figure 6-23 show the areas on the water network which do not meet FW2 fire class requirements in 2046, along with a description of the area which excludes it from requiring FW2 cover from the water network.

If more detail is required, Appendix D contains plans showing the available fire flow in the upgraded 2046 network on a node-by-node basis (note hydrants have not been included in the model).

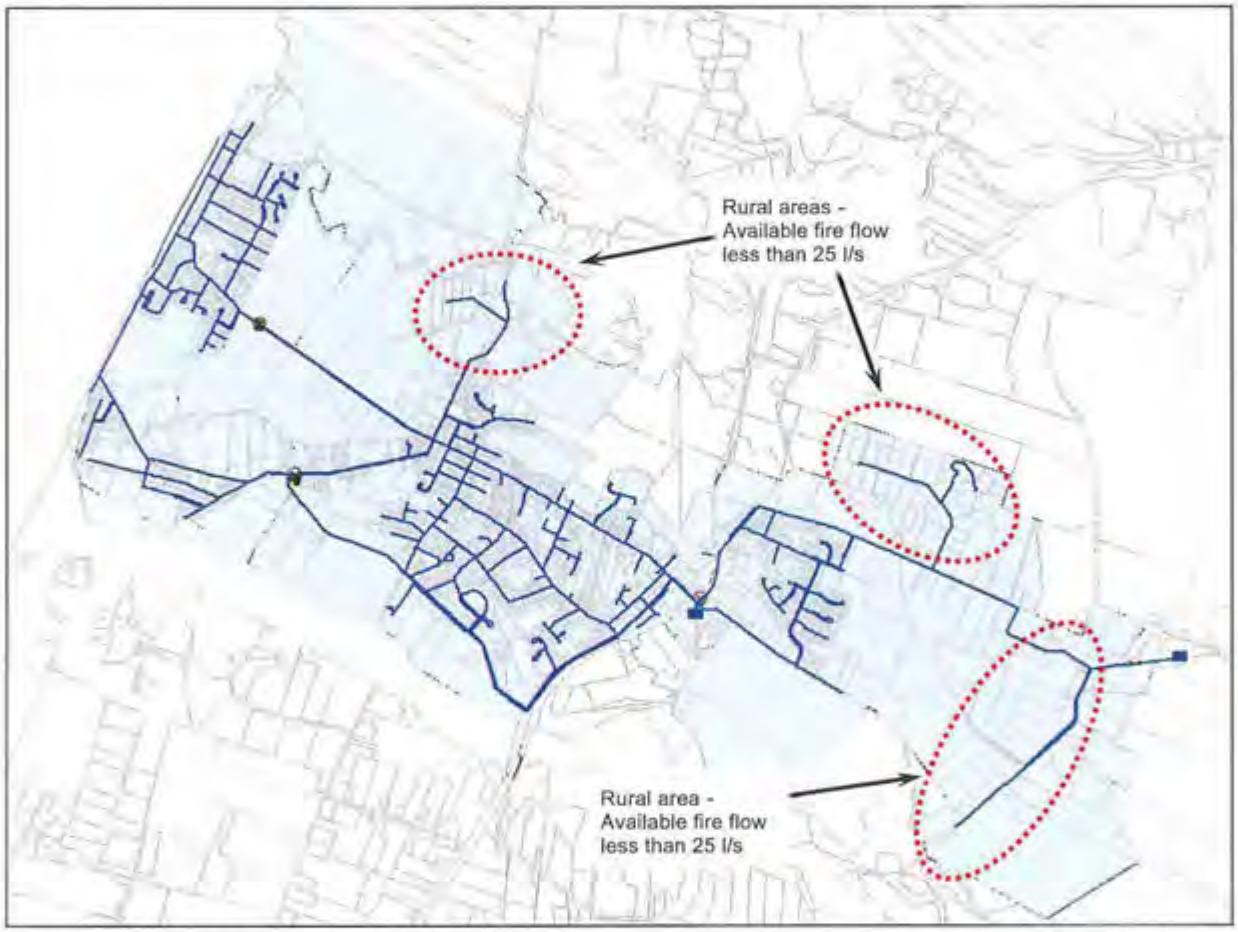

Figure 6-21 : Otaki Fire Flow Exception Areas

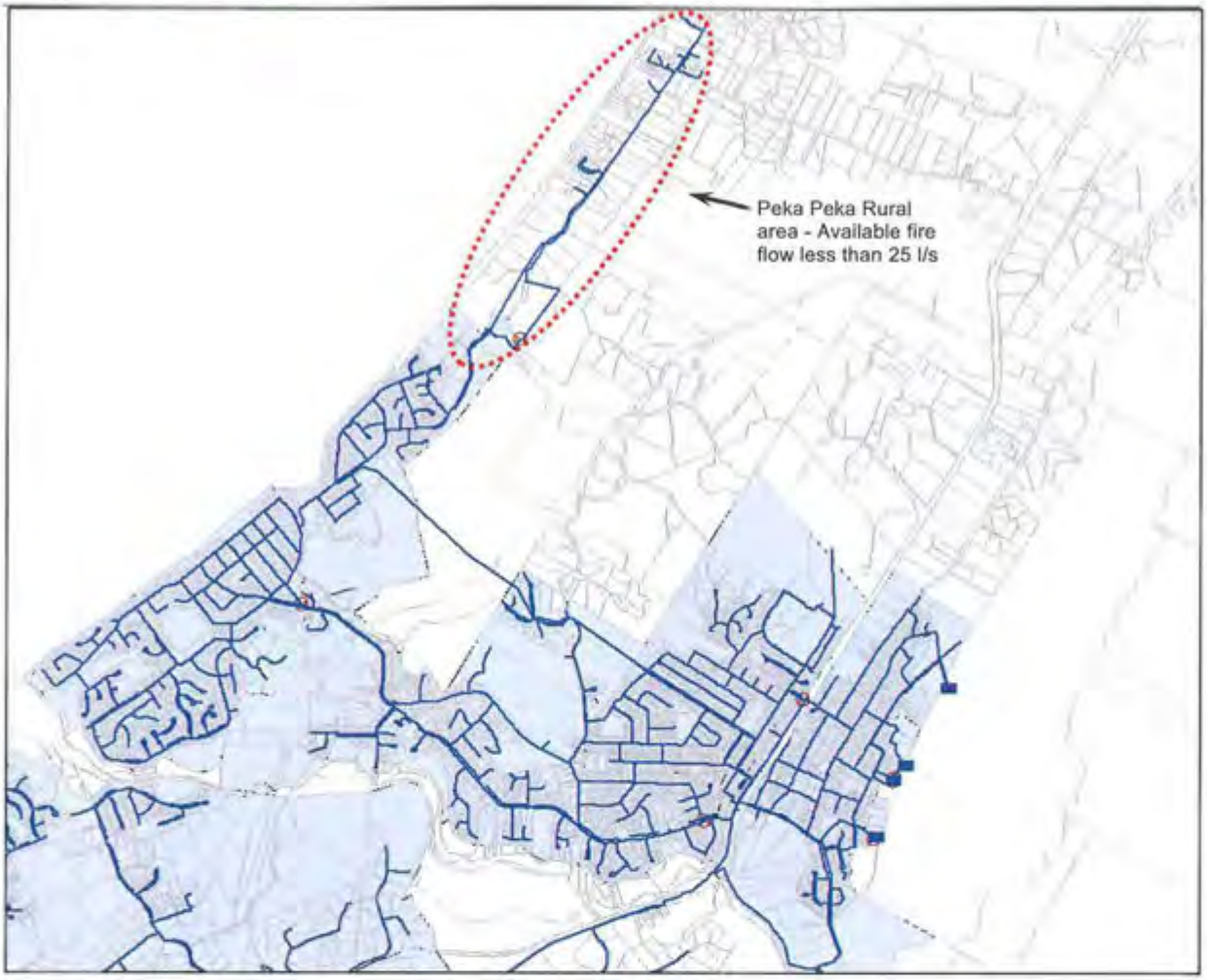

Figure 6-22 : Waikanae Fire Flow Exception Areas

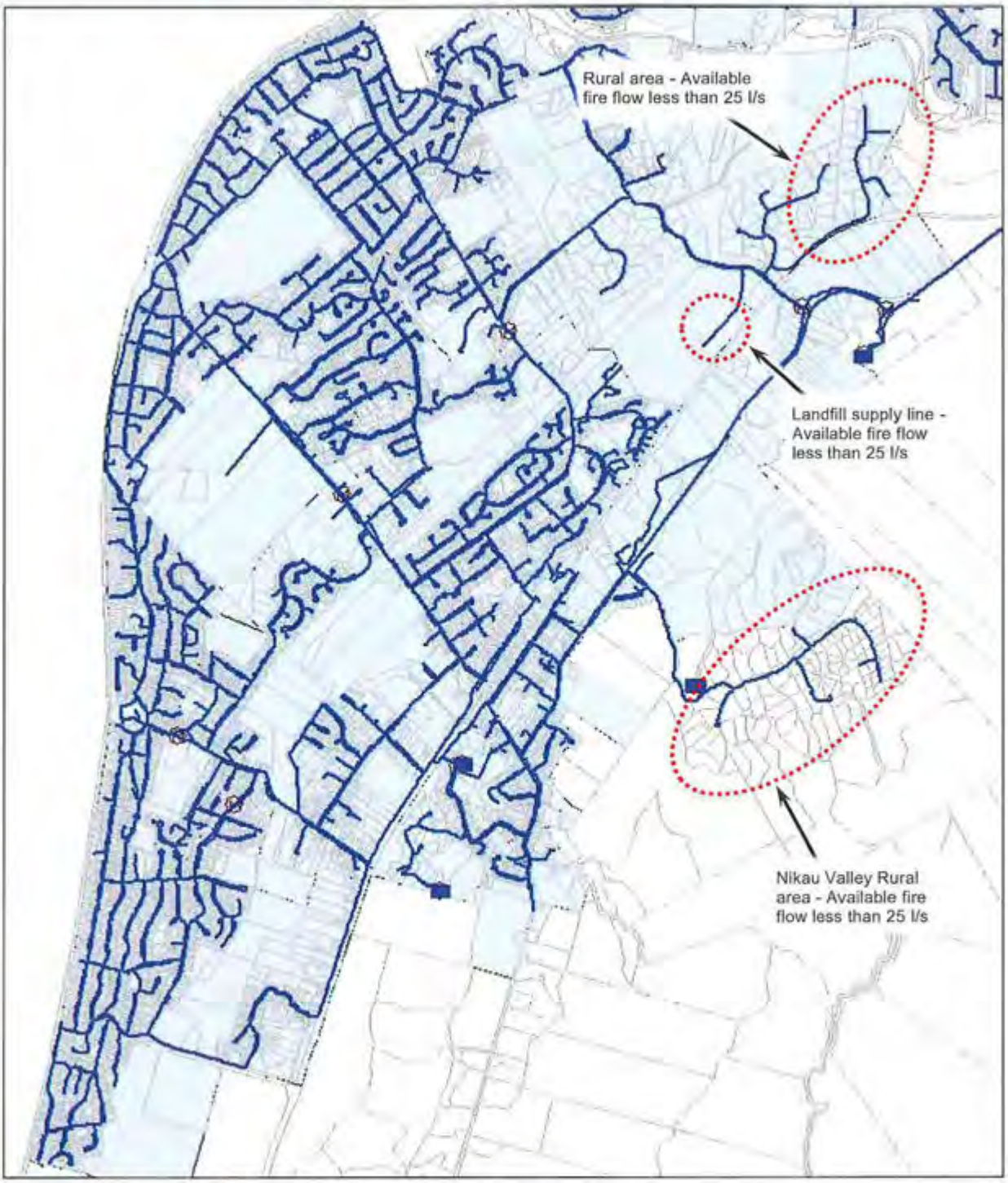

Figure 6-23 : Paraparaumu-Raumati Fire Flow Exception Areas

7 Upgrades

This section outlines the recommended upgrades which have been identified to address the deficiencies outlined in the performance assessment.

Costs have been developed for pipework based on unit rates from recent projects MWH has worked with in the Wellington region. Details are contained in Section 7.2.

7.1 Summary

Table 7-1 gives a description of each upgrade, the estimated upgrade cost and the planning horizon in which it will be required. Some of the alternative or additional upgrades which were not recommended have been included for reference, .

Figure 7-1, Figure 7-2 and Figure 7-3 show the locations of the upgrades within the networks. Sections 7.3 to 7.6 give more details of each upgrade.

Table 7-1 : Upgrades Summary

Upgrade Ref	Upgrade Type	Report Section	Upgrade name	Description	Upgrade Quantities	Cost	Planning Horizon	Deficiencies addressed
UPG01	Greenfields	7.3.1	Ngarara Supply Main	Connects the Ngarara development to the existing network	650m of 200mm ID main	$650,000	2026	N/A
UPG02	Greenfields	7.3.2	Waikanae North Supply Main	Connects the remaining Waikanae North development to the existing network	500m of 200mm ID main	$500,000	2026	N/A
UPG03	Greenfields	7.3.3	Airport Industrial Supply Main	Connects the Airport Industrial development to the existing network	500m of 300mm ID main	$550,000	2026	N/A
UPG04	Greenfields	7.3.4	159 Winara Avenue Development	WPS, rising main, reservoir and gravity distribution network for 80 properties	1 x pump station, 1 x 250m³ reservoir, 500m of 100mm ID rising main, 800m 150mm ID reticulation	$2,550,000	2016	N/A
UPG05	Strategic	7.4.1	Tasman Road Trunk Main	Connects Tasman Road bores to Otaki Main Street	1,500m of 250mm ID main	$1,600,000	2016	F2 (severe) & Security of Supply
UPG06	Strategic	7.4.2	Otaki Reservoir	New reservoir and combined inlet/outlet main connecting to Otaki network upstream of County Road WPS	1 x 2,500 m³ reservoir, 1,750m of 250mm ID main	$11,900,000	2016	F2 (severe) & Security of Supply
UPG07a	Strategic	7.4.3	Ngarara Loop Stage 1	Connection from Elizabeth Street to Ngarara supply main. Installation of a new PRV at intersection of Ngarara Road and Ferndale Drive set to deliver 67m HGL.	350m of 250mm ID main, 2,050m of 200mm ID main, 1 x new 200mm diam PRVs	$2,650,000	2026	P1 (severe) P4 (moderate) P5 (moderate)
UPG07a	Strategic	7.4.3	Ngarara Loop Stage 2	Connection from Ngarara development through to Waikanae Beach. Installation of a new PRV delivering 53m HGL between Ngarara and the Waikanae Beach zone.	1,150m of 200mm ID main, 1 x new 200mm diam PRVs	$1,500,000	2026	P1 (severe) P5 (moderate) & Security of Supply
UPG08	Pressure	7.5.1	Tui High Level Extension	Extension of Tui High Level from Tui Crescent to the end of Kotare Street (feeding the WPS to supply the 159 Winara development). Also includes reconnection of around 90 properties in Kotare Street to the new Tui HL main.	650m of 100mm ID main, approx. 90 customer reconnections	$1,050,000	2016	P2 (moderate)

Upgrade Ref	Upgrade Type	Report Section	Upgrade name	Description	Upgrade Quantities	Cost	Planning Horizon	Deficiencies addressed
(UPG08a)	(Additional)	7.5.1	Tui High Level Extension – Kereru / Kotare	Loop extension of the Tui High Level pressure zone down Kereru Street and along Kotare Street to join with upgrade UPG08. Also includes reconnection of around 30 properties in Kotare Street and Kereru Street to the new Tui HL loop main.	350m of 50mm ID main approx. 30 customer reconnections	$550,000	2016	Part of P2 (minor)
UPG09	Pressure	7.5.2	Ngaio Street Valve	Open Ngaio Street boundary valve to increase supply from Kakariki DMA into Hemi DMA. Will require new flow meter	1 x new 150mm diam flow meter	$50,000	2016	P2 (moderate) F1 (severe)
UPG10	Pressure	7.5.3	Riwai High Level Alterations	Extension of Riwai High Level to supply high-elevation properties. Also involves reconnection of three existing mains to high level and reconnection of around 90 customers to new and existing high level reticulation.	3 x distribution main reconnections, approx. 90 customer reconnections, 120m of 100mm ID main, 260m of 50mm ID main	$1,100,000	2016	P3 (moderate) F12 (minor)
UPG11	Pressure	7.5.4	Te Moana PRV	Installation of new PRV at intersection Te Moana Road and Korimiko Road.	1 x new 200mm diam PRV	$100,000	2016	P4 (moderate)
UPG12	Pressure	7.5.5	Peka Peka	New 150mm ID main in Rutherford Drive between Pharazyn Avenue and Marram Way	2,050m of 150mm ID main	$1,800,000	2026	P5 (moderate)
UPG13	Fire	7.6.1	Otaki Loop Fire Main	Connection from Otaki Reservoir to the Riverbank industrial zone, connecting trhough to the 200mm diam main from Rangiuru bore in Riverbank Road.	250m of 250mm ID main, 2,850m of 200mm ID main	$3,350,000	2016	F2 (severe)
(UPG13a)	(Alternative)	7.6.1.1	Otaki River Water Diversion	Create access points to river water with appropriate hose connections at key points along Riverbank Road	Unknown	Unknown	(2016)	(F2)
UPG14	Fire	7.6.2	Kapiti Road Fire Main	New 250mm ID main in Kapiti Road between Te Roto Drive and the estimated point of supply to Airport Industrial (near Cedar Drive)	950m of 250mm ID main	$1,000,000	2026	F3 (severe) F4 (moderate)
UPG15	Fire	7.6.3	Hurley Road and Magrath Avenue Fire Mains	New mains in Hurley Road and Magrath Avenue	350m of 150mm ID main	$300,000	2016	F4 (moderate)
UPG16	Fire	7.6.4	Rangiuru	New mains from Rangiuru bores to Old Coach Road and in The Ave	600m of 150mm ID main	$650,000	2016	F5 (severe)

Upgrade Ref	Upgrade Type	Report Section	Upgrade name	Description	Upgrade Quantities	Cost	Planning Horizon	Deficiencies addressed
(UPG18a)	(Alternative)	7.6.4.1	Stream Water Diversion	Create access points to stream with appropriate hose connections in Kapiti Lane	Unknown	Unknown	(2016)	(F5)
UPG17	Fire	7.6.5	Mountain View Terrace	New main in Robert McKeen Street from Tasman Road to Mountain View Terrace	250m of 150mm ID main	$250,000	2016	F6 (moderate)
UPG18	Fire	7.6.6	Lupin Street	New main in Matene Street between Main Street and Hadfield Street, continuing in Hadfield Street to Tamihana Street	480m of 150mm ID main	$450,000	2016	F7 (moderate)
(UPG18a)	(Alternative)	7.6.6.1	Dedicated Storage for Fire	25m³ storage at the intersection of Lupin Road and Te Harawira	1 x 25m³ tank with connection from reticulation	Unknown	(2016)	(F7)
UPG19	Fire	7.6.7	Otaki Sports ground	New main from sports field gates in Mill Road to sports fields.	300m of 150mm ID main	$300,000	2016	F8 (minor)
(UPG19a)	(Alternative)	7.6.7	Dedicated Storage for Fire	25m³ storage near the sports ground buildings	1 x 25m³ tank with connection from reticulation	Unknown	(2016)	(F8)
UPG20	Fire	7.6.8	Freemans Road	New mains in Elphick Street, Te Manuao Road and Freemans Road bertween Waitohu Valley Road and Rahui Road. Also in Tararua Crescent and Renata Road	1,550m of 150mm ID main	$1,400,000	2016	F9 (severe)
UPG21	Fire	7.6.9	Puriri Road	New 150mm mains in Greenaway Road from Te Moana Road to Puriri Road, and continuing in Puriri Road to just short of Kauri Road	560m of 150mm ID main	$500,000	2016	F10 (moderate)
(UPG21a)	(Alternative)	7.6.9	Dedicated Storage for Fire	25m³ storage near 45 Puriri Road	1 x 25m³ tank with connection from reticulation	Unknown	(2016)	(F10)
UPG22	Fire	7.6.10	Groves Road	New 150mm main in Kohutuhutu Road between Matatua Road and The Palms	120m of 150mm ID main	$150,000	2016	F11 (minor)
(UPG22a)	(Alternative)	7.6.10	Dedicated Storage for Fire	25m³ storage at the end of Groves Road	1 x 25m³ tank with connection from reticulation	Unknown	(2016)	(F11)
Total						**$34,350,000**		

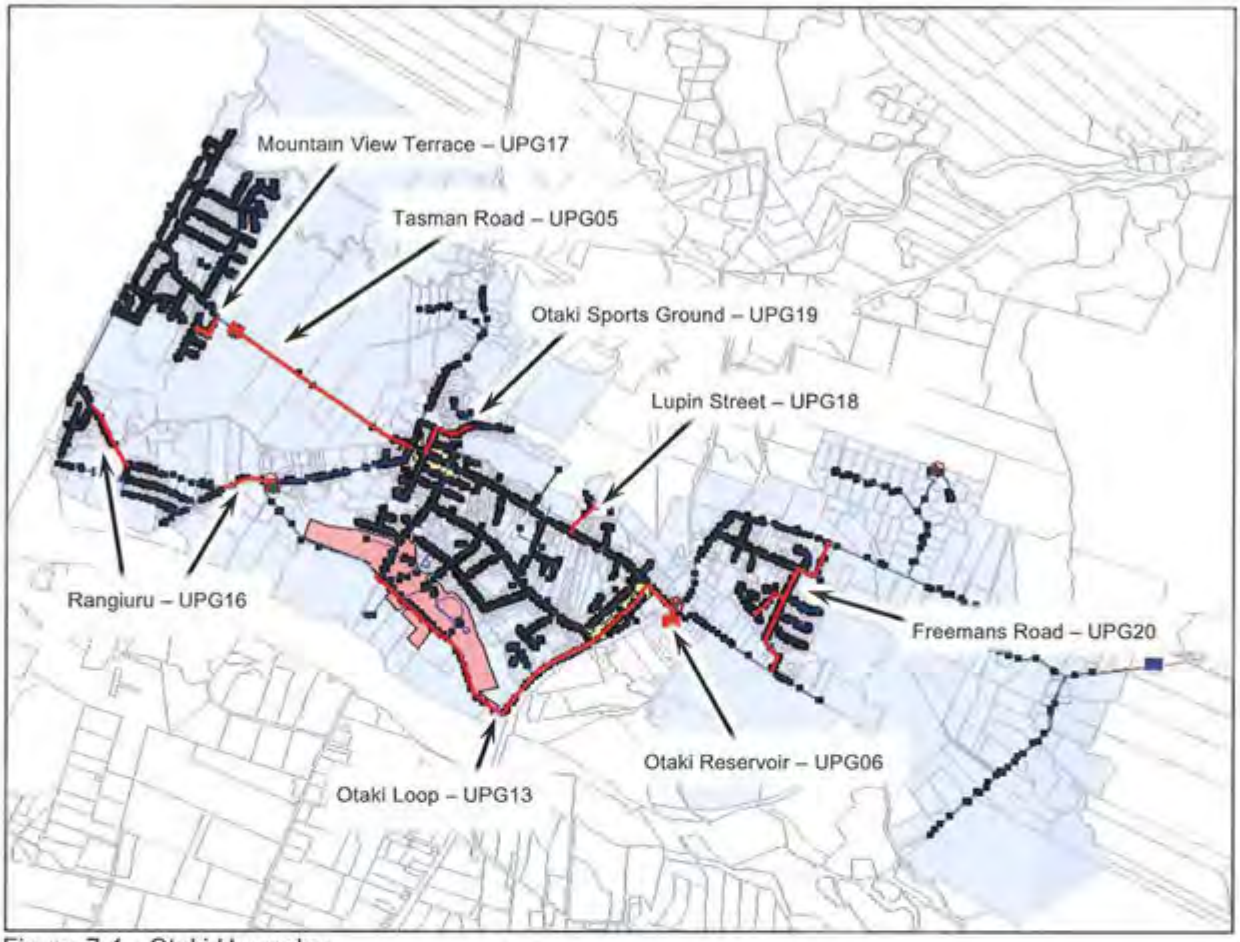

Figure 7-1 - Otaki Upgrades

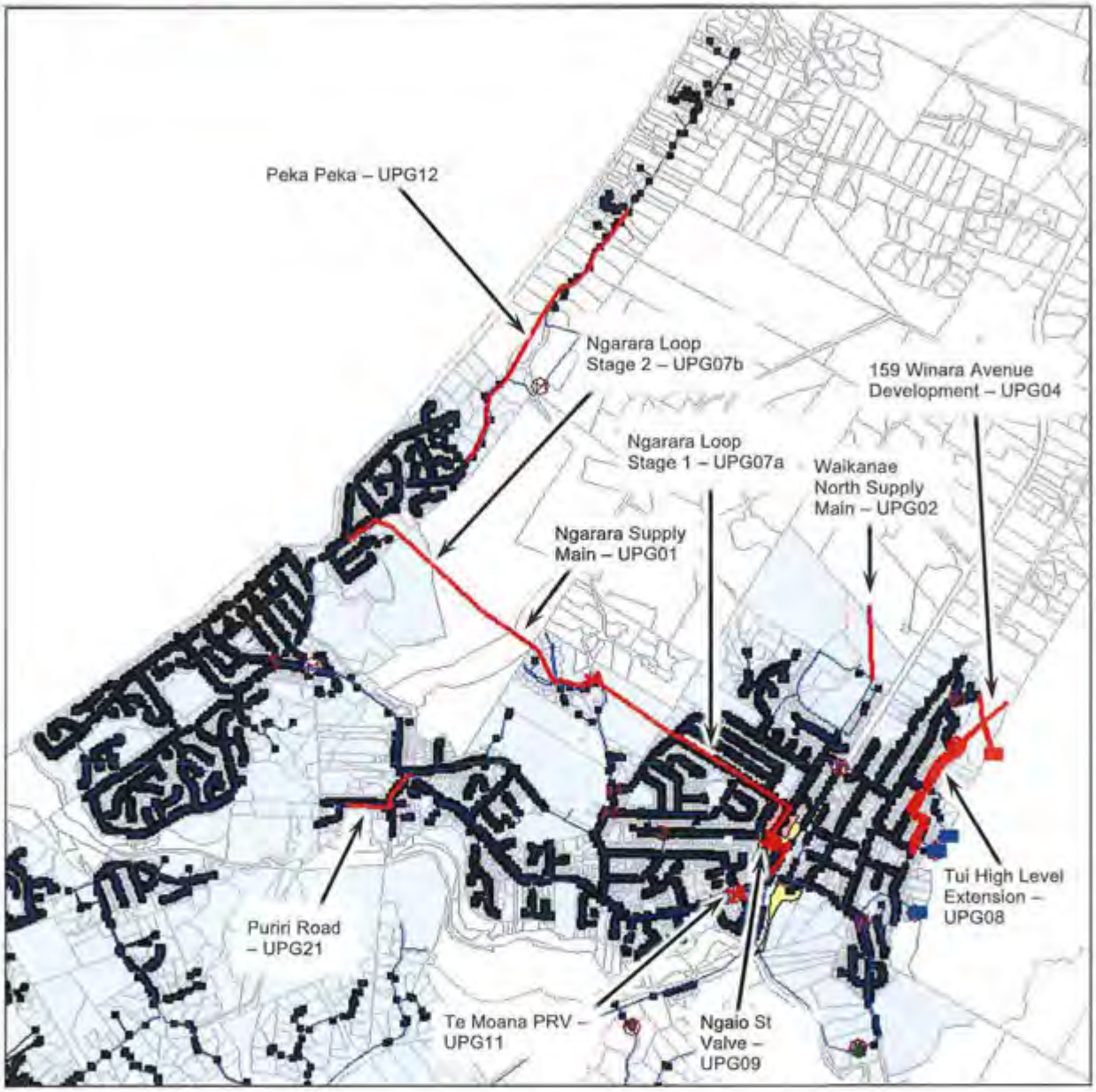

Figure 7-2 - Waikanae Upgrades

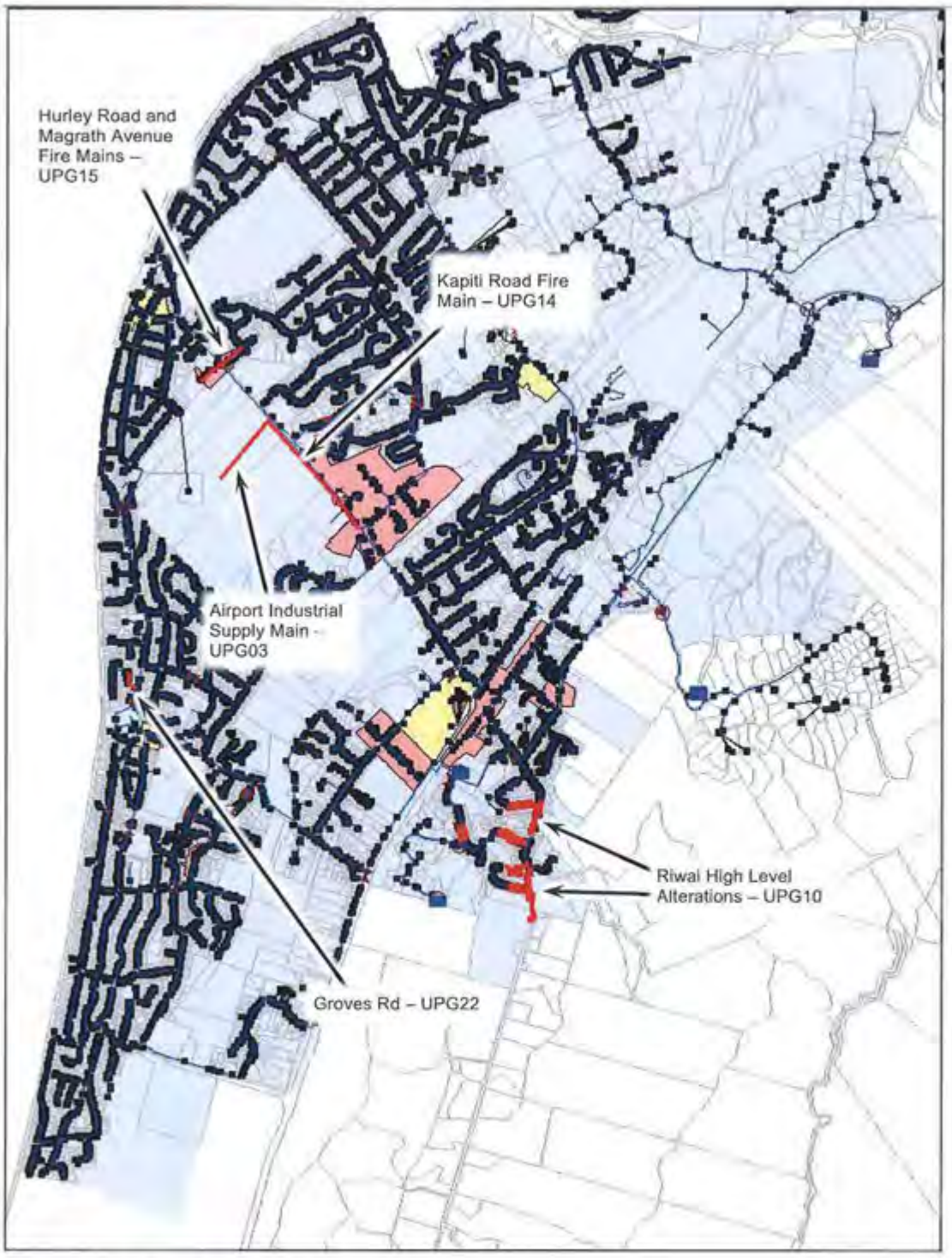

Figure 7-3 – Paraparaumu / Raumati Upgrades

7.2 Costs

7.2.1 Cost Overview

The total required capital expenditure for Kapiti Coast over the next 30 years is estimated to be around $34 million. An overview of the total capital expenditure by type and by planning horizon is given in Table 7-2.

Table 7-2 : Cost Overview

Upgrade Type	2016	2026	2036	2046	Total
Greenfields	$2,550,000	$1,700,000	$0	$0	$4,250,000
Strategic	$13,500,000	$4,150,000	$0	$0	$17,650,000
Pressure	$2,300,000	$1,800,000	$0	$0	$4,100,000
Fire	$7,350,000	$1,000,000	$0	$0	$8,350,000
Total	**$25,700,000**	**$8,650,000**	**$0**	**$0**	**$34,350,000**

This shows that to meet levels of service, all expenditure is required in the next 10 years. The current network has issues with fire flows which will need to be resolved quickly, and the Otaki Reservoir (the largest capital project in the register) is required immediately for storage, security of supply and fire supply reasons.

Depending on Council priorities it may be possible to compromise on some levels of service and defer some costs to later, or to use alternative solutions suggested in the detailed upgrade sections (Sections 7.3to 7.6) to reduce the overall cost.

7.2.2 Costing Methodology

Rough order costs have been developed to provide an indication of likely investment requirements. These are indicative only, and have been calculated from recent projects MWH has been involved with in the Wellington region.

A base rate has been determined for each pipe diameter. The base rates used are shown below.

Table 7-3 : Unit Rates for Pipe Costing

Diameter (m)	Base Cost ($/m)
100	850
150	850
200	1,000
250	1,050
300	1,100
375	1,300
450	1,350
525	1,500
800	1,900

Coefficients have also been applied for a number of factors which are likely to affect cost. The factors which have been taken into account are as follows:

CBD/Centre	+20% cost	Likely higher traffic management and construction costs
Steep grade (>12%)	+20% cost	Likely higher construction costs
Low elevation (<2m)	+20% cost	Likely poor ground conditions

The cost analysis of the different elements in each upgrade which add up to the upgrade sums shown in Table 7-1 is presented in Table 7-4. The following assumptions were made:

- For pipelines, the factors assumed to be at play are shown. Where factors for a pipe changed along its length, the pipe length was split into separate elements (for example, a pipe passing from within a city centre area to outside the city centre is calculated as two separate elements)
- Costs for each element are rounded up to the nearest $50k for costs under $1 million, and to the nearest $100k for costs over $1 million
- For non-pipe elements, estimates have been made on a mixture of past experience, local knowledge and engineering judgement

Table 7-4 : Network Element Cost Analysis

Upgrade Ref	Length (m)	Diameter (mm)	CBD/Centre?	Steep?	Low Elevation?	Rounded Cost ($)
UPG01	650	200	PE	No	No	$650,000
UPG02	500	200	PE	No	No	$500,000
UPG03	500	300	PE	No	No	$550,000
UPG04	500	100	PVC	No	Yes	$550,000
UPG04	800	150	PVC	No	Yes	$850,000
UPG04	Res refill pump (with VSD) to serve 80-90 properties (estimated cost)					$150,000
UPG04	Winara Reservoir 250m3 (estimated cost)					$1,000,000
UPG05	1500	250	PE	No	No	$1,600,000
UPG06	1750	250	PE	No	No	$1,900,000
UPG06	Otaki Reservoir 2,500m3 (estimated cost)					$10,000,000
UPG07a	350	250	PE	Yes	No	$450,000
UPG07a	2050	200	PE	No	No	$2,100,000
UPG07a	1 x PRV on 200mm diam mains (estimated cost)					$100,000
UPG07b	1150	200	PE	No	No	$1,400,000
UPG07b	1 x PRV on 200mm diam mains (estimated cost)					$100,000
UPG08	650	100	PVC	No	No	$600,000
UPG08	Reconnect 90 customers to high level (estimated cost)					$450,000
UPG09	1 x 200mm Flow meter (estimated cost)					$50,000
UPG10	120	100	PVC	No	Yes	$150,000
UPG10	260	50	PVC	No	Yes	$350,000
UPG10	Reconnect 90 customers to high level (estimated cost)					$450,000
UPG10	Reconnect 3 mains to high level (estimated cost)					$150,000
UPG11	1 x PRV on 200mm diam mains (estimated cost)					$100,000
UPG12	2050	150	PVC	No	No	$1,800,000
UPG13	250	250	PE	Yes	No	$350,000
UPG13	500	200	PE	Yes	No	$600,000
UPG13	2350	200	PE	No	No	$2,400,000
UPG14	950	250	PE	No	No	$1,000,000
UPG15	350	150	PVC	No	No	$300,000
UPG16	600	150	PVC	No	No	$650,000
UPG17	250	150	PVC	No	No	$250,000
UPG18	480	150	PVC	No	No	$450,000
UPG19	300	150	PVC	No	No	$300,000

Upgrade Ref	Length (m)	Diameter (mm)	CBD/Centre?	Steep?	Low Elevation?	Rounded Cost ($)
UPG20	1550	150	PVC	No	No	$1,400,000
UPG21	560	150	PVC	No	No	$500,000
UPG22	120	150	PVC	No	No	$150,000
Total						**$34,350,000**

7.3 Greenfields Developments

Upgrades associated with greenfields developments are required to supply greenfields areas with water from the existing network. As these areas cannot be supplied without these upgrades, they are included in the performance assessment scenarios as well as the upgraded scenarios.

7.3.1 Ngarara Supply Main (UPG01)

This main connects the expected centre of the Ngarara development to the existing network in Ferndale Drive. This development first appears in the 2026 planning horizon, and the supply main will therefore be required at this time.

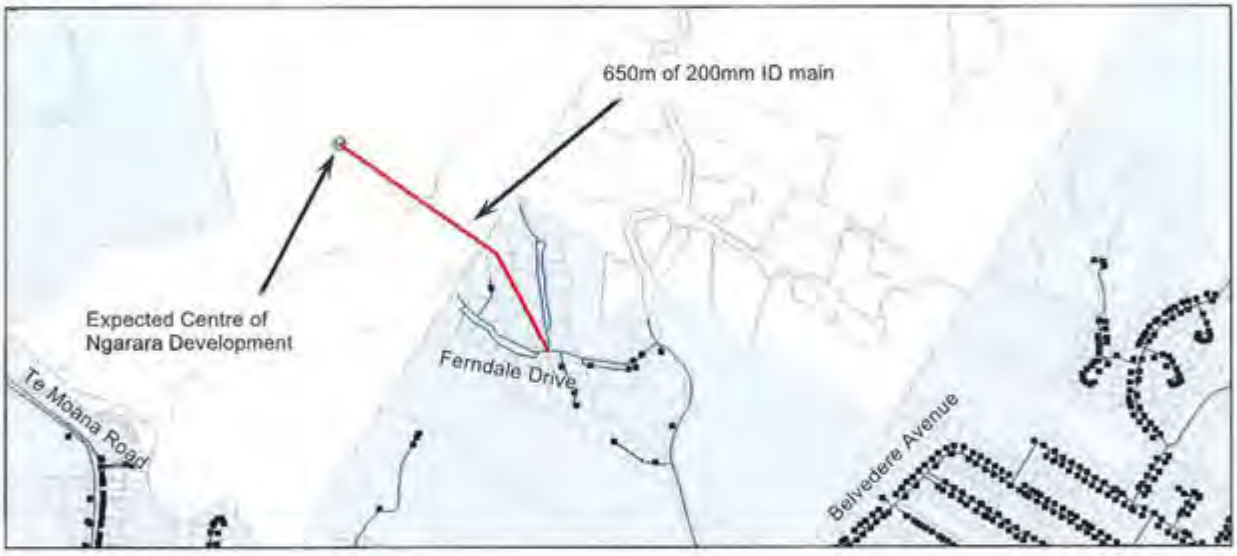

Figure 7-4 : Ngarara Supply Main

It is possible that the alignment and connection point may differ reticulation depending on developer requirements – this upgrade is therefore indicative only.

7.3.2 Waikanae North Supply Main (UPG02)

This main connects the expected centre of the Waikanae North development to the existing network in Parata Street. The development is partially complete, but the network associated with this is already in place so the supply main for future growth is programmed for 2026 planning horizon.

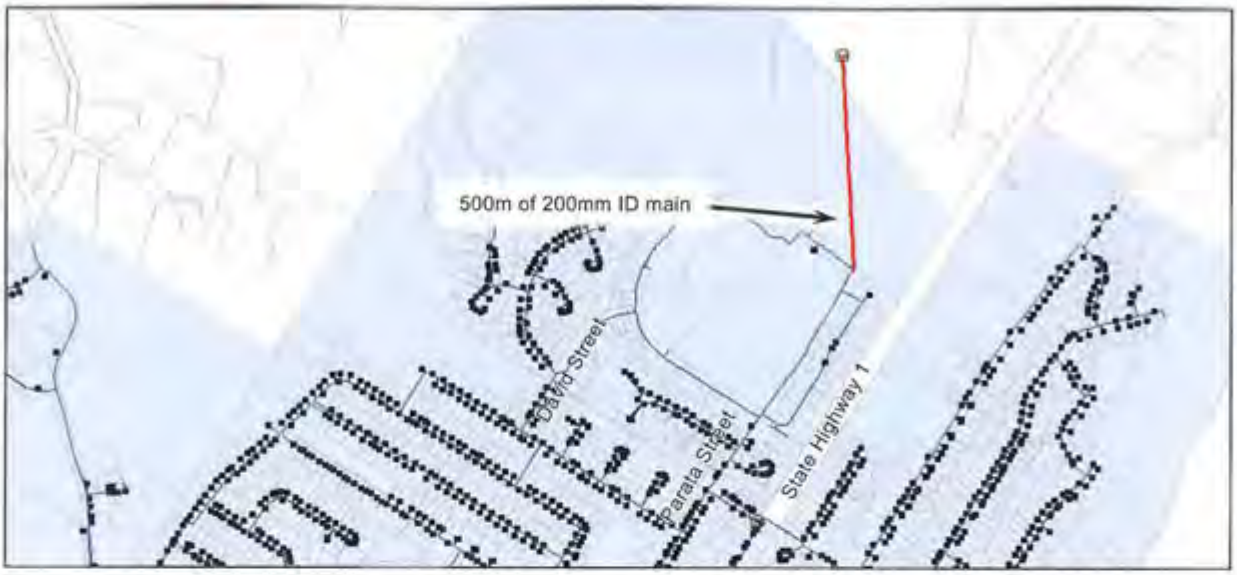

Figure 7-5 : Waikanae North Supply Main

7.3.3 Airport Industrial Supply Main (UPG03)

The details of this development are not yet clear. The point of connection to the existing network is assumed, but it is known that if the development is supplied from a single point a 300mm diameter main is likely to be required. The supply main for future growth is programmed for 2026 planning horizon.

Figure 7-6 : Airport Industrial Supply Main

7.3.4 159 Winara Avenue Development (UPG04)

81 new properties are proposed in the area to the east of Winara Avenue. These will be fed by gravity from a proposed reservoir at around 130m HGL, which will in turn be supplied via a rising main and a pump station in Kotare Street.

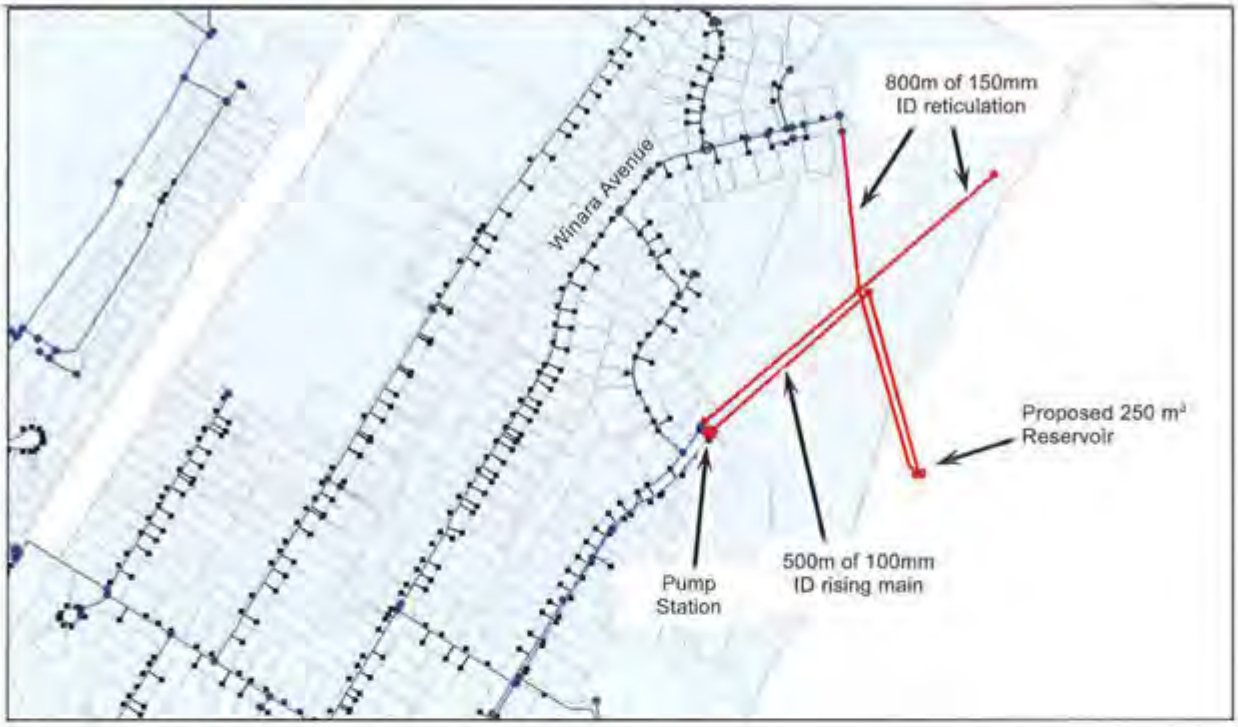

Figure 7-7 : 159 Winara Avenue Development

The distribution network consists of 800m of 150mm ID reticulation, and the rising main consists of 500m of 100mm ID main.The reservoir is required to be around 250m³ in size.

Initially the pump station will be fed from the Kakariki DMA, but as there are already issues with low pressures in Kotare Street (see Section 6.3.2) VSD controls will be used to ensure the pump station does not run at peak time and does not cause any further degradation of pressures.

Once the Tui High Level Extension is constructed (see Section 7.5.1), the pump station can instead be fed from this higher-pressure main, and the VSD controls will not be required.

The network in Figure 7-7 is applied added to the model and connected to the existing low level main in the 2016 scenario. In the 2026 scenario and all following scenarios, the network is connected to the Tui High Level Extension.

7.4 Strategic Upgrades

Strategic upgrades have been identified as major upgrades required to facilitate water transfer across a network and/or enhance network operation. Although they sometimes address specific deficiencies, this is not their primary purpose.

7.4.1 Tasman Road Trunk Main (UPG05)

Even under current demand conditions it is not possible to deliver the required fire flow to the Riverbank Road Industrial and Otaki Main Highway Commercial areas (see Section 6.4.2).

There is plenty of capacity at the Tasman Bore (up to 110 l/s), but with the current configuration of the Tasman Road trunk mains (2 x 150mm diameter mains) it is not possible to deliver this flow to the points where it is required.

A 250mm ID main is required – this will fully address the fire flow deficiency at Otaki Main Highway, and together with the Otaki Reservoir (see Section 7.4.2) and the Otaki Loop Main (Section 7.6.1), the 100 l/s flow requirement at Riverbank Industrial can be met.

This upgrade is required in the 2016 planning horizon.

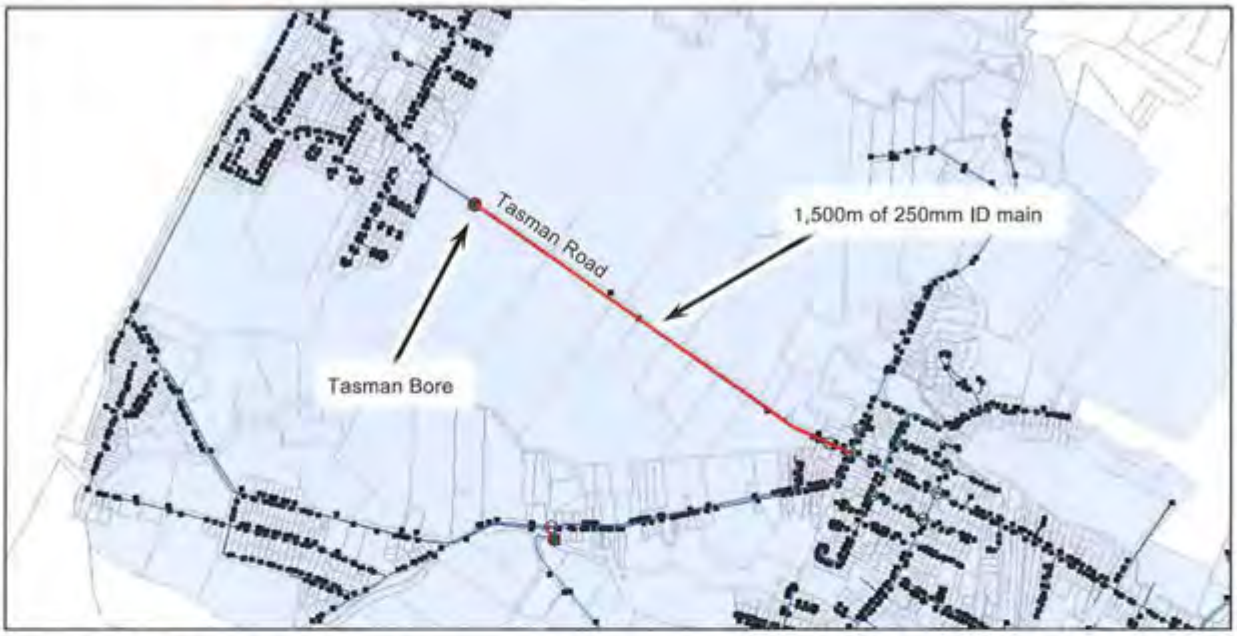

Figure 7-8 : Tasman Road Trunk Main

7.4.2 Otaki Reservoir (UPG06)

7.4.2.1 Recommended Configuration

There is a significant storage shortfall in the current Otaki network, and fire flow is also unable to be supplied. Although security of supply has not been specifically assessed, the reliance of the Otaki network on the Tasman Road bore has historically been noted as a concern.

To address all three of these concerns, a reservoir is required in the Otaki network. The most effective place for this to connect to the existing network is immediately upstream of the County Road pump station, however there is no elevated land in this location. A location for the reservoir has not yet been identified, but based on previous investigations it is thought likely that the reservoir will be between 1.5km and 2km from this location.

A reservoir has been in the long term plan for a number of years. Locations have been proposed and recommended in the past, but none have been progressed. Rather than modelling the reservoir in a location which could be contentious, the reservoir has been placed in the model directly adjacent to County Road as shown in Figure 7-9, and the length of the short connection to the County Road network has been forced in the model to reflect a distance of 1,750m.

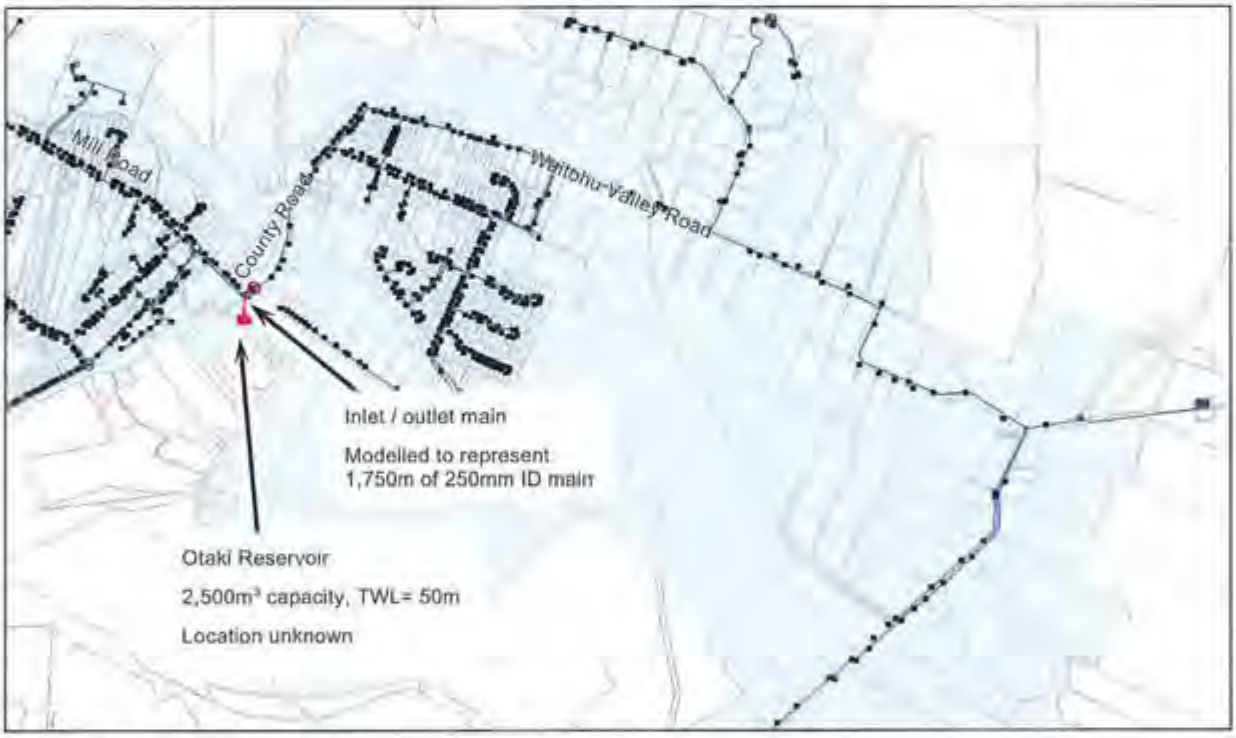

Figure 7-9 : Otaki Reservoir (as modelled - location unknown)

For storage purposes, a reservoir of 2,500m^3 is required. After some trial and error a ground elevation of 47.5m was selected, with a reservoir depth of 3m providing a top water level of 50.5m.

The Tasman Road pumps were altered to act as a refill pump, turning on to deliver 58m HGL (53.5m pressure) when the reservoir drops to 2.0m depth and turning off again when the reservoir reaches 2.9m depth. It was found that unless the Tasman Road Trunk Main (UPG05, Section 7.4.1) was implemented, the Tasman Road bores need to run at much higher pressure to refill the reservoir. This in turn results in high pressures across the Otaki Beach DMA.

In addition to the core reservoir infrastructure as shown in Figure 7-9, the reservoir requires the Tasman Road upgrade (UPG05) and some operational changes to operate effectively. These are shown in Figure 7-10.

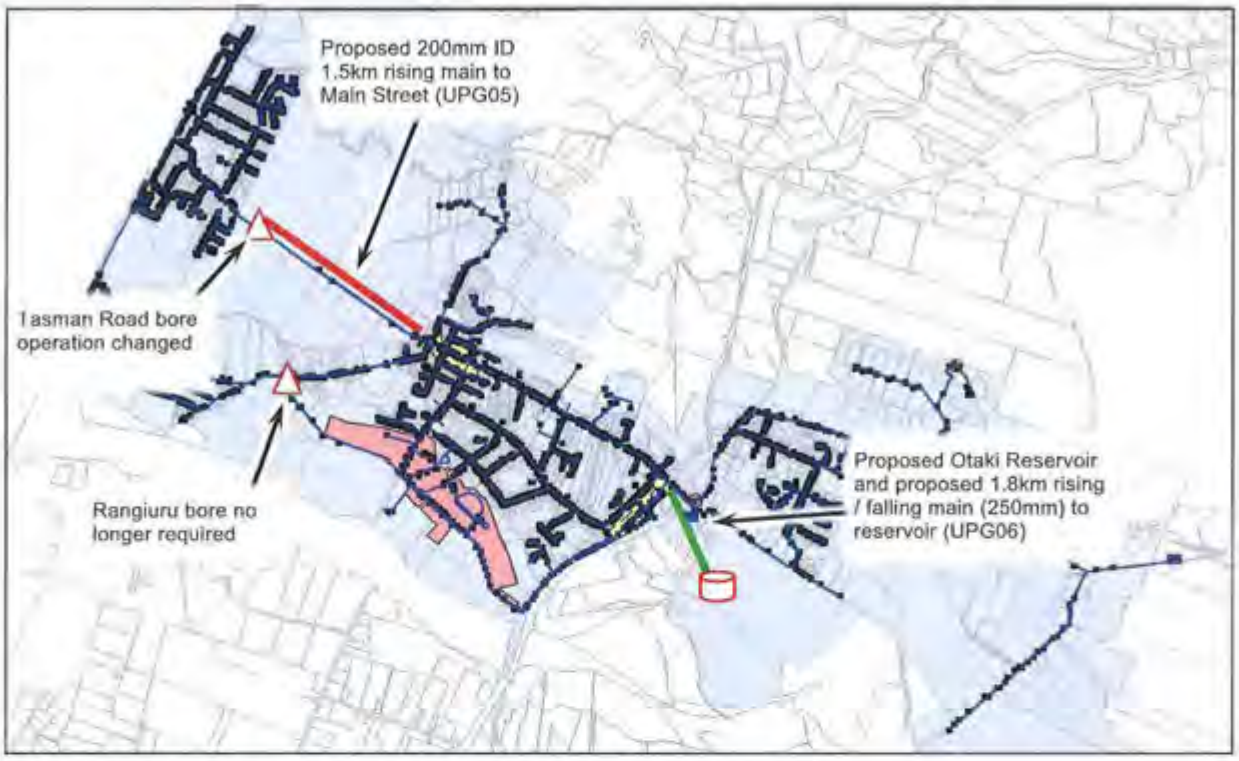

Figure 7-10 : Otaki System Upgrades required for Otaki Reservoir

The reservoir is required immediately to address fire flow, storage and security of supply issues. It has been implemented in the 2016 scenario in the model.

7.4.2.2 Alternative Configuration – Dedicated Feed

An assessment was carried out to determine what additional upgrades would be required to turn the Otaki network into a dedicated feed system.

Potential advantages of dedicated feed systems are:

- More stable pressures, resulting in less wear on the network and components
- Less reliance on continuity of supply from the source
- Improved water quality through reduced water age

7.4.2.2.1 Upgrades

Figure 7-11 shows the upgrades required to turn Otaki into a gravity system with dedicated feed to Otaki Reservoir. Pumping mains were sized to keep head loss to under 2.5 m/km with the Tasman Bore pumps operating 80% of the time under peak summer demand. Note that the location of the Otaki Reservoir is not yet known – the location shown on the plan is indicative only. It is assumed that the reservoir will be around 1.8km from County Road, where the reservoir will connect to the existing network.

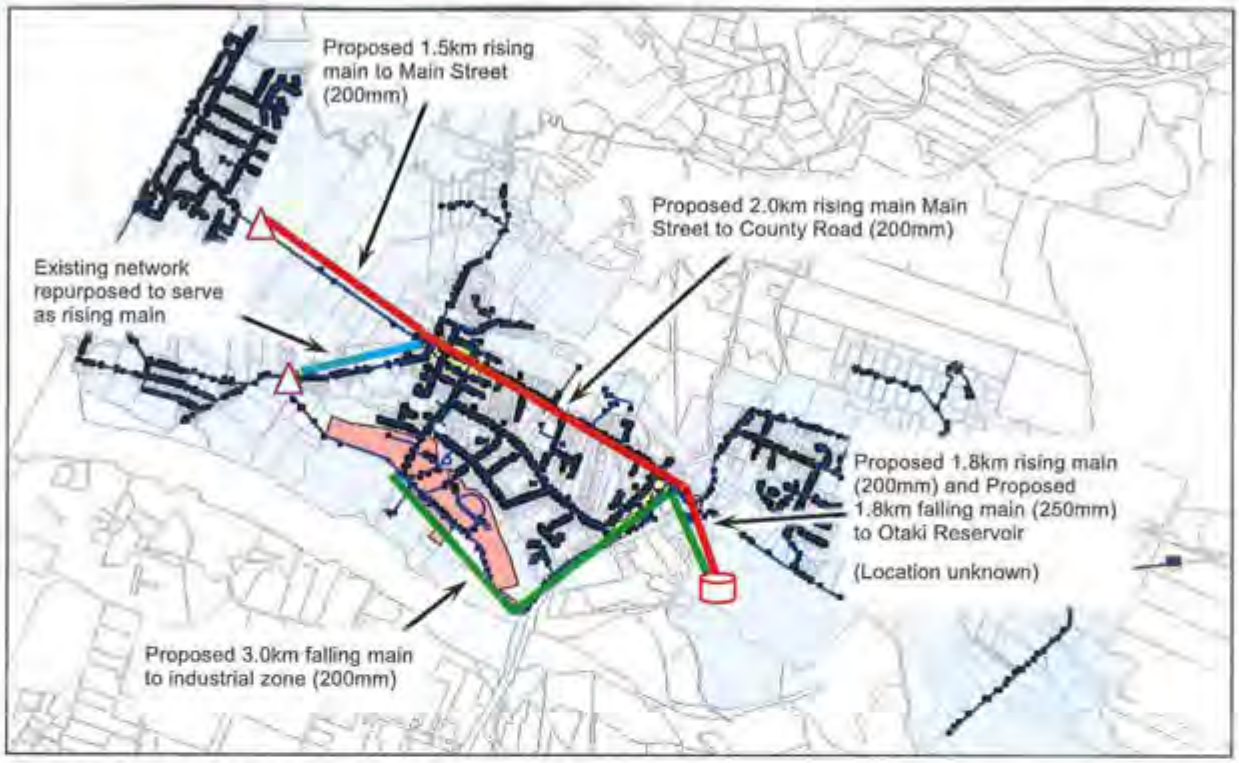

Figure 7-11 : Otaki Dedicated Feed System Upgrades

The upgrades shown in Figure 7-11 are listed below, along with notes to compare each upgrade to the requirements for a push-pull system.

1. 1.5km rising main to Main Street (200mm) – this upgrade has already been proposed (Section 7.4.1) to address connectivity issues between Tasman Road bores and the Otaki township.
2. 2.0km rising main from Main Street to County Road (200mm) – this upgrade is additional to the upgrades already proposed.
3. 1.8km rising main (200mm) and 1.8km falling main (250mm) to Otaki Reservoir. The upgrades already proposed require only one combined rising / falling main (Section 7.4.2.1). The second 200mm diameter rising main is an additional upgrade.
4. 3.0km falling main to industrial zone (200mm) – this upgrade is already proposed to improve fire flow in the Industrial area to 100 l/s (Section 7.6.1).
5. A 150mm main in Rangiuru Road has been repurposed as a rising main, with the parallel 200mm diameter main remaining as part of the gravity network. Although the Rangiuru Bore does not operate under normal conditions, it is thought this would provide some limited backup in the event of a failure at Tasman Bore or on the dedicated rising main from Tasman Road to Main Street.

7.4.2.2.2 Performance

Even with the additional upgrades, the gravity system does not operate as effectively as the push-pull system initially proposed. In the push-pull configuration the network can be jointly supplied by the reservoir and bores under peak or fire demand. In the gravity system, there is only one point of supply - all peak and fire demands must travel down the falling main from the reservoir before distributing through the reticulation.

This results in available fire flows below 50 l/s in the industrial zone unless the SH1 and Riverbank Road network is upgraded, and fire flows below 50 l/s remain in the Main Street commercial area. Figure 7-12 shows these locations.

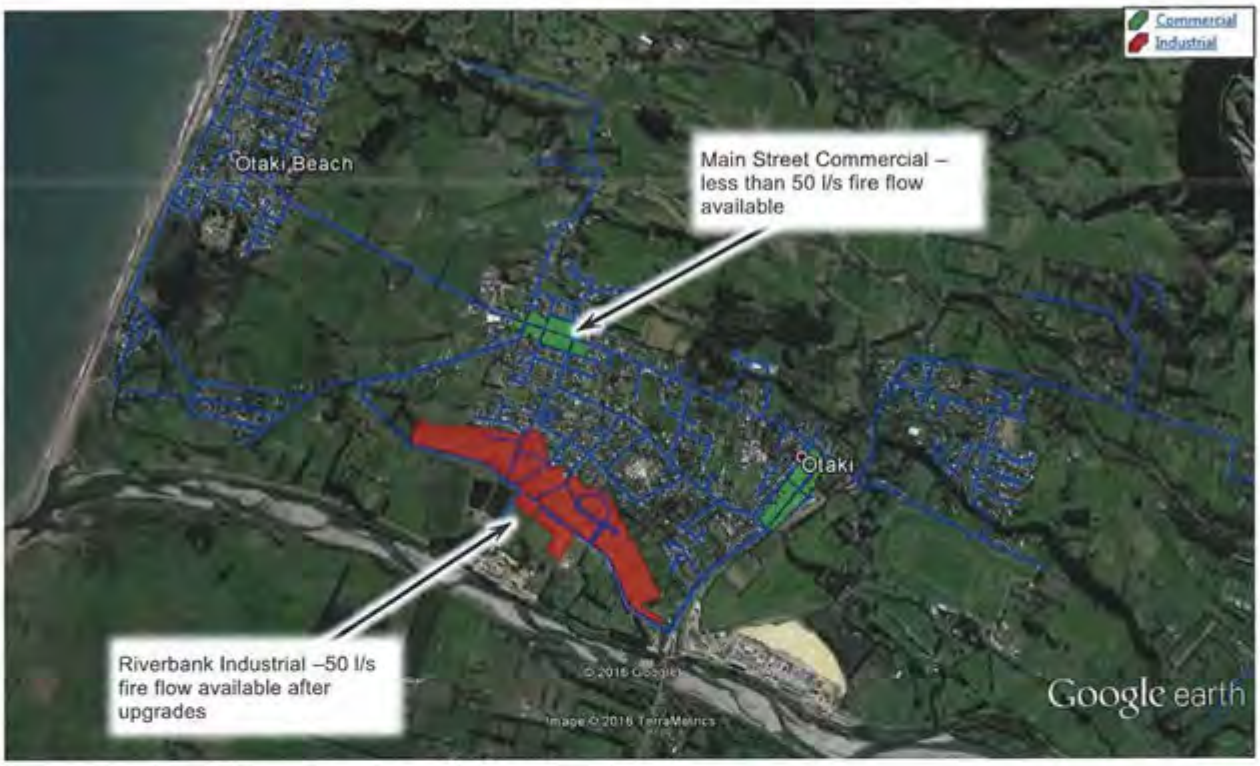

Figure 7-12 : Otaki Dedicated Feed Fire Flow Performance

In terms of water age, there is significant improvement in reservoir water age under the dedicated feed configuration. Figure 7-13 shows the comparison.

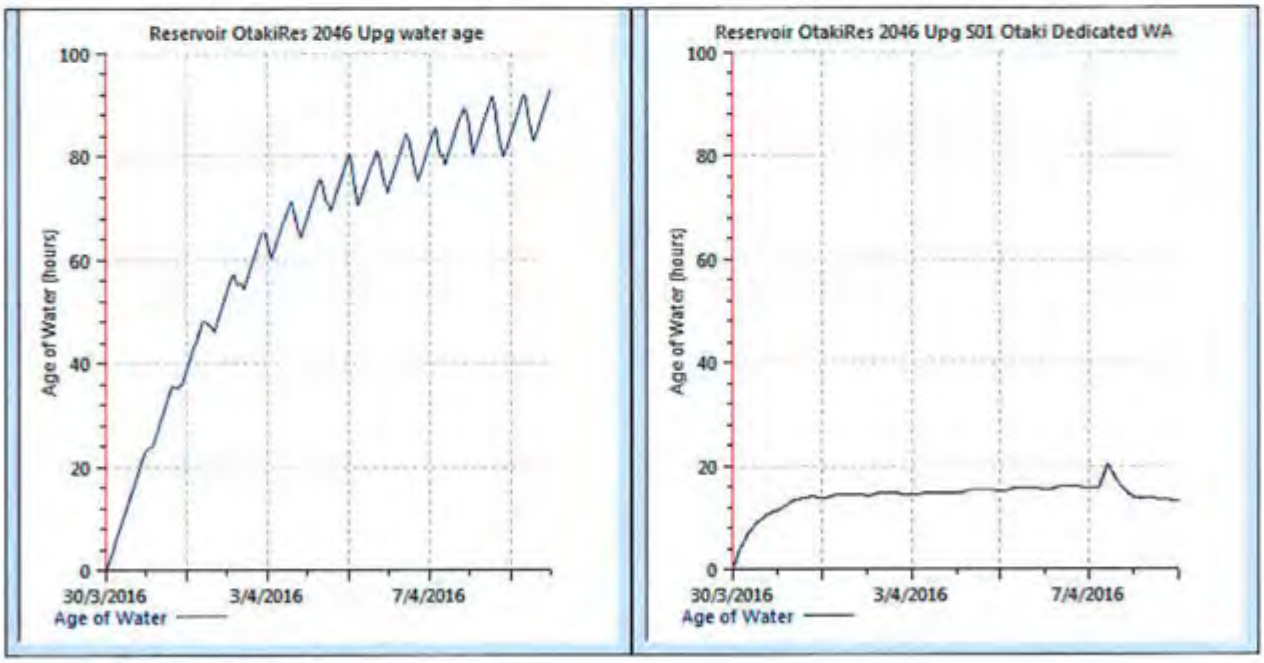

Figure 7-13 : Water Age Comparison

Although water age in the push-pull system is significantly higher, modelling also shows high water age in the existing Waitohu Reservoir. As there are no apparent problems with water quality at this reservoir, it is not thought that this is a major concern.

In terms of security of supply, the dedicated main system introduces significantly more risk than in the push-pull system, as there is no alternative means of supply if the falling main from Otaki Reservoir fails.

7.4.2.2.3 Recommendation

The dedicated feed system requires an additional 3.8km of new 200mm diameter mains. This investment provides a benefit in terms of water age, but water quality may not be an issue in this network. In terms of fire flow and security of supply, the dedicated feed configuration is significantly worse than the proposed push-pull configuration. We therefore do not recommended upgrading to a dedicated feed configuration in Otaki.

7.4.3 Ngarara Loop (UPG07a and UPG07b)

7.4.3.1 Recommended Configuration

In addition to the Ngarara supply main (UPG01, Section 7.3.1), network upgrades are required to prevent excessive head losses upstream of the Ngarara supply main itself. After some study of alternative configurations, it was decided that a new main from Elizabeth Street to the Ngarara supply main via Kapanui Road would be the best option. This comprises Stage 1 of the Ngarara Loop upgrade. Section 7.4.3.2 outlines the consideration of alternatives for Stage 1.

Extending this main on from the Ngarara development to Field Way ion the Waikanae Beach zone comprises Stage 2. This addresses security of supply concerns, as the Te Moana Road main is currently the only route for water to reach Waikanae Beach.

The preferred route for Stage 1 starts at Elizabeth Street as a 250mm diameter main, passes through the commercial and industrial areas and then continues down Kapanui Road as a 200mm diameter main. At the end of Kapanui Road the main will continue on into the Eldon Rest Home through to Ngarara Road, where a PRV is proposed to reduce the network pressure from around 100m HGL to 67m HGL. The 200mm ID main then continues down Ferndale Drive to Te Heke Place to end where the Ngarara supply main (UPG01) starts.

Stage 2 starts at the western end of the Ngarara supply main (UPG01). In Stage 2, the 200mm ID main continues across open land to connect with the existing 200mm ID main in Field Way. A PRV is proposed at the Field Way connection point to further reduce network pressure to 53m HGL, as a match for the existing Rauparaha PRV.

Stage 1 of this upgrade is required when the Ngarara development comes online in 2026 planning horizon. For security of supply reasons Stage 2 has also been included in the 2026 planning horizon.

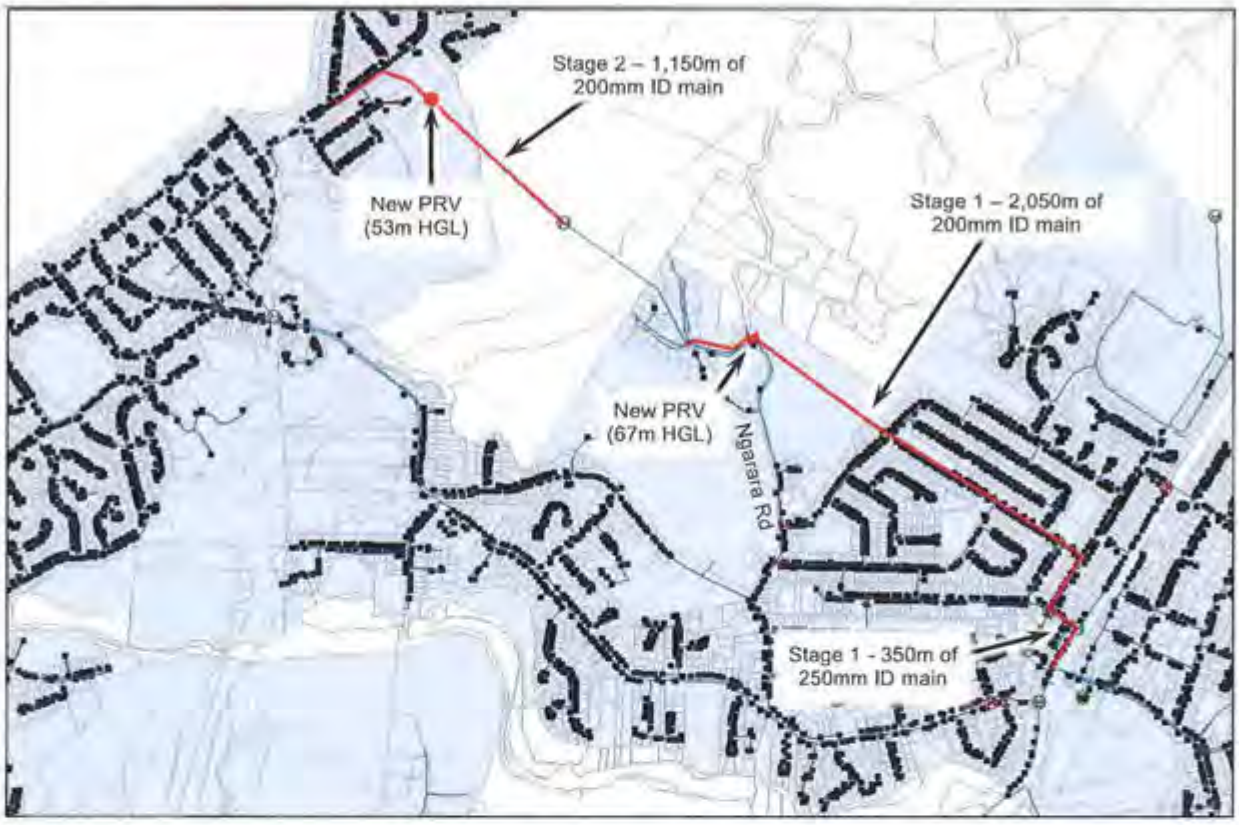

Figure 7-14 : Ngarara Loop - UPG7a (Stage 1) and UPG7b (Stage 2)

7.4.3.2 Route Investigations – Alternative Configurations

The route detailed in Section 7.4.3.1 was the recommendation following an assessment of three routes. This section outlines the assessment and outcomes.

7.4.3.2.1 Alternatives

Three alternative routes were considered – Figure 7-15 shows the routes. Route lengths are as follows:

1. Te Moana Road = 3,050m (700m x 250mm and 2,350m x 200mm)
2. Ngaio Road = 2,850m (600m x 250mm and 2,250 x 200mm)
3. Kapanui Road = 2,350m (300m x 250mm and 2,050m x 200mm)

The Te Moana Road and Ngaio Road options run along existing roads and seem to have similar constructability. From aerial photography, Ngaio Road appears to have marginally less traffic. The Kapanui Road option is quieter still, but passes through a retirement home between Belvedere Avenue and Ngarara Road. The route can be designed to follow existing roadways within the home.

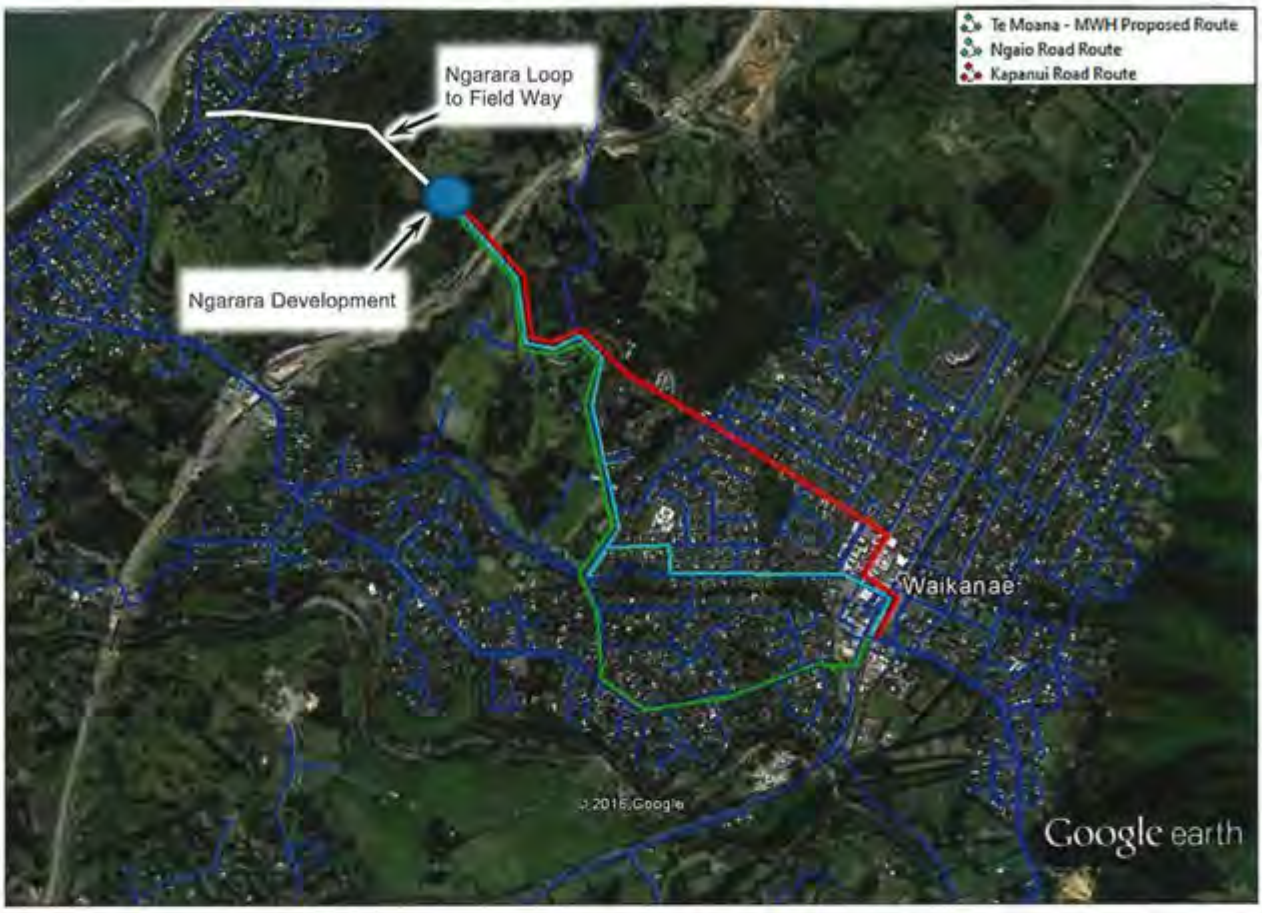

Figure 7-15 : Ngarara Supply Route Alternatives Considered

7.4.3.2.2 Performance – Fire Flow

There are no concerns regarding fire flow under any of the routes considered.

7.4.3.2.3 Performance – Security of Supply

The performance of each route was assessed assuming the loop to Field Way is complete and the existing PRV in Rauparaha Street failed and was shut off.

- Under option 1, pressures in Waikanae Beach drop to around 24m.
- Under option 2 and option 3 pressures are better, with pressures under both options dropping to around 27m.

7.4.3.2.4 Recommendation

On balance, we recommend option 3 (Kapanui Road), as this is overall the best-performing and cheapest option.

7.4.3.2.5 Raw Water Mains – Bores Decommissioning

One option which was not part of the study, but which may be worth exploring is that the existing raw 375mm and 450mm diameter water mains designed to carry bore water to the water treatment plant may not be required when the proposed Waikanae Dam is commissioned. These mains could be repurposed to carry fresh water, or could be used as sleeves for smaller diameter pipes to reduce construction costs.

This option is dependent on timing of the Waikanae Dam, as development of Ngarara is likely to start soon. However, if it is possible to use the bore water mains the cost savings could be significant.

Figure 7-16 shows the alignment of the bore water mains which could be used.

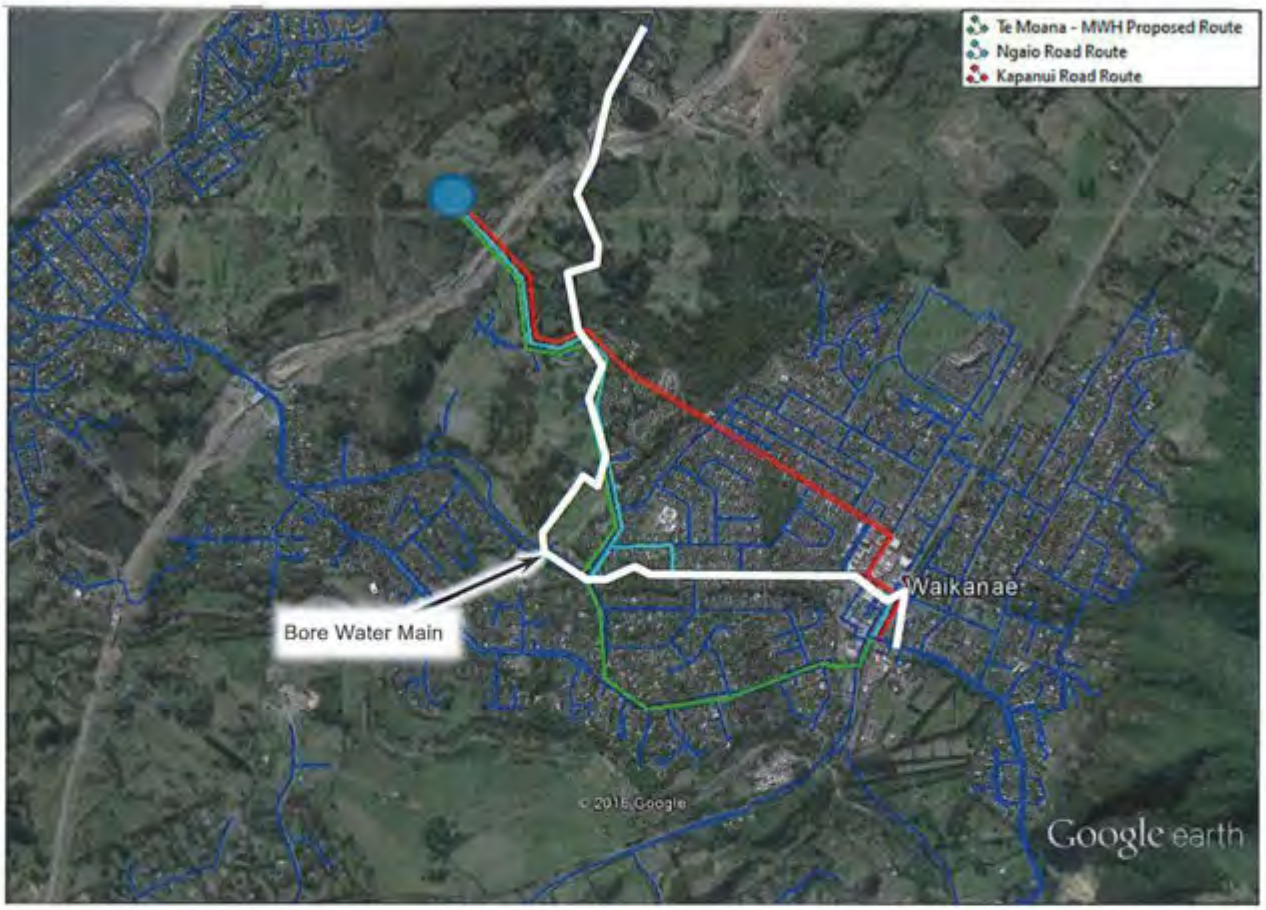

Figure 7-16 – Route of Bore Water Mains which could assist Ngarara Supply

7.5 Pressure Upgrades

7.5.1 Tui High Level Extension (UPG08)

To address the issues highlighted in Section 6.3.2, the Tui High Level network is to be extended from Tui Crescent to the end of Kotare Street. All properties along this stretch of main (around 90 properties) are to be disconnected from the low level reticulation and reconnected to the new high level main. The customers to be reallocated are listed in Appendix A.

This upgrade is required immediately, and is included in the 2016 planning horizon in the model.

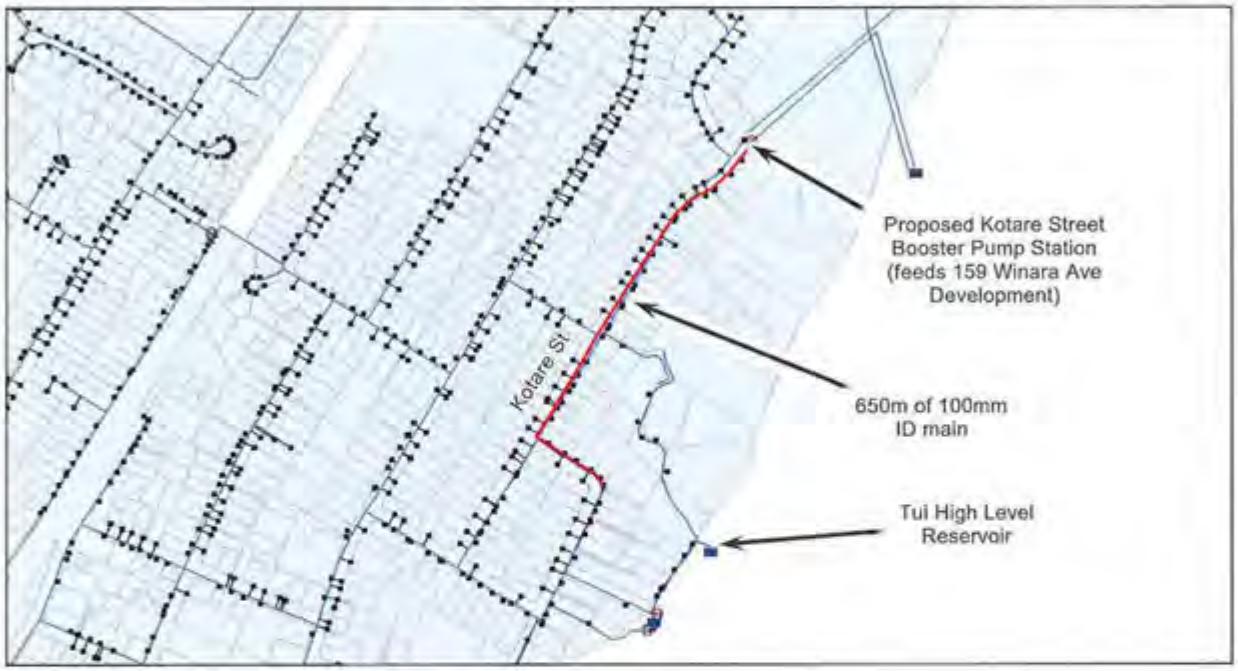

Figure 7-17 : Tui High Level Extension

7.5.2 Ngaio Street Valve (UPG09)

To assist in addressing low pressure issues in Section 6.3.2 and to address fire flow issues in Section 6.4.1, a boundary valve between Kakariki and Hemi Street DMAs is to be opened, and a new flow meter installed.

Figure 7-18 : Ngaio Street Valve

This upgrade is required immediately, and is included in the 2016 planning horizon in the model.

7.5.3 Riwai High Level Alterations (UPG10)

To address the pressure issues in Section 6.3.3 and the fire flow issues in Section 6.4.12, a number of changes are proposed to extend the Riwai high Level network.

1. The distribution mains in Waimanu Grove, the right-of-way to 82 Valley Road, and in Valley Road opposite Eldon Rest Home should be disconnected form the low level reticulation and reconnected to existing Riwai High Level reticulation.
2. The Riwai High Level reticulation should be extended with a new 120m of 100mm diameter main in Hookway Grove, and 260m of 50mm ID main in Kaitawa Crescent.
3. Approximately 90 properties should be connected to the Riwai High Level reticulation (existing or new), as shown in Figure 7-20. A list of these properties is given in Appendix A.

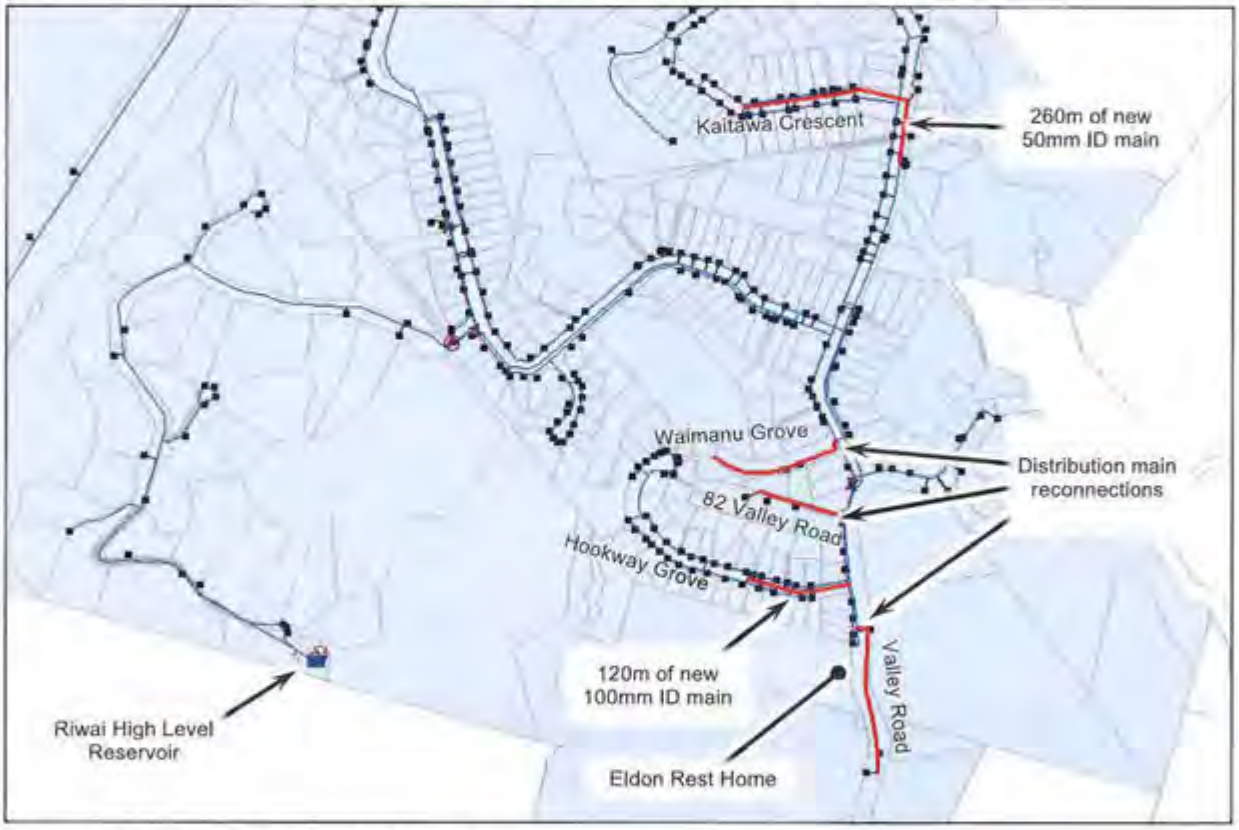

Figure 7-19 : Riwai High Level Alterations

This upgrade is required immediately, and is included in the 2016 planning horizon in the model.

Figure 7-20 : Properties to be reconnected to Riwai High Level Reticulation

7.5.4 Te Moana Road PRV (UPG11)

To address high pressures in Te Moana Road and the Ngarara Development as outlined in Section 6.3.4, a PRV is to be installed just east of the intersection of Te Moana Road and Koromiko Road.

The PRV is to be set to deliver 75m HGL in 2016, dropping to 67m HGL when the Ngarara loop main is installed (Section 7.4.3).

The existing PRV at Rauparaha Street remains in place and is set to deliver 53m HGL.

Figure 7-21 : Te Moana Road PRV

This upgrade is required in 2016, to address existing high pressures.

7.5.5 Rutherford Drive Upgrade (UPG12)

As outlined in Section 6.3.5, although Peka Peka is currently supplied with fixed-volume restrictors, KCDC intends to provide full on-demand water supply in the future. To provide this, approximately 2km of new 150mm ID main will be required to ensure all Peka Peka properties receive 25m pressure.

Note this does not provide sufficient fire flow for fire class FW2 (required to meet the fire code requirements for residential properties) – it is assumed that these requirements are met by existing fire storage facilities.

This upgrade will be required when the Peka Peka supply is converted to on-demand supply. In the model this has been implemented in the 2026 planning horizon.

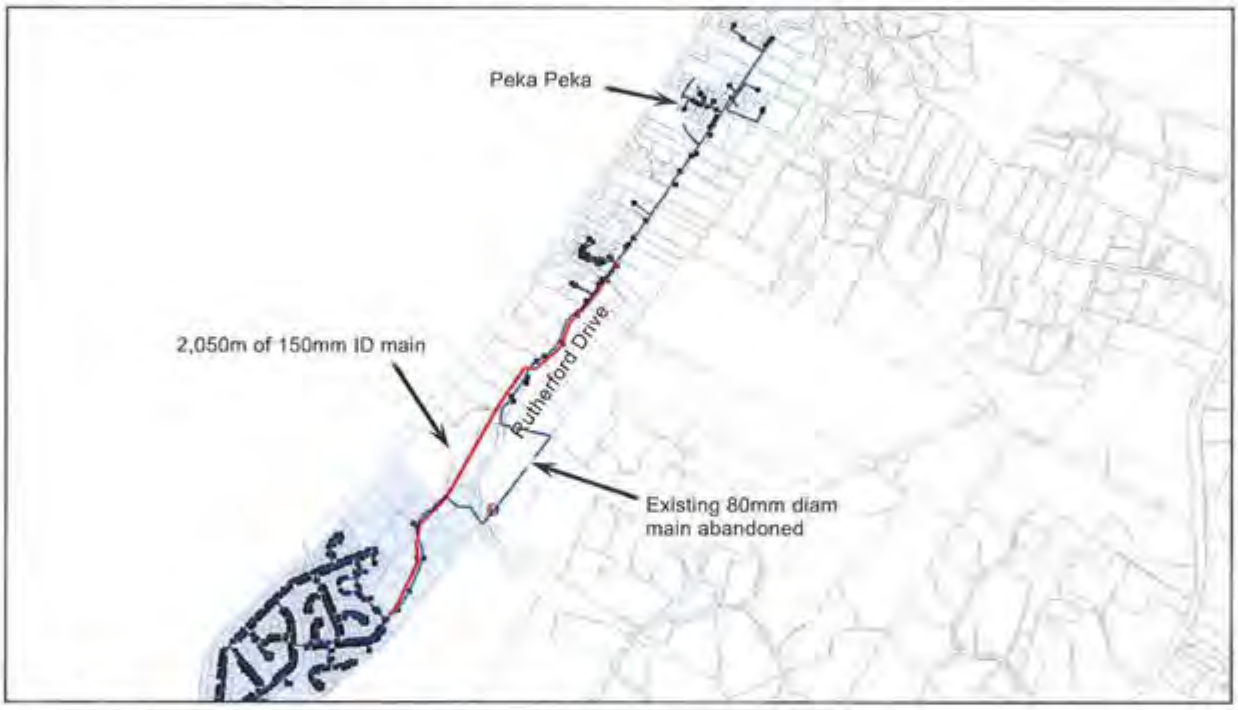

Figure 7-22 : Rutherford Drive Upgrade

7.6 Fire Upgrades

7.6.1 Otaki Loop Fire Main (UPG13)

Under current demand conditions it is not possible to deliver the required level of fire flow (100 l/s, FW4) to the Riverbank Road Industrial area (see Section 6.4.2).

Even with the Tasman Road Trunk Main and Otaki Reservoir upgrades in place, the network leading from these upgrades to the industrial area is too small to provide the required fire flow.

A 200mm ID main is required connecting the Otaki Reservoir inlet/outlet main to the industrial area and linking through to the 200mm diameter main from Rangiuru Bore, which currently extends as far as Aotaki Street.

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

Figure 7-23 : Otaki Loop Fire Main

7.6.1.1 Otaki Loop Alternative Configuration – River Water Diversion / Storage

In discussions with the Fire Service (NZFS), NZFS mentioned that in a recent fire in the Riverbank industrial area they ran hoses across the ground to the Otaki River to try and make up the shortfall in required fire flow. NZFS indicated that if it were made possible to create access points to river water with appropriate hose connections at key points along Riverbank Road, then the Otaki Loop fire main may not be required.

It is outside the scope of this project and the feasibility is unknown, but it is thought that a configuration such as that shown in Figure 7-24 may be cheaper than 2,850m of pipe upgrades. Further investigation is recommended.

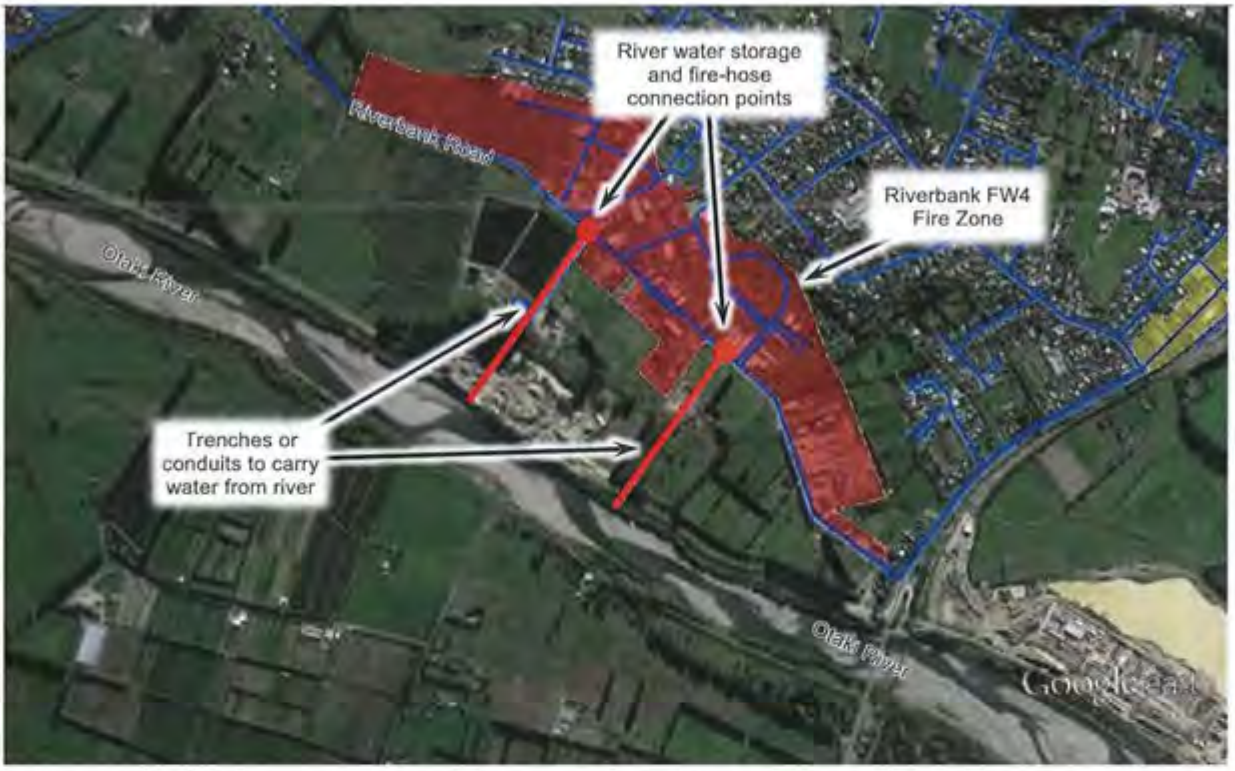

Figure 7-24 : Alternative Riverbank Road Fire Supply - Otaki River

7.6.2 Kapiti Road Fire Main (UPG14)

To address the fire flow issues outlined in Section 6.4.3 and to assist in addressing the fire flow issues outlined in Section 6.4.4, 950mm of 250mm ID main is to be installed along Kapiti Road between Te Roto Drive and the anticipated supply point to Airport Industrial area.

Figure 7-25 : Kapiti Road Fire Main

This upgrade is required immediately to address the current fire flow deficiencies in Hurley Road and Magrath Avenue, and has been implemented in the 2016 planning horizon in the model.

7.6.3 Hurley Road and Magrath Avenue Fire Mains (UPG15)

To address the fire flow issues outlined in Section 6.4.4 and ensure FW4 fire flow requirements can be met in Hurley Road and Magrath Avenue, 350m of 150mm ID mains are to be installed in Hurley Road and Magrath Avenue.

Figure 7-26 : Hurley Road and Magrath Avenue Fire Mains

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

7.6.4 Rangiuru Mains (UPG16)

To address the fire flow issues outlined in Section 6.4.5, two sets of upgrades are required in Rangiuru Road.

370m of 150mm ID main is to be installed between the Rangiuru bore and the intersection with Old Coach Road, and 230m of 150mm ID main is to be installed in The Ave.

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

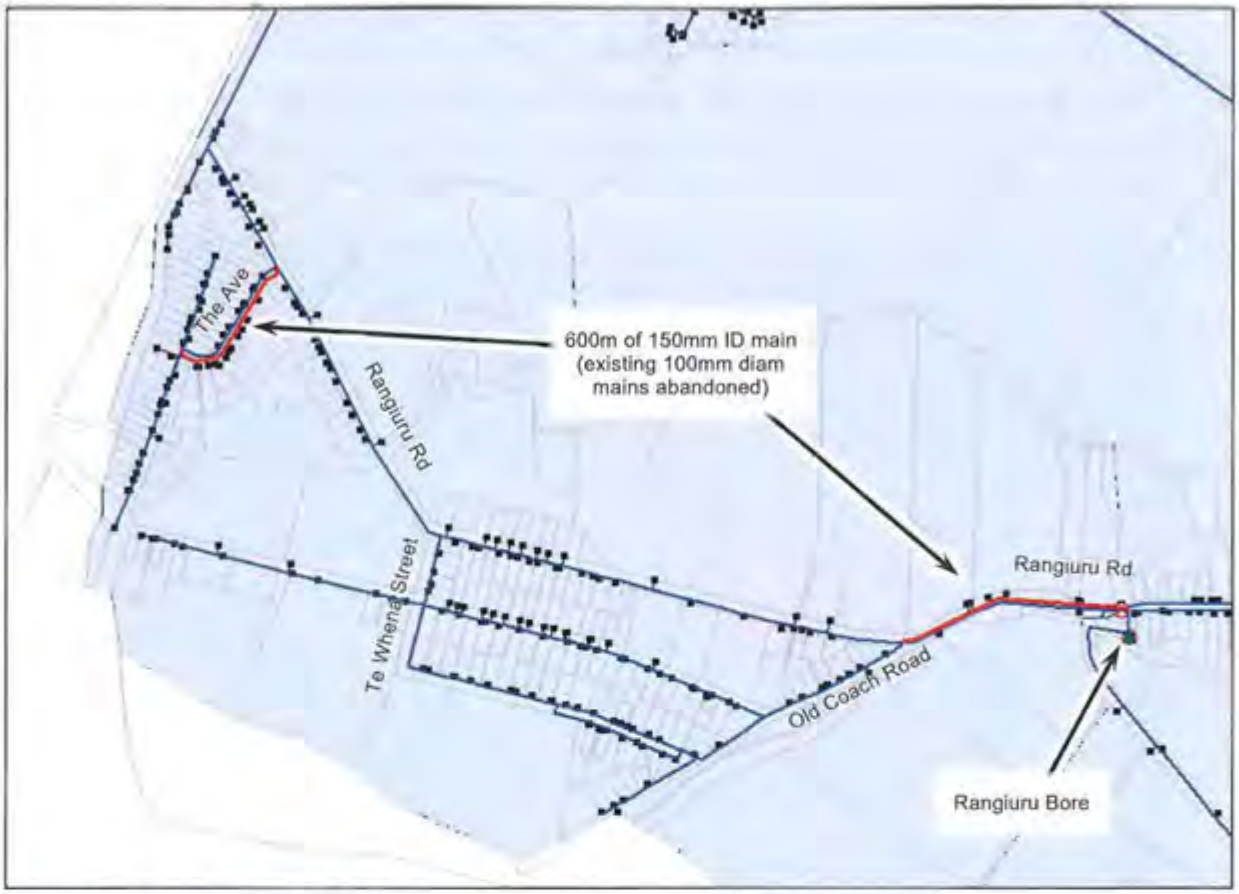

Figure 7-27 : Rangiuru Road Fire Upgrades

7.6.4.1 Rangiuru Alternative Configuration – River Water Diversion / Storage

NZFS have indicated that the second stretch of Rangiuru mains upgrade (between Te Whena Street and The Ave) could be avoided if it were possible create an access point to the stream alongside Kapiti Lane with appropriate hose connections.

It is outside the scope of this project and the feasibility is unknown, but it is thought that a configuration such as that shown in Figure 7-28 may be cheaper than 480m of pipe upgrades. Further investigation is recommended.

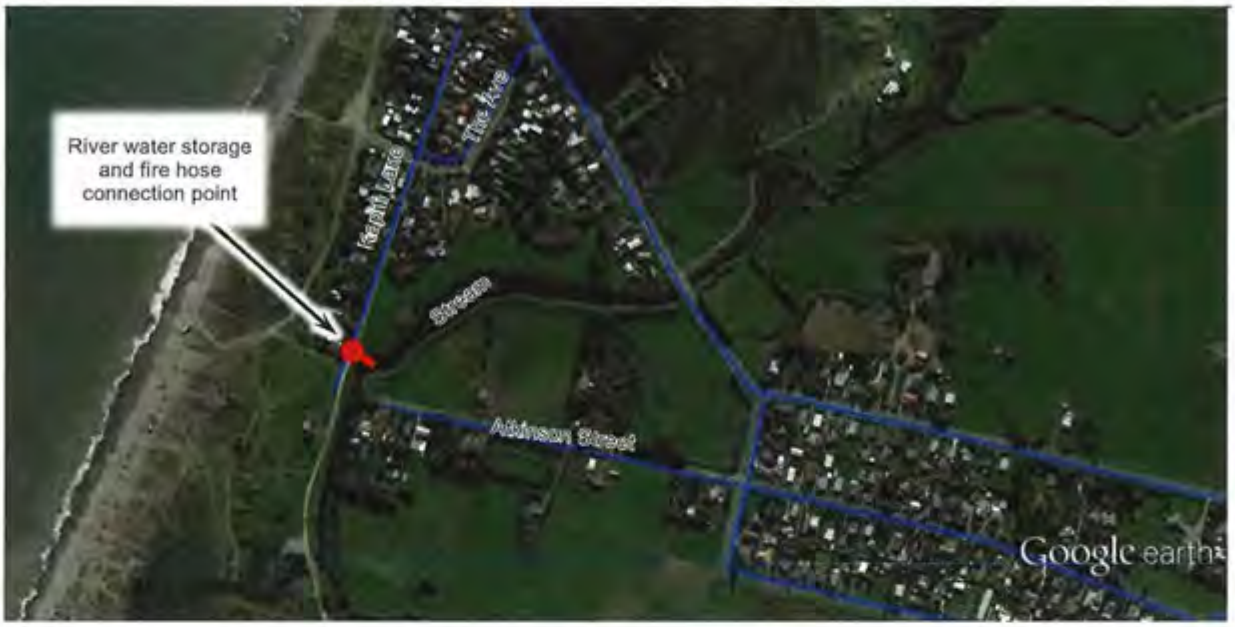

Figure 7-28 : Alternative Rangiuru Fire Supply Option

7.6.5 Mountain View Terrace (UPG17)

To address the fire flow issues outlined in Section 6.4.6, 250m of 150mm ID main is to be installed in Robert McKeen Street between Tasman Road and Mountain View Terrace.

Figure 7-29 : Mountain View Terrace Fire Upgrade

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

7.6.6 Lupin Road (UPG18)

To address the fire flow issues outlined in Section 6.4.7, 480m of 150mm ID main is to be installed in Matene Street, Hadfield Street and Lupin Road.

Figure 7-30 : Lupin Road Fire Upgrade

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

7.6.6.1 Lupin Street Alternative Configuration – 25m³ Storage

NZFS have indicated that they would be satisfied without the upgrade along Hadfield Street and Lupin Road if 25m³ storage could be installed at the end of Lupin Street.

FW2 requires 12.5 l/s to be available within 135m of any property, and a further 12.5 l/s to be available within 270m. All existing hydrants in Lupin Street can supply 12.5 l/s, so FW2 will be satisfied as long as the storage is within 270m of all points where 25 l/s can't be supplied.

Enough storage is required to maintain this 12.5 l/s flow for 30 minutes. This equates to 22.5m³, so 25m³ storage has been recommended. A connection for fire hoses would be required at this storage point, and 200m of 150mm ID main would still be required to supply 25 l/s to the end of Matene Street, but 280m of the 150mm ID upgrade shown in Figure 7-30 could be eliminated.

Quality of the stored water is not a concern as it will be used for firefighting only. It could therefore be connected to the existing reticulation with a standard cistern refill valve, which would top it up whenever some of the volume was used.

The feasibility of this option is unknown, but it is thought that this configuration (shown in Figure 7-31) may be a cheaper option than the upgrades shown in Figure 7-30. Further investigation is recommended.

Figure 7-31 : Lupin Road Alternative Fire Upgrade - Storage

7.6.7 Otaki Sports ground (UPG19)

To address the fire flow issues outlined in Section 6.4.8, 300m of 150mm ID main is to be installed along the access road to the grounds, as shown in Figure 7-32.

Alternatively, storage (with an appropriate connection point for a fire hose) could be used to supplement the existing fire flow from the network. See section 7.6.6.1 for detail on the operation and considerations which should be taken into account when using storage, but the location of the storage in this instance is not important so long as it is within 270m of all entrances to buildings.

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

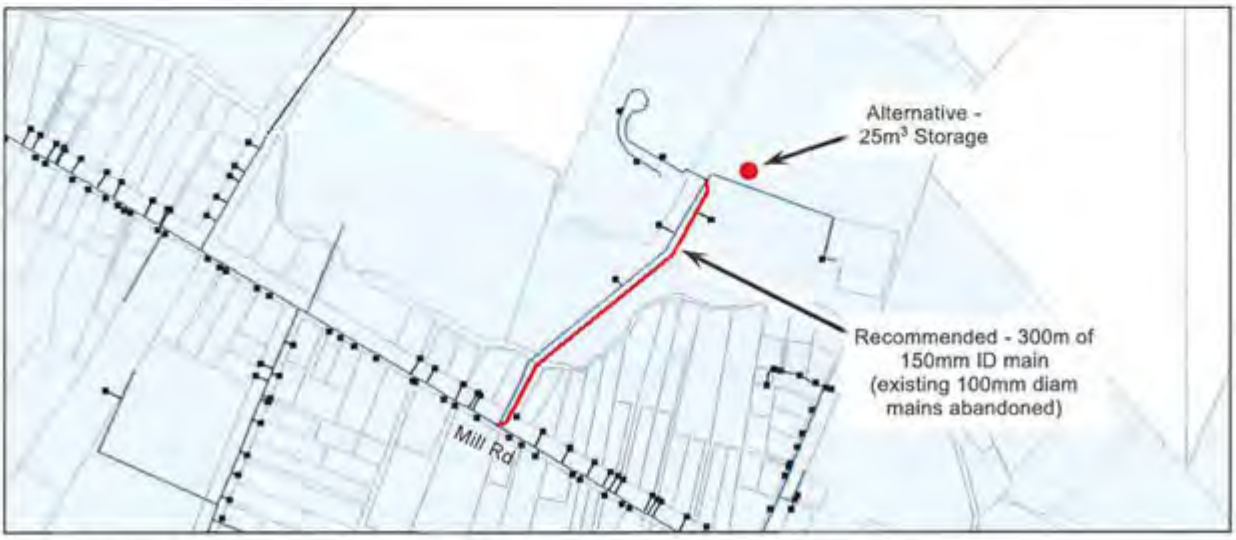

Figure 7-32 : Otaki Sports Ground Fire Upgrade

7.6.8 Freemans Road (UPG20)

To address the fire flow issues outlined in Section 6.4.9, 1,550m of 150mm ID main is to be installed, as shown in Figure 7-33.

Storage was not investigated for this particular case. Due to the extensive nature of the fire flow deficiencies, any storage option would require multiple storage units at different locations. This would increase the complexity of the solution significantly. It was therefore concluded that in this case reticulated fire flow would be more appropriate.

Figure 7-33 : Freemans Road Fire Upgrades

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

7.6.9 Puriri Road (UPG21)

To address the fire flow issues outlined in Section 6.4.10, 560m of 150mm ID main is to be installed along Greenaway Road and Puriri Road, as shown in Figure 7-34.

Alternatively, to reduce the length of the upgrade a 25m^3 storage tank could be installed by 45 Puriri Road. This is also shown in Figure 7-34.

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

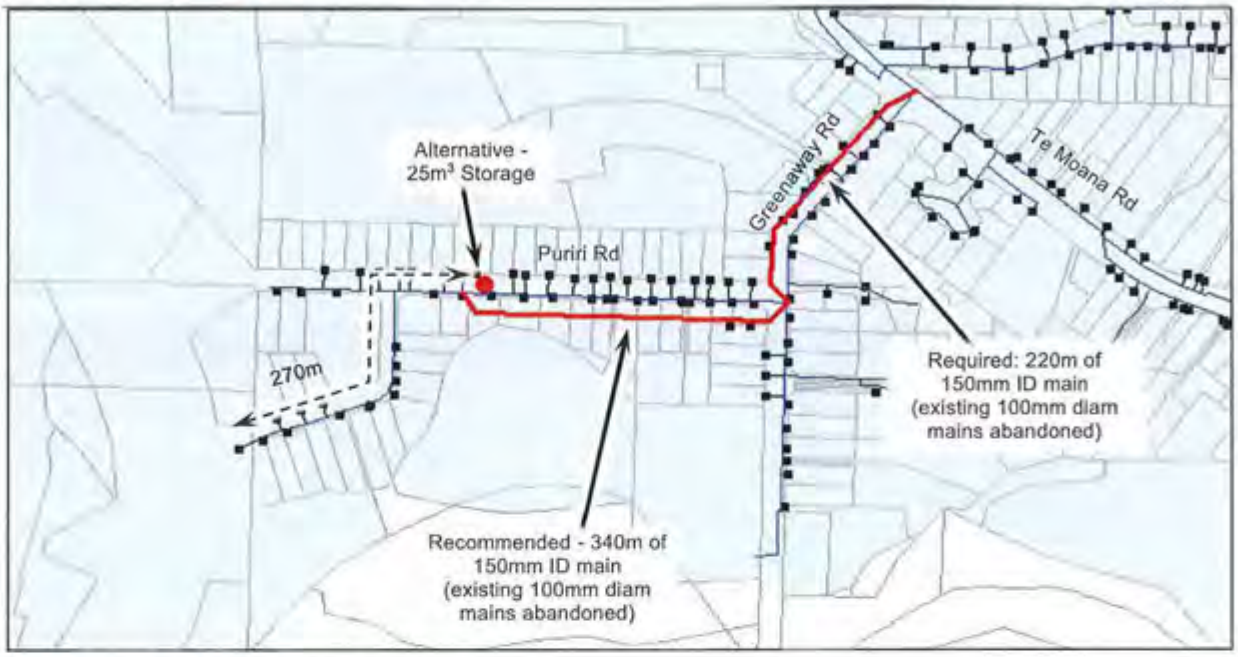

Figure 7-34 : Puriri Road Fire Upgrade

7.6.10 Groves Road (UPG22)

To address the fire flow issues outlined in Section 6.4.11, 120m of 150mm ID main is to be installed along the access road to the grounds, as shown in Figure 7-35.

Alternatively, to reduce the length of the upgrade a 25m^3 storage tank could be installed at the end of Groves Road. This is also shown in Figure 7-35.

This upgrade is required immediately to address current fire flow deficiencies, and has been implemented in the 2016 planning horizon in the model.

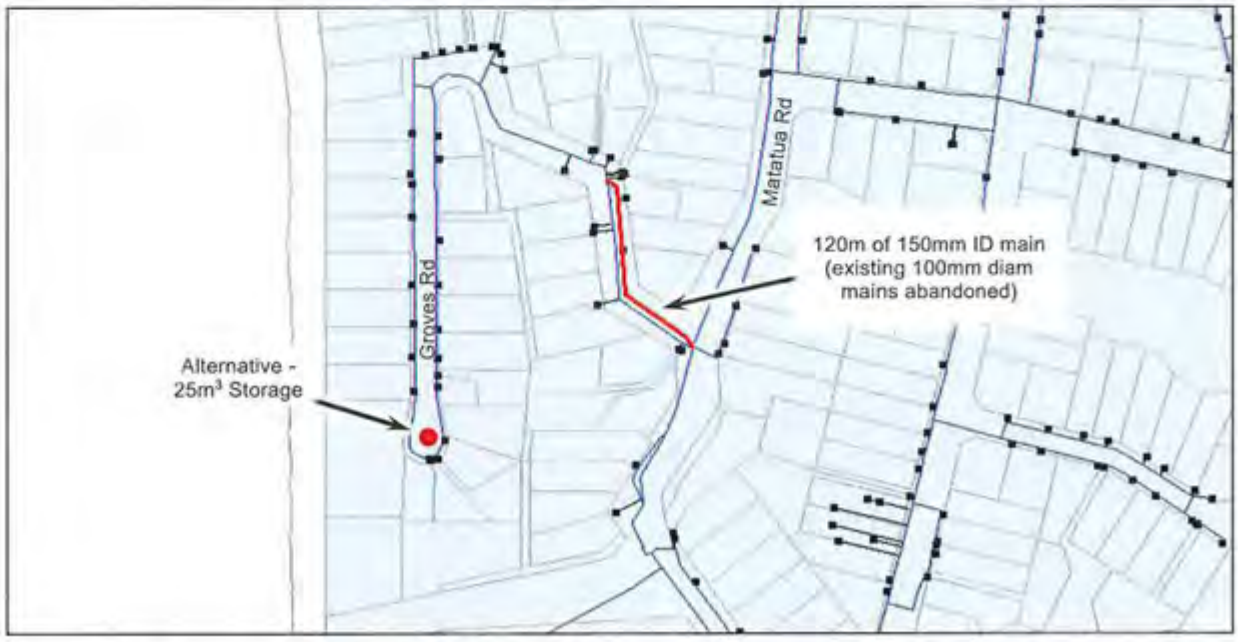

Figure 7-35 : Groves Road Fire Upgrade

8 Conclusions

The water network model built in phases 1-3 of the KCDC Water Modelling Project has been used as a base to develop a 30-year water networks capital investment programme. This involved creation of future planning horizon demand scenarios, assessment of the network in relation to performance criteria for pressure, fire flow and storage, and identification of capital projects to address deficiencies. Unit rates were used to assign potential high level costs to these projects.

Demands for the four planning horizons are summarised in Table 8-1.

Table 8-1 : Demand Summary

Supply Zone / Category	2016 (m^3/day)	2026 (m^3/day)	2036 (m^3/day)	2046 (m^3/day)
Waikanae	**5,698**	**6,708**	**7,499**	**8,253**
Existing Commercial	599	599	599	599
Existing Leakage	1,877	1,877	1,877	1,877
Existing Residential + Infill	3,123	3,125	3,548	3,935
Greenfields	99	1,107	1,475	1,842
Paraparaumu/Raumati	**13,352**	**14,031**	**14,434**	**14,677**
Existing Commercial	1,277	1,277	1,277	1,277
Existing Leakage	1,672	1,672	1,672	1,672
Existing Residential + Infill	10,403	10,637	10,267	10,510
Greenfields	0	445	1,218	1,218
Otaki	**2,883**	**2,897**	**2,897**	**2,897**
Existing Commercial	395	395	395	395
Existing Leakage	732	732	732	732
Existing Residential + Infill	1,756	1,770	1,770	1,770
Greenfields	0	0	0	0
Total	**21,933**	**23,636**	**24,830**	**25,827**

Overviews of the upgrades are shown in Figure 8-1, Figure 8-2 and Figure 8-3.

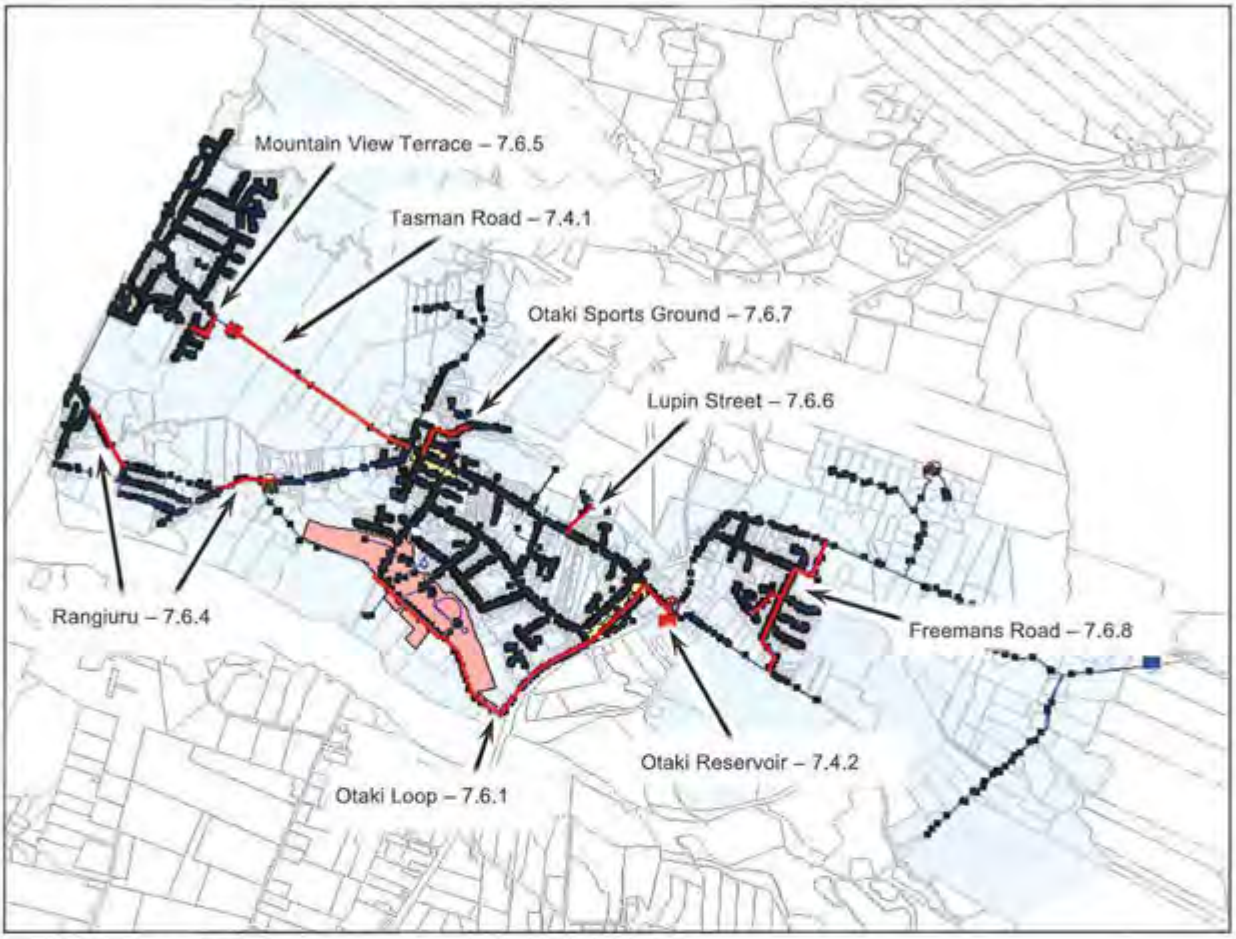

Figure 8-1 - Otaki Upgrades

Figure 8-2 - Waikanae Upgrades

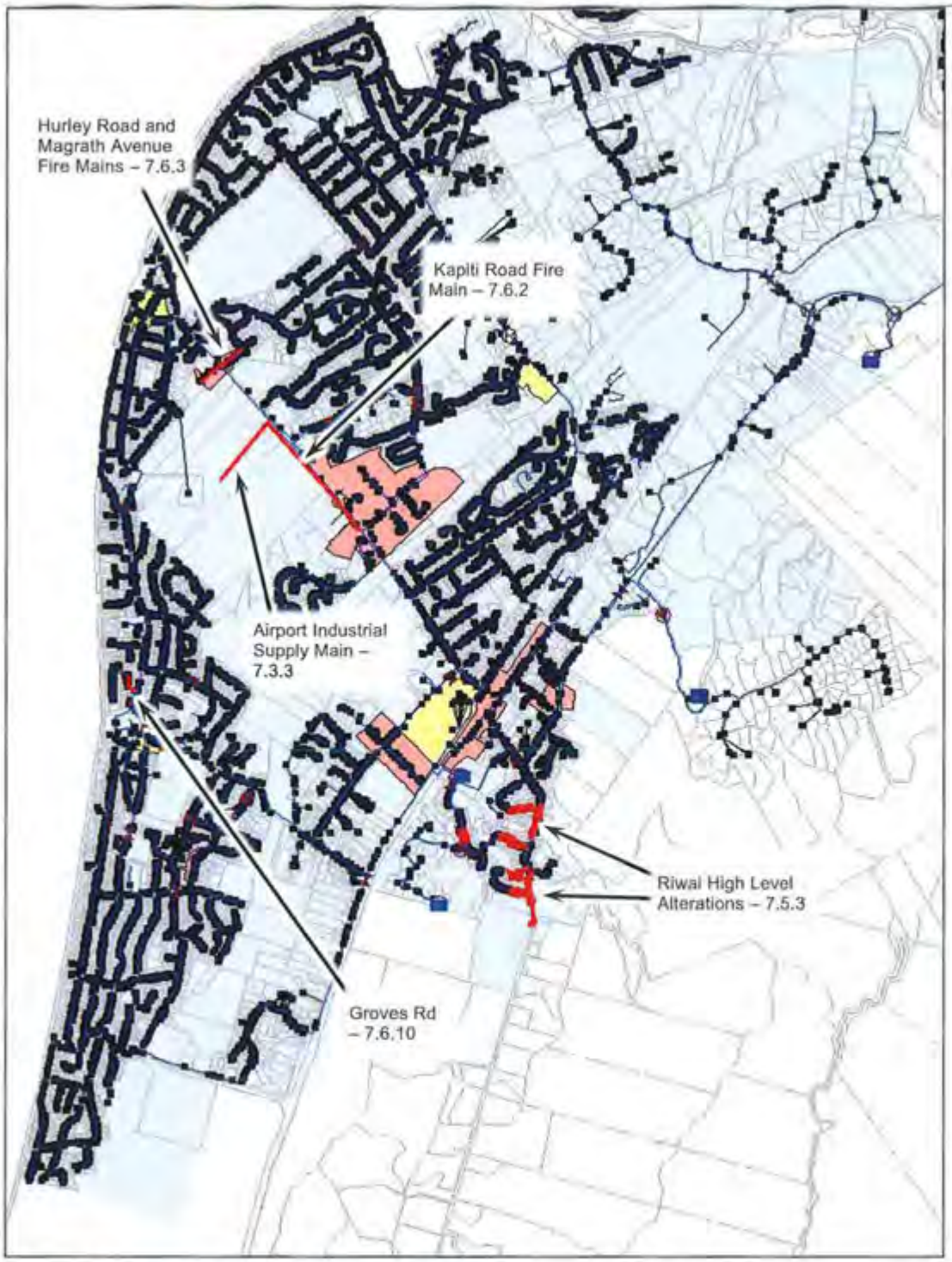

Figure 8-3 – Paraparaumu / Raumati Upgrades

Some alternative upgrade options are discussed in detail, which could reduce costs or provide other benefits. These may be investigated further if required.

Costs of the recommended upgrades are summarised in Table 8-2. It was found that with expenditure to bring the network up to standard spread over the next 10 years, the current expected population growth would require no additional expenditure between 2026 and 2046.

Security of Supply and Water Age were not assessed except in some cases where an individual upgrade had a clear benefit.

Table 8-2 : Cost Overview

Upgrade Type	2016	2026	2036	2046	Total
Greenfields	$2,550,000	$1,700,000	$0	$0	$4,250,000
Strategic	$13,500,000	$4,150,000	$0	$0	$17,650,000
Pressure	$2,300,000	$1,800,000	$0	$0	$4,100,000
Fire	$7,350,000	$1,000,000	$0	$0	$8,350,000
Total	**$25,700,000**	**$8,650,000**	**$0**	**$0**	**$34,350,000**

9 Recommendations

In order to further develop the KCDC water network development plan, the following actions are recommended:

1. The recommended upgrades should be reviewed and used to develop an investment strategy for the water network in the KCDC Asset Management Plan.

2. "The "alternative" and "additional" upgrades outlined in Table 7-1 should be reviewed and if necessary further investigation should be carried out to assess whether they should replace or be added to the recommended upgrades.

3. If Security of Supply and Water Age are considered to be significant drivers for network development, network-wide assessments of these factors should be undertaken.

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Appendices

Appendix A Customers to be Reallocated

The customers in the table below are to be checked, and if assigned to the low level (Riwai Reservoir or Kakariki Reservoir zones) they should be reconnected to high level reticulation which is also present in the street. See sections 7.5.1 and 7.5.3 for details.

Identifier	Address	Current DMA	Elevation (m AD)	Reallocated to	Upgrade
KWSN000500	1A Tui Crescent	Kakariki Res	80.5	Tui High Level	UPG08
KWSN001095	10 Tui Crescent	Kakariki Res	84	Tui High Level	UPG08
KWSN001802	27 Kotare Street	Kakariki Res	70	Tui High Level	UPG08
KWSN003052	43 Kotare Street	Kakariki Res	71.5	Tui High Level	UPG08
KWSN003572	19 Kotare Street	Kakariki Res	75.5	Tui High Level	UPG08
KWSN003574	45 Tui Crescent	Kakariki Res	78	Tui High Level	UPG08
KWSN003617	36 Kotare Street	Kakariki Res	66.5	Tui High Level	UPG08
KWSN003616	52 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN003619	25 Kotare Street	Kakariki Res	70.5	Tui High Level	UPG08
KWSN003623	30 Kotare Street	Kakariki Res	69	Tui High Level	UPG08
KWSN004545	61A Kotare Street	Kakariki Res	73	Tui High Level	UPG08
KWSN004551	63 Kotare Street	Kakariki Res	73	Tui High Level	UPG08
KWSN004552	61 Kotare Street	Kakariki Res	73	Tui High Level	UPG08
KWSN004870	53 Kotare Street	Kakariki Res	78	Tui High Level	UPG08
KWSN004875	13 Tui Crescent	Kakariki Res	84	Tui High Level	UPG08
KWSN007371	41B Kotare Street	Kakariki Res	68	Tui High Level	UPG08
KWSN007376	37B Kotare Street	Kakariki Res	65	Tui High Level	UPG08
KWSN007377	51 Kotare Street	Kakariki Res	74.5	Tui High Level	UPG08
KWSN010142	33 Kotare Street	Kakariki Res	64.5	Tui High Level	UPG08
KWSN010167	22 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN013026	44 Kotare Street	Kakariki Res	69	Tui High Level	UPG08
KWSN013028	46 Kotare Street	Kakariki Res	71	Tui High Level	UPG08
KWSN013029	58 Kotare Street	Kakariki Res	72	Tui High Level	UPG08
KWSN013030	62 Kotare Street	Kakariki Res	72	Tui High Level	UPG08
KWSN013031	42 Kotare Street	Kakariki Res	67	Tui High Level	UPG08
KWSN013033	55 Kotare Street	Kakariki Res	73	Tui High Level	UPG08
KWSN013368	49 Kotare Street	Kakariki Res	73.5	Tui High Level	UPG08
KWSN013372	59 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN013644	41 Tui Crescent	Kakariki Res	82.5	Tui High Level	UPG08
KWSN013824	12 Tui Crescent	Kakariki Res	84.5	Tui High Level	UPG08
KWSN013826	6 Tui Crescent	Kakariki Res	83.5	Tui High Level	UPG08
KWSN013829	18 Tui Crescent	Kakariki Res	82.5	Tui High Level	UPG08
KWSN013830	8 Tui Crescent	Kakariki Res	83.5	Tui High Level	UPG08
KWSN013842	43 Tui Crescent	Kakariki Res	80	Tui High Level	UPG08
KWSN013949	47 Kotare Street	Kakariki Res	73	Tui High Level	UPG08
KWSN014230	28 Kotare Street	Kakariki Res	70.5	Tui High Level	UPG08
KWSN014235	1 Tui Crescent	Kakariki Res	80.5	Tui High Level	UPG08
KWSN014952	57C Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08

Identifier	Address	Current DMA	Elevation (m AD)	Reallocated to	Upgrade
KWSN015777	56 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN015778	50 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN015780	65 Kotare Street	Kakariki Res	74	Tui High Level	UPG08
KWSN015782	67 Kotare Street	Kakariki Res	74.5	Tui High Level	UPG08
KWSN016315	23A Kotare Street	Kakariki Res	72	Tui High Level	UPG08
KWSN016844	31 Kotare Street	Kakariki Res	66	Tui High Level	UPG08
KWSN016886	45 Kotare Street	Kakariki Res	72	Tui High Level	UPG08
KWSN016892	29 Kotare Street	Kakariki Res	68.5	Tui High Level	UPG08
KWSN017187	23B Kotare Street	Kakariki Res	71	Tui High Level	UPG08
KWSN017215	41A Kotare Street	Kakariki Res	68	Tui High Level	UPG08
KWSN017427	37A Kotare Street	Kakariki Res	65	Tui High Level	UPG08
KWSN017434	21 Kotare Street	Kakariki Res	73	Tui High Level	UPG08
KWSN017546	39 Tui Crescent	Kakariki Res	84	Tui High Level	UPG08
KWSN019414	26 Kotare Street	Kakariki Res	70.5	Tui High Level	UPG08
KWSN019415	66 Kotare Street	Kakariki Res	73	Tui High Level	UPG08
KWSN020114	29 Tui Crescent	Kakariki Res	86.5	Tui High Level	UPG08
KWSN021625	32 Kotare Street	Kakariki Res	68	Tui High Level	UPG08
KWSN021626	40 Kotare Street	Kakariki Res	64	Tui High Level	UPG08
KWSN021881	64 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN022244	16 Tui Crescent	Kakariki Res	85	Tui High Level	UPG08
KWSN022245	17 Kotare Street	Kakariki Res	78	Tui High Level	UPG08
KWSN022250	14 Tui Crescent	Kakariki Res	84.5	Tui High Level	UPG08
KWSN023022	69 Kotare Street	Kakariki Res	75	Tui High Level	UPG08
KWSN023026	60 Kotare Street	Kakariki Res	72	Tui High Level	UPG08
KWSN023027	68 Kotare Street	Kakariki Res	74.5	Tui High Level	UPG08
KWSN023029	57 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN023720	4 Tui Crescent	Kakariki Res	82	Tui High Level	UPG08
KWSN024897	54 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN024898	48 Kotare Street	Kakariki Res	72.5	Tui High Level	UPG08
KWSN024999	24 Kotare Street	Kakariki Res	72	Tui High Level	UPG08
KWSN004967	104 Valley Road	Riwai Res	52.5	Riwai High Level	UPG10
KWSN000444	46 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN000448	33 Kaitawa Crescent	Riwai Res	41	Riwai High Level	UPG10
KWSN000449	29 Kaitawa Crescent	Riwai Res	41	Riwai High Level	UPG10
KWSN000450	44 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN000451	31 Kaitawa Crescent	Riwai Res	41	Riwai High Level	UPG10
KWSN000878	104 Ruapehu Street	Riwai Res	46	Riwai High Level	UPG10
KWSN002197	9 Hookway Grove	Riwai Res	42.5	Riwai High Level	UPG10
KWSN002201	1 Hookway Grove	Riwai Res	49.5	Riwai High Level	UPG10
KWSN002202	5 Hookway Grove	Riwai Res	45.5	Riwai High Level	UPG10
KWSN002214	76 Riwai Street	Riwai Res	42	Riwai High Level	UPG10
KWSN002474	4 Riwai Street	Riwai Res	48	Riwai High Level	UPG10
KWSN002975	14 Hookway Grove	Riwai Res	42	Riwai High Level	UPG10

Identifier	Address	Current DMA	Elevation (m AD)	Reallocated to	Upgrade
KWSN002976	12 Hookway Grove	Riwai Res	43	Riwai High Level	UPG10
KWSN004165	40 Kaitawa Crescent	Riwai Res	41	Riwai High Level	UPG10
KWSN004584	2 Hookway Grove	Riwai Res	50	Riwai High Level	UPG10
KWSN004585	80 Valley Road	Riwai Res	53	Riwai High Level	UPG10
KWSN004587	82 Riwai Street	Riwai Res	49	Riwai High Level	UPG10
KWSN005249	89 Valley Road	Riwai Res	50	Riwai High Level	UPG10
KWSN005782	4 Hookway Grove	Riwai Res	46.5	Riwai High Level	UPG10
KWSN006304	26 Riwai Street	Riwai Res	41	Riwai High Level	UPG10
KWSN006305	25 Riwai Street	Riwai Res	41	Riwai High Level	UPG10
KWSN006306	24 Riwai Street	Riwai Res	41.5	Riwai High Level	UPG10
KWSN007406	94 Ruapehu Street	Riwai Res	44	Riwai High Level	UPG10
KWSN008698	19 Riwai Street	Riwai Res	43	Riwai High Level	UPG10
KWSN009694	43 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN010527	15 Riwai Street	Riwai Res	44.5	Riwai High Level	UPG10
KWSN010549	13 Riwai Street	Riwai Res	45.5	Riwai High Level	UPG10
KWSN011077	16 Riwai Street	Riwai Res	42	Riwai High Level	UPG10
KWSN011081	14 Riwai Street	Riwai Res	44.5	Riwai High Level	UPG10
KWSN011094	114 Ruapehu Street	Riwai Res	44	Riwai High Level	UPG10
KWSN011098	110 Ruapehu Street	Riwai Res	48	Riwai High Level	UPG10
KWSN011411	102 Ruapehu Street	Riwai Res	45	Riwai High Level	UPG10
KWSN012826	140 Ruapehu Street	Riwai Res	55.5	Riwai High Level	UPG10
KWSN013467	118 Ruapehu Street	Riwai Res	43.5	Riwai High Level	UPG10
KWSN013501	3 Hookway Grove	Riwai Res	46.5	Riwai High Level	UPG10
KWSN013502	7 Hookway Grove	Riwai Res	44	Riwai High Level	UPG10
KWSN013862	106 Ruapehu Street	Riwai Res	48	Riwai High Level	UPG10
KWSN013863	94 Valley Road	Riwai Res	48.5	Riwai High Level	UPG10
KWSN013866	92 Ruapehu Street	Riwai Res	43.5	Riwai High Level	UPG10
KWSN014779	50 Kaitawa Crescent	Riwai Res	42	Riwai High Level	UPG10
KWSN014780	52 Kaitawa Crescent	Riwai Res	42	Riwai High Level	UPG10
KWSN014781	99B Ruapehu Street	Riwai Res	41.5	Riwai High Level	UPG10
KWSN014785	54 Kaitawa Crescent	Riwai Res	42.5	Riwai High Level	UPG10
KWSN014786	42 Kaitawa Crescent	Riwai Res	41	Riwai High Level	UPG10
KWSN014787	99C Ruapehu Street	Riwai Res	44.5	Riwai High Level	UPG10
KWSN015579	37 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN015580	41 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN015590	35 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN015902	82A Valley Road	Riwai Res	49.5	Riwai High Level	UPG10
KWSN015904	82B Valley Road	Riwai Res	48	Riwai High Level	UPG10
KWSN015908	82C Valley Road	Riwai Res	46.5	Riwai High Level	UPG10
KWSN016176	17 Riwai Street	Riwai Res	44	Riwai High Level	UPG10
KWSN016186	6 Riwai Street	Riwai Res	47	Riwai High Level	UPG10
KWSN018049	11 Hookway Grove	Riwai Res	42	Riwai High Level	UPG10
KWSN018051	8 Hookway Grove	Riwai Res	44	Riwai High Level	UPG10

Identifier	Address	Current DMA	Elevation (m AD)	Reallocated to	Upgrade
KWSN018206	3 Waimanu Grove	Riwai Res	46	Riwai High Level	UPG10
KWSN018309	48 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN018707	80 Riwai Street	Riwai Res	46	Riwai High Level	UPG10
KWSN019273	78 Riwai Street	Riwai Res	45.5	Riwai High Level	UPG10
KWSN020334	8-10 Riwai Street	Riwai Res	46	Riwai High Level	UPG10
KWSN020355	120 Ruapehu Street	Riwai Res	43.5	Riwai High Level	UPG10
KWSN021017	16 Hookway Grove	Riwai Res	41.5	Riwai High Level	UPG10
KWSN021550	108 Ruapehu Street	Riwai Res	48.5	Riwai High Level	UPG10
KWSN021557	112 Ruapehu Street	Riwai Res	45.5	Riwai High Level	UPG10
KWSN021810	11 Riwai Street	Riwai Res	47	Riwai High Level	UPG10
KWSN022056	18 Riwai Street	Riwai Res	42	Riwai High Level	UPG10
KWSN022058	20 Riwai Street	Riwai Res	42	Riwai High Level	UPG10
KWSN022060	21 Riwai Street	Riwai Res	43	Riwai High Level	UPG10
KWSN022061	23 Riwai Street	Riwai Res	42	Riwai High Level	UPG10
KWSN022082	1 Waimanu Grove	Riwai Res	48	Riwai High Level	UPG10
KWSN023043	92 Valley Road	Riwai Res	49	Riwai High Level	UPG10
KWSN023046	18 Hookway Grove	Riwai Res	41.5	Riwai High Level	UPG10
KWSN023048	6 Hookway Grove	Riwai Res	44.5	Riwai High Level	UPG10
KWSN023050	84 Valley Road	Riwai Res	52.5	Riwai High Level	UPG10
KWSN023116	86 Valley Road	Riwai Res	51	Riwai High Level	UPG10
KWSN023122	39 Kaitawa Crescent	Riwai Res	41.5	Riwai High Level	UPG10
KWSN023123	12 Riwai Street	Riwai Res	45	Riwai High Level	UPG10
KWSN023849	22 Riwai Street	Riwai Res	41.5	Riwai High Level	UPG10
KWSN023983	13 Hookway Grove	Riwai Res	41	Riwai High Level	UPG10
KWSN024669	91 Valley Road	Riwai Res	51.5	Riwai High Level	UPG10
KWSN005965	6 Panorama Drive	Riwai Res	49	Riwai High Level	UPG10
KWSN005966	55 Riwai Street	Riwai Res	42.5	Riwai High Level	UPG10
KWSN008708	53 Riwai Street	Riwai Res	40.5	Riwai High Level	UPG10
KWSN014782	101 Ruapehu Street	Riwai Res	45.5	Riwai High Level	UPG10
KWSN018405	57 Riwai Street	Riwai Res	44	Riwai High Level	UPG10
KWSN019490	100 Valley Road	Riwai Res	48.5	Riwai High Level	UPG10

Appendix B Initial Performance Assessment Plans

Network - Otaki Non-Upgraded 2016 (21,834m3/day)

Run - 2016 Performance Assessment

Simulation - 2016 Performance Assessment at 30/03/2016 00:00:00

PA 2016 (21,834m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Otaki Non-Upgraded 2026 (23325m3/day)

Run - 2026 Performance Assessment

Simulation - 2026 Performance Assessment at 30/03/2016 00:00:00

PA 2026 (23325m3/day)

Customer Points: pnmin (m)

- >= 90.
- >= 60.
- >= 45.
- >= 35.
- >= 25.
- >= -999.

Network - Otaki Non-Upgraded 2036 (24,519m3/day)

Run - 2036 Performance Assessment

Simulation - 2036 Performance Assessment at 30/03/2016 00:00:00

PA 2036 (24519m2/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Otaki Non-Upgraded 2046 (25,516m3/day)

Run - 2046 Performance Assessment

Simulation - 2046 Performance Assessment at 30/03/2016 00:00:00

PA 2046 (25516m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Waikanae-Paraparaumu Non-Upgraded 2016 (21,834m3/day)

Run - 2016 Performance Assessment

Simulation - 2016 Performance Assessment at 30/03/2016 00:00:00

PA 2016 (21,834m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Waikanae-Paraparaumu Non-Upgraded 2026 (23,325m3/day)

Run - 2026 Performance Assessment

Simulation - 2026 Performance Assessment at 30/03/2016 00:00:00

PA 2026 (23325m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Waikanae-Paraparaumu Non-Upgraded 2036 (24,519m3/day)

Run - 2036 Performance Assessment

Simulation - 2036 Performance Assessment at 30/03/2016 00:00:00

PA 2036 (24519m2/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Waikanae-Paraparaumu Non-Upgraded 2046 (25,516m3/day)

Run - 2046 Performance Assessment

Simulation - 2046 Performance Assessment at 30/03/2016 00:00:00

PA 2046 (25516m3/day)

Customer Points: pnmin (m)

- >= 90.
- >= 60.
- >= 45.
- >= 35.
- >= 25.
- >= -999.

Appendix C Upgraded Network Performance Plans

Network - Otaki Upgraded 2016 (21,834m3/day)_1

Run - 2016 Upgraded

Simulation - 2016 Upgraded at 30/03/2016 00:00:00

UPG 2016 (21,834m3/day)_1

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Otaki Upgraded 2026 (23,325m3/day)

Run - 2026 Upgraded

Simulation - 2026 Upgraded at 30/03/2016 00:00:00

UPG 2026 (23325m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Otaki Upgraded 2036 (24,519m3/day)

Run - 2036 Upgraded

Simulation - 2036 Upgraded at 30/03/2016 00:00:00

UPG 2036 (24519m2/day)

Customer Points: pnmin (m)

- >= 90.
- >= 60.
- >= 45.
- >= 35.
- >= 25.
- >= -999.

Network - Otaki Upgraded 2046 (25,516m3/day)

Run - 2046 Upgraded

Simulation - 2046 Upgraded at 30/03/2016 00:00:00

UPG 2046 (25516m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Waikanae-Paraparaumu Upgraded 2016 (21,834m3/day)

Run - 2016 Upgraded

Simulation - 2016 Upgraded at 30/03/2016 00:00:00

UPG 2016 (21,834m3/day)_1

Customer Points: pnmin (m)

- >= 90.
- >= 60.
- >= 45.
- >= 35.
- >= 25.
- >= -999.

Network - Waikanae-Paraparaumu Upgraded 2026 (23,325m3/day)

Run - 2026 Upgraded

Simulation - 2026 Upgraded at 30/03/2016 00:00:00

UPG 2026 (23325m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Waikanae-Paraparaumu Upgraded 2036 (24,519m3/day)

Run - 2036 Upgraded

Simulation - 2036 Upgraded at 30/03/2016 00:00:00

UPG 2036 (24519m2/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25.
  - >= -999.

Network - Waikanae-Paraparaumu Upgraded 2046 (25,516m3/day)

Run - 2046 Upgraded

Simulation - 2046 Upgraded at 30/03/2016 00:00:00

UPG 2046 (25516m3/day)

- Customer Points: pnmin (m)
  - >= 90.
  - >= 60.
  - >= 45.
  - >= 35.
  - >= 25
  - >= -999.

Appendix D Upgraded Network Available Fire Flow

The plans contained in this appendix show the modelled available fire flow at each point on the network under the 2043 upgraded scenario. As hydrants are not included in the model, this has been carried out at every node on the network.

As the fire code requires a set amount of flow within a certain distance of any property from a combination of hydrants, individual hydrants which do not meet the requirements of the fire code are not of concern. However, there should not be any general urban areas on the network where the distance to the nearest hydrant which meets requirements is larger than 270m.

Rural areas where this happens on the upgraded network are highlighted both here and in Section 6.4.13 in the report.

Available Fire Flow (l/s) - Otaki Upgraded 2043 scenario

Note hydrants have not been included in the model - available fire flow has been assessed at each model node.

Node: Available Fire Flow (l/s)

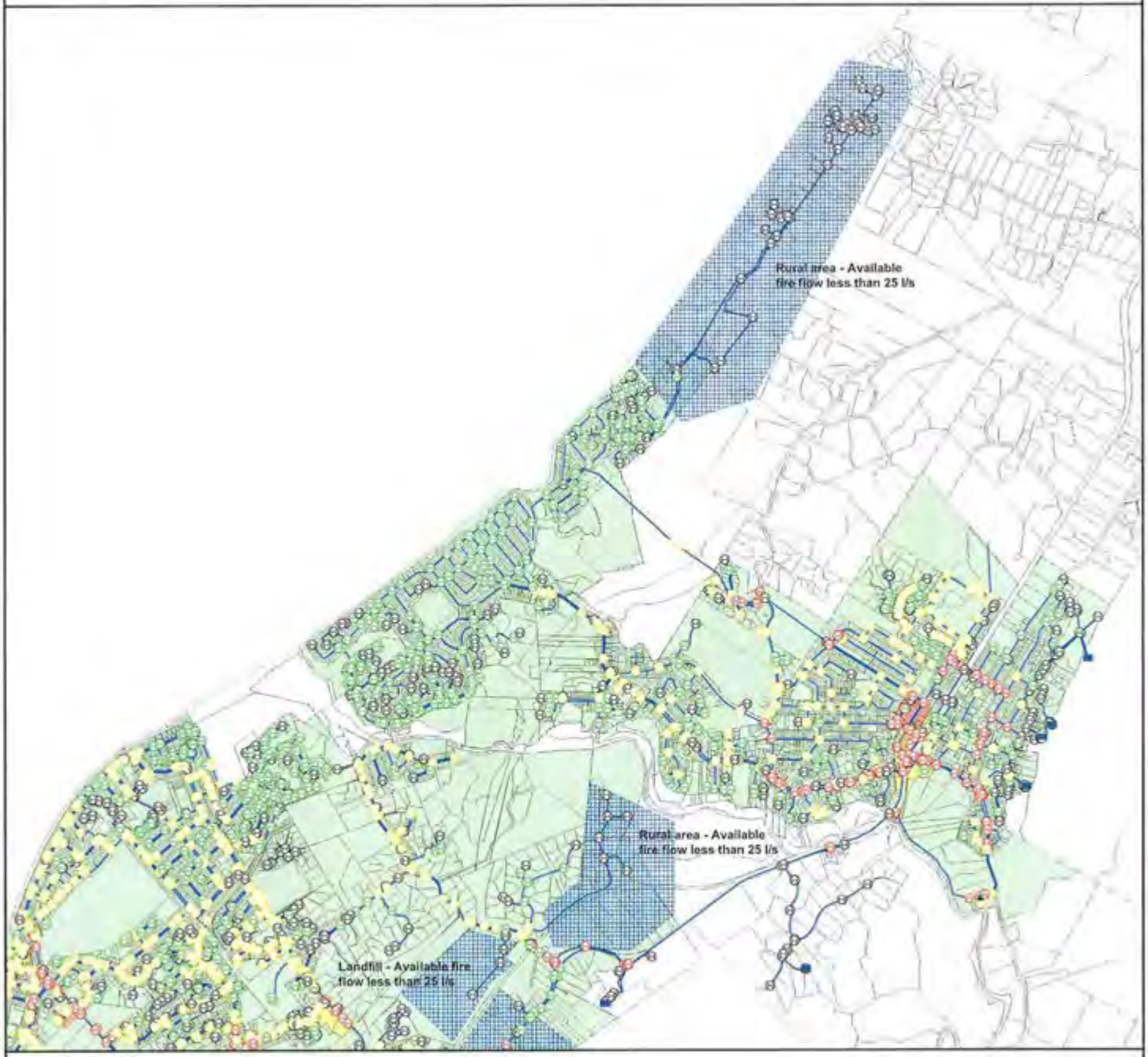
- >= 100.
- >= 50.
- >= 25.
- >= 0.

Target Fire Flow @ 10m Pressure

- FW4: 100 l/s
- FW3: 50 l/s
- FW2: 25 l/s

Available Fire Flow (l/s) - Waikanae and Paraparaumu North Upgraded 2043 scenario

Note hydrants have not been included in the model - available fire flow has been assessed at each model node.



Node: Available Fire Flow (l/s)

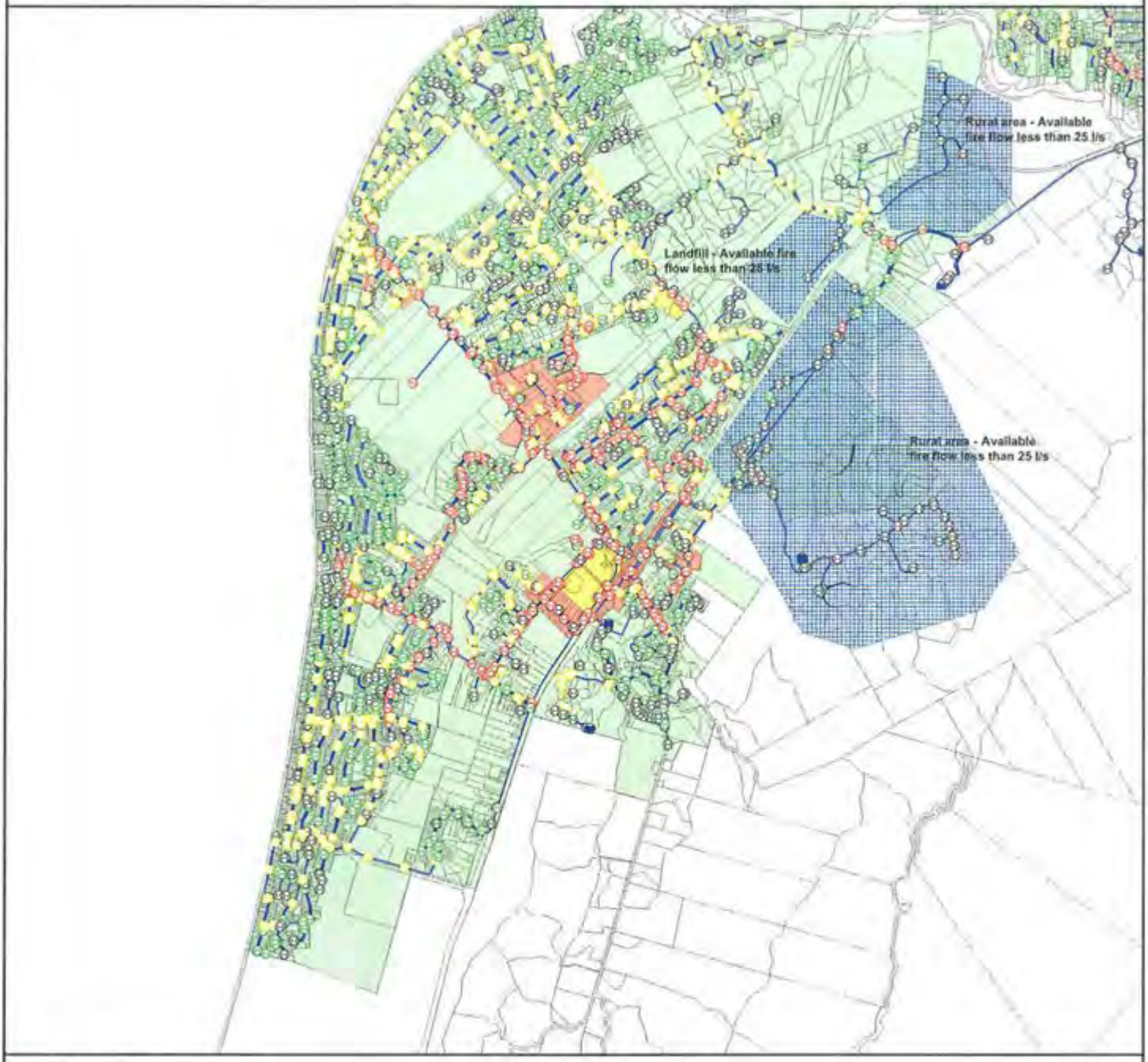
- >= 100.
- >= 50.
- >= 25.
- >= 0.

Target Fire Flow @ 10m Pressure

- FW4: 100 l/s
- FW3: 50 l/s
- FW2: 25 l/s

Available Fire Flow (l/s) - Paraparaumu South and Raumati Upgraded 2043 scenario

Note hydrants have not been included in the model - available fire flow has been assessed at each model node.



Node: Available Fire Flow (l/s)

- >= 100.
- >= 50.
- >= 25.
- >= 0.

Target Fire Flow @ 10m Pressure

- FW4: 100 l/s
- FW3: 50 l/s
- FW2: 25 l/s

MWH now part of Stantec

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OTAKI MASTER PLAN UPDATE

PREPARED FOR KAPITI COAST DISTRICT COUNCIL

30 July 2019

This document has been prepared for the benefit of Kapiti Coast District Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

PROJECT MANAGER		PROJECT TECHNICAL LEAD
Ben Davies		Cedric Papion

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Cedric Papion	.....	21/06/2019
REVIEWED BY		
Ben Davies	.....	21/06/2019
APPROVED FOR ISSUE BY		
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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
01	24/06/2019	Draft	JV	CP	BD	BD
02	30/07/2019	Revised following client's comments	JV	CP	CP	BD

Executive Summary

Objectives

Stantec New Zealand (Stantec) completed a master plan for the Otaki water supply network for Kapiti Coast District Council (KCDC) in 2017, identifying a lack of emergency storage and a number of pipe upgrades for firefighting compliance. At the time, no population growth was forecasted.

KCDC has since updated the population forecast based on Forecast.ID data, which shows significant growth in Otaki.

The objectives of this study are as follows:

- Confirm what pipe size is required to renew the trunk main from the Tasman bores to the CBD area in light of the new population forecast.
- Revise the Otaki master plan to confirm if other network upgrades are required to meet the Level of Service for minimum pressure and fire flow and confirm storage requirements.

Findings

The population growth projected for the Otaki networks has significant effects on the current network. The findings from the 2017 master plan remain largely valid but some recommended upgrades need to be upsized.

Considering the new population forecast, a new 300mm diameter pipe is required in addition to the twin existing 150mm pipes along Tasman Road, to Matene Street in the CBD area. This diameter would give KCDC the flexibility to turn off the Rangiuru bore if required. A 200mm diameter pipe would require the Rangiuru bore to remain in operation. The other upgrades required to meet the Level of Service standards are shown in Figure 0-1. Other key upgrades include:

- A 3.5km Otaki Loop fire pipe.
- A new Otaki Reservoir.
- A new Waitohu Reservoir.

A cost estimate overview is shown in Table 0-1, including contractor cost, professional services, KCDC management and risk. More detail is provided in Table 0-2.

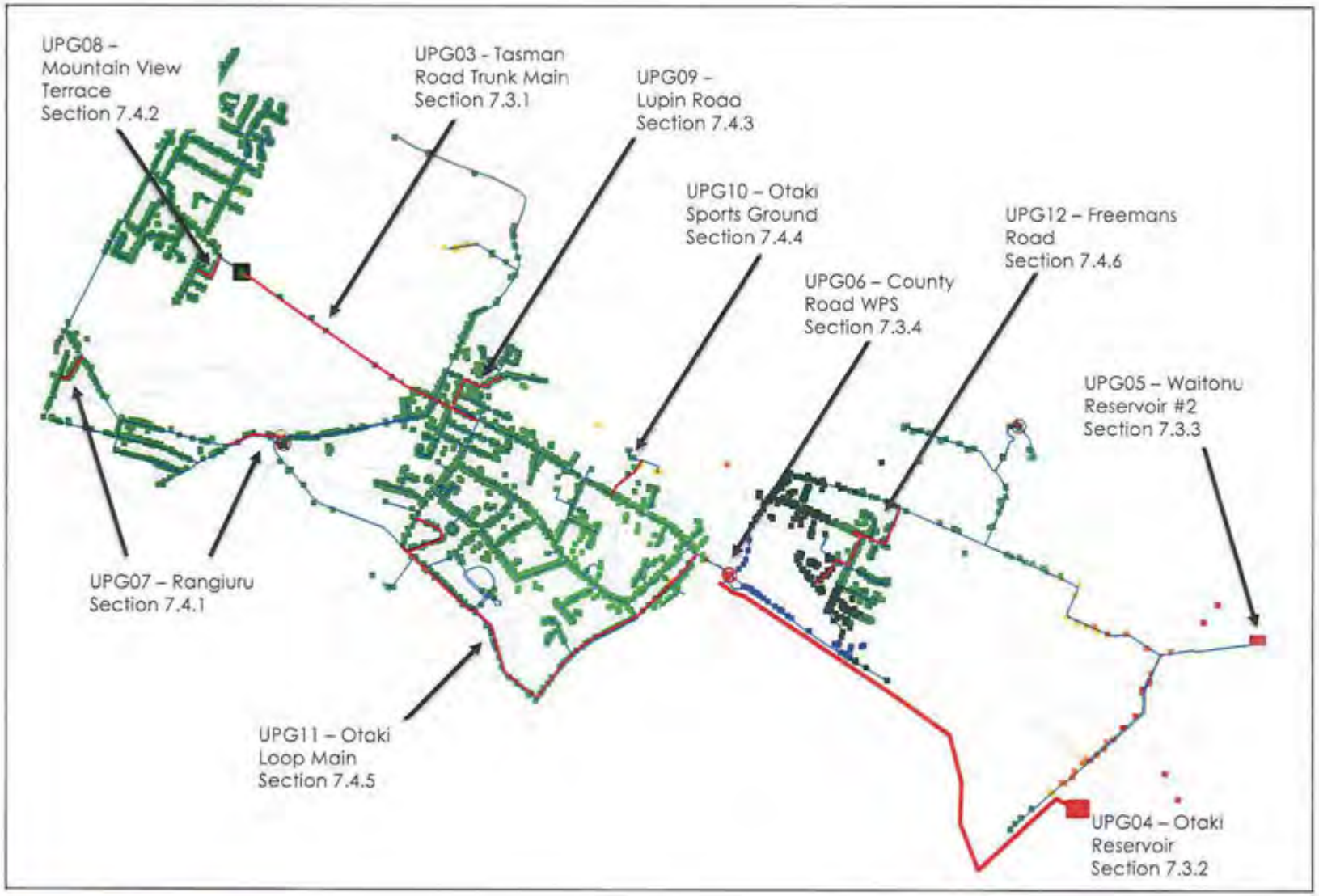
Table 0-1: Cost Overview

Upgrade	Total Cost Out-Turn Estimate including Risk
Greenfields	TBD
Strategic	$ 20.3M
Fire	$ 12.9M
Total	$ 33.2M

Recommendations

It is recommended that:

- KCDC confirms that the key assumptions adopted in this report are acceptable:
    - 1,225 L/property/day greenfield demand.
    - Locations of potential development sites.
    - Location and elevation of the proposed Otaki Reservoir.
    - Whether the added flexibility provided by the 300mm diameter recommended for the proposed Tasman Road pipe warrants the additional cost (up from 200mm).
    - Whether KCDC Operations wish to retain the current VSD setup for the County Road PS or change it to a fixed speed setup.
    - 12 hours maximum daily pumping time for County Road PS.
    - 1.2 times Peak Day Demand + fire storage criteria for reservoir sizing.
- KCDC gives consideration to alternative fire supply options, as detailed in the upgrades section of this report.



Fire 0-1 : Otaki Upgrades

Table 8-2: Upgrades Summary

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG01 Section 7.2.1	Greenfields	Otaki Main Development Site	Connects the potential development site to the existing network	Depends on the actual location of the development, currently unknown	TBD	N/A
UPG02 Section 7.2.2	Greenfields	Waitohu Plateau Development Sites	Connects the potential development site to the existing network	Depends on the actual location of the development, currently unknown	TBD	N/A
UPG03 Section 7.3.1	Strategic	Tasman Road Trunk Main	Construct a new 300mmØ pipe along Tasman Road between the Tasman bores and Rangiuru Road (approximately 1500m in length), in addition to the existing pipe. Also construct a new 200mmØ pipe along Main Street between Rangiuru Road and Matene Street (approximately 130m in length), in addition to the existing pipe.	1500m of 300mm ID trunk main, 130m of 200mm ID main	$ 3.6M	P1 P2 F5 Security of Supply
UPG04 Section 7.3.2	Strategic	Otaki Reservoir	Construct a new Otaki Reservoir. Also construct a new combined inlet/outlet main connecting to Otaki network upstream of County Road WPS	Reservoir size depends on level of service adopted by KCDC. Nominal allowance for 1.2xPDD+FF volume = 5.5ML. Pipework depends on actua location of the reservoir, currently unknown. Nominal allowance for 3.2km of 300mm diameter pipe.	$ 13.8M	F5 ana Security of Supply

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG05 Section 7.3.3	Strategic	Waitohu Reservoir #2	Construct a new Waitohu Reservoir and associated pipework in addition to the existing reservoir.	Reservoir size depends on level of service adopted by KCDC. Nominal allowance for 1.2xPDD+FF volume = 0.65ML.	$ 1.9M	Security of Supply
UPG06 Section 7.3.4	Strategic	County Road Pump Station	Upgrade existing County Road WPS from 7kW to 20kW.	20 kW pump station	$ 0.7M	P2
UPG07 Section 7.4.1	Fire	Rangiuru	Construct a new 150mmØ main along Rangiuru Road from the Rangiuru bores to Old Coach Road (380m in length). Also construct a new 150mmØ main along The Avenue between Rangiuru Road and Kapiti Lane (240m in length). Abandon existing 100mmØ main where the new mains are laid.	620m of 150mm ID main	$ 1.2M	F1
UPG08 Section 7.4.2	Fire	Mountain View Terrace	Construct a new 150mmØ main along Robert McKeen Street between Tasman Road and Mountain View Terrace (260m in length). Abandon existing 100mmØ main where the new mains are laid.	260m of 150mm ID main	$ 0.6M	F2

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG09 Section 7.4.3	Fire	Lupin Road	Construct a new 150mmØ main along Matene Street between Main Street and Hadfield Street (200m in length), continuing in Hadfield Street and Lupin Road to Tamihana Street (270m in length). Abandon existing 100mmØ main where the new mains are laid.	470m of 150mm ID main	$ 0.9M	F3
UPG10 Section 7.4.4	Fire	Otaki Sports Ground	Construct a new 150mmØ main along from sports field gates in Mill Road to sports fields (310m in length). Abandon existing 100mmØ main where the new mains are laid.	310m of 150mm ID main	$ 0.6M	F4
UPG11 Section 7.4.5	Fire	Otaki Loop Fire Main	Construct a new 200mmØ main along Main Highway from Mill Road to Riverbank Road, continuing along Riverbank Road to Aotaki Street and connecting to the 200mmØ main from Rangiuru bore in Riverbank Road (2850m in length). This is in addition to the existing pipes. Also, construct a new 150mmØ main along Titoki Street and Rimu Street (500m in length). Abandon existing 100mmØ main where the new 150mmØ mains are laid.	2,850m of 200mm ID main. 500m of 150mm ID main	$ 7.5M	F5

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG12 Section 7.4.6	Fire	Freemans Road	Construct a new 150mmØ main along Elphick Street, Te Manuao Road and Freemans Road between Waitohu Valley Road and Ludlam Way (765m in length). Also, construct a new 150mmØ main along Tararua Crescent and Renata Road between Freemans Road and Oriwa Crescent (305m in length). Abandon existing 100mmØ main where the new 150mmØ mains are laid.	1,070m of 150mm ID main	$ 2.1M	F6

Kapiti Coast District Council

Otaki Master Plan Update

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. Introduction

Stantec New Zealand (Stantec) completed a master plan for the Otaki water supply network for Kapiti Coast District Council (KCDC) in 2017, identifying a lack of emergency storage and a number of pipe upgrades for firefighting compliance. At the time, no population growth was forecasted.

KCDC has since updated the population forecast based on Forecast.ID data, which shows significant growth in Otaki. The master plan therefore requires review and update

1.1 Objectives

The objectives of this study are as follows:

- Confirm what pipe size is required to renew the trunk main from the Tasman bores to the CBD area in light of the new population forecast.
- Revise the Otaki master plan to confirm if other network upgrades are required to meet the Level of Service for minimum pressure and fire flow and confirm storage requirements.

1.2 Specifications

The Level of Service for minimum and maximum pressure is 25m and 90m, respectively.

Fire fighting requirements were taken from the Fire Code SNZ PAS 4509:2008.

Two sets of guidelines were considered for reservoir sizing:

- NZS 4404:2010 Land Development and Subdivision Infrastructure which makes reference to the Water Supply Code of Australia (WSA) version 3.1. These propose an indicative target of 8-24 h consumption at peak day demand.
- Wellington Water's reservoir sizing guidelines, which propose three criteria:
    - 2 times Average Day Demand
    - 1.2 times Peak Day Demand plus fire flow.
    - Emergency water needs post-earthquake up to Day 30.

Wellington Water's Regional Water Model Specifications 2017 version 8 were used as a guideline for carrying out the modelling in this study.

2. Study Area

The Otaki network is composed of three main metered areas: Otaki Beach, Otaki Main, and Waitohu Plateau (Figure 2-1 and Figure 2-2).

The network is supplied from the Tasman and Rangiuru bores, which sit between the main township (on SH1) and the beach. Water is pumped through the reticulation down to the beach and up to the township. At SH1 water is boosted up through a higher supply zone to the Waitohu Reservoir.

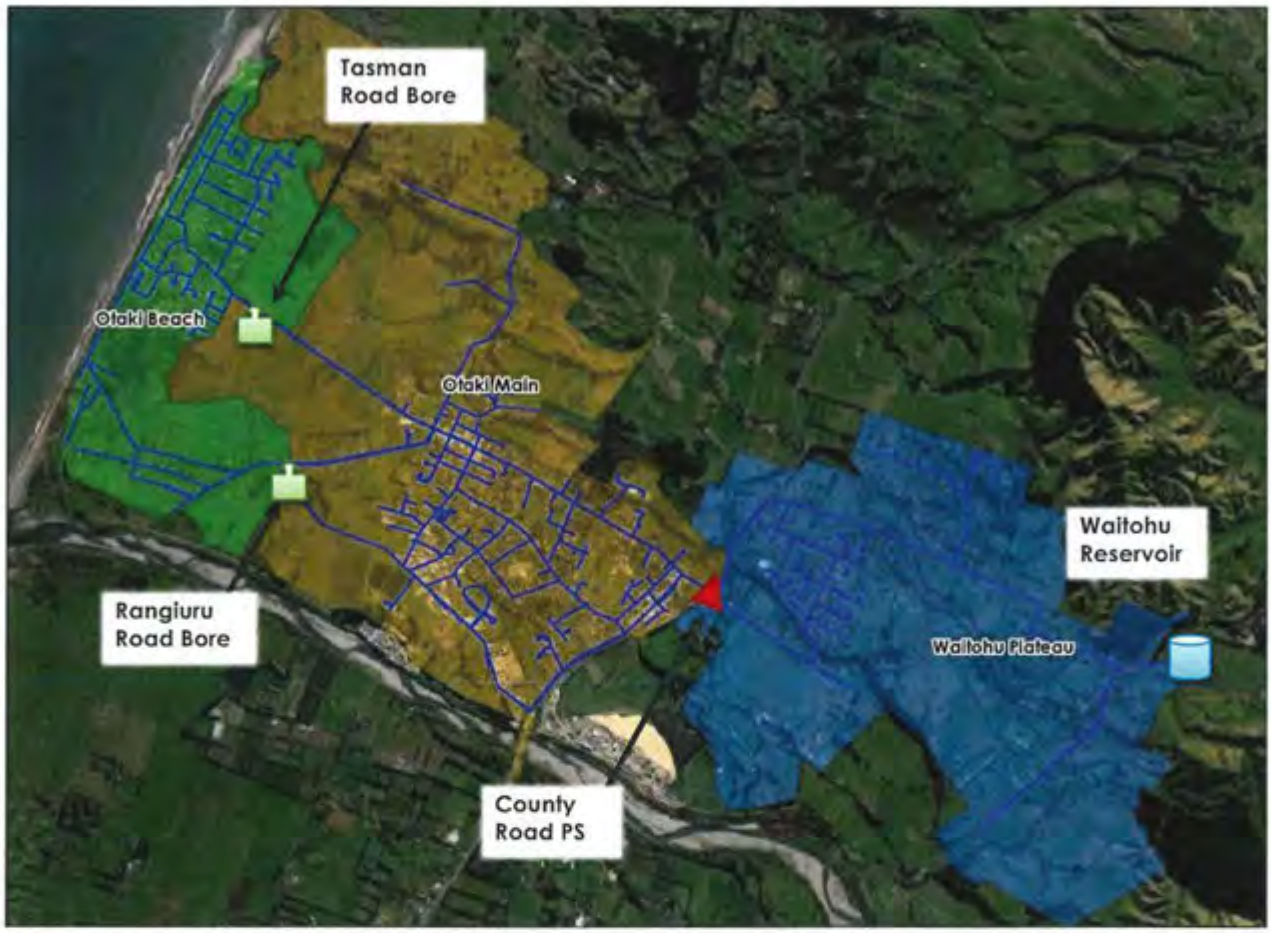


Figure 2-1: Otaki network overview

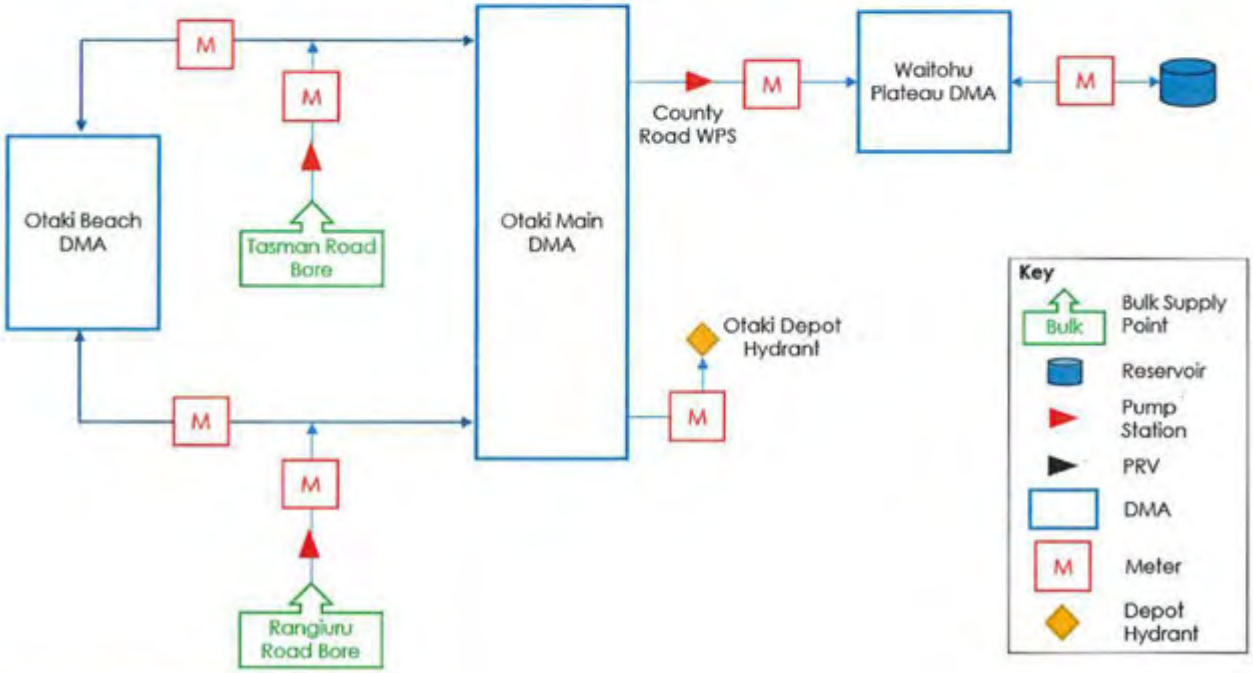


Figure 2-2: Otaki network schematic

3. Data Sources

3.1 Asset Data

KCDC provided InfoNet layers in geodatabase format dated April 2019 including locations of:

- Hydrants
- Bulk flow meters
- Water network fixtures
- Water network pipes
- Pump stations
- Reservoirs
- Customer water meters
- Valves
- Zones
- Parcels

3.2 SCADA and Demand Data

KCDC provided the following data for use in the model update:

- Quarterly customer meter readings from 2015-2019.
- Daily Bulk flow data for the bulk flow meters from 2015-2019.
- Raw flow readings for bulk flow meters on the Otaki networks for July 2018 up to December 2018.
- Raw level readings for Waitohu Reservoir where monitoring is in place for the same period.

3.3 Customer Points and Billing Data

KCDC has implemented universal water metering for all customers. Meters are read in 3-month cycles.

Billing data was supplied in spreadsheet form for the meters in the Otaki supply zone. This data set contained the following information:

- Asset ID
- Meter Serial Number
- Open and Close Dates
- Metered Days
- Daily Consumption
- Category (commercial / residential)
- Meter Type
- Address
- Water Zone (DMA)
- Number of connections

3.4 Population Projections

The population forecast used for this model update was based on two data sources:

- Forecast.id yearly forecast to 2047.
- Specific known potential developments.

Both were provided by KCDC in a memo dated April 2019.

4. Network Update

A hydraulic model was built in 2016 for the KCDC Water Network Development Plan. The assets, particularly the pipes from this model were compared against the recent GIS data provided by the council in 2019.

Pipes installed after 2016, and the corresponding fittings and valves were imported/updated in the hydraulic model to reflect the current network. These are shown in Figure 4-1, and include small pockets of land with recent developments and the single 200mmØ PVC main along Rahui Road upstream of the County Road pump station which has been upgraded to twin 250mmØ OD PE100 mains.

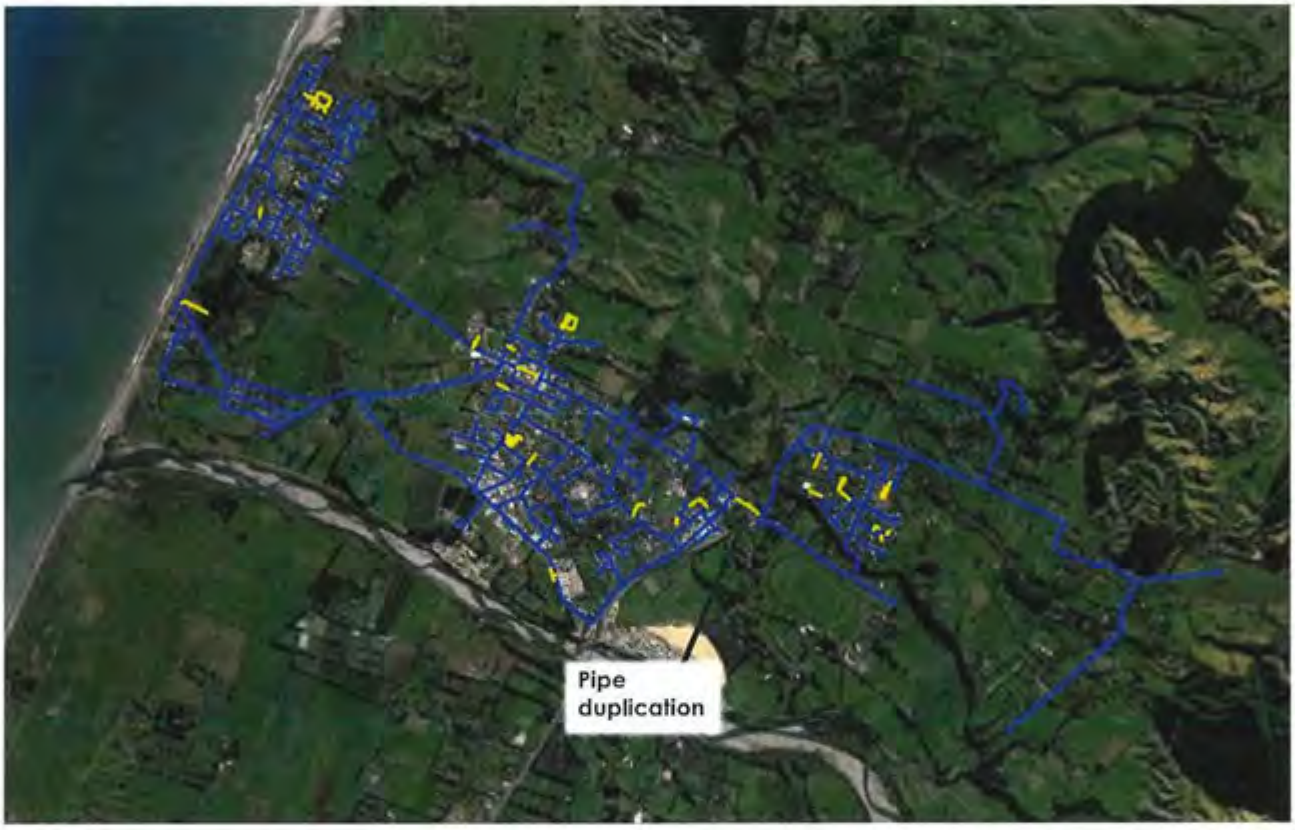


Figure 4-1: Recent Pipe Changes

5. Demand Update

5.1 Customer Points Update

The KCDC database registers different types of meters (filed "type"), which were treated differently for the hydraulic model. The different categories are described in the Water Consumption Manual 2018 provided by the council. This is summarised in Table 5-1.

Table 5-1 : Water Meter Types (Water Consumption Manual 2018, KCDC 2018)

Type	Meter	Description	Model
Primary	Primary Meter	A Primary Meter is a standalone meter that serves one property only. However, a property can have more than one metered connection. Primary meters are generally located at the road boundary.	Imported in model. Average demand based on billing data record for the meter.
Primary MP	Primary Meter Multi-Property	A Primary MP Meter serves two or more properties. There is a Check meter or a Check Placeholder Meter for each property connected to the primary shared connection. In some instances, a property can have more than one Check Meter.	Not imported
Primary PH	Primary Meter Placeholder	A Primary Placeholder Meter provides a means to represent a shared multi-property primary connection where the Primary Meter has not yet been installed or could not be installed. In this case, each of the connected properties should have a Check Meter installed.	Not imported
Check	Check Meter	A Check Meter is subservient to a Primary MP Meter. A check Meter can only serve one property only. A Check Meter allows to measure the water consumption for an individual property connected to a shared multi-property primary connection.	Imported in model. Average demand based on billing data record for the meter.
Check PH	Check Meter Placeholder	A Check Meter Placeholder represents an individual property connection where a physical Check Meter could not be installed, or the owner did not agree to the installation of a Check Meter.	Imported in model. Average demand based on billing data record for the primary meter MP linked to this meter, minus the other check meters linked to the primary meter MP.
Redundant	Redundant Meter	A Redundant Meter is a meter that has been installed but is not required for meter billing.	Not imported
Not Conn	Meter not Connected	A 'Not Connected' Meter is a meter that has been installed but it is not connected to a property.	Not imported
Unknown	Unknown Meter	An 'Unknown' Meter is a meter that has been installed but further investigations are required to identify its connections.	Not imported

5.2 Billing Data

Most of the customers in the Kapiti district are metered, and billing data was used to determine the yearly volume of water used by these customers.

The match between the billing data and the GIS geospatial meter locations was done through the Node_ID field in the meters shapefile and the Meter Asset_ID field in the billing data. The process is summarised as follows:

- There are 3,954 meters in the GIS data set.
  - Out of these, 3,604 are of type 'Check', 'Check PH', and 'Primary'.
  - Out of these, **3,395** have a match in the billing data, and were retained as customer points.
- Billing data entries with no match in GIS were discounted, as well as entries with zero or negative consumption. Following this, **3,370** billing records remained.
- The total consumption of the remaining meters was **1,625.75 m³/day** or **593,125 m³/year**. However, this does not include the consumption of 'Check PH' meters.
- There are 25 meters are of type 'Check PH' based on the meters shapefile. 'Check PH" meters are also known as deduction accounts.
  - The specific consumption of these 25 meters were derived based on the reading of the Primary MP meter the Check PH meter is connected to and the other Check meters connected to the Primary MP meter.
  - Total consumption of the Check PH meters was **78.75 m³/day** or **28,743.75 m³/year**.

The final data set imported into the model therefore includes: **3,395 customer points** with a total average demand of 1,625.75 + 78.75 = **1,704.5 m³/day**.

The data received had been pre-processed to ensure no double counting occurred. Checks were carried out to ensure no more than one primary or primary multi reading was associated with each Asset ID.

5.3 Water Loss Estimation

In previous studies metered demand figures were not available. Water loss was therefore recalculated taking the billing data into account.

As this information is now available, two approaches were followed to estimate leakage: night flow method and water balance method.

5.3.1 Water Balance Method

In fully metered systems the water balance method is a more reliable method of calculating water loss over a long period of time.

The water balance method calculates the unaccounted-for water from:

- The total water supplied based on SCADA information obtained between 3rd August and 3rd November 2018 minus
- The total water used based on billing data for the same period.

Table 5-2: Water Loss Method

DMA	Total Supplied Water Based on SCADA (m³/day)	Total Used Based on Billing Data (m³/day)	Water Loss (m³/day)	Water Loss (l/s)	Water Loss (l/prop/day)
Otaki Beach	532	388	144	1.7	**124**
Otaki Main	1,454	850	604	7.0	**307**
Waitohu Plateau	467	282	185	2.1	**293**

5.3.2 Night Flow Method

The night flow method uses assumptions about genuine water use at night time to derive an estimate for leakage and can serve as a validation for the water loss method.

Flow data was obtained in 5-minute timesteps for all bulk flow meters between 1st – 14th July 2018. The total water demand in each DMA was calculated from the inflow and outflow meter records, for each timestep.

A representative minimum night flow was identified for each DMA. This minimum night flow comprises both legitimate use and leakage. A figure for legitimate night use was assumed following the New Zealand Water Loss Guidelines (2010). To start with, a figure of 2 l/property/hour was used, and this was subsequently adjusted to match the water loss calculated from the water balance.

For all DMAs, this led to realistic figures for legitimate night use of between 2.8 and 4.0 l/property/hour.

This validates both the water loss and night flow approaches and the demand analysis is considered reliable.

Table 5-3: Water Loss based on Night Flow Method

DMA	Minimum Night Flow (l/s)	Legitimate Night Use (l/prop/hour)	Water Loss (l/s)	Water Loss (l/prop/day)	Water Loss (m^3/day)	Water Loss (m^3/day) as per water balance method
Otaki Beach	2.9	4.0	1.7	**135**	146	144
Otaki Main	8.5	2.4	7.0	**348**	605	604
Waitohu Plateau	3.3	3.5	2.2	**297**	187	185

5.4 Current Demand Applied in Model

5.4.1 Average Day Base Demand

Once a figure for leakage was determined, the genuine water use on any day was assumed to be the difference between the total system demand based on SCADA flow meter readings and the leakage estimate.

Table 5-4 shows the average annual demand breakdown.

Table 5-4: ADD total system demand and breakdown

DMA	Average residential metered consumption (m^3/day)	Average non-residential metered consumption (m^3/day)	Leakage (m^3/day)	ADD Total system demand (m^3/day)
Otaki Beach	405	17	146	562
Otaki Main	696	289	605	1,589
Waitohu Plateau	287	11	187	483
Total	1,388	317	938	2,634

The "PA 2018_Otaki Update_ADD" network object in the model contains the average yearly metered consumption for each customer point.

Leakage within each DMA was distributed in the model across all nodes proportional to the number of properties connected to each node.

5.4.2 Historical Peak Demand

The total system demand for Otaki was calculated for each day between 22nd January to 1st March 2019 based on area meter flow records. The highest demand in this period occurred on 11th February with a total system demand of 3,472 m^3/day.

As per accepted practice, it was assumed that commercial demand and leakage do not change depending on the season and that the difference between ADD and PDD is entirely caused by increased residential demand.

From these assumptions, a residential demand factor of 1.6 was identified to increase the total system demand in Otaki to that observed on 11th February 2019.

Table 5-5: PDD total system demand and breakdown, and comparison against ADD breakdown

DMA	Average residential metered consumption (m^3/day)	Average non-residential metered consumption (m^3/day)	Leakage (m^3/day)	ADD Total system demand (m^3/day)	PDD residential consumption (m^3/day)	PDD Total system demand (m^3/day)
Otaki Beach	405	17	146	568	531	694
Otaki Main	696	289	605	1,590	1,018	1,912
Waitohu Plateau	287	11	187	485	669	867
Total	1,388	317	938	2,643	2,218	3,473

The "PA 2018_Otaki Update_PDD" network object in the model contains the average yearly metered consumption for each customer point with the demand for residential customers multiplied by 1.6.

5.4.3 Peak Day Demand Pattern

To identify peak day demand, the genuine demand for each DMA was reviewed for the period 16th – 29th December 2018. The daily demand pattern was found to be very close to the residential demand pattern used in the previous model. This pattern is therefore still considered appropriate and was retained in the updated model.

Commercial and residential water users were assumed to have a similar demand pattern throughout the day.

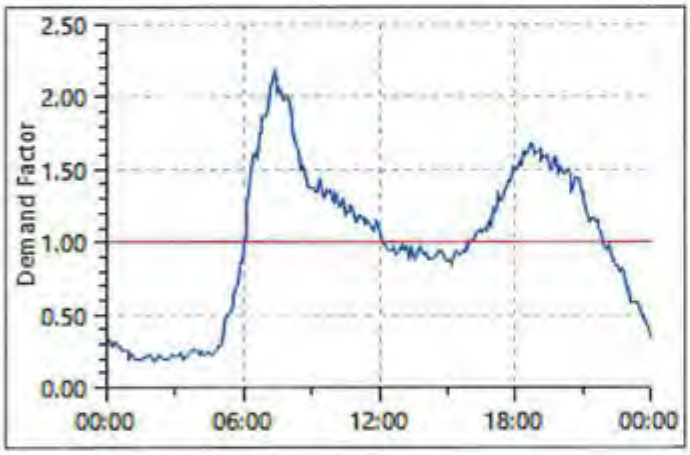


Figure 5-1: Demand Pattern Adopted

5.5 Future Peak Day Demand

5.5.1 Summary

We assumed two kinds of demand growth in the future scenario:

- Infill growth based on Forecast.ID population projection
- Additional greenfield development based on KCDC local knowledge.

Table 5-6 summarises the 2047 residential consumption and total system demand and compares the future residential consumption against the 2018 ADD and PDD.

Table 5-6: Summary of residential PDD demand and 2047 total system demand

DMA	2018 ADD residential metered consumption (m^3/day)	2018 PDD residential consumption (m^3/day)	2047 PDD residential infill consumption (m^3/day)	2047 PDD residential greenfield consumption (m^3/day)	2047 PDD total system demand (m^3/day)
Otaki Beach	405	531	674	0	837
Otaki Main	696	1,018	1,203	1,139	3236
Waitohu Plateau	287	669	778	86	1062
Total	1,388	2,218	2,655	1,225	5,135

5.5.2 Population Forecast - Infill

Future infill growth estimates were sourced from Forecast.ID. Figure 5-2 shows the extent of the area included for Otaki, and the surrounding areas.

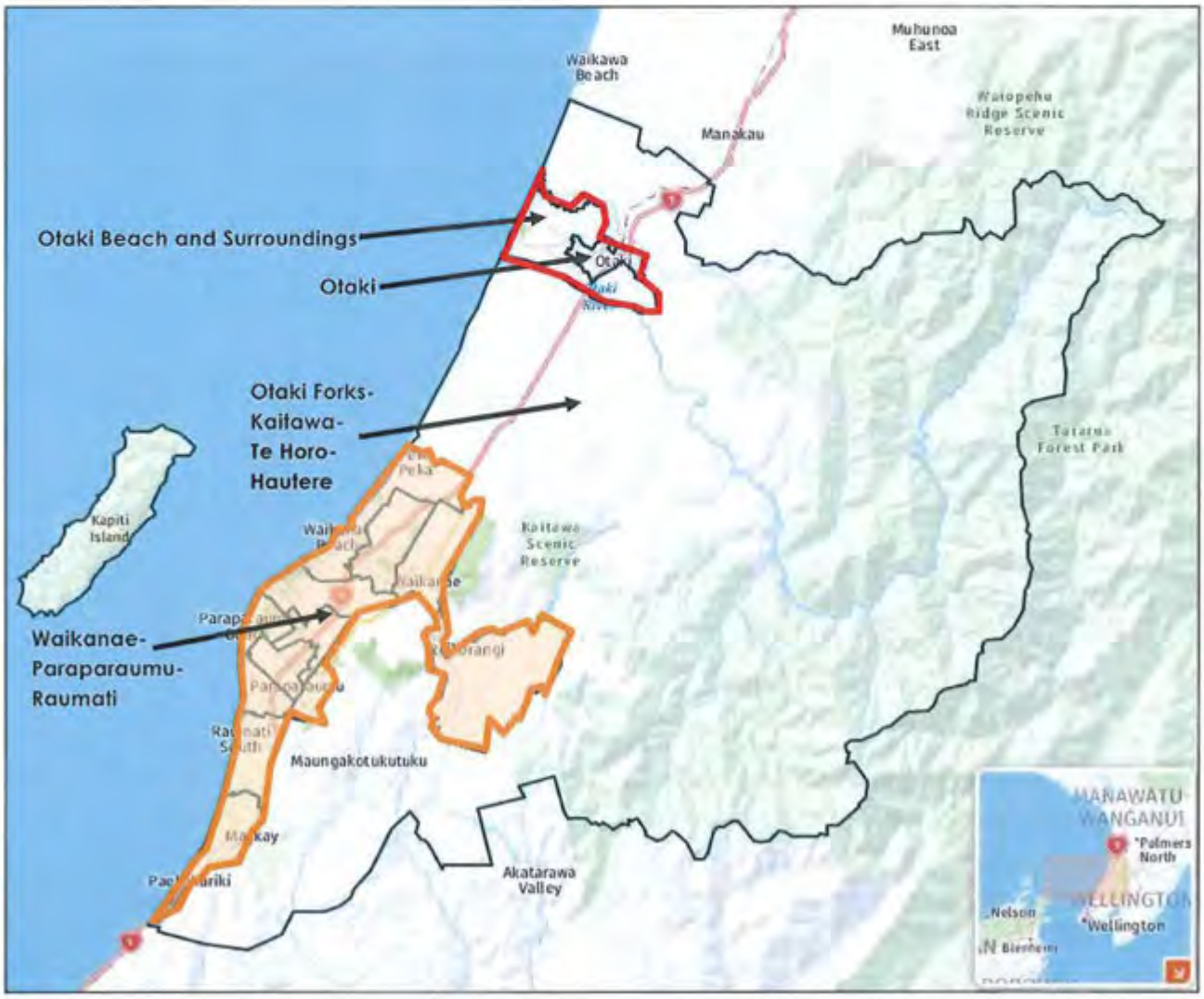


Figure 5-2: Forecast.ID areas

Forecast.ID set out current population projection growth out to 2047 within the zoned areas. These are summarised in Table 5-7. For this study, only the 2047 population projection was considered.

Table 5-7: Forecast.ID Population Projection

Unit Area	Population Forecasts		Scaling factor
	2017	2047	
Otaki	3,451	4,020	1.16
Otaki Beach and surroundings	2,774	3,529	1.27
Otaki Forks-Kaitawa-Te Horo-Hautere	3,842	4,445	1.16
Total	10,067	11,994	1.19

In the model, the Forecast.ID zone was captured in the "area code" field. A scaling factor was applied to the node in each area to represent the forecast growth.

It was assumed that the occupancy rate and the number of non-residential properties remains constant.

5.5.3 Population Forecast - Greenfield Sites

There are two main potential development sites in Otaki not currently accounted for in the Forecast.ID population projection:

- North and north/east of the current CBD shopping area
- Small pockets of land in the Waitohu area

As there are not indications of how these areas will be laid out, the developments have been modelled with all demand on a single node, supplied by the closest pipe on the network with the required capacity.

In the previous WNDP, a demand of 1,225 L/property/day was assigned to these development sites. This demand was based from the Kapiti Coast Water Conservation Report which has a peak demand target of 490 L/person/day and multiplied by 2.5 person/property. This was retained in this study. Elevations for all customer points, including proposed greenfield developments, were read from the LINZ/Koordinates digital elevation model (DEM).

Table 5-8: Potential Development Sites Projected Population

DMA with greenfield growth	Greenfield lots		Greenfield population
	2017	2047	2047
Otaki Main	0	930	2,139
Waitohu Plateau	0	70	161
Total	0	1,000	2,300

Figure 5-3: Modelled development sites

6. Performance Assessment

6.1 Summary

The performance of the water network under the 2047 planning horizon was undertaken to identify parts of the system which do not meet the Level of Service standards.

Figure 6.1 shows areas where levels of service for pressure and fire flow are not met. Details on the pressure and fire flow deficiencies are provided in Sections 6.2 and 6.3, and storage is addressed in Section 6.4.

Table 6-1 summarises the pressure deficiencies and Table 6-2 summarises the fire flow deficiencies in tabular form.

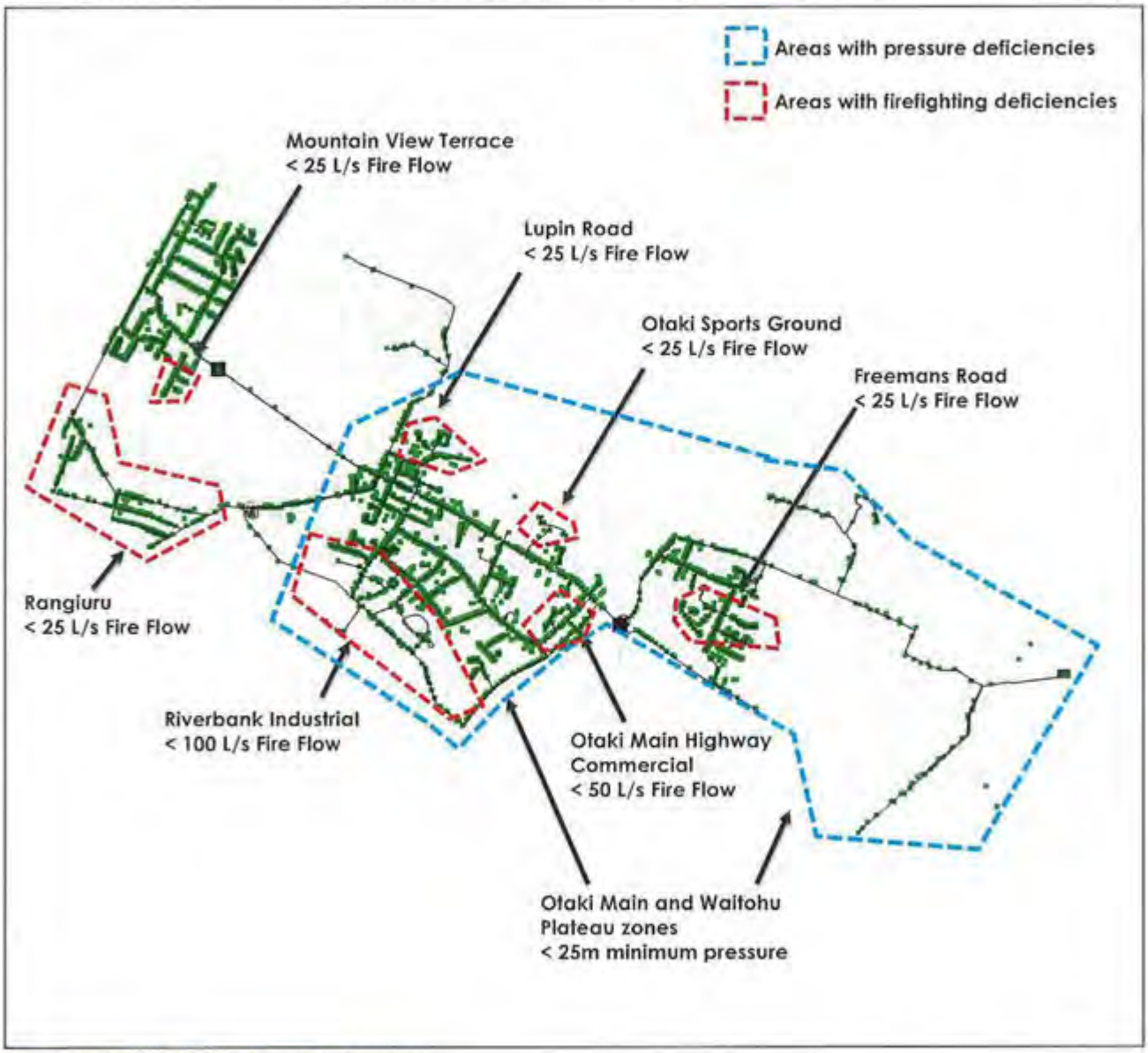


Figure 6-1: 2047 Otaki network deficiencies

Table 6-1: 2047 Pressure Deficiencies

Deficiency	Description / Reference	Number of Properties Affected	Comments	Severity	Addressed by
P1	Otaki Main (Section 6.2.1)	Approximately 1587 residential, commercial, and industrial	Low pressures due to increase in demand, extreme head losses in existing Tasman Road mains	Severe	UPG03 - Tasman Road Trunk Main
P2	County Road Pump Station (Section 6.2.2)	Approximately 577 residential and commercial	Negative pressures due to drained Waitohu Reservoir	Severe	UPG03 - Tasman Road Trunk Main UPG06 - County Road Pump Station Upgrade

Table 6-2: 2047 Firefighting Deficiencies

Deficiency	Description / Reference	Number of Properties Affected	Fire Class	Severity	Addressed by
F1	Rangiuru (Section 6.3.1)	Approximately 230 residential	FW2	Severe	UPG07 - Rangiuru
F2	Mountain View Terrace (Section 6.3.2)	Approximately 70 residential	FW2	Moderate	UPG08 - Mountain View Terrace
F3	Lupin Road (Section 6.3.3)	Approximately 80 residential	FW2	Moderate	UPG09 - Lupin Road
F4	Otaki Sports Ground (Section 6.3.4)	Approximately 10 residential	FW2	Minor	UPG10 - Otaki Sports Ground
F5	Riverbank Industrial and Otaki Main Highway (Section 6.3.5)	Approximately 185 commercial and industrial	FW3 and FW4	Severe	UPG03 - Tasman Road Trunk Main, UPG04 - Otaki Reservoir UPG11 - Otaki Loop Fire Main
F6	Freemans Road (Section 6.3.6)	Approximately 260 residential	FW2	Severe	UPG12 - Freemans Road

The network is currently supplied by both the Tasman Road bore and the Rangiuru bore. **The hydraulic model assumes that both bores remained in use in the future.**

Table 6-3: Maximum instant bore flow

Bore	Consent	Modelled (future)
Tasman	83 l/s	46 l/s
Rangiuru	47 l/s	30 l/s
Combined	130 l/s	76 l/s

Consideration was given to operating the network with only the Tasman Road bore. Whether or not this is possible while meeting the consent condition for instant flow depends on the elevation of the proposed Otaki Reservoir. A low elevation reservoir (~51m) allows a single Tasman Road bore to replenish the reservoir; however, a higher elevation reservoir (~68m) requires the second pump to operate at times, exceeding the consent limit. For this reason, the Rangiuru bore was retained in the hydraulic model, even if it is not strictly required for meeting the Level of Service.

6.2 Pressure Deficiencies

6.2.1 Otaki Main (P1)

As a result of the increase in demand due to the increase in population, the Tasman Road bore supplies more flow into the reticulation. There are a pair of 150mmØ trunk mains along Tasman Road from the bores, however, these pipes are too small for the flow required. This causes more head losses through the pipes and this leads to low pressures in the distribution.

The Tasman Road bore has a capacity of up to 110 L/s, but with the current configuration of the trunk mains, it is not possible to deliver this flow to the points where it is required. With the current demand this is just about acceptable, but with growth it becomes a severe problem.

Figures 6-2 and 6-3 show the change in minimum pressure across the network from the 2018 to the 2047 planning horizon.

Figure 6-4 shows the increase of head loss through the Tasman Road trunk mains from 2018 to 2047.

Figure 6-2: Performance assessment - Otaki network minimum pressure under 2018 peak day demand

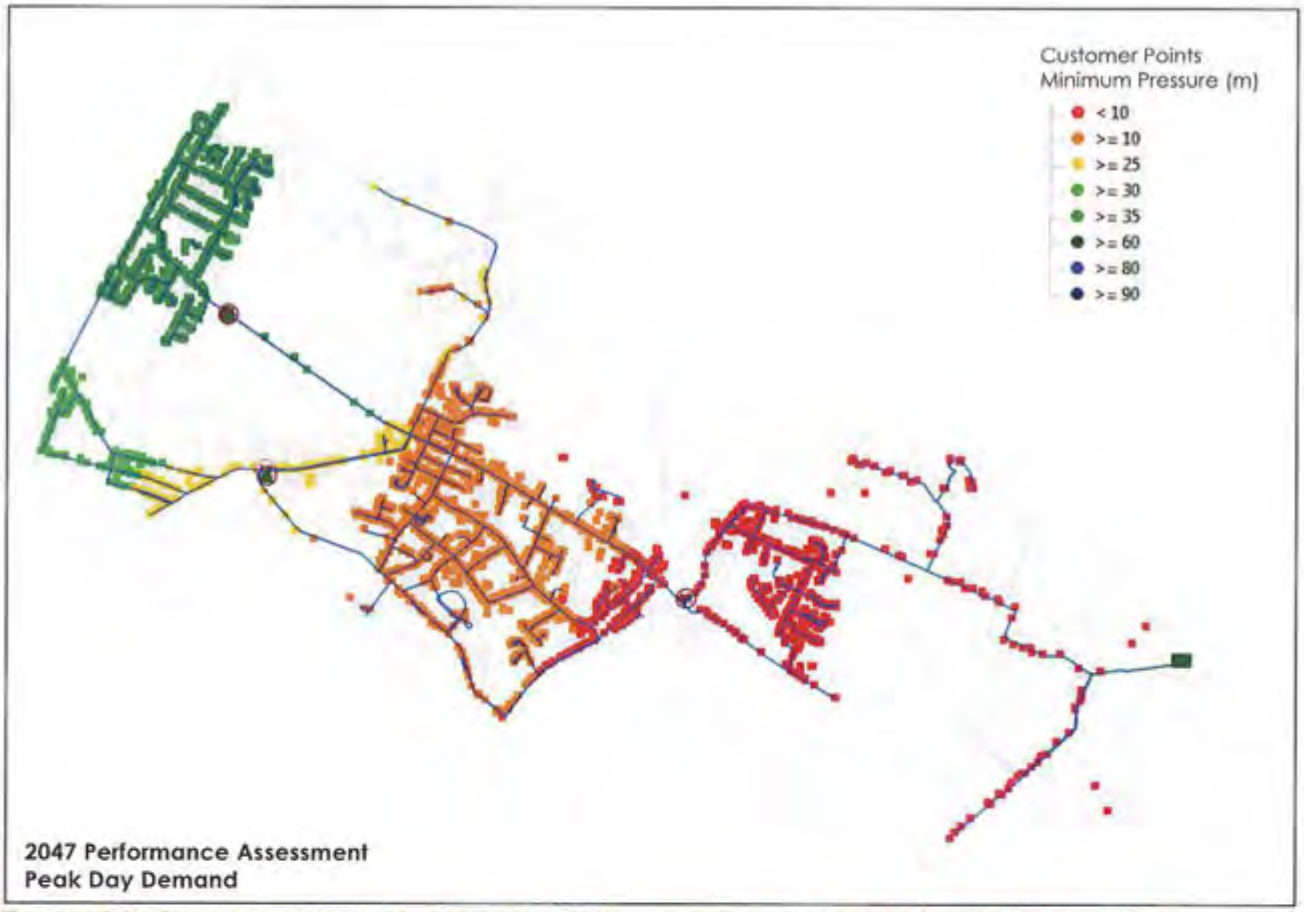


Figure 6-3: Performance assessment - Otaki network minimum pressure under 2047 peak day demand

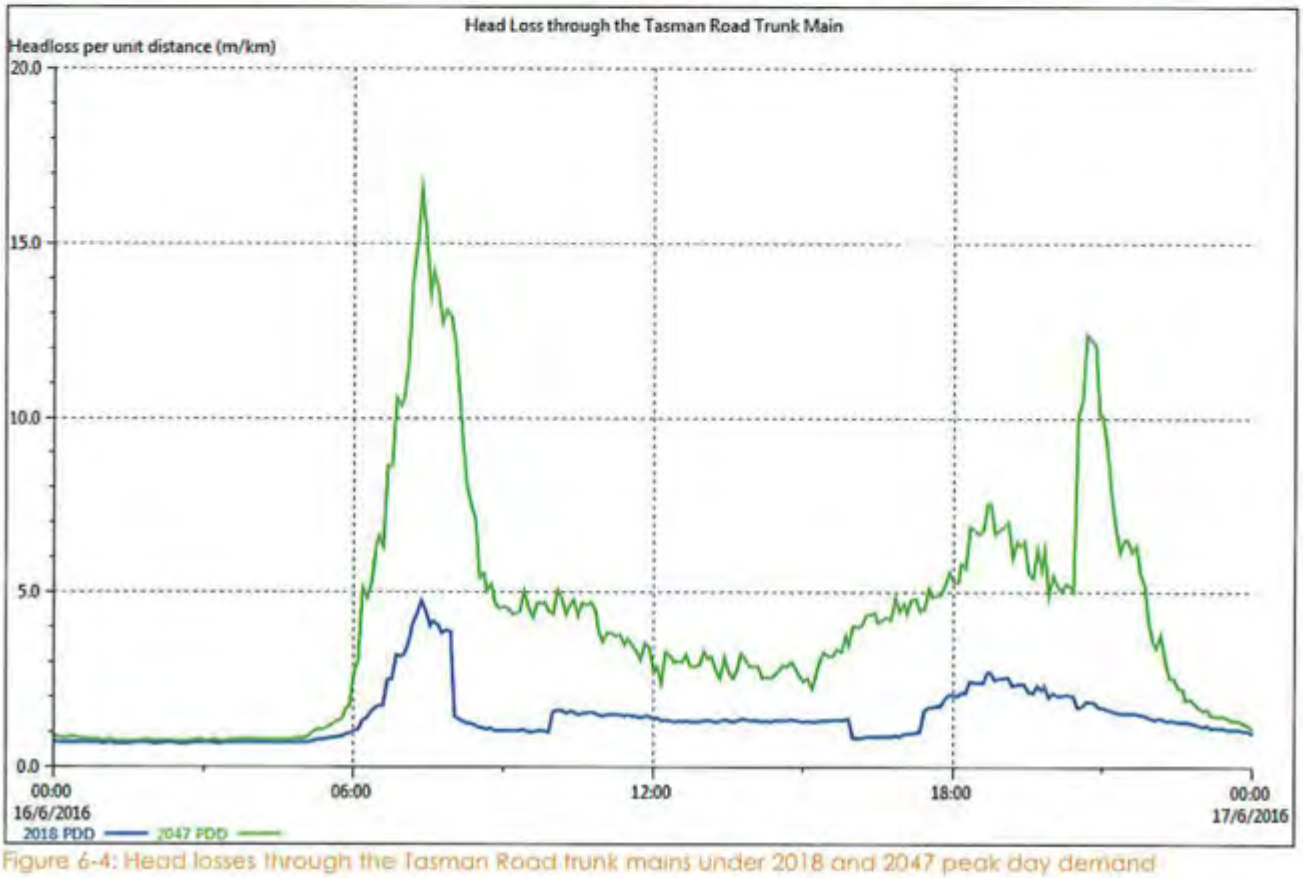


Figure 6-4: Head losses through the Tasman Road trunk mains under 2018 and 2047 peak day demand

6.2.2 County Road Pump Station (P2)

In the Waitohu Plateau zone, the 2047 demand is greater than the capacity of the Waitohu Reservoir, which drains in about 20 hours during a typical peak day demand. This leads to pressures in the zone dropping and loss of supply.

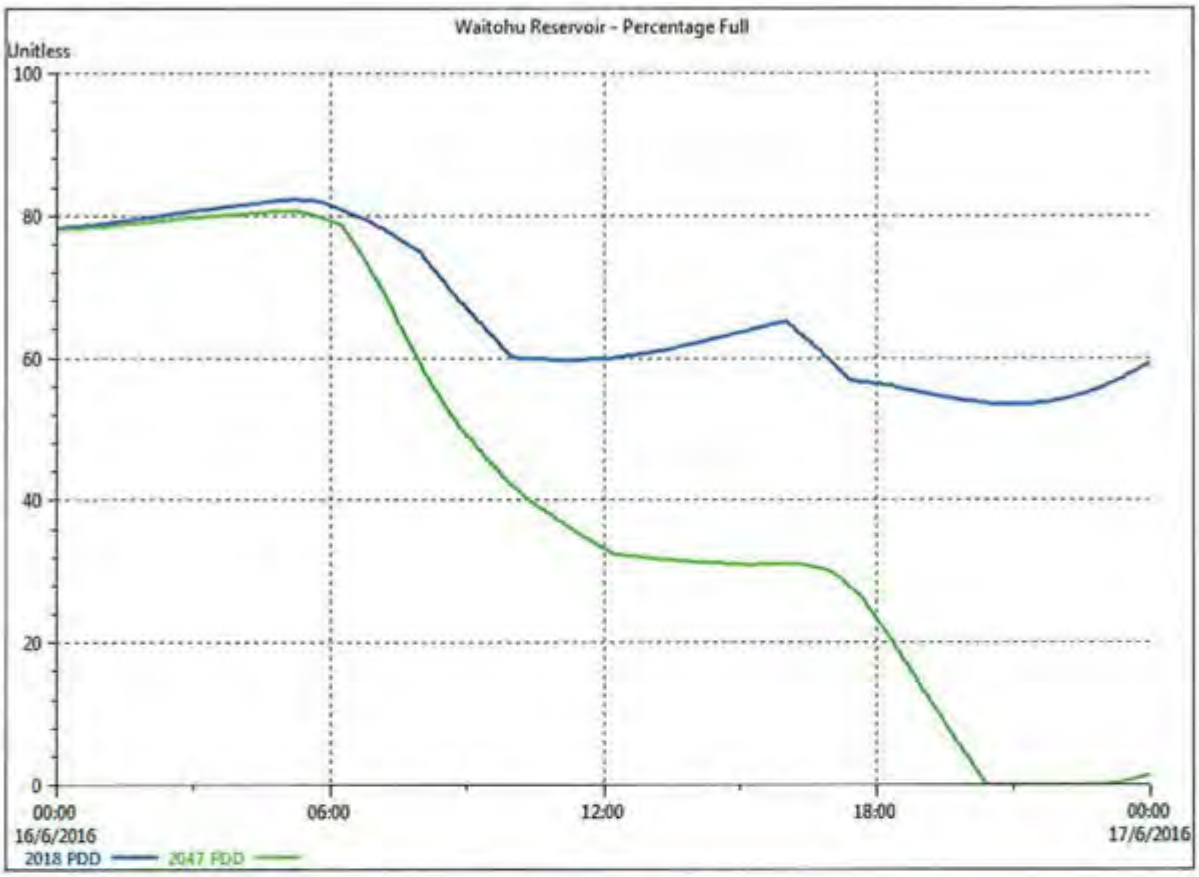


Figure 6-5: Levels in the Waitohu Reservoir under 2018 and 2047 peak day demand

The zone is supplied from the Tasman and Rangiuru Bores via the County Road pump station; however, the pump station does not have the capacity to deliver the required flow into the zone. Moreover, due to the substandard pressure upstream of the pump station, it does not have enough inlet pressure to boost the water up into the higher-level area.

6.3 Firefighting Deficiencies

The previous WNDP has identified a number of firefighting upgrades for the Otaki network. These were reviewed to confirm if they are still valid.

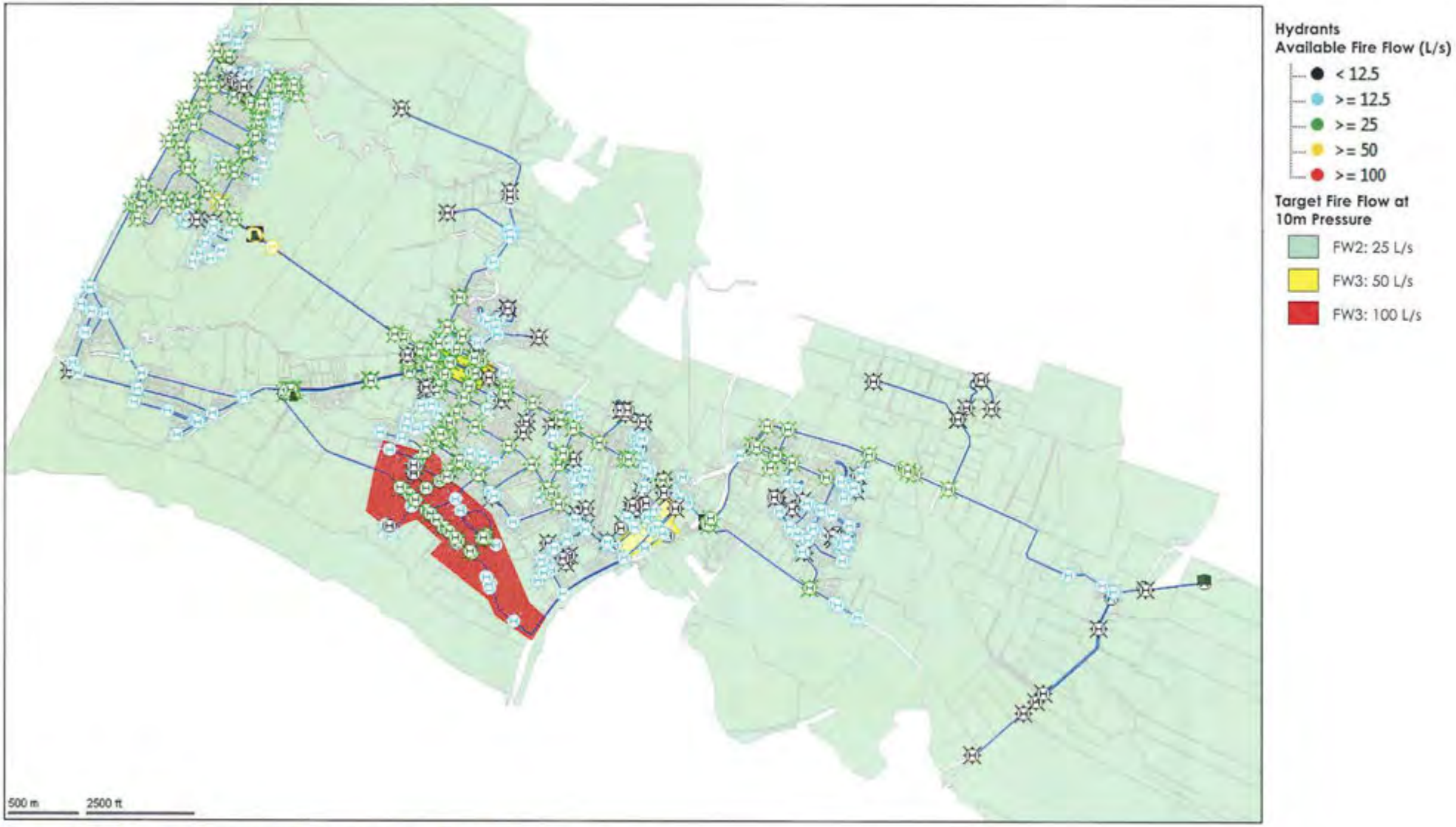


Figure 6-6: Performance assessment – Available Fire Flow at 10m residual pressure

6.3.1 Rangiuru (F1)

Around 230 properties near the beach at the end of Rangiuru Road do not have FW2 (residential) fire flow coverage. The area is fed from the northern and eastern ends by long stretches of 100mm diameter main.

Figure 6-7: Rangiuru fire flow deficiency

6.3.2 Mountain View Terrace (F2)

Around 70 properties do not receive FW2 coverage in Mountain View Terrace. All reticulation in this area is 100mm diameter and is a single-ended feed at Tasman Road.

Figure 6-8: Mountain View Terrace fire flow deficiency

6.3.3 Lupin Road (F3)

Around 80 properties do not receive FW2 coverage in Lupin Road. All reticulation in this area is 100mm diameter and is supplied from a single-ended feed at the junction of Hadfield Street and Matene Street.

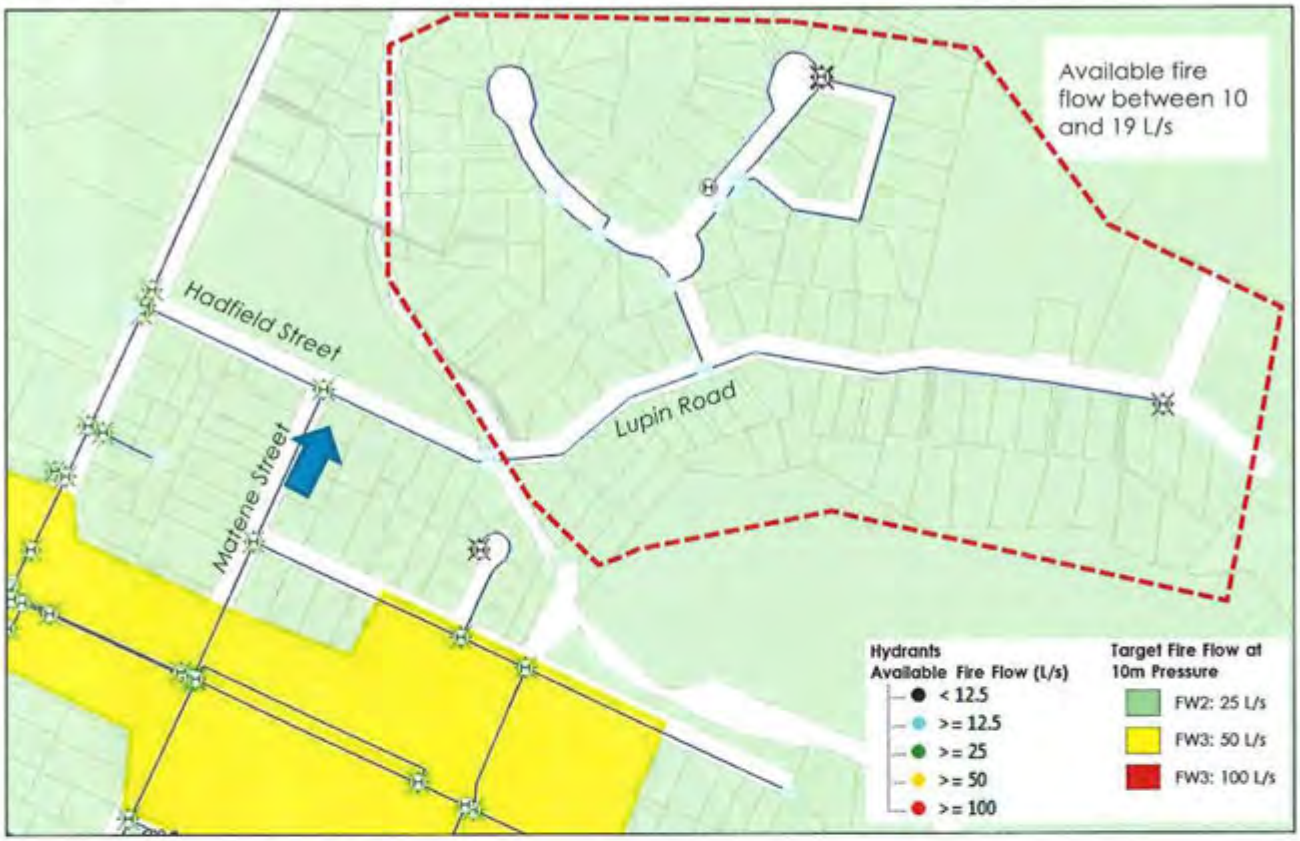


Figure 6-9: Lupin Road fire flow deficiency

6.3.4 Otaki Sports Ground (F4)

The sports ground is fed from Mill Road, but as the 100mm diameter main is long and supplied from a single-ended feed, FW2 fire flow is not able to be supplied.

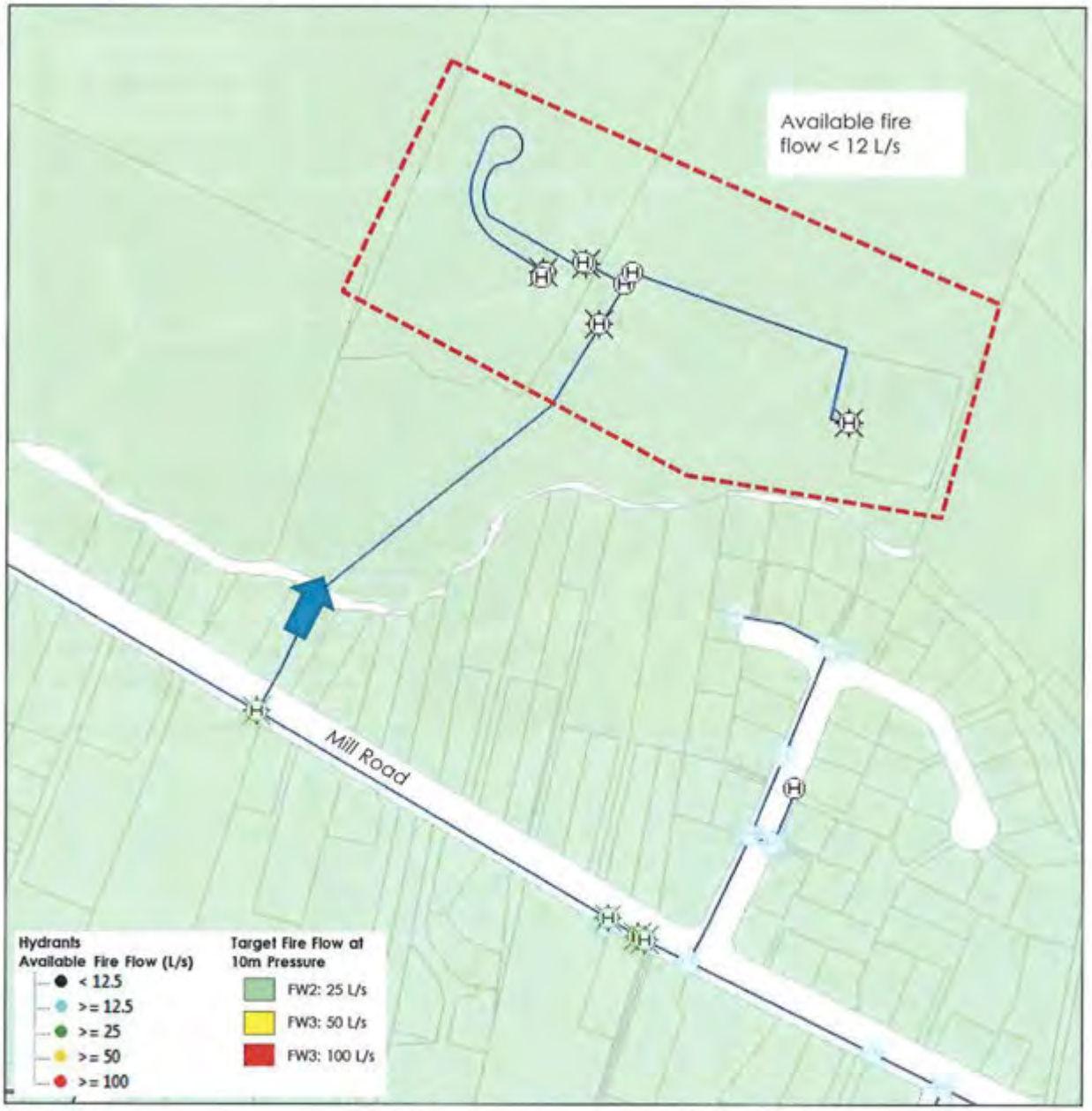


Figure 6-10: Otaki Sports Ground fire flow deficiency

6.3.5 Riverbank Industrial and Otaki Main Highway (F5)

The Otaki commercial area on State Highway 1 receives marginally less than the 50 l/s required to meet the FW3 fire class requirement. The industrial area in Riverbank Road also achieves less than 50 l/s available fire flow but requires 100 l/s to meet the FW4 fire class requirement for industrial areas.

These areas (along with all of the Otaki Main DMA) are reliant on flow from the Rangiuru and Tasman bores. Rangiuru can supply 30 l/s, but although Tasman has pumps capable of supplying a total of 110 l/s, network restrictions in Tasman Road prevent this being delivered to these areas at the required pressure.

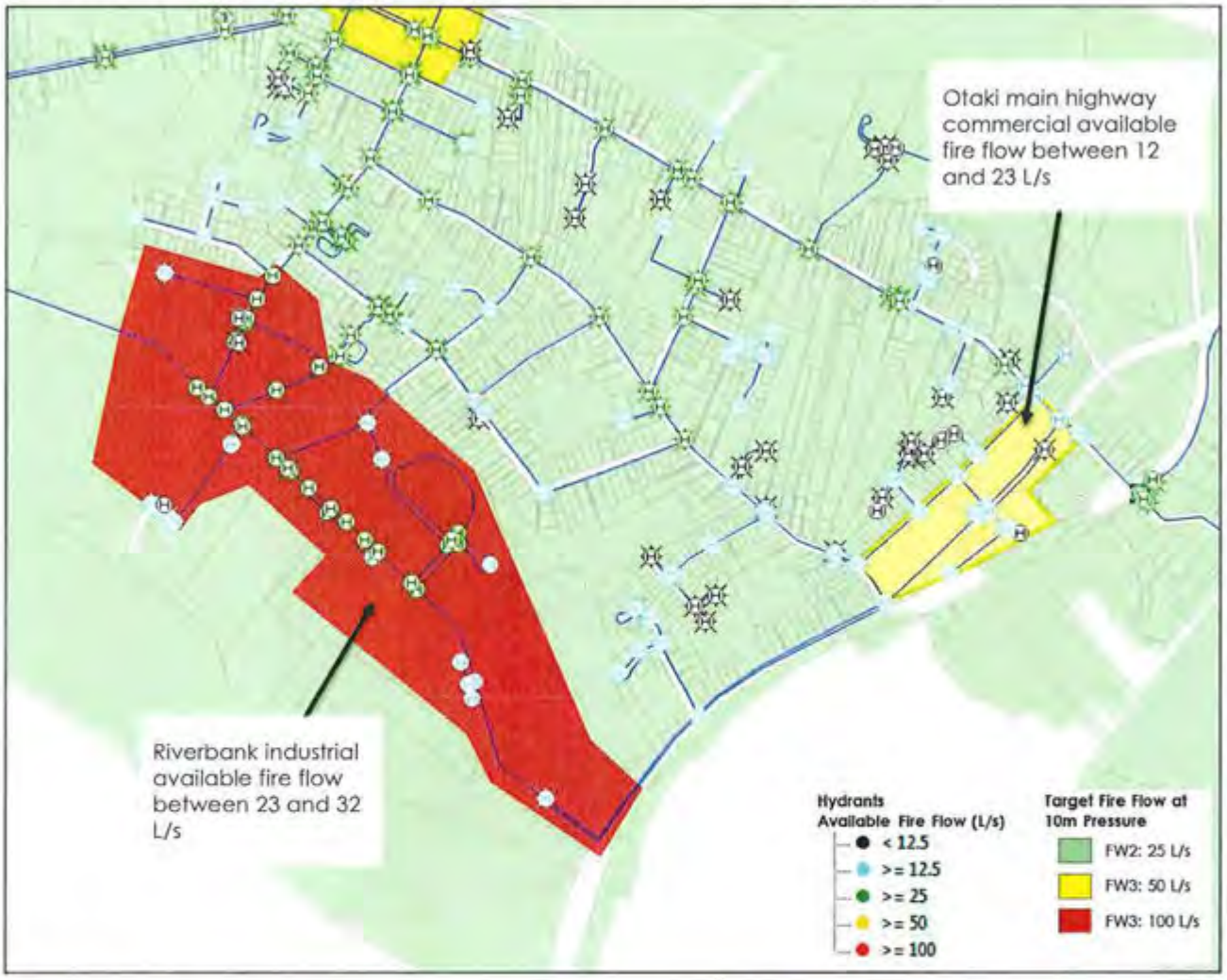


Figure 6-11: Riverbank industrial and Otaki main highway commercial fire flow deficiency

6.3.6 Freemans Road (F6)

A large portion of the Waitohu residential reticulation is all 100mm diameter. Even though it is not a single-ended feed, the reticulation is too small to deliver the 25 l/s required for FW2 to around 260 properties.

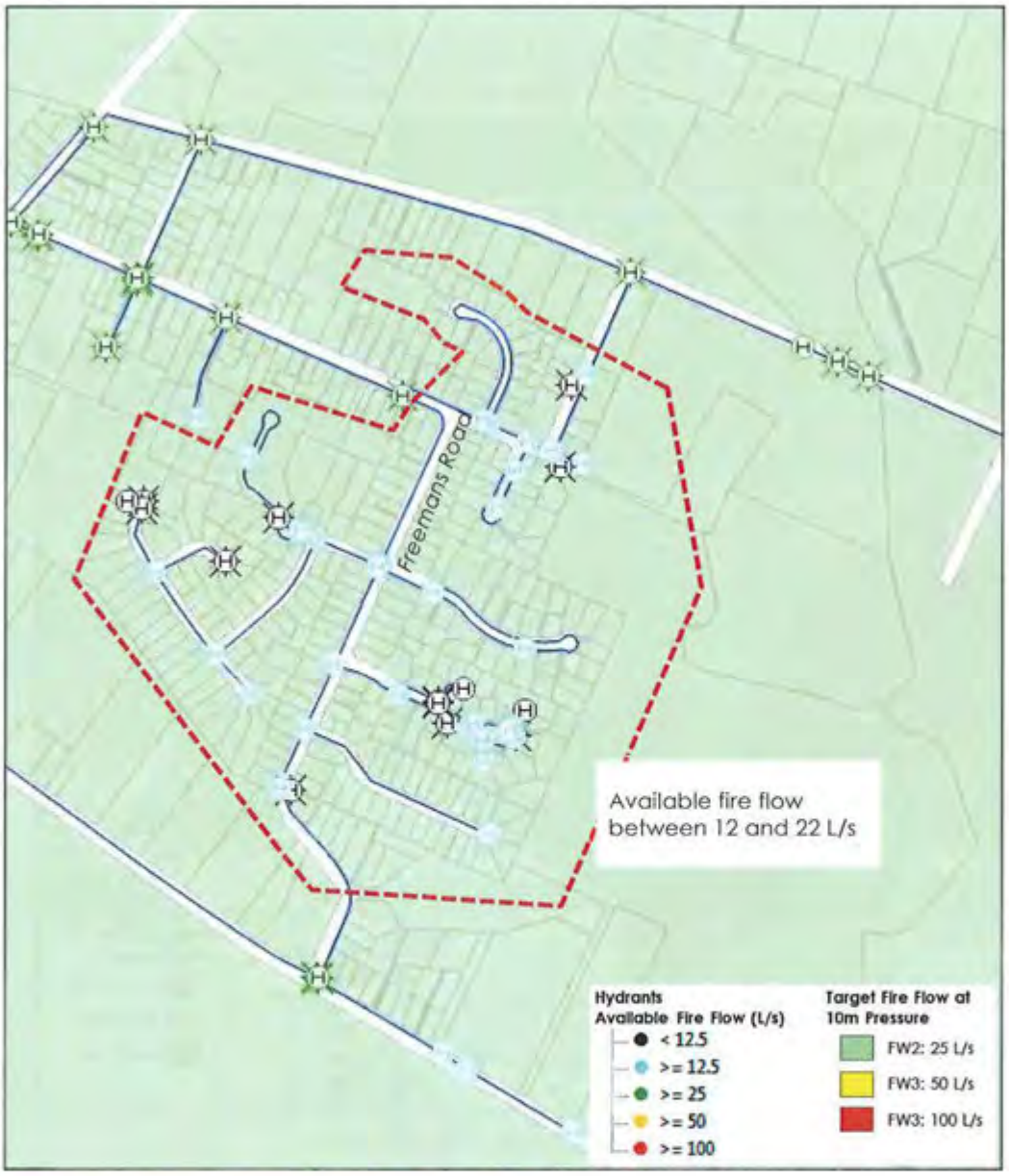


Figure 6-12: Freemans Road fire flow deficiency

6.4 Existing Storage Deficiencies

The previous WNDP has identified significant storage shortfall in Otaki. Calculations for the reservoir sizing has been done based on the Water Supply Code of Australia (WSA) 03-2011 version 3.1, and the Wellington Water guidelines.

6.4.1 WSA (Water Supply Code of Australia) Guidelines

The WSA states that for surface reservoirs, useable reservoir capacity (including reserve storage capacity should be equal to a minimum of 8-24 h consumption at peak day demand, depending on the needs of the specific system. This is interpreted as reservoir capacity equivalent to the peak day demand.

6.4.2 Wellington Water Guidelines

Wellington Water has guidelines for storage requirements, in terms of operational and seismic resilience. For operational resilience, 100% of the storage volume should be at least equal to the greater of:

- 2 times Average Day Demand, assuming current per-capita consumption.
- Peak Day Demand + 20% + Fire Fighting Storage.

Based on the Fire Service Code of Practice, firefighting storage according to fire class is as follows:

- FW2 – 45 m^3
- FW3 – 180 m^3
- FW4 – 540 m^3

Both Otaki Beach and Waitohu Plateau are classified as FW2 and Otaki Main is classified as FW4.

The storage required for seismic resilience is intended for a survival consumption of 20 l/person/day, as well as critical users and businesses with various levels of priority. 70% of the total storage should be sufficient for:

- From Day 8 to Day 30:
  - Public distribution points.
  - Critical users category 1 (civil defence centres, major hospitals, lifelines).
- From Day 14 to Day 30:
  - Critical users category 2 (aged care facilities, medical centres).
- From Day 21 to Day 30:
  - Critical users category 3 (education).

Under the seismic criteria for calculating storage volume, the following assumptions were used:

- Otaki Main allocates 10m^3 for critical users consumption, and a population of 6,200 in 2047.
- Otaki Beach and Waitohu Plateau allocates 5m^3 each for critical users consumption, and a 2047 population of 3,800 and 2,000, respectively.

6.4.3 Reservoir Sizing

Table 6-4 below summarises the required storage volume based on both WSA and Wellington Water guidelines.

Table 6-4: Required storage volume based on WSA and Wellington Water guidelines

Water Supply Area	Criteria	Required Storage	Shortfall
Otaki Beach + Otaki Main	1xPDD (WSA)	4,072	4,072
	2xADD (WWL)	7,074	7,074
	1.2xPDD+FF (WWL)	5,472	5,472
	Seismic (WWL)	5,060	5,060
Waitohu Plateau	1xPDD (WSA)	1,062	387
	2xADD (WWL)	1,236	561
	1.2xPDD+FF (WWL)	1,320	645
	Seismic (WWL)	1,150	475

The chart in Figure 6-13 summarises the required storage volume for Otaki based on the specified guidelines.

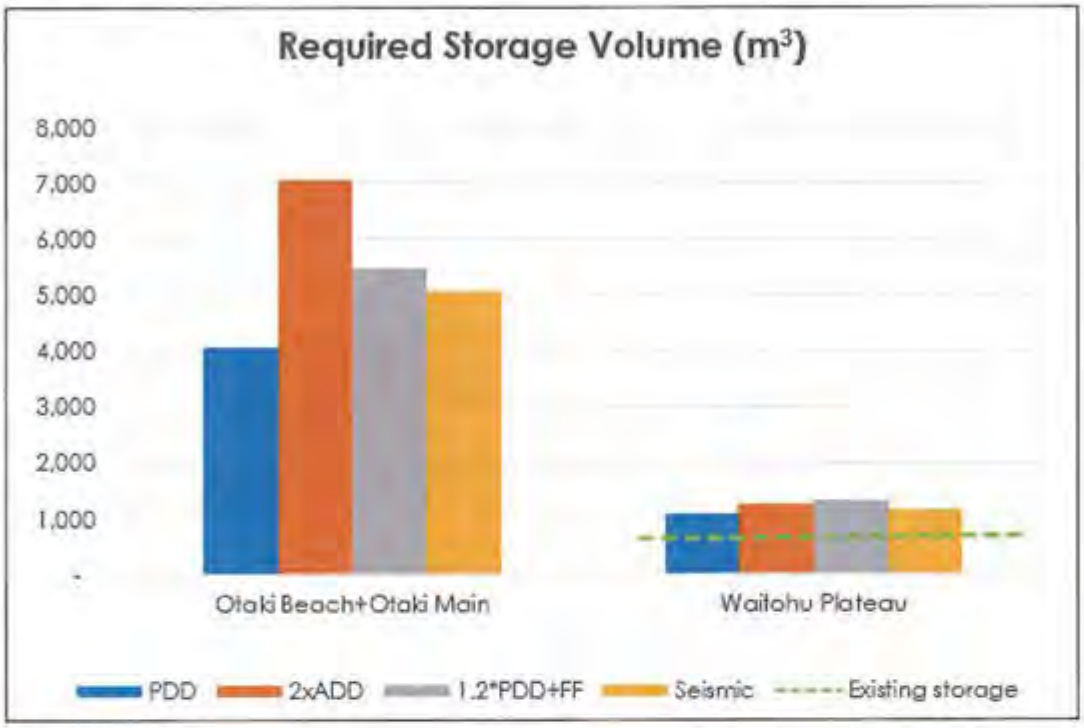


Figure 6-13: Required storage volume based on WSA and Wellington Water guidelines

For the purpose of preliminary sizing and costing of upgrades, we adopted Wellington Water's guideline for operational resilience where the storage volume must be equal to or greater than the peak day demand + 20% + firefighting storage. This is a middle ground between the WSA value and the highest WWL value. **KCDC needs to confirm their target Level of Service for water storage.**

Under this criterion, the combined storage shortfall for Otaki Main and Otaki Beach is 5,472 m³. In the Waitohu Plateau zone, the required storage volume is 1,320 m³. The existing Waitohu Reservoir volume is 675 m³, leaving a shortfall of 645 m³ for the zone.

7. Upgrades

This section outlines the recommended upgrades which have been identified to address the deficiencies outlined in the performance assessment.

7.1 Summary

Table 7-1 gives a description of each upgrade and the estimated upgrade cost.

Figure 7-1 shows the locations of the upgrades within the networks. Sections 7.2 to 7.3 give more details of each upgrade.

Table 7-1: Upgrades Summary

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG01 Section 7.2.1	Greenfields	Otaki Main Development Site	Connects the potential development site to the existing network	Depends on the actual location of the development, currently unknown	TBD	N/A
UPG02 Section 0	Greenfields	Waitohu Plateau Development Sites	Connects the potential development site to the existing network	Depends on the actual location of the development, currently unknown	TBD	N/A
UPG03 Section 7.3.1	Strategic	Tasman Road Trunk Main	Construct a new 300mmØ pipe along Tasman Road between the Tasman bores and Rangiuru Road (approximately 1500m in length), in addition to the existing pipe. Also construct a new 200mmØ pipe along Main Street between Rangiuru Road and Matene Street (approximately 130m in length), in addition to the existing pipe.	1500m of 300mm ID trunk main. 130m of 200mm ID main	$ 3.9M	P1 P2 F5 Security of Supply
UPG04 Section 7.3.2	Strategic	Otaki Reservoir	Construct a new Otaki Reservoir. Also construct a new combined inlet/outlet main connecting to Otaki network upstream of County Road WPS	Reservoir size depends on level of service adopted by KCDC. Nominal allowance for 1.2xPDD+FF volume = 5.5ML. Pipework depends on actual location of the reservoir, currently unknown. Nominal allowance for 3.2km of 300mm diameter pipe.	$ 13.8M	F5 and Security of Supply

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG05 Section 7.3.3	Strategic	Waitohu Reservoir #2	Construct a new Waitohu Reservoir and associated pipework in addition to the existing reservoir.	Reservoir size depends on level of service adopted by KCDC. Nominal allowance for 1.2xPDD+FF volume = 0.65ML.	$ 1.9M	Security of Supply
UPG06 Section 7.3.4	Strategic	County Road Pump Station	Upgrade existing County Road WPS from 7kW to 20kW.	20 kW pump station	$ 0.7M	P2
UPG07 Section 7.4.1	Fire	Rangiuru	Construct a new 150mmØ main along Rangiuru Road from the Rangiuru bores to Old Coach Road (380m in length). Also construct a new 150mmØ main along The Avenue between Rangiuru Road and Kapiti Lane (240m in length). Abandon existing 100mmØ main where the new mains are laid.	620m of 150mm ID main	$ 1.2M	F1
UPG08 Section 7.4.2	Fire	Mountain View Terrace	Construct a new 150mmØ main along Robert McKeen Street between Tasman Road and Mountain View Terrace (260m in length). Abandon existing 100mmØ main where the new mains are laid.	260m of 150mm ID main	$ 0.6M	F2

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG09 Section 7.4.3	Fire	Lupin Road	Construct a new 150mmØ main along Matene Street between Main Street and Hadfield Street (200m in length), continuing in Hadfield Street and Lupin Road to Tamihana Street (270m in length). Abandon existing 100mmØ main where the new mains are laid.	470m of 150mm ID main	$ 0.9M	F3
UPG10 Section 7.4.4	Fire	Otaki Sports Ground	Construct a new 150mmØ main along from sports field gates in Mill Road to sports fields (310m in length). Abandon existing 100mmØ main where the new mains are laid.	310m of 150mm ID main	$ 0.6M	F4
UPG11 Section 7.4.5	Fire	Otaki Loop Fire Main	Construct a new 200mmØ main along Main Highway from Mill Road to Riverbank Road, continuing along Riverbank Road to Aotaki Street and connecting to the 200mmØ main from Rangiuru bore in Riverbank Road (2850m in length). This is in addition to the existing pipes. Also, construct a new 150mmØ main along Titoki Street and Rimu Street (500m in length). Abandon existing 100mmØ main where the new 150mmØ mains are laid.	2,850m of 200mm ID main, 500m of 150mm ID main	$ 7.5M	F5

Upgrade Reference	Upgrade Type	Upgrade Name	Description	Upgrade Quantities	Cost Estimate (rounded)	Deficiencies Addressed
UPG12 Section 7.4.6	Fire	Freemans Roaa	Construct a new 150mmØ main along Elphick Street, Te Manuao Road and Freemans Road between Waitohu Valley Road and Ludlam Way (765m in length). Also, construct a new 150mmØ main along Tararua Crescent and Renata Road between Freemans Road and Oriwa Crescent (305m in length). Abandon existing 100mmØ main where the new 150mmØ mains are laid.	1,070m of 150mm ID main	$ 2.1M	F6

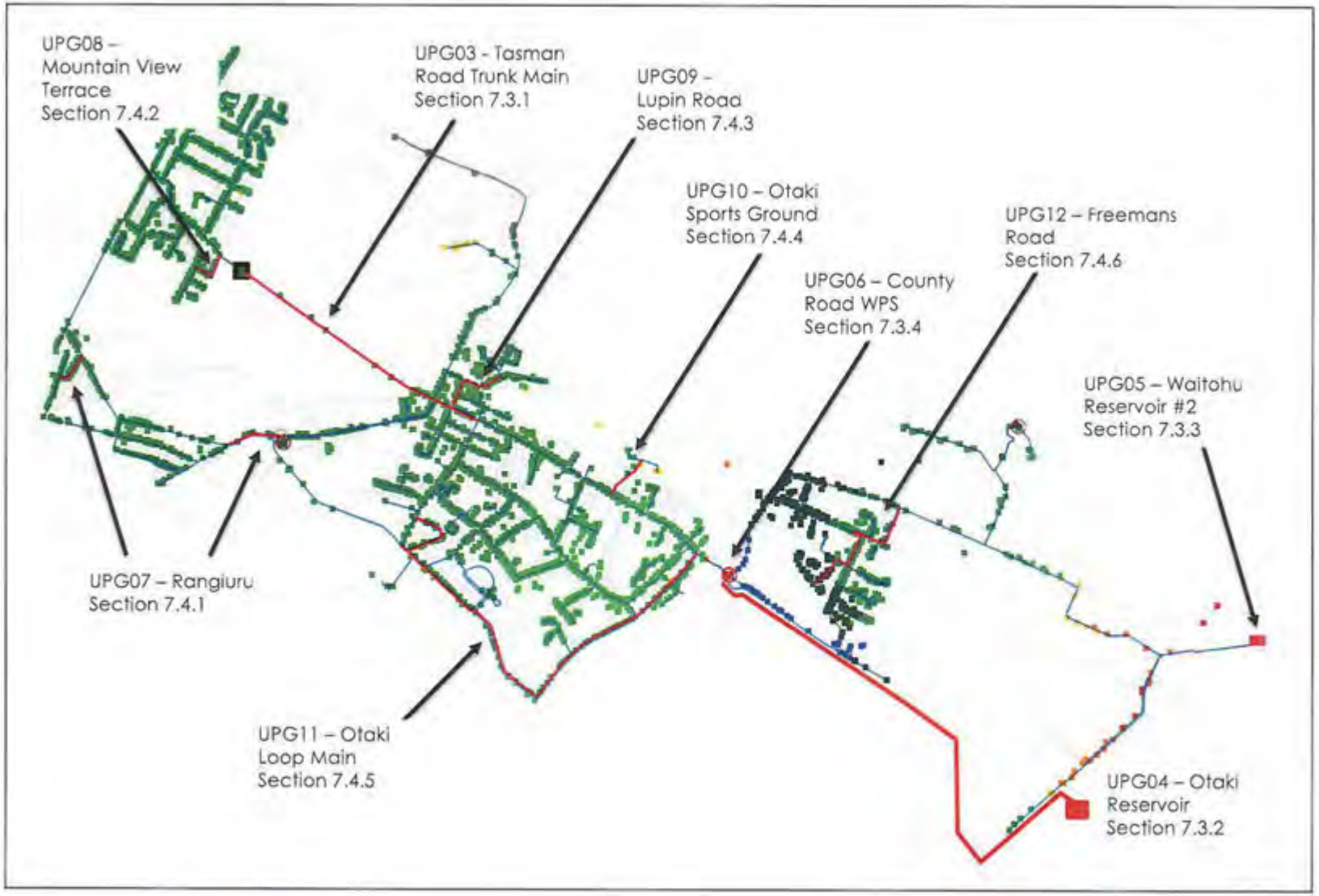


Figure 7-1: Otaki Upgrades

7.2 Greenfields Upgrades

Upgrades associated with potential development sites are required to supply greenfield areas with water from the existing network. As these areas cannot be supplied without these upgrades, they are included in the performance assessment scenarios as well as the upgraded scenarios.

7.2.1 Otaki Main Development Site (UPG01)

There is around 96Ha of land available of which 64Ha has genuine usable capacity as a potential development site north and northeast of the current CBD shopping area of Otaki. This gives a potential of 930 lots with an additional population of 2,139.

This development site was modelled as a single customer point containing 930 properties north of the Otaki shopping area. The area is primarily fed from the Otaki Main network. The alignment and connection point may differ depending on developer requirements, therefore this upgrade is indicative only.

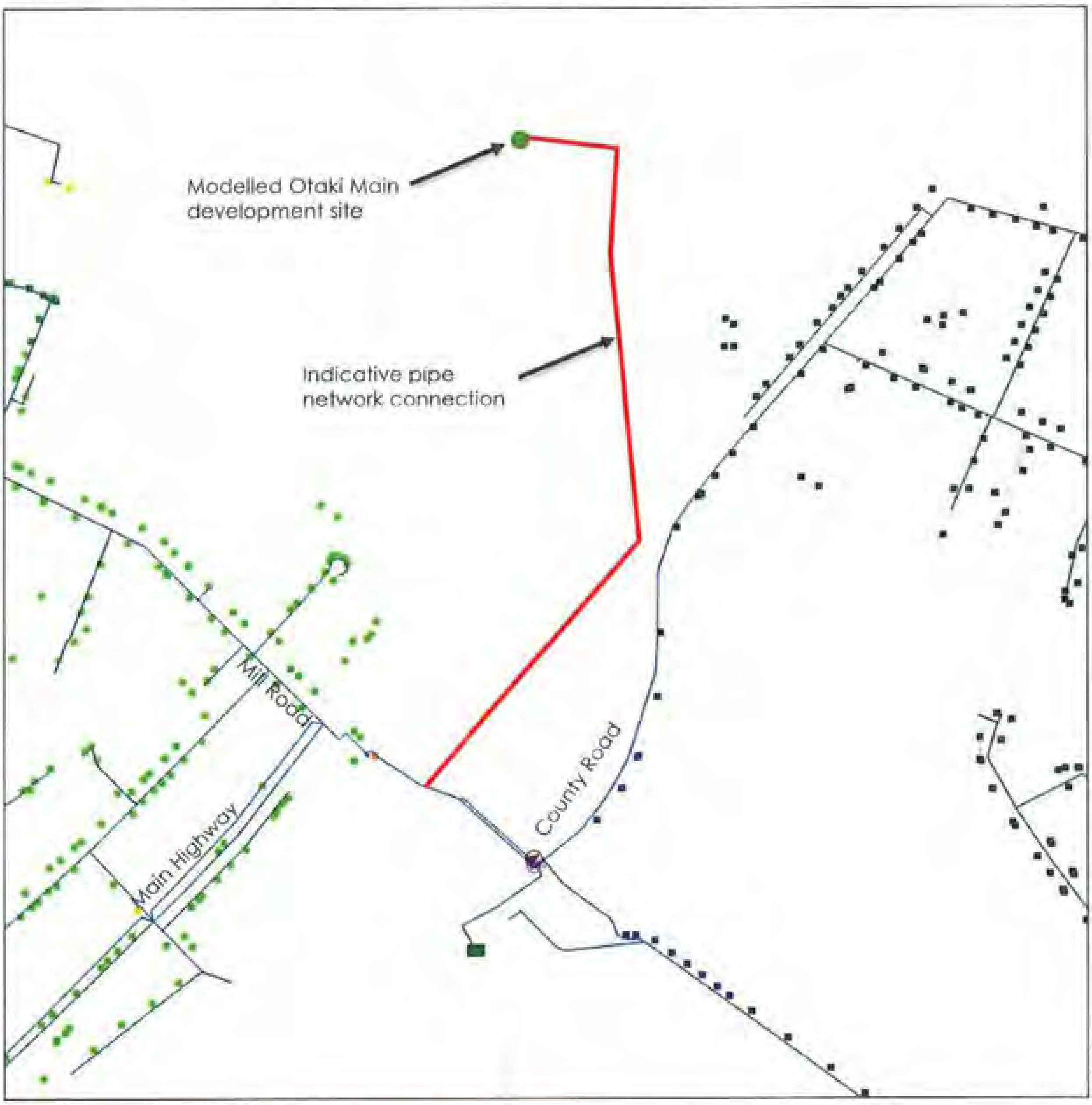


Figure 7-2: Modelled Otaki Main potential development site

7.2.2 Waitohu Plateau Development Sites (UPG02)

There are small pockets of land in the Waitohu area that can be potential development sites. These sites are able to generate a total of 70 lots with an additional population of 161.

These development sites were modelled as two customer points containing 35 properties each, as shown in Figure 7-3. The alignment and connection points may differ depending on developer requirements, therefore this upgrade is indicative only.

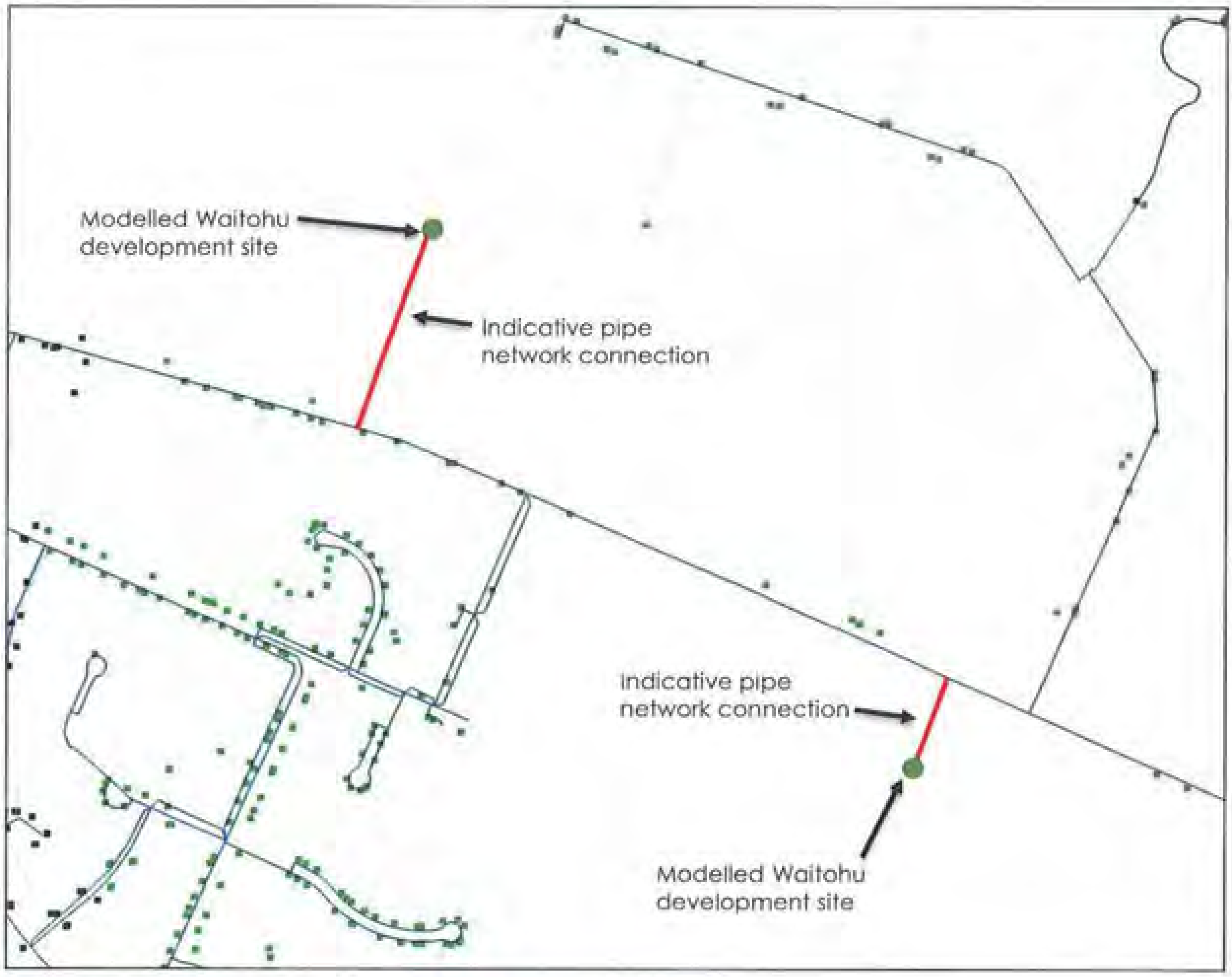


Figure 7-3: Modelled Waitohu area potential development sites

7.3 Strategic Upgrades

Strategic upgrades have been identified as major upgrades required to facilitate water transfer across a network and/or enhance network operation. Although they sometimes address specific deficiencies, this is not their primary purpose.

7.3.1 Tasman Road Trunk Main (UPG03)

Even under current demand conditions, it is not possible to deliver the required fire flow to the Riverbank Road Industrial and Otaki Main Highway Commercial areas (see Section 6.3.4).

There is plenty of capacity at the Tasman Bore (up to 110 l/s), but with the current configuration of the Tasman Road trunk mains (2 x 150mm diameter mains) it is not possible to deliver this flow to the points where it is required.

A new 300mm ID main is required in addition to the parallel 150mmØ mains – this will fully address the fire flow deficiencies at Otaki Main Highway and at Riverbank Industrial. In addition, the trunk main is crucial in delivering water to replenish the proposed Otaki Reservoir (see Section 7.3.2), and enable the network to have enough upstream pressure for the County Road pump station (Section 7.3.4). The existing 200mmØ main along Mill Road does not need to be upgraded as most of the head is lost on the existing 150mmØ mains on Tasman Road, before the water reaches Mill Road. Once the 300mmØ trunk main is constructed, the existing pipe on Mill Road has enough capacity to meet the required Level of Service for minimum pressure and fire flow.

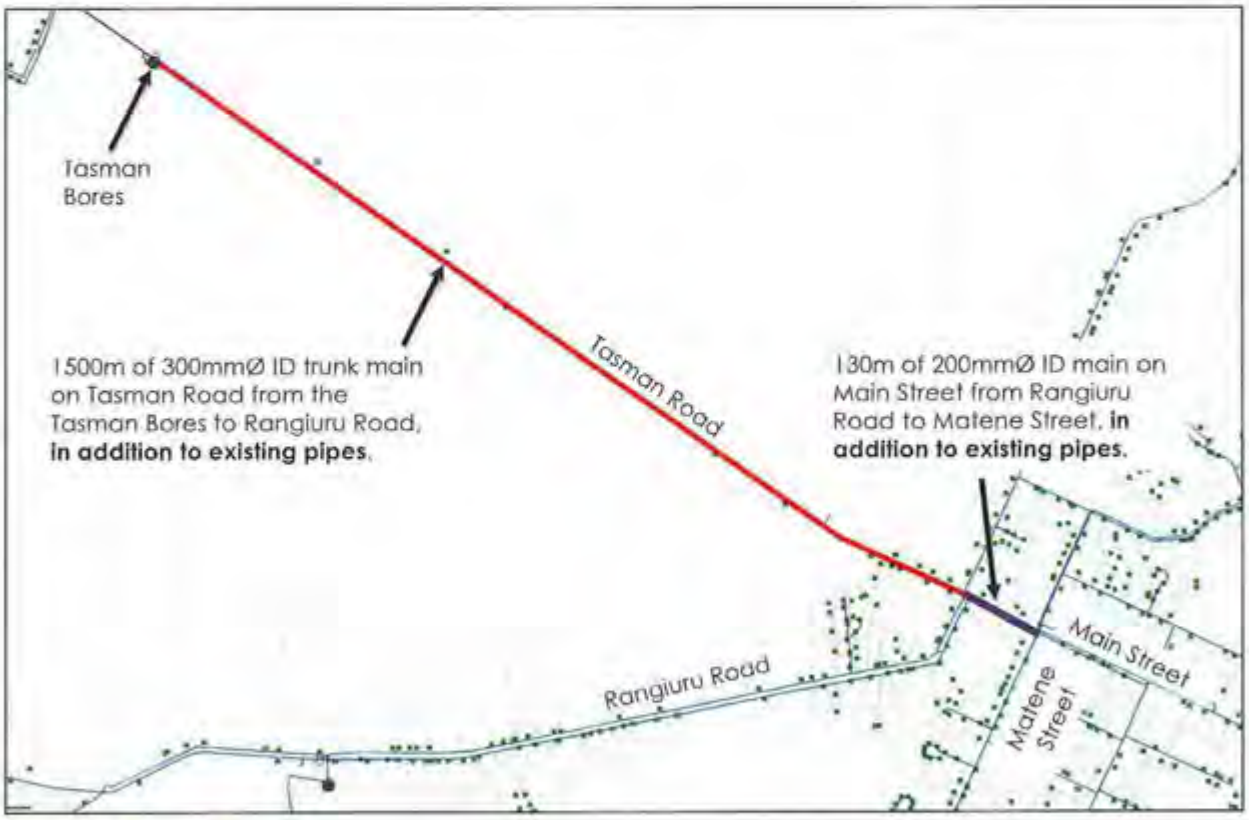


Figure 7-4: Tasman Road trunk main upgrade

Consideration was given to a new 200mm diameter pipe instead of a new 300mm diameter pipe. This was found to be suitable as long as Rangiuru bore is operating. For the purpose of this report, we have recommended a 300mm diameter pipe, which would give KCDC the flexibility of turning off Rangiuru while maintaining the Level of Service, at a relatively low additional cost for the slightly larger pipe size.

7.3.2 Otaki Reservoir (UPG04)

Previous investigations have identified a number of possible sites off Waitohu Valley Road and Ringawhati Road for a possible new reservoir in Otaki. However, these locations are not yet confirmed. For the purpose of the modelling work, the new **reservoir was located on Ringawhati Road**, and an allowance was made for a new inlet/outlet pipe. The new pipe was assumed to connect just upstream of the County Road pump station. The exact location for the reservoir and the pipe alignment are yet to be identified.

Based on the reservoir sizing criteria under peak demand day (Section 6.4.3), the proposed reservoir was sized as 5,500 m^3. The reservoir is expected to operate on a **push-pull setup**, with a single pipe conveying water in and out.

The previous investigations considered sites with a ground elevation around 68m (TWL around 73m). Figure 7-5 shows the approximate area considered for the reservoir as well as a possible alignment for the proposed pipe. The alignment and its feasibility have not been assessed in detail.

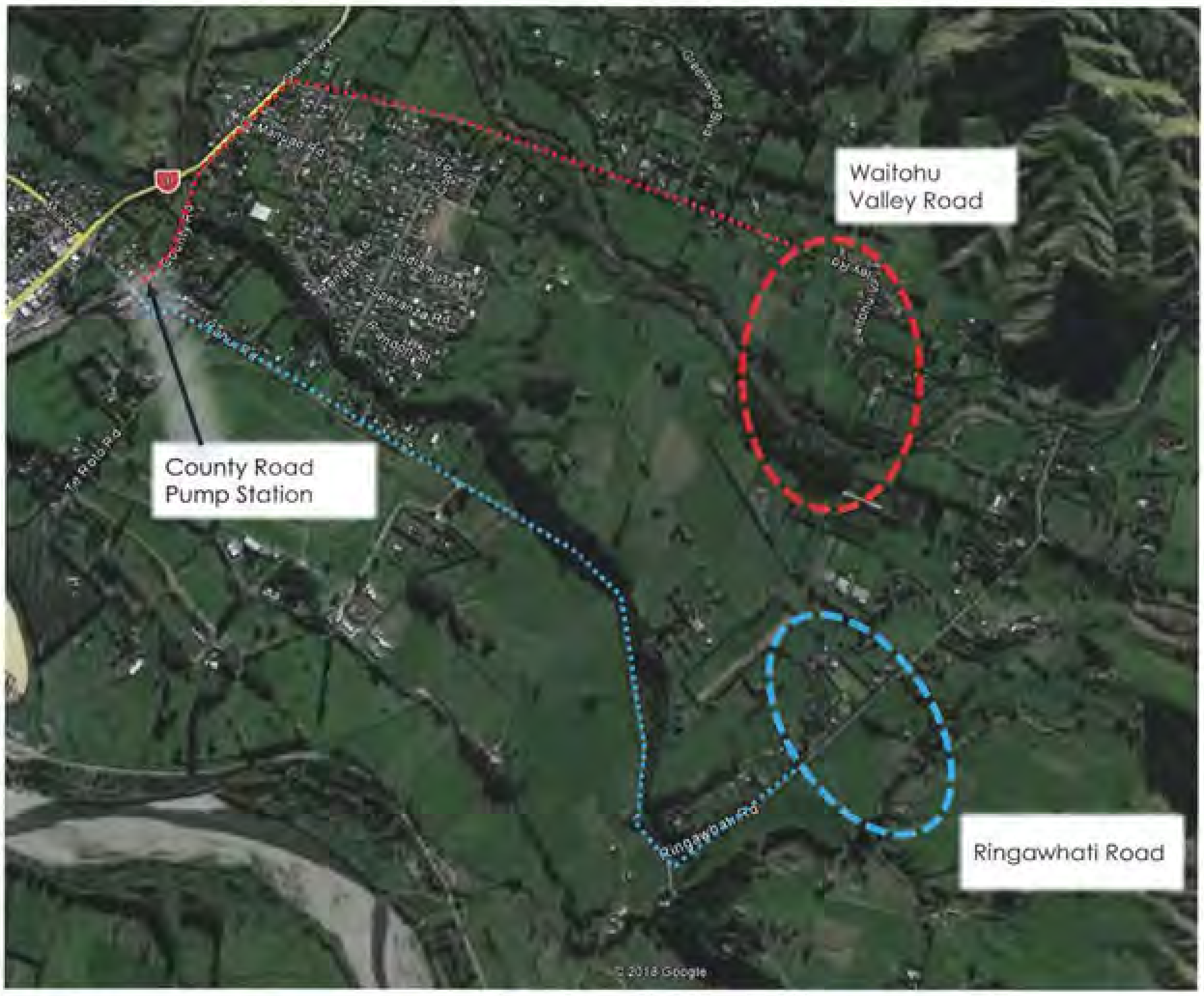


Figure 7-5 : Locations at 68m contour near Waitohu Valley Road and Ringawhati Road

In the model, the reservoir has been placed near Ringawhati Road as shown in Figure 7-6. This location is a place-holder until an actual site is selected. The length of the connection to the County Road network is around 3,200m. The modelled dedicated falling/rising main is 300mmØ diameter.

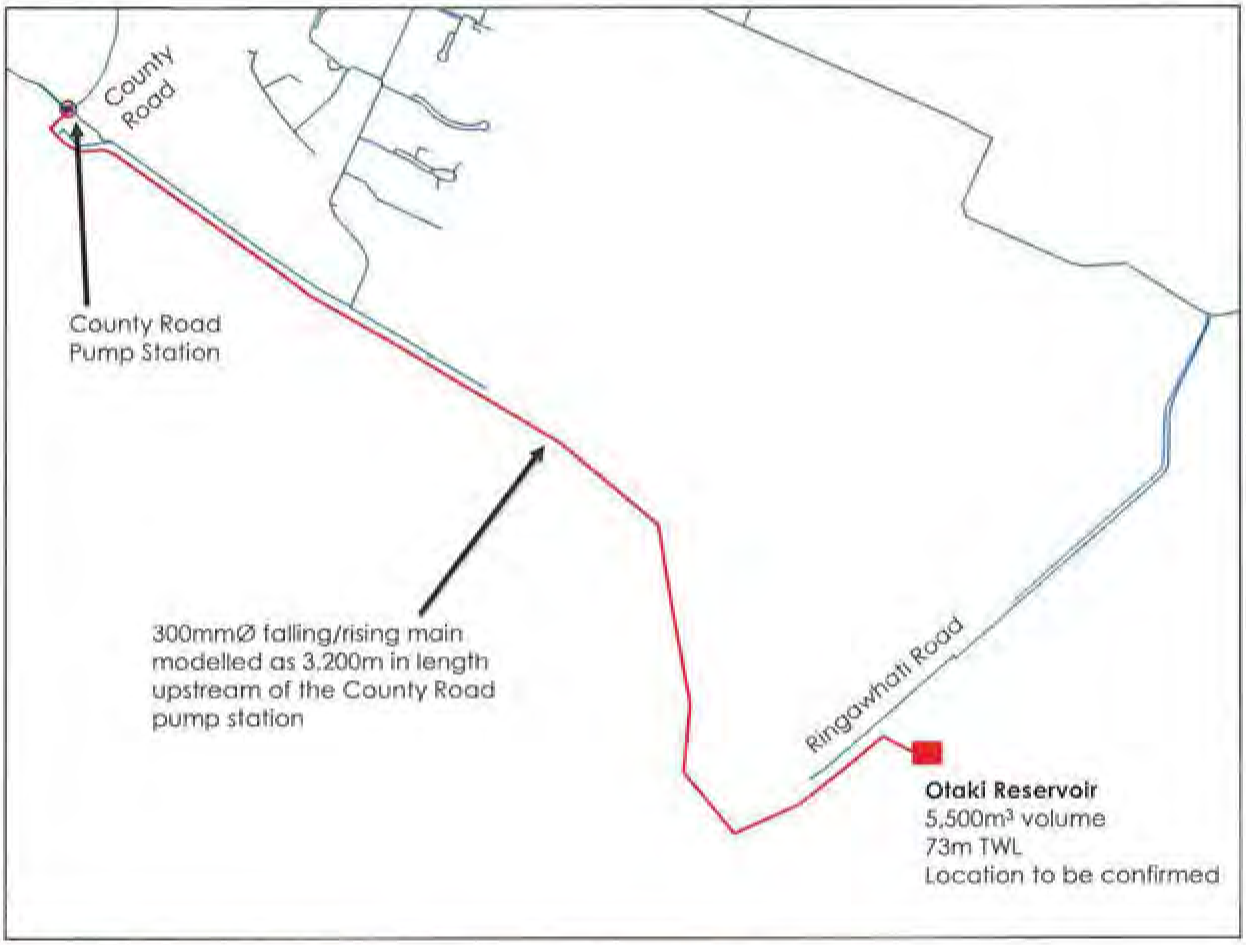


Figure 7-6: Proposed Otaki Reservoir as modelled – location to be confirmed)

The bore pumps were altered to act as a refill pump, turning on to deliver 73m HGL (73m pressure) when the reservoir level drops to 3.5 m depth and turning off again when the reservoir reaches 4.6m depth. It was found that unless the Tasman Road Trunk Main upgrade (UPG03, Section 7.3.1) was implemented, the network does not have enough pressure to refill the reservoir.

These upgrades are shown in Figure 7-7.

The model indicates that this upgraded configuration allows the level of service to be met under future peak demand.

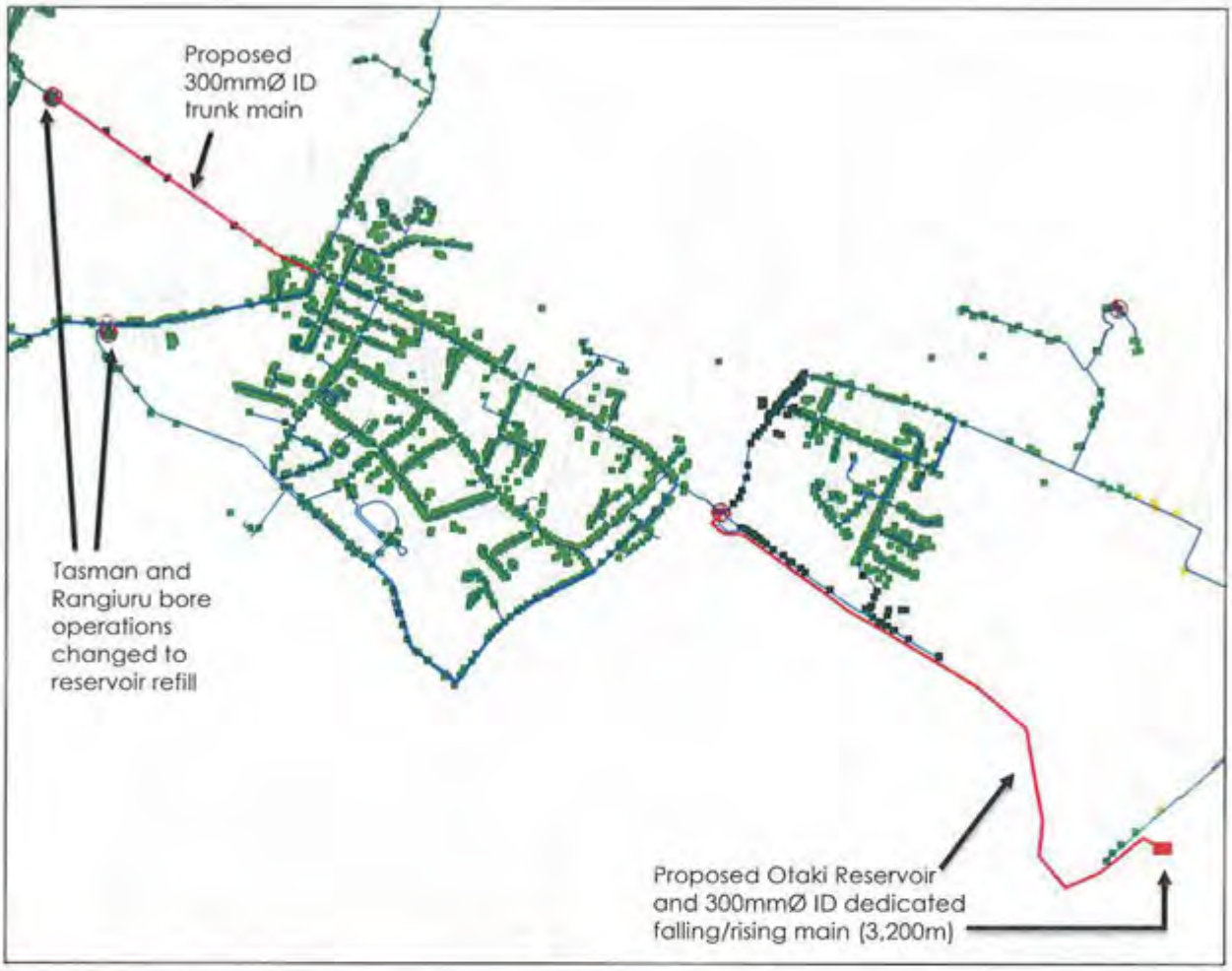


Figure 7-7: Otaki system upgrades required for Otaki Reservoir

The reservoir is required to address existing fire flow, storage, and security of supply issues.

7.3.3 Waitohu Reservoir #2 (UPG05)

The existing Waitohu Reservoir capacity is 675m³, however it is not enough to meet the storage requirements for the Waitohu Plateau area. Based on the reservoir sizing criteria under peak day demand, the proposed additional reservoir in the zone is sized as 650 m³. The top and bottom water levels are 97.16m and 90.77m, respectively. This is the same as the top and bottom water levels of the existing Waitohu Reservoir.

The proposed reservoir was modelled beside the existing Waitohu Reservoir. For both reservoirs to replenish properly, the County Road pump station upgrade (Section 7.3.4) is also required.

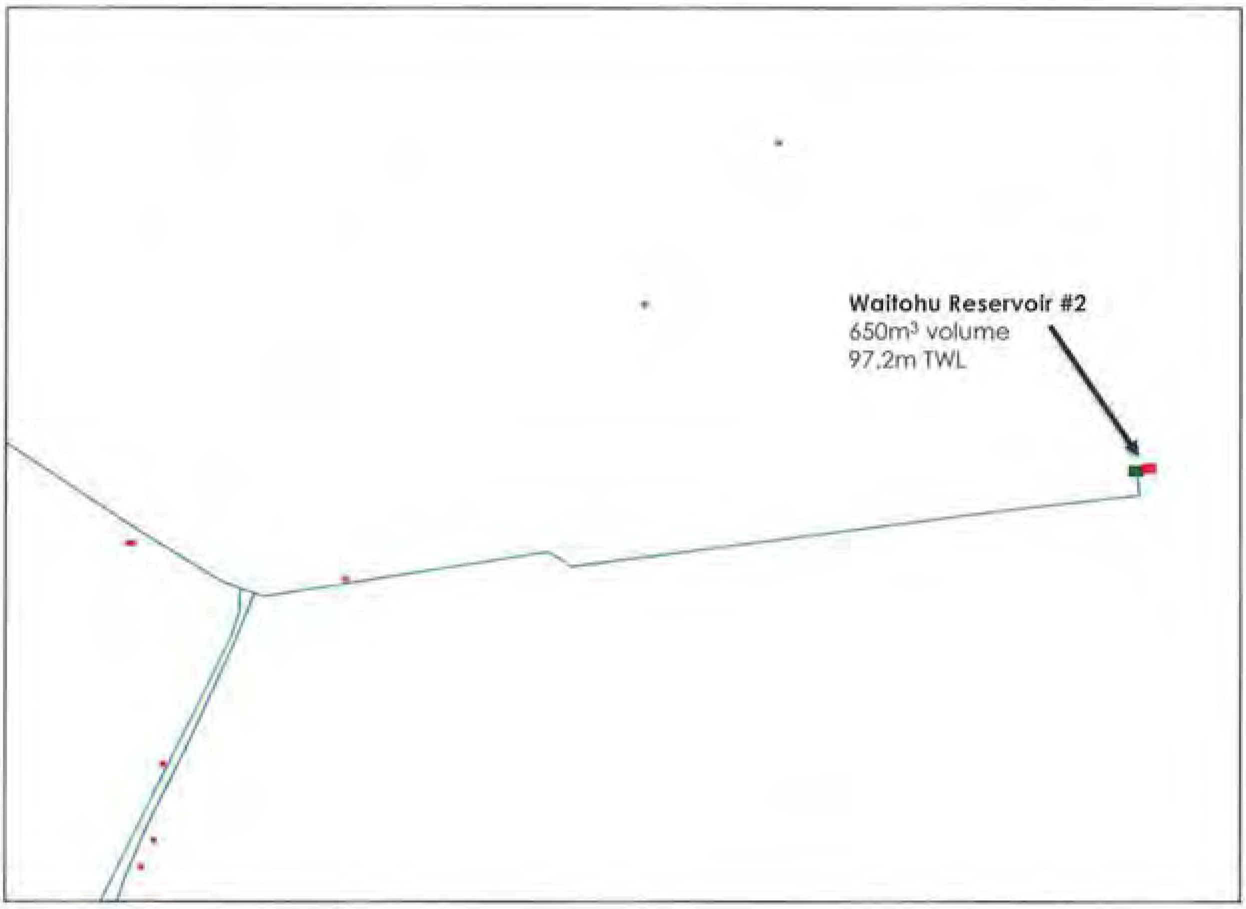


Figure 7-8: Proposed Waitohu Reservoir #2 upgrade

7.3.4 County Road Pump Station (UPG06)

The existing pump station is driven by a VSD, set to deliver approximately 40m head gain. With the additional demand in Waitohu, this pump station becomes incapable of delivering the daily demand under future peak day demand conditions.

To accommodate the projected growth, a new pump station is required. This can be either driven by a VSD, or be a fixed speed pump.

If driven by a VSD, it should be designed to deliver approximately 17L/s at 50m head gain.

If the proposed Waitohu Reservoir #2 is constructed, the VSD setup may be replaced by an on/off fixed speed pump setup. In this case, assuming 12h operation daily under peak day demand, the pump should be able to deliver:

- 1062 [m³/day future daily peak demand] / 12 [hours] / 3600 [s/hour] * 1000 [L/m3] = 24.6 L/s
- At approximately 65m head gain.
- This gives a shaft power of about 20kW.

The selection of the type of pump (VSD vs fixed speed) was not considered as part of this study. Fatigue and maximum pressure should be considered when selecting a pump type.

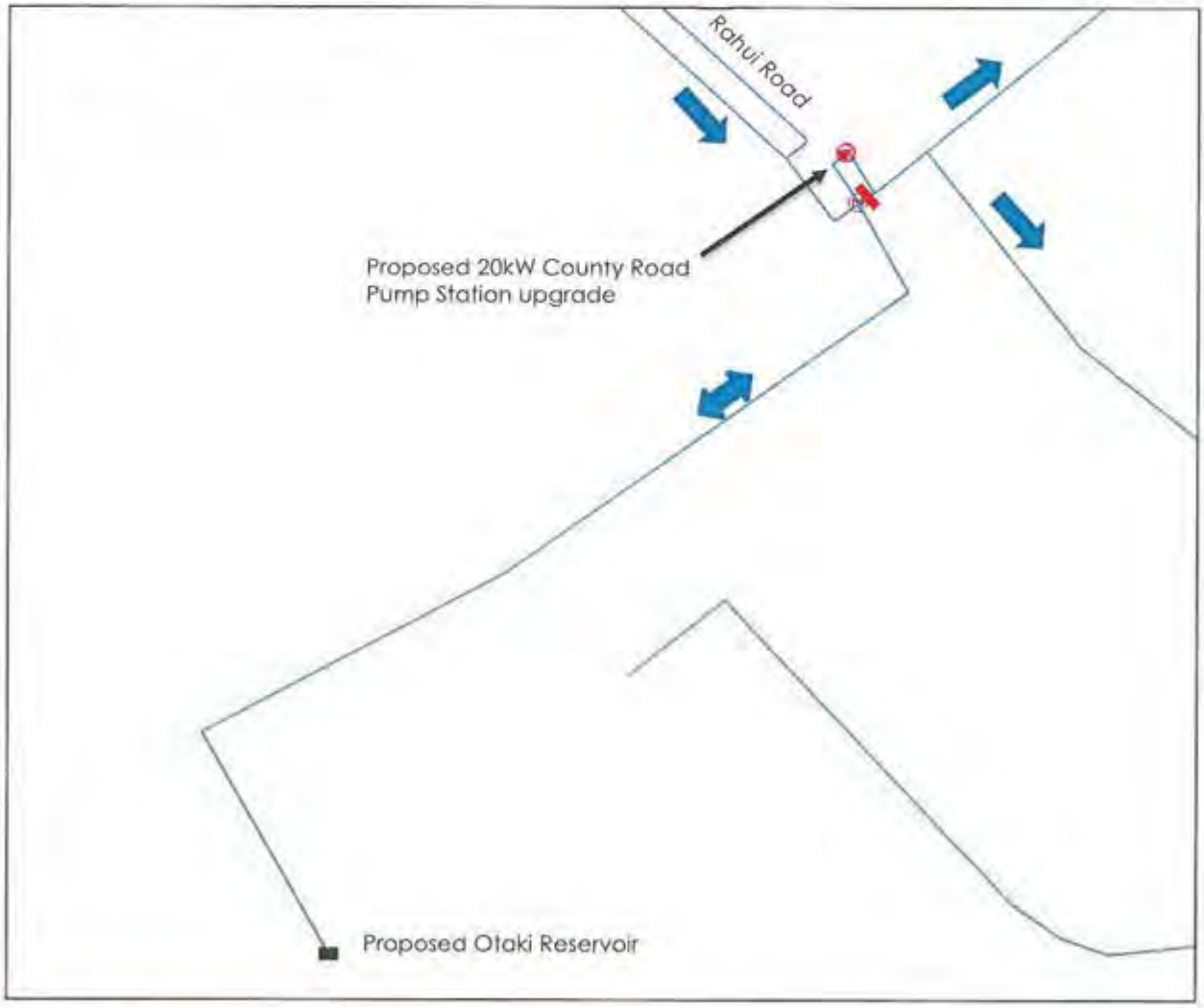


Figure 7-9: Proposed County Road pump station upgrade

7.4 Firefighting Upgrades

7.4.1 Rangiuru (UPG07)

To address the fire flow issues outlined in Section 6.3.1, two sets of upgrades are required in Rangiuru Road.

380m of 150mm ID main is to be installed between the Rangiuru bore and the intersection with Old Coach Road, and 240m of 150mm ID main is to be installed in The Avenue. The existing 100mmØ mains are to be abandoned where the proposed upgrades are to be laid.

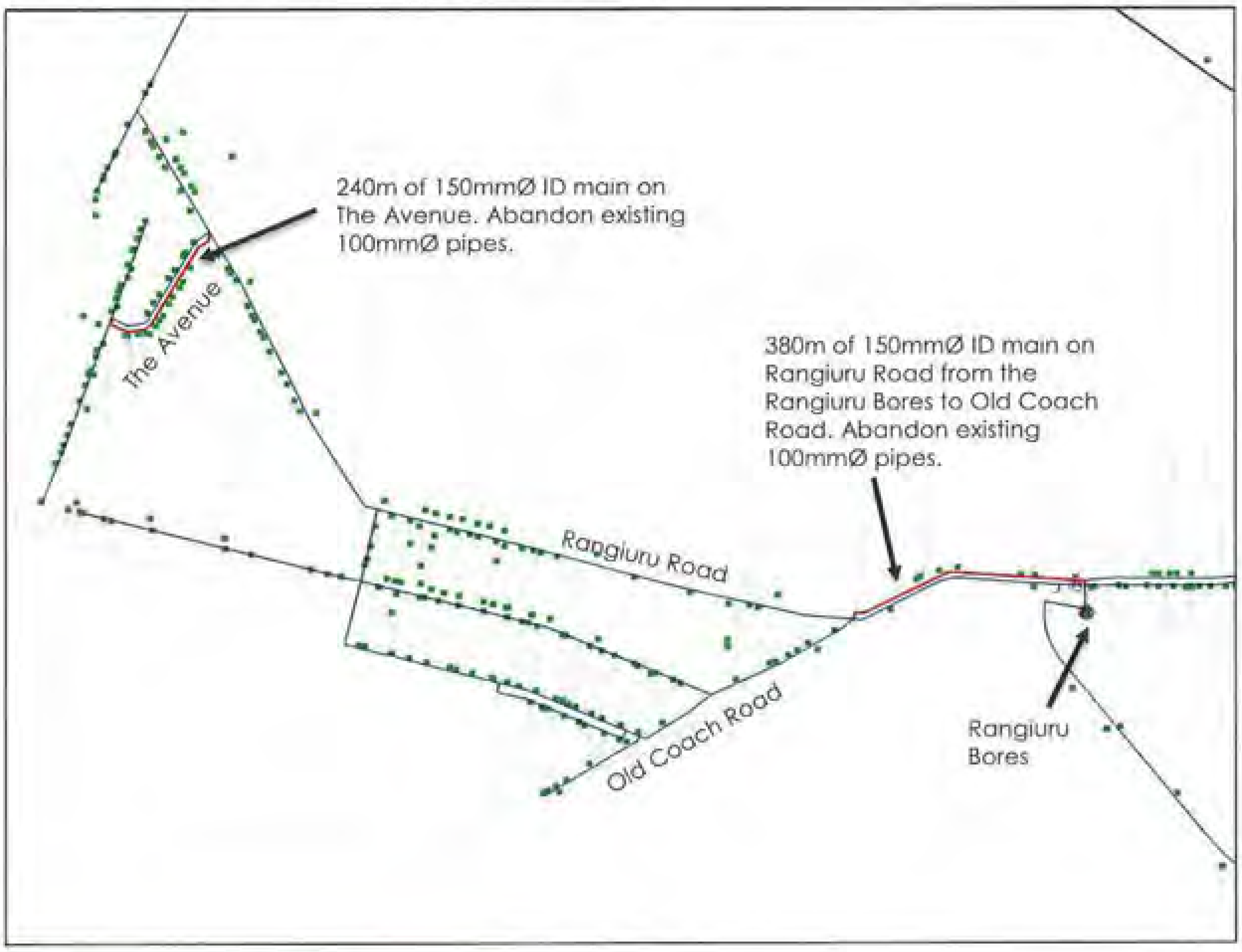


Figure 7-10: Rangiuru Road fire upgrades

7.4.1.1 Rangiuru Alternative Configuration – River Water Diversion / Storage

As per the previous WNDP, NZFS have indicated that the Rangiuru mains upgrade on The Avenue could be avoided if it were possible to create an access point to the stream alongside Kapiti Lane with appropriate hose connections.

It is outside the scope of this project and the feasibility is unknown. Further investigation is recommended.

Figure 7-11: Alternative Rangiuru fire supply option

7.4.2 Mountain View Terrace (UPG08)

To address the fire flow issues outlined in Section 6.3.2, 260m of 150mm ID main is to be installed in Robert McKeen Street between Tasman Road and Mountain View Terrace. The existing 100mmØ mains are to be abandoned where the proposed upgrades are to be laid.

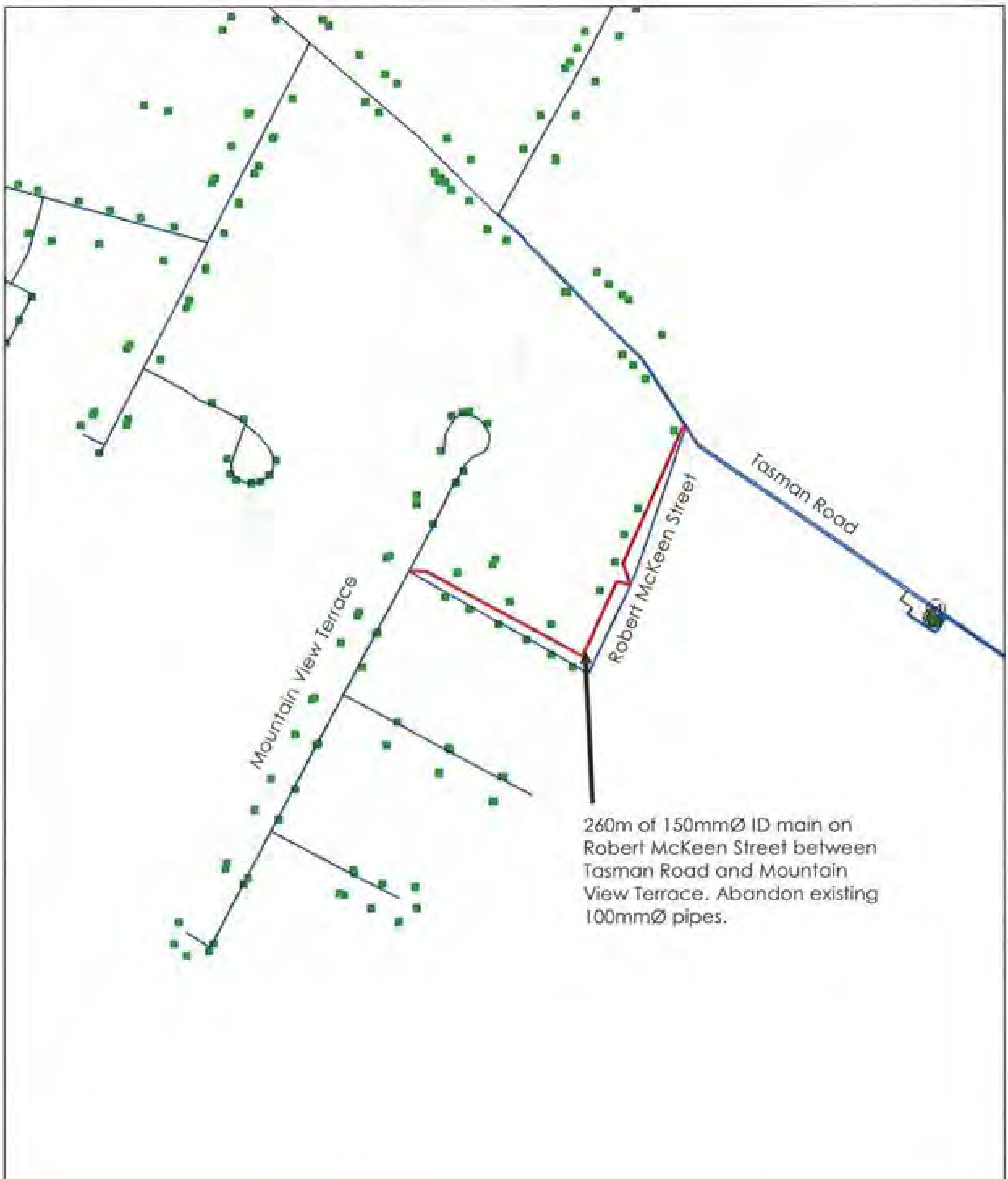


Figure 7-12: Mountain View Terrace fire upgrade

7.4.3 Lupin Road (UPG09)

To address the fire flow issues outlined in Section 6.3.3, 470m of 150mm ID main is to be installed in Matene Street, Hadfield Street and Lupin Road. The existing 100mmØ mains are to be abandoned where the proposed upgrades are laid.

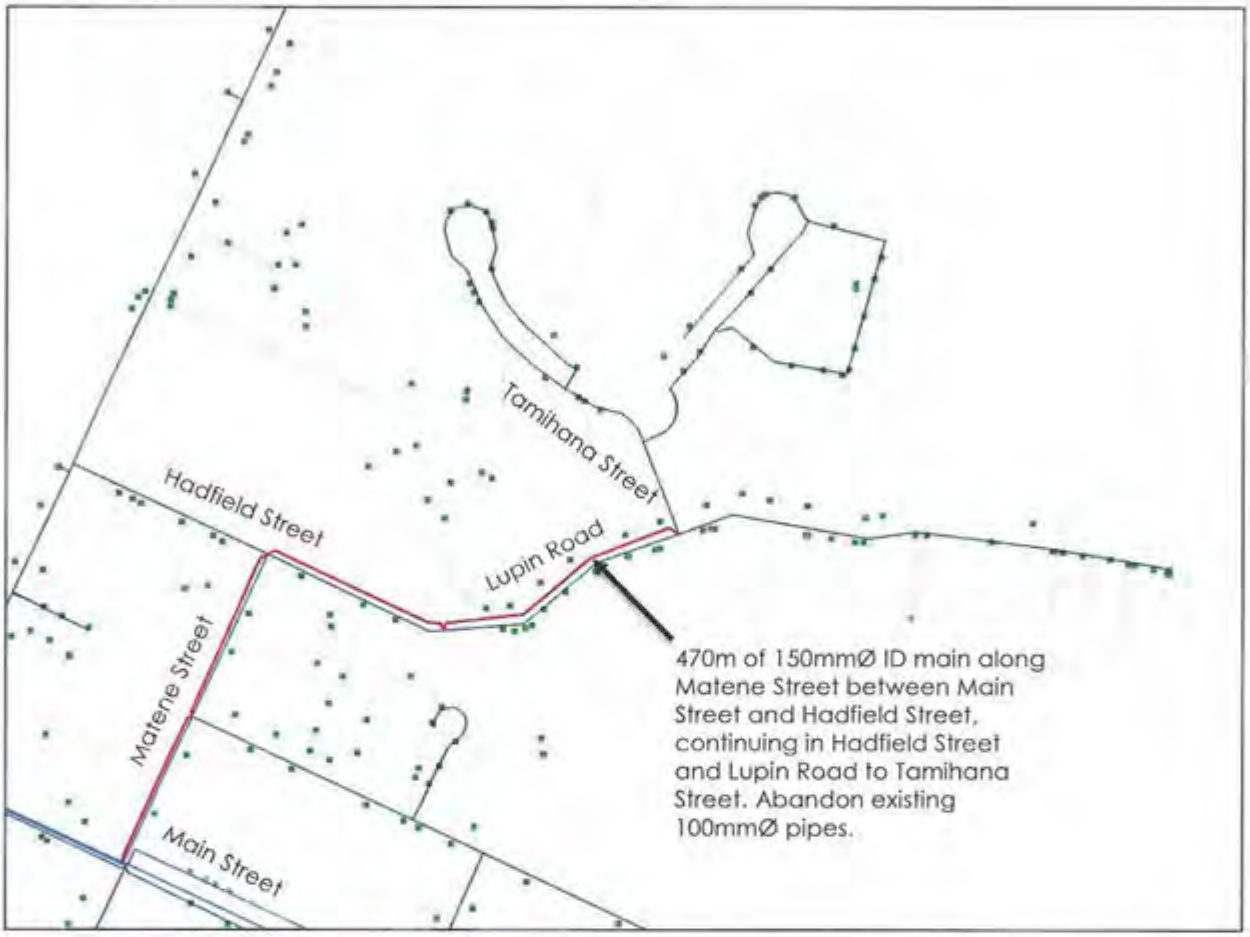


Figure 7-13: Lupin Road fire supply upgrade

7.4.4 Otaki Sports Ground (UPG10)

To address the fire flow issues outlined in Section 6.3.4, 310m of 150mm ID main is to be installed along the access road from the gates on Mill Road to the grounds, as shown in Figure 7-14.

Alternatively, storage (with an appropriate connection point for a fire hose) could be used to supplement the existing fire flow from the network.

FW2 requires 12.5 l/s to be available within 135m of any property, and a further 12.5 l/s to be available within 270m. The existing hydrants within the sports grounds can supply 12.5 l/s, so FW2 will be satisfied as long as the storage is within 270m of all points where 25 l/s can't be supplied.

Enough storage is required to maintain this 12.5 l/s flow for 30 minutes. This equates to 22.5m³, therefore 25m³ storage has been recommended. A connection for fire hoses would be required at this storage point. With this proposed storage, the pipe upgrade could be eliminated.

Quality of the stored water is not a concern as it will be used for firefighting only. It could therefore be connected to the existing reticulation with a standard cistern refill valve, which would top it up whenever some of the volume was used.

The feasibility of this option is unknown, but it is thought that this option may be cheaper than the pipe upgrade. Further investigation is recommended.

The area is classified under open space (recreation) zone.

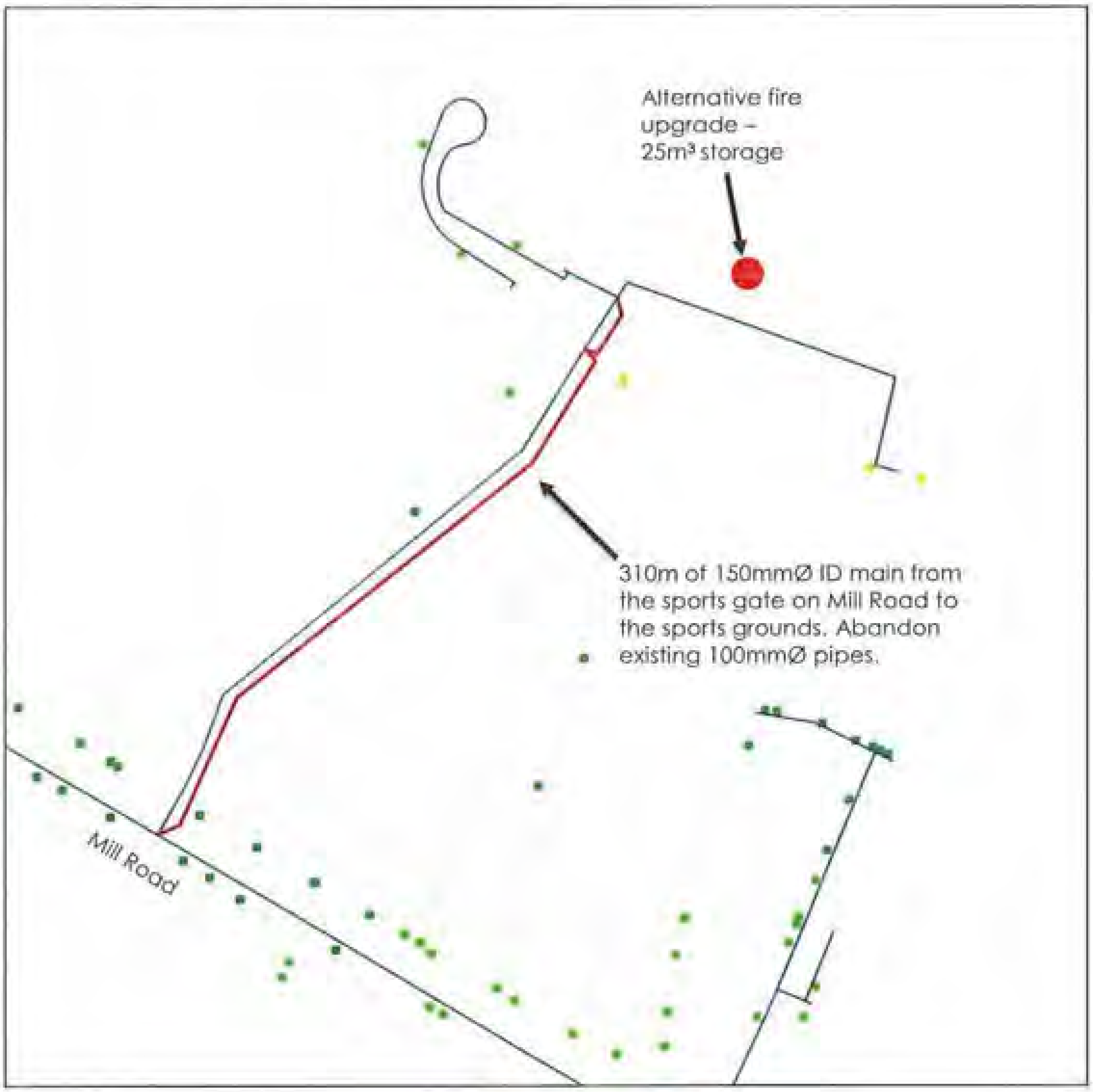


Figure 7-14: Otaki sports ground fire supply upgrade

7.4.5 Otaki Loop Fire Main (UPG11)

Under current demand conditions it is not possible to deliver the required level of fire flow (100 l/s, FW4) to the Riverbank Road Industrial area (see Section 6.3.5).

Even with the Tasman Road Trunk Main and Otaki Reservoir upgrades in place, the network leading from these upgrades to the industrial area is too small to provide the required fire flow.

A 200mm ID main is required to connect the existing 200mmØ on Mill Road near the proposed Otaki Reservoir to the industrial area and linking through to the 200mmØ main from Rangiuru Bore, which currently extends as far as Aotaki Street.

In addition, upsizing the smaller 100mmØ mains to 150mmØ along Rimu Street and Titoki Street are required.

Figure 7-15: Otaki loop main fire upgrade

7.4.5.1 Otaki Loop Alternative Configuration – River Water Diversion / Storage

In a previous fire in the Riverbank industrial area, Fire Service (NZFS) ran hoses across the ground to the Otaki River to try and make up the shortfall in required fire flow. NZFS indicated that if it were made possible to create access points to river water with appropriate hose connections at key points along Riverbank Road, then the Otaki Loop fire main may not be required.

A detailed assessment of this option it is outside the scope of this project and the **feasibility is unknown**, but it is thought that a configuration such as that shown in Figure 7-16 may be cheaper than 2,850m of pipe upgrades. **Further investigation is recommended.**

Figure 7-16: Alternative Riverbank Road Fire Supply - Otaki River

7.4.6 Freemans Road (UPG12)

To address the fire flow issues outlined in Section 6.3.6, 1,070m of 150mm ID main is to be installed, as shown in Figure 7-17.

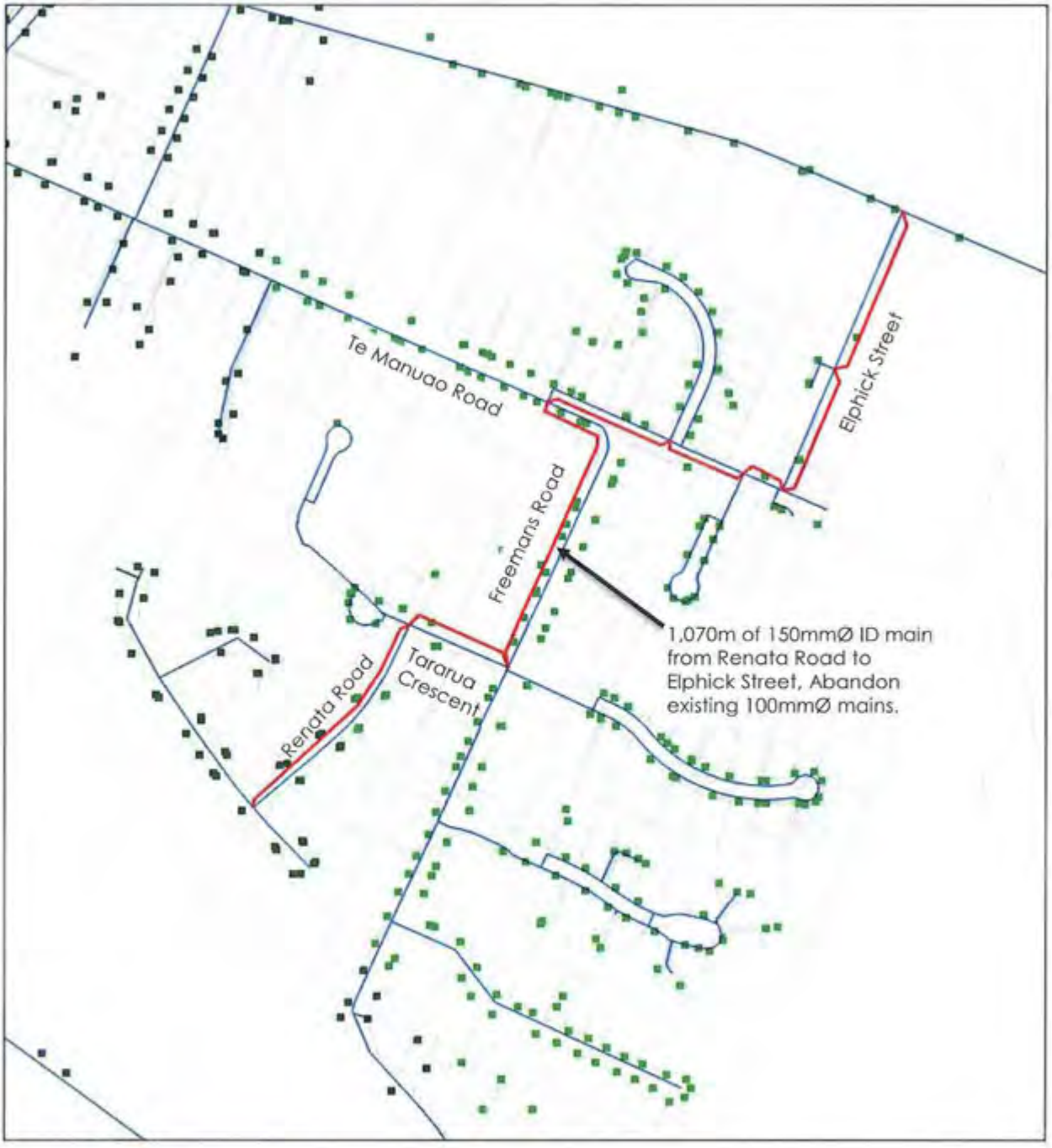


Figure 7-17: Freemans Road fire supply upgrade

8. Cost Estimate

8.1 Cost Overview

The total required capital expenditure for KCDC is estimated to be around $35 million, including contractor cost, professional services, management by KCDC and risks, and excluding greenfields development infrastructure. An overview of the total capital expenditure by type is given in Table 8-1.

Table 8-1: Cost Overview

Upgrade	Costs
Greenfields	TBD
Strategic	$ 20.3M
Fire	$ 12.9M
Total	$ 33.2M

The current network has issues with fire flows which will need to be resolved quickly, and the two proposed reservoirs are required immediately for storage, security of supply and fire supply reasons.

Depending on Council priorities it may be possible to compromise on some levels of service and defer some costs to later, or to use alternative solutions suggested in the detailed upgrade sections to reduce the overall cost.

8.2 Costing Methodology

Costs have been developed for pipework based on unit rates from recent projects Stantec has worked with in the Wellington region. These are indicative only.

The formulas used to calculate for the cost estimate is shown as follows:

Contractor Cost Estimate = length x base rate x coefficient for topography x coefficient for location x coefficient for length

Total Out-Turn Cost = Contractor Cost Estimate x Consultant x Management x Contingency

Table 8-2 shows the base rates depending on pipe diameter. Coefficients have also been applied for a number of factors which are likely to affect cost. Table 8-3 shows the values used as coefficients included in the contractor cost estimate, and Table 8-4 shows the variable coefficients as used in the total out-turn cost. These variable coefficients may be changed as required.

Table 8-2: Base rates for pipe

Diameter (mm)	Base Cost/m
100	850
150	950
200	1000
250	1050
300	1200
375	1300
450	1350
525	1500
800	1900

Table 8-3: Fixed Coefficients

	Fixed Coefficients
Ductile iron (DI	+10%
CBD/Centre	+20%
Steep grade (>12%)	+20%
Low elevation (<2m)	+20%
Small project (<100m)	+25%
Large project (>500m)	-10%

Table 8-4: Variable Coefficients

	Variable Coefficients
Professional service (planning, geotechnical, consenting, design, procurement, administration)	+15%
KCDC management	+7%
for contingency, as a surrogate for cost risk (uncertainties about rates, quantities and unknowns)	+30%

The cost analysis of the different elements in each upgrade which add up to the upgrade sums is presented in Table 8-5. Costs for each element are rounded up to the nearest $100k.

For reservoirs, the following formula was used for a high-level estimate which was based on past experience in the Wellington region. This does not include land acquisition cost.

$$\text{Reservoir cost estimate} = 2.37 \times (\text{Reservoir Volume [ML]})^{0.55} \times \$1{,}000{,}000$$

For the pump station, estimates have been made on a combination of past experience, local knowledge and engineering judgement.

Table B-5: Network element cost analysis

Item	Length (m)	Diameter (mm)	Material	CBD/ Centre	Steep?	Low elevation?	Contractor cost estimate	Total Out-Turn Cost Estimate before risk	Total Out-Turn Cost Estimate	Rounded Cost
UPG01	Otaki Main Greenfields									TBD
UPG02	Waitohu Plateau Greenfields									TBD
UPG03	1500	300	PE	No	No	No	$ 2,250,000	$ 2,745,000	$ 3,568,500	$ 3.9M
UPG03	130	200	PE	Yes	No	No	$ 188,500	$ 229,970	$ 298,961	
UPG04	3200	300	PE	No	No	No	$ 4,800,000	$ 5,856,000	$ 7,612,800	$ 13.8M
UPG04	Otaki Reservoir (5,500 m³)								$ 6,052,682	
UPG05	Waitohu Reservoir #2 (650 m³)								$ 1,870,039	$ 1.9M
UPG06	County Road Pump Station (20 kW)								$ 700,000	$ 0.7M
UPG07	620	150	PE	No	No	No	$ 736,250	$ 898,225	$ 1,167,693	$ 1.2M
UPG08	260	150	PE	Yes	No	No	$ 358,150	$ 436,943	$ 568,026	$ 0.6M
UPG09	470	150	PE	No	No	No	$ 558,125	$ 680,913	$ 885,186	$ 0.9M
UPG10	310	150	PE	No	No	No	$ 368,125	$ 449,113	$ 583,846	$ 0.6M
UPG11	2850	200	PE	Yes	No	No	$ 4,132,500	$ 5,041,650	$ 6,554,145	$ 7.5M
UPG11	500	150	PE	No	No	No	$ 593,750	$ 724,375	$ 941,688	
UPG12	1070	150	PE	No	No	No	$ 1,270,625	$ 1,550,163	$ 2,015,211	$ 2.1M

9. Conclusion and Recommendations

The population growth projected for the Otaki networks has significant effects on the current network.

Considering the new population forecast, the pipe size required to renew the trunk main from the Tasman Bores to Matene Street in the CBD area is 300mm. The other upgrades required to meet the Level of Service standards are shown in Figure 9-1. The cost overview is shown in Table 9-2.

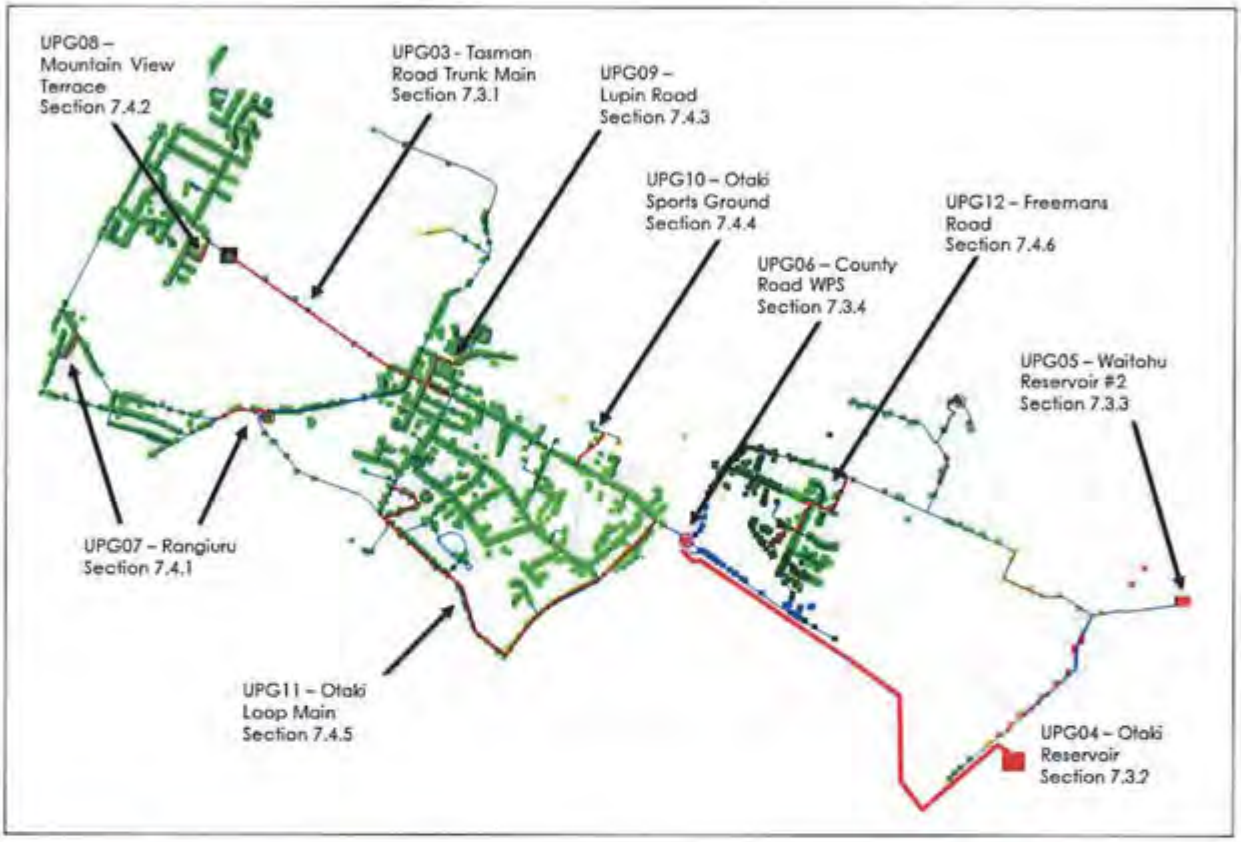


Figure 9-1: Otaki network upgrades

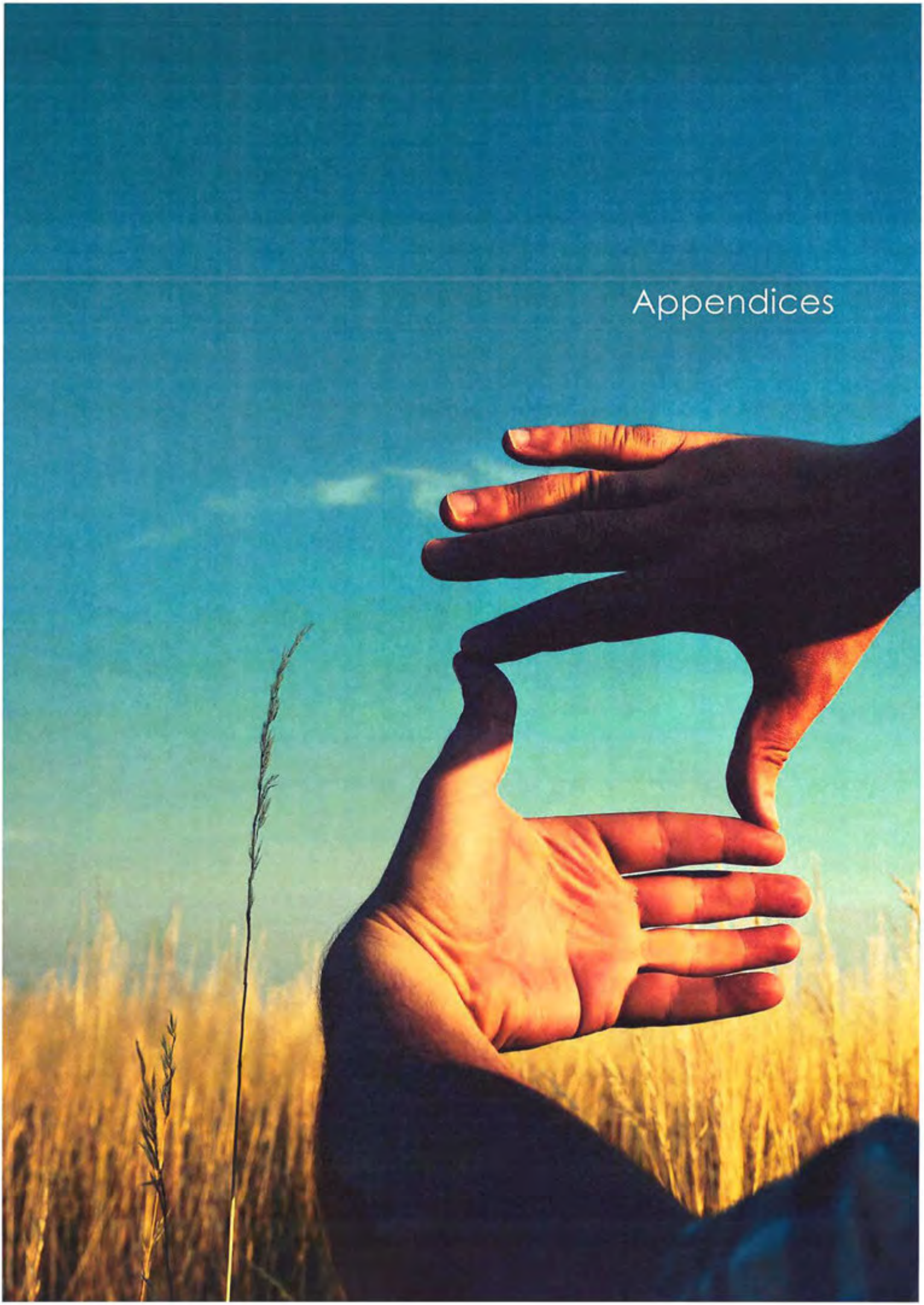
Table 9-1: Cost Overview

Upgrade	Total Out-Turn Cost Estimate including Risk
Greenfields	TBD
Strategic	$ 20.3M
Fire	$ 12.9M
Total	$ 33.2M

It is recommended that:

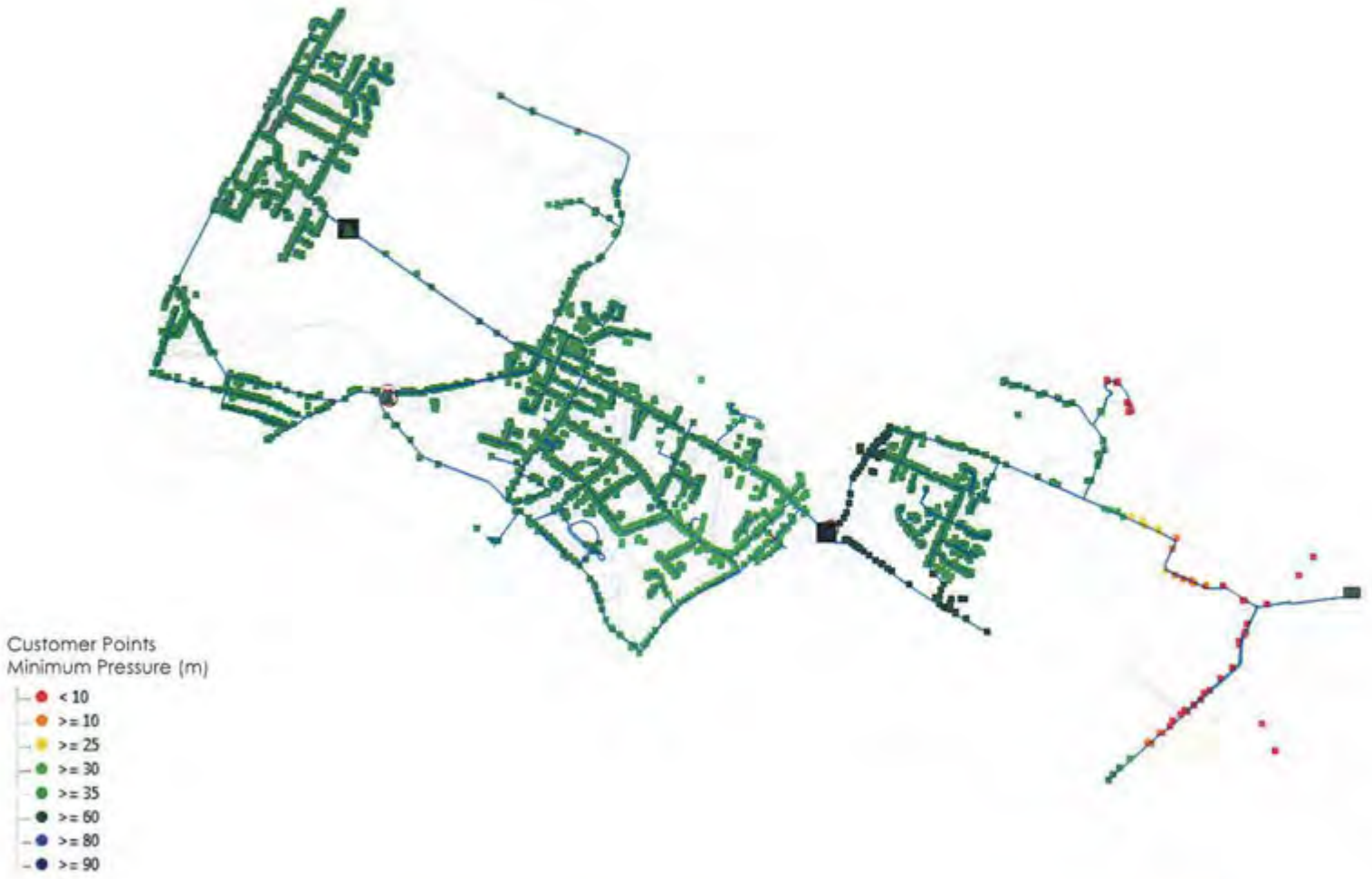
- KCDC confirms that the key assumptions adopted in this report are acceptable:
    - 1,225 L/property/day greenfield demand.
    - Locations of potential development sites.
    - Location of the proposed Otaki Reservoir.
    - Whether KCDC Operations wish to retain the current VSD setup for the County Road PS or change it to a fixed speed setup.
    - Whether the added flexibility provided by the 300mm diameter recommended for the proposed Tasman Road pipe warrants the additional cost (up from 200mm).
    - 12 hours pumping time for County Road PS.
    - 1.2 times Peak Day Demand + fire storage criteria for reservoir sizing.
- KCDC gives consideration to alternative fire supply options.

Appendices



Appendix A Initial Performance Assessments Plans

2018 PDD Performance Assessment



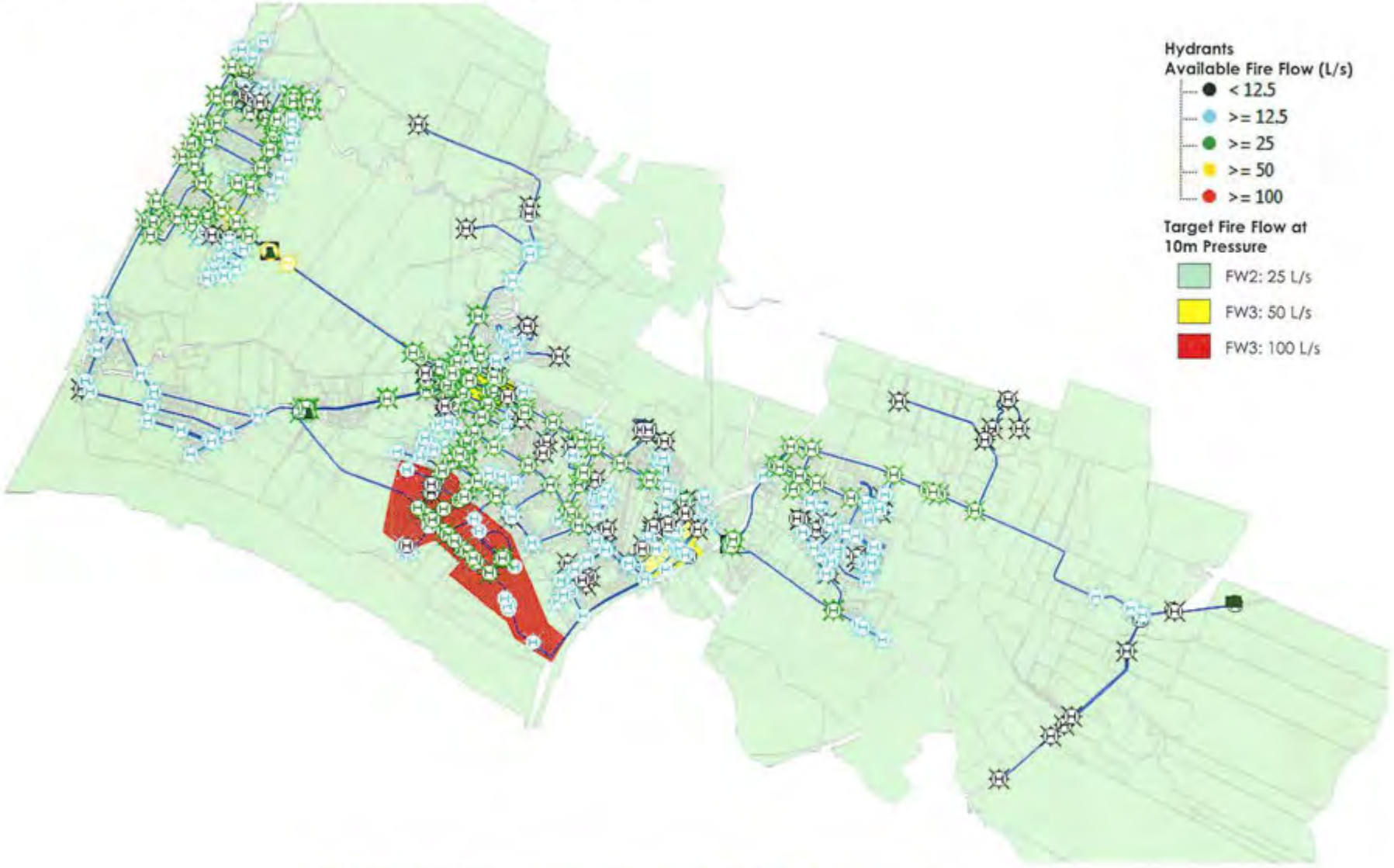
2047 PDD Performance Assessment

Appendix B Upgraded Network Performance Plans

2047 PDD Upgraded Network

Appendix C Initial Network Available Fire Flow Plans

2047 PDD Initial Network Available Fire Flow



Appendix D Plans Upgraded Network Available Fire Flow

2047 Upgraded Network Available Fire Flow

Wellington
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Robert Bird Group

Eligible Infrastructure Services Planning Report

Ōtaki Housing Development

Issue: B (Final)

16 December 2021

Prepared For: Kapiti Coast District Council

Project No.: N0375

Document No.: N0375-RBG-ZZ-XX-RP-CV-00001

1 Introduction

Kapiti Coast District Council (KCDC) supports the provision of additional infrastructure to accommodate forecasted growth. In addition to the recently adopted its 2021 Long Term Plan (LTP) which aims to ensure the resilience of the District. As a part of this initiative, KCDC has recently provided an expression of interest (EOI) for Infrastructure Acceleration Funding (IAF) from the Government to enable the construction of additional 1158 dwellings in Ōtaki within the next five years, as shown in the Figure 1 below.

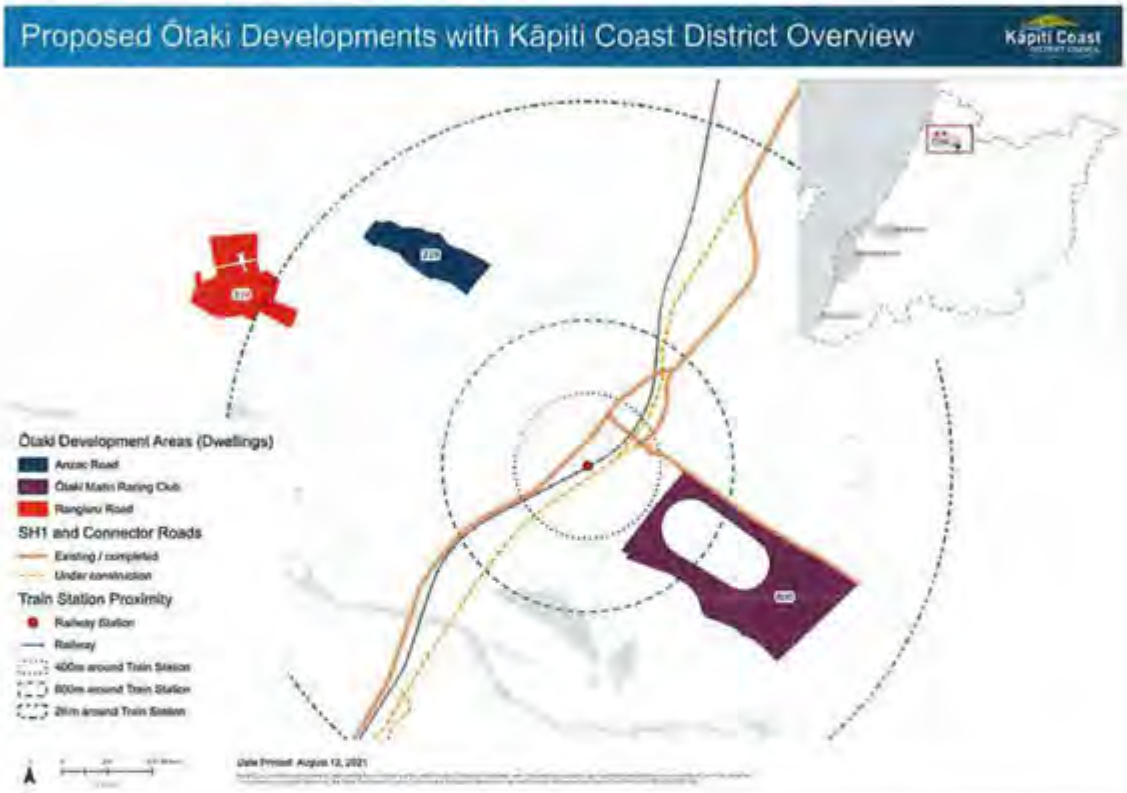

Figure 1: Proposed Housing Development (Source KCDC EOI Submission)

The three areas of housing developments the EOI identified for the construction within the next 5 are listed in Table 1 below.

Item	Development Area	No. of Dwelling
1	Anzac Road	239
2	Ōtaki Māori Racing Club	600
3	Rangiuru Road	319

Table 1: Proposed Housing Development Areas (Source KCDC EOI Submission)

KCDC requires an infrastructure need assessment to be carried out on the existing infrastructure. This will identify the potential upgrading works required to enable these developments. KCDC has instructed Robert Bird Group to carry out an assessment to identify eligible infrastructure services and prepare plans for the necessary upgrades. This includes preparation of a scoping document,

works programme and baseline cost estimates. This was completed by using the cost data provided by KCDC.

2 Background

Stantec completed an assessment of the water supply network in the Ōtaki area for KCDC in July 2019. This assessment identified the required service upgrades to withstand the expected population growth in the Ōtaki area.

As the scale of the proposed new developments was not expected at the time, only minor adjustments to the identified upgrading works have been made using the network performance history. There were no recent wastewater and stormwater networks assessments, therefore the service requirements were determined using a network performance history.

3 Available Information

The following reports were used when completing this assessment.

1. Stantec – Ōtaki Master Plan Update (July 2019)

   Stantec's report provided KCDC with a master plan for Ōtaki's water supply network (Stantec, 2021). This report found that Ōtaki's water supply network has insufficient emergency storage and numerous pipe upgrades would be required for firefighting compliance. Stantec provided possible network upgrades that would meet the new population forecast, based on findings from Ōtaki's 2017 water supply network master plan.

2. SKM – KCDC Water Supply Ōtaki Reservoir Options (2007)

   The purpose of SKM's report was to investigate service reservoir options (SKM, 2007). Its water supply model determined that a new reservoir would be beneficial, and four options were considered. The report outlined the existing water supply system at the time and details of the proposed upgrades.

3. EOI Combined Infrastructure Plan - Combined Plan for Ōtaki (Appendix A).

4. KCDC GIS Plans – Existing 3Water networks. (Appendix A).

5. KCDC EOI Summary Table - Proposed Housing Forecasts (Appendix A).

6. KCDC Information on Recent Rates for Infrastructure Installations (Appendix B).

4 Existing Infrastructure

4.1 General

Existing infrastructure networks in the vicinity of the proposed developments were considered, to determine which ones would be directly affected. The downstream infrastructure needs were identified using existing network information.

4.2 Water

The existing water network is supplied directly by two bore pumps located in Tasman Road and Rangiuru Road. The water storage reservoir (0.65ML) at the top end of Waitohu Valley Road is supplementing the network demand using a common inlet and outlet main. The water pumping station in County Road (near Rahui Road) pumps directly into the network to maintain the supply pressure as well as the Waitohu Valley reservoir storage.

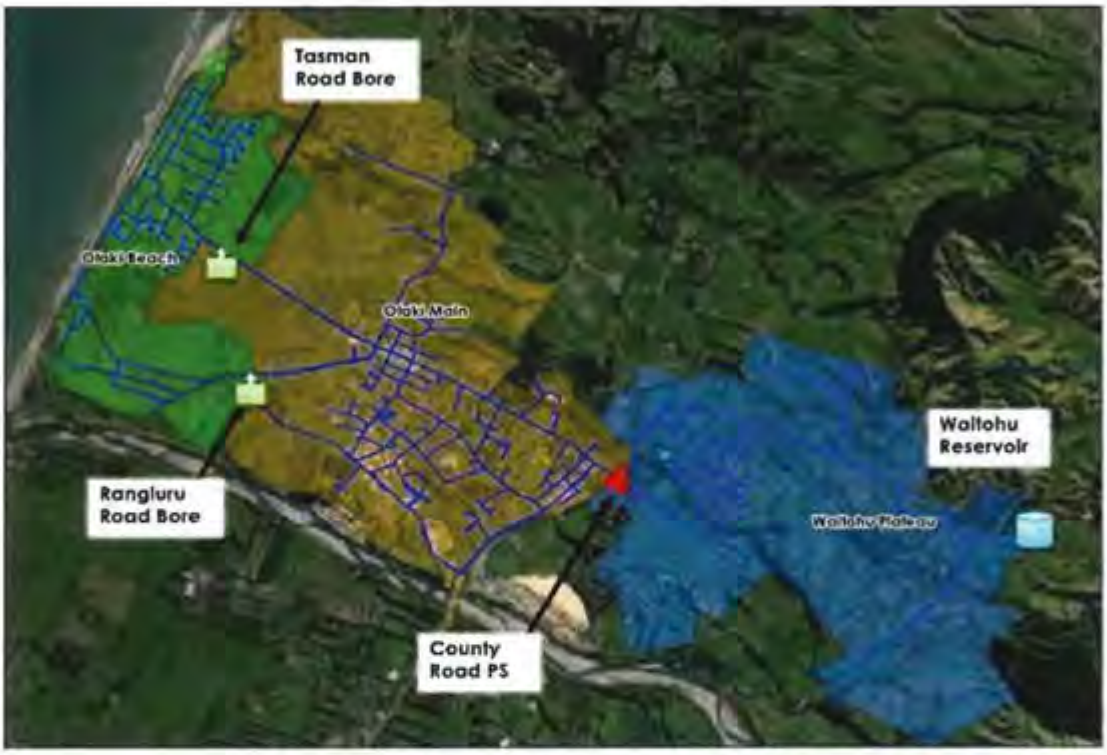

Figure 2: Existing Water Supply Network and Supply Source (Source: Stantec Report July 2019)

4.3 Wastewater

The existing wastewater treatment plant is connected to the wastewater network servicing the Ōtaki area as shown in Figure 3. According to the KCDC utility operations records, the pipe network is nearing its capacity.

Figure 3: Existing Wastewater Supply Network and Treatment Plant (Source: KCDC GIS)

4.4 Stormwater

The existing stormwater networks consists of series of pipelines along the roading network, mainly discharging to GW maintained Te Awahohonou Drain which connect to Mangapouri Stream within the Ōtaki area. Part of the stormwater network in Ōtaki area is currently discharging to Ragiuru Stream and channels in the proposed Rangiuru development area as shown in Figure 4 below.

Figure 4: Existing Stormwater Pipes and Channel Network (Source: KCDC GIS)

5 Infrastructure Needs Assessment

5.1 General

The purpose of this assessment is to understand the current status of the existing infrastructure and to determine the extent of the required upgrading works. This assessment is based on the information available in the Stantec Report, as well as the information gathered from consultations with KCDC operational staff.

Following discussion with Greater Wellington Regional Council (GW), a planning advice was obtained to confirm the feasibility of receiving resource consents for the proposed upgrading works required for the infrastructure networks specially for the works required to upgrade the existing scheduled stormwater channels.

5.2 Water

5.2.1 General

A new 5.5ML reservoir in the area opposite No.35 Ringawhati Road and the duplication of the existing reservoir at the current location have been proposed together with pipe network upgrades as recommended in Stantec report. This report has been prepared to improve the supply to the Ōtaki Zone together with new pipe network upgrades to improve fire flow capacities within the existing water supply network as shown in Figure 5 below.

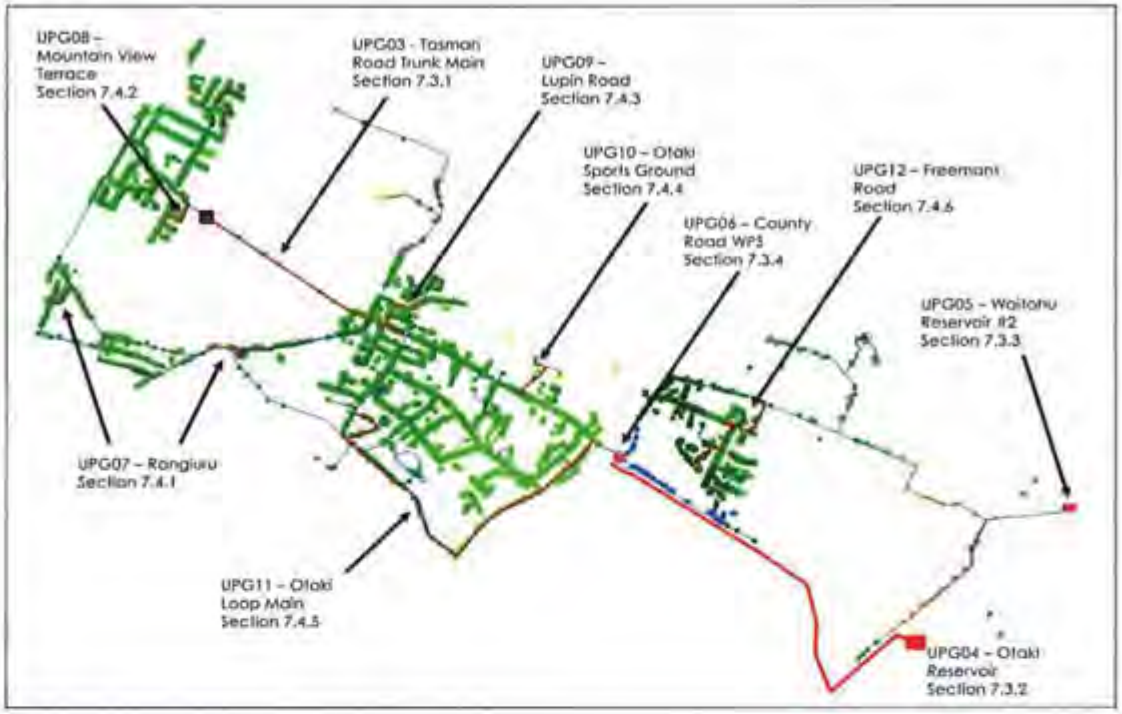

Figure 5: Proposed Water Supply Network Upgrades (Source: Stantec Report July 2019)

As the above upgrading work have been determined prior to the demand from the new developments, additional pipe network upgrading works have been identified to improve the network performance to service the area including the new developments.

5.2.2 Proposed Water Supply Upgrading Work

5.2.2.1 Water Storage Reservoirs

As recommended in Stantec report, a new 5.5ML reservoir in the area opposite No.35 Ringawhati Road together with duplication of the existing reservoir with a new 0.65MLreservoir at the current location have been proposed.

As the existing storage reservoir is directly supplied from the existing pipe network (i.e common inlet and outlet pipe) the new duplication reservoir will be connected to the common inlet and outlet main which will be upgraded to DN200 to increase the supply capacity within the network.

The new 5.5ML reservoir (Ringawhati Road) is proposed to have a dedicated rising main (inlet) from the County Road pumping station and Non-Return Valve on the outlet main to avoid network pressure issues due to the elevation difference between Waitohu Valley (existing) reservoir site and new reservoir site.

5.2.2.2 Pump Stations

A new (dedicated) pump set is proposed at the existing County Road pumping station to supply the new 5.5ML reservoir (Ringawhati Road) with a dedicated DN200 rising main.

5.2.2.3 Pipe Network

The proposed upgrading works required for the water supply pipe network are in the table below.

Development	Network Component	Proposed Upgrade	Remarks
Rangiuru Road New Housing	Pipeline Network	DN200, Ring main along Aotaki St, River Bank Rd and Main Hwy	Zone pressure improvement (fire & potable supply)
		DN200, Along Rangiuru Road, from 284 - 167 Rangiuru Road	Zone pressure improvement (fire & potable supply)
		DN100 replaced with DN150, Along Rangiuru Road, from 167-149 Rangiuru Road	Zone pressure improvement (fire & potable supply)
		DN100 replaced with DN150 along Robert Mckeen Street	Zone pressure improvement (fire & potable supply)
		DN100 replaced with DN150 along The Avenue	Zone pressure improvement (fire & potable supply)
Anzac Road New Housing	Pipeline Network	DN20 replaced with DN 150, Water main along Anzac Road	Zone pressure improvement (fire & potable supply)
		DN100 replaced with DN150 along Aotaki St	Zone pressure improvement (fire & potable supply)
Ōtaki Race Course New Housing	Pipeline Network	DN300, main along Rahui Road to new 5.5ML Ōtaki Reservoir	Zone pressure improvement (fire & potable supply)
		DN200, Water main along Te Roto Road	Zone pressure improvement (fire & potable supply)
		2120m DN100 replaced with DN200 along Ringawhati Road	Zone pressure improvement (fire & potable supply)
Water Supply Zone Upgrades	Storage Reservoir	Contruct new Ōtaki Reservoir, next to existing reservoir near Waitohu Valley Road, approx size 0.65 ML	Security of water supply for existing and new developments
		Contruct new Ōtaki Reservoir, near Ringawhati Road, approx size 5.5 ML	Security of water supply for existing and new developments
		DN300 NRV (Outlet Supply), near Ringawhati Road	Security of water supply for existing and new developments
			Security of water supply for existing and new developments
		DN200 Rising Main along Rahui Road and Ringawhati Road to New 5.5ML Reservoir	Security of water supply for existing and new developments
	New Supply Source (Bore)	New Bore pumping station (Location TBC) complete with connecting pipeline (DN150 -200m Long)	Security of water supply for existing and new developments

Table 2: Proposed Water Supply Network Upgrading Works

5.3 Stormwater

5.3.1 General

The stormwater flows from the existing development are expected to be discharged to GW maintained Te Awahohonou Drain and Rangiuru Stream. An appropriate stormwater management within each development are envisaged, however the existing stormwater channels are expected to

have adequate capacities to cater for flows generated from the new developments. Also, these existing channels are expected to cater for the secondary flows.

5.3.1.1 Pump Stations

A new pump station is proposed in Rangiuru Road with a DN150 rising main.

5.3.1.2 Streams and Channel Upgrades

The following stream and channel sections have been identified for upgrading to service new

Development	Network Component	Proposed Upgrade	Remarks
Rangiuru Road New Housing	Pipeline Network, Streams & Channels	DN225 replaced with DN600 Stormwater pipe, at 254 Rangiuru Road	Improve stormwater capacity
		DN150 PE pipe, rising main along Rangiuru Road	Improve stormwater capacity
		Downstream improvements	Improve stormwater capacity
	Pump Station	Construct new pumping station to service Rangiuru road	Lift SW flows to stream
Anzac Road New Housing	Streams & Channels	Upgrade stream near proposed Anzac Road development (GW Te Awahohonu Drain) including culverts	Increase stormwater capacity
		Surface water diversion channel (1000m) to prevent flows from the Cemetary above Anzac Road development	Cultural issue – prevent stormwater runoff from the cemetery
		Down stream improvements	Improve stormwater capacity
Ōtaki Race Course New Housing	Pipeline Network & Culvert	DN600 Stormwater main along Te Roto Road	Improve stormwater capacity
		Replace existing 975mm Culvert with DN1500 Culvert	Improve stormwater capacity
		Down stream improvements	Improve stormwater capacity

Table 3: Proposed Stormwater Upgrading Works

5.4 Wastewater

5.4.1 General

The stormwater flows from the existing development are expected to be discharged to GW maintained Te Awahohonou Drain and Rangiuru Stream. An appropriate stormwater management within each development are envisaged, however the existing stormwater channels are expected to have adequate capacities to cater for flows generated from the new developments. Also, these existing channels are expected to cater for the secondary flows.

5.4.1.1 Pump Stations

A new (dedicated) pump set is proposed at the existing County Road pumping station to supply the new 5.5ML reservoir (Ringawhati Road) with a dedicated DN200 rising main.

Development	Network Component	Proposed Upgrade	Remarks
Rangiuru Road New Housing	Pumping Station	Upgrade/Rebuild wastewater pump station servicing Rangiuru Road	Increase capacity
		DN 200 new rising main near Riverbank Road	Increase capacity
Anzac Road New Housing	Pumping Station	Upgrade/Rebuild waste water pump station at Raukawa Street	Increase capacity
		Upgrade waste water pump station at Mateno Street (Rangatira Street)	Increase capacity
		DN200 upgrade rising main along Raukawa Street	Increase capacity
		DN 250 upgrade rising main intersection of Rangatira Street and Aotaki Street	Increase capacity
Ōtaki Race Course New Housing	Pumping Station	Upgrade waste water pump station at the Corner of Te Roto Road and Rahui Road	Increase capacity
		Upgrade waste water pump station in County Road	Increase capacity
		Upgrade waste water pump station in Arthur Street	Increase capacity
		11m DN 200 upgrade rising main corner of Te Roto Road and Rahui Road	Increase capacity
		DN 250 upgrade rising main near Rahui Road	Increase capacity
		DN 250 upgrade rising main on Arthur Street and Dunstan Street	Increase capacity
Ōtaki Service Upgrades	Main Pumping to WWTP (PS12)	Upgrade waste water pump station at Riverbank Road near wastewater treatment plant	Increase capacity

Table 4: Proposed Wastewater Network Upgrading Works

5.4.1.2 Pipe Network

The proposed upgrading works required for the wastewater pipe network are in the table below.

Development	Network Component	Proposed Upgrade	Remarks
Rangiuru Road New Housing	Sewer Main	DN200 upgrade main on Rangiuru Road	Increase capacity
Anzac Road New Housing	Sewer Main	DN 300 upgrade main on Aotaki Street	Increase capacity
		DN 450 upgrade main Aotaki Street	Increase capacity
Ōtaki Race Course New Housing	Sewer Main	DN225 upgrade main on Te Roto Road	Increase capacity

Development	Network Component	Proposed Upgrade	Remarks
		DN 350 upgrade main along Rahui Road and County Road	Increase capacity
		DN 350 upgrade main on Mill Road	Increase capacity
		DN 450 upgrade main on Dunstan Street	Increase capacity
		DN 400 upgrade main on Waerenga Road, Atmore Avenue, Lemon Street and Miro Street	Increase capacity
		DN 450 upgrade main on Riverbank Road	Increase capacity

Table 5: Proposed Wastewater Pumping Station Upgrading Works

5.5 Roading

5.5.1 General

The proposed roading upgrading work similar to that identified in EOI documentation and only inclusions are the works required for new intersections and road drainage/signage.

5.5.1.1 Roading

Development	Roading Component	Proposed Upgrade	Remarks
Rangiuru Road New Housing	Road	523m of Suburban Acess Road, 2x4.2m Traffic lanes. With recessed parking and cycling facilities	Provide collector network for the area
		300m Southern Suburban Access, 2x4.2m Traffic lanes. With recessed parking and cycling facilities	Provide collector network for the area
Anzac Road New Housing	Road	Upgrade Anzac Road to Suburban Neighbourhood Road, with 5.7m Traffic lane, foot path and unsegregated cycling facilities	Improve traffic capacity
Ōtaki Race Course New Housing	Road	Upgrade Te Roto Road to Rural Collector Road, 5.7m Traffic lane, 1.5m separated footpath and sealed shoulder cycling faculties including intersection to Lot. Possible land take	Improve traffic capacity
		Upgrade Rahui Rd for 1100mm (excl intersection), 8.4m Traffic lane, separated footpath and urbanisation of the currently rural road	Improve traffic capacity

Table 6: Proposed Roading Upgrading Works

5.5.1.2 Intersections

Development	Roading Component	Proposed Upgrade	Remarks
Rangiuru Road New Housing	Intersections	Upgrade existing intersection between Kauri Street and Aotaki Street, to include Pedestrian crossing	Provide safe access to development

Development	Roading Component	Proposed Upgrade	Remarks
		Proposed new intersection between Rangiuru road and Suburban Acess Road	Provide safe access to development
		Proposed new intersection between suburban access roads	Provide safe access to development
Anzac Road New Housing	Intersections	New Intersection at Raukawa Street	Provide safe access to development
		Intersection upgrade between Mill Road and Anzac Road	Provide safe access to development
Ōtaki Race Course New Housing	Intersections	Intersection upgrade between Rahui Road and Te Roto Road	Provide safe access to development
		Intersection upgrade Rahui Freemans - install roundabout	Improve traffic capacity

Table 7: Proposed Roading Intersections Upgrading Works

6 Proposed Infrastructure Scope & Cost Allocation

The proposed infrastructure upgrading works identified in above sections are summarised to enable cost allocation. The details of the scope of works required for each infrastructure sector including the allocated baseline costs using the coast data provided by KCDC, are in Appendix C.

7 Risk Register

Risk register has been updated based on RFP requirements. The copy of the updated risk register is in Appendix D.

8 Infrastructure Programme

The proposed infrastructure upgrading works implementation programme prepared based on the KCDC EOI submission information is in Appendix E.

9 Proposed Infrastructure Upgrade Plans

The proposed infrastructure plans prepared using KCDC GIS maps covering the KCDC EOI submission information and the scope of work above are in Appendix F.

APPENDICES

Appendix A	Available Information
Appendix B	KCDC Cost Data
Appendix C	Sope of Work & Baseline Cost
Appendix D	Updated Risk Register
Appendix E	Infrastructure Programme
Appendix F	Proposed Infrastructure Upgrade Plans

Appendix A Available Information

Combined Plan for Ōtaki

Kāpiti Coast DISTRICT COUNCIL

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INFRASTRUCTURE ACCELERATION FUND

EXPRESSION OF INTEREST RESPONSE: ŌTAKI PROPOSAL

PART B Q1, F: Summary of proposed Ōtaki housing forecasts, outcomes and eligible infrastructure

CONFIDENTIAL

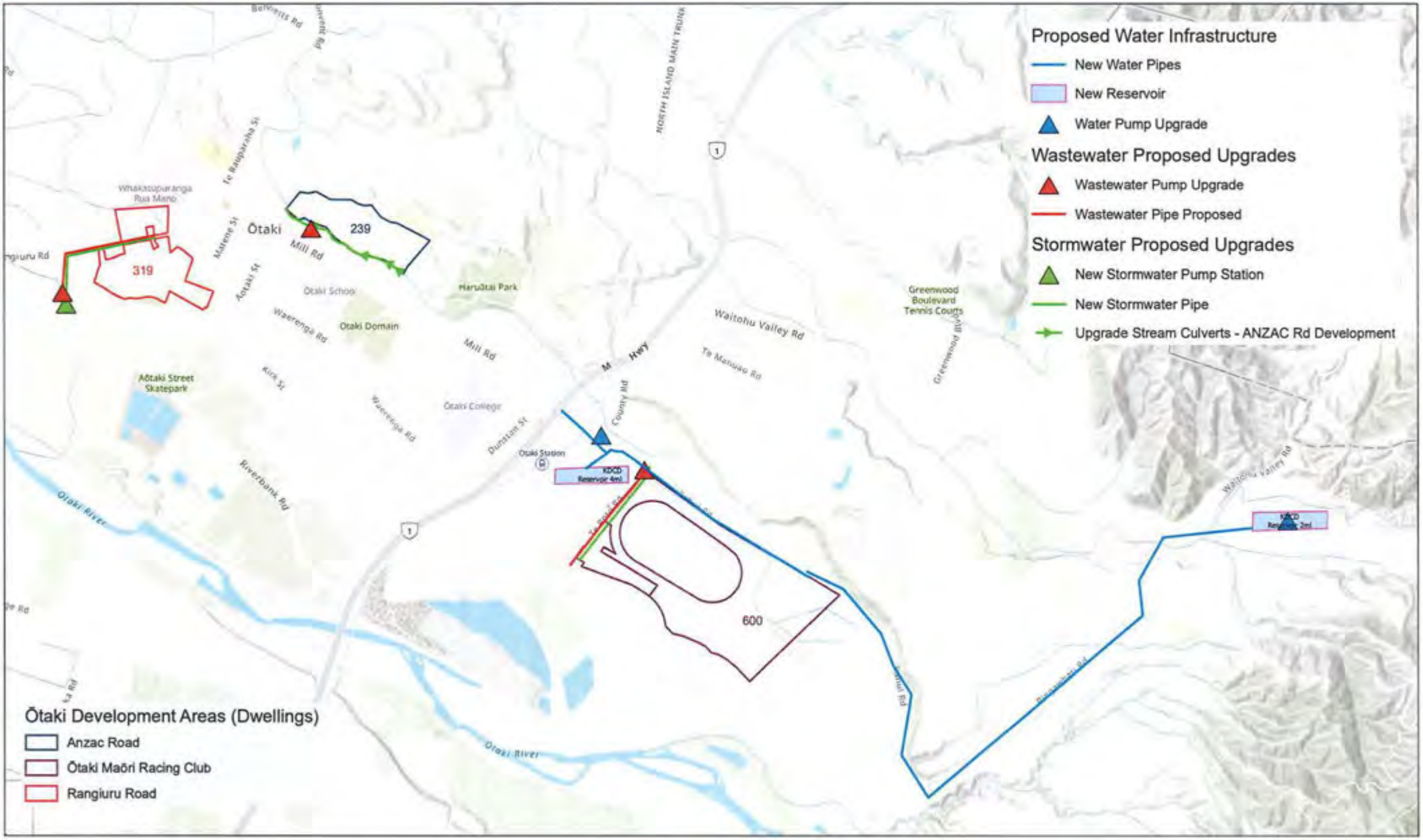
Ōtaki housing forecasts	Total dwellings	2022	2023	2024	2025	2026	2027	2028
Ōtaki Dwellings, median projection, annual (interpolated)	2,212	1,909	1,962	2,010	2,059	2,109	2,160	2,212
Cumulative additional forecast dwellings 2022-2028	**354**	**51**	**104**	**152**	**201**	**251**	**302**	**354**

Proposed housing outcomes		2022	2023	2024	2025	2026	2027	2028
Rangiuru Road, Ōtaki Development Area (no. dwellings/annum)	319	57	117	96	39	10		
Ōtaki Māori Racing Club, Ōtaki (no. dwellings/annum)	600	50	100	150	150	100	50	
Anzac Road, Ōtaki Development Site (no. dwellings/annum)	239					39	100	100
Total proposed housing outcomes 2022-2028	**1,158**	**107**	**324**	**570**	**759**	**908**	**1,058**	**1,158**

Proposed eligible infrastructure	2022	2023	2024	2025	2026	2027	2028
Potable water							
Land acquisition for reservoir 2,500sqm							
Upgrade extising County Rd pump station							
New 2 megalitre reservoir (Waitohu #2)							
New 150mm trunk main pipeline x 2,730m							
New 4 megalitre reservoir							
Wastewater							
Rangiuru Road, Ōtaki Development Area							
Upgrade 200mm trunk pipeline x 1,100m							
1 x pump station upgrades							
Ōtaki Māori Racing Club, Ōtaki							
Upgrade 200mm trunk pipeline x 1,000m							
3 x pump station upgrades							
Anzac Road, Ōtaki Development Site							
Investigations on existing trunk pipeline							
1 x pump station upgrades							
Stormwater (feasibility and design including flood management)							
Rangiuru Road, Ōtaki Development Area							
New trunk pipeline to the Ōtaki River							
1 x pump station upgrades							
Ōtaki Māori Racing Club, Ōtaki							
New trunk pipline to local stream							
Anzac Road, Ōtaki Development Site							
Upgrades to culverts for local stream							
Transport							
Rangiuru Road, Ōtaki Development Area							
New local road and footpath connecting Rangiuru Rd to Kauri St x 500m							
Ōtaki Māori Racing Club, Ōtaki							
Upgrade Te Roto Rd including widening and new footpath x 650m							
Anzac Road, Ōtaki Development Site							
Upgrade Anzac Rd including new footpath x 200m							

Proposed Upgrades / New 3 Water Services and Reservoirs

Kāpiti Coast DISTRICT COUNCIL



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Proposed Transport Infrastructure Overview

Kāpiti Coast DISTRICT COUNCIL

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Appendix B KCDC Cost Data

Item	Infrastructure	Development Reference	Network Component	Item	Proposed Upgrading Scope	Reason for Upgrade	Reference	Unit	Qty	Rate	Baseline Cost Estimate	Inflation Rate	Inflation Adjustment	Total Adjusted Amount	Notes
1	Water	Rangiuru Road New Housing	Pipeline Network	1.1	DN300, Ring main along Aotaki St, River Bank Rd and Main Hwy	Zone pressure improvement (fire & potable supply)	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	m	3800	$ 1,050	$ 3,990,000		$ -	$ -	
				1.2	DN200, Along Rangiuru Road, from 284 - 167 Rangiuru Road	Zone pressure improvement (fire & potable supply)		m	1100	$ 1,050	$ 1,155,000		$ -	$ -	
				1.3	DN150 replaced with DN150, Along Rangiuru Road, from 167-149 Rangiuru Road	Zone pressure improvement (fire & potable supply)		m	400	$ 680	$ 272,000		$ -	$ -	
				1.4	DN100 replaced with DN150 along [illegible] Mokena Street	Zone pressure improvement (fire & potable supply)		m	300	$ 680	$ 204,000		$ -	$ -	
				1.5	DN100 replaced with DN150 along The Avenue	Zone pressure improvement (fire & potable supply)		m	300	$ 680	$ 204,000		$ -	$ -	Tentative Site:
											$ 5,825,000		$ -	$ -	
		Anzac Road New Housing	Pipeline Network	1.6	DN20 replaced with DN 150, Water main along Anzac Road	Zone pressure improvement (fire & potable supply)		m	400	$ 870	$ 348,000		$ -	$ -	
				1.7	DN100 replaced with DN150 along Aotaki St	Zone pressure improvement (fire & potable supply)		m	200	$ 870	$ 174,000		$ -	$ -	
		Te Roto Road (Otaki Race Course New Housing)	Pipeline Network	1.8	DN300, main along Rahui Road to new 5.5ML Otaki Reservoir	Zone pressure improvement (fire & potable supply)	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	m	3300	$ 1,250	$ 4,125,000		$ -	$ -	
				1.9	DN300, Water main along Te Roto Road	Water supply		m	500	$ 1,050	$ 525,000		$ -	$ -	
				1.10	2120m DN100 replaced with DN200 along Ringawhati Road	Zone pressure improvement (fire & potable supply)	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	m	2000	$ 1,050	$ 2,100,000		$ -	$ -	
		Water Supply Zone Upgrades	Storage Reservoir	1.11	Construct new Otaki Reservoir, next to existing reservoir near Waitohu Valley Road, approx size 0.85 ML	Security of water supply	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	LS	1	$ 1,500,000	$ 1,500,000		$ -	$ -	$1.45M[illegible] I've got $1.5M including land
				1.12	Construct new Otaki Reservoir, near Ringawhati Road, approx size 5.5 ML	Security of water supply		LS	1	$ 8,000,000	$ 8,000,000		$ -	$ -	$1.45M[illegible]
				1.13	DN200 NRV (Outlet Supply), near Ringawhati Road	Security of water supply		LS	1		$ -		$ -	$ -	
			Pumping Station	1.14	Upgrade existing water pumping station near County Road and Rahui Road	Secure water supply	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	LS	1		$ -		$ -	$ -	Done
				1.15	DN250 Rising Main along Rahui Road and Ringawhati Road to New 5.5ML Reservoir	Secure water supply		m	[illegible]	$ 850	$ [illegible]		$ -	$ -	
			New Supply Source (Bore)	1.16	New Bore pumping station (location TBC) complete with connecting pipeline (DN150 - 200m Long)	Secure water supply		LS	1		$ -		$ -	$ -	
2	Wastewater	Rangiuru Road	Pump Station	2.1	Upgrade waste water pump station servicing Rangiuru Road	Increase wastewater capacity		LS	1		$ -		$ -	$ -	
			Rising main	2.2	DN 200 new rising main near Riverbank Road	Increase wastewater capacity		m	900	$ 1,100	$ 990,000		$ -	$ -	
			Pipeline Network	2.4	DN200 upgrade main on Rangiuru Road	Improve wastewater capacity		m	700	$ 1,150	$ 805,000		$ -	$ -	
		Aotaki Road	Pump Station	2.5	Upgrade waste water pump station at Raukawa Street	Increase wastewater capacity		LS	1		$ -		$ -	$ -	
				2.6	Upgrade waste water pump station at Matene Street (Rangatira Street)	Increase wastewater capacity		LS	1		$ -		$ -	$ -	
			Rising mains	2.7	DN200 upgrade rising main along Raukawa Street	Increase wastewater capacity		m	200	$ 1,100	$ 220,000		$ -	$ -	
				2.8	DN 250 upgrade rising main intersection of Rangatira Street and Aotaki Street	Increase wastewater capacity		m	500	$ 1,200	$ 600,000		$ -	$ -	
			Pipeline Network	2.9	DN 300 upgrade main on Aotaki Street	Improve wastewater capacity		m	200	$ 1,300	$ 260,000		$ -	$ -	
				2.10	DN 450 upgrade main Aotaki Street	Improve wastewater capacity		m	400	$ 1,500	$ 600,000		$ -	$ -	
		Te Roto Road (Otaki Race Course new housing)	Pump Station	2.10	Upgrade waste water pump station at the Corner of Te Roto Road and Rahui Road	Increase wastewater capacity		LS	1		$ -		$ -	$ -	
				2.11	Upgrade waste water pump station in County Road	Increase wastewater capacity		LS	1		$ -		$ -	$ -	
				2.12	Upgrade waste water pump station in Arthur Street	Increase wastewater capacity		LS	1		$ -		$ -	$ -	
			Rising mains	2.11	51m DN 200 upgrade rising main corner of Te Roto Road and Rahui Road	Increase wastewater capacity		m	20	$ 1,500	$ 30,000		$ -	$ -	
				2.12	DN 250 upgrade rising main near Rahui Road	Increase wastewater capacity		m	400	$ 1,200	$ 480,000		$ -	$ -	
				2.13	DN 250 upgrade rising main on Arthur Street and Dunstan Street	Increase wastewater capacity		m	400	$ 1,200	$ 480,000		$ -	$ -	
			Pipeline Network	2.14	DN225 upgrade main on Te Roto Road	Improve wastewater capacity		m	500	$ 1,200	$ 600,000		$ -	$ -	
				2.15	DN 350 upgrade main along Rahui Road and County Road	Improve wastewater capacity		m	500	$ 1,300	$ 650,000		$ -	$ -	
				2.16	DN 350 upgrade main on Mill Road	Improve wastewater capacity		m	200	$ 1,300	$ 260,000		$ -	$ -	
				2.17	DN 450 upgrade main on Dunstan Street	Improve wastewater capacity		m	300	$ 1,500	$ 450,000		$ -	$ -	
				2.18	DN 400 upgrade main on Waerenga Road, Atmore Avenue, Lemon Street and Mira Street	Improve wastewater capacity		m	1800	$ 1,400	$ 2,520,000		$ -	$ -	
				2.19	DN 450 upgrade main on Riverbank Road	Improve wastewater capacity		m	300		$ -		$ -	$ -	
		Otaki Service Upgrade	Main Pumping to WWTP (PS11)	4.1	Upgrade waste water pump station at Riverbank Road near wastewater treatment plant	Increase wastewater capacity		LS	1		$ -		$ -	$ -	

Item	Infrastructure	Development Reference	Network Component	Item	Proposed Upgrading Scope	Reason for Upgrade	Reference	Unit	Qty	Rate	Baseline Cost Estimate	Inflation Rate	Inflation Adjustment	Total Adjusted Amount	Notes
4	Roading														
		Rangiuru Road	Roads	4.1	520m of Suburban Access Road, 2x4.2m Traffic lanes. With recessed parking and cycling facilities	Provide collector network for the area		m	523	$ 6,000	$ 3,138,000		$ -	$ -	
				4.1a	300m Southern Suburban Access, 2x4.2m Traffic lanes. With recessed parking and cycling facilities	Provide collector network for the area		m	300	$ 6,000	$ 1,800,000		$ -	$ -	
			Intersections	4.2	Upgrade existing intersection between Rauri Street and Aataki Street, to include Pedestrian crossing	Provide safe access to development		LS	1	$ 70,000	$ 70,000		$ -	$ -	
				4.3	Proposed new intersection between Rangiuru road and Suburban Acces Road	Provide safe access to development		LS	1	$ 450,000	$ 450,000		$ -	$ -	
				4.4	Proposed new intersection between suburban access roads	Provide safe access to development		LS	1	$ 260,000	$ 260,000		$ -	$ -	
			Extra costs	4.5	Road signage			LS	1	$ 20,000	$ 20,000		$ -	$ -	
				4.6	Road drainage			LS	1	$ 210,000	$ 210,000		$ -	$ -	
		Anzac Road	Roads	4.7	Upgrade Anzac Road to Suburban Neighbourhood Road, with 3.7m Traffic lane, foot path and unsegregated cycling facilities	Improve traffic capacity		LS	1	$ 430,000	$ 430,000		$ -	$ -	
			Intersections	4.8	New intersection at Baukawa Street	Provide access to site		LS	1	$ -	$ -		$ -	$ -	
				4.9	Intersection upgrade between Mill Road and Anzac Road	Provide safe access to development		LS	1	$ -	$ -		$ -	$ -	
			Extra costs	4.10	Road Drainage			LS	1	$ 60,000	$ 60,000		$ -	$ -	
		Te Bata Road	Roads	4.11	Upgrade Te Bata Road to Rural Collector Road, 5.7m Traffic lane, 1.5m seperated footpath and sealed shoulder cycling facilities including intersection to Lot. Possible land take	Improve traffic capacity		LS	1	$ 870,000	$ 870,000		$ -	$ -	
				4.11a	Upgrade Rahui Rd (ar 1100mm incl intersection), 8.4m Traffic lane, seperated footpath and urbanisation of the currently rural road	Improve traffic capacity		LS	1	$ 1,725,000	$ 1,725,000		$ -	$ -	
			Intersections	4.12	Intersection upgrade between Rahui Road and Te Bata Road	Provide safe access to development		LS	1	$ 640,000	$ 640,000		$ -	$ -	
				4.12a	Intersection upgrade Rahui Road - Install roundabout	Improve traffic capacity		LS	1	$ 2,000,000	$ 2,000,000		$ -	$ -	
			Extra costs	4.13	Road Drainage			LS	1	$ 200,000	$ 200,000		$ -	$ -	
				4.13a	Road Drainage (Rahui upgrade)			LS	1	$ 380,000	$ 380,000		$ -	$ -	

Site	Location	Number of dwellings proposed	Our solution for KCDC SW Infrastructure	Approximate Cost Estimate (Includes detailed investiagtions, designs, Resource Consents, Construction, Contract Administration, Project Management) + 10% contingency	Notes	Cost / Dwelling
1	Otaki Racing Club	600	Piped infrastructure up to the stream and other associated assets (manholes, stream outlets etc)	8,000,000	Requires GWRC Resource Consent	13,333.33
2	Anzac Road	239	Upgrading Culverts currently on the stream (including culverts on private properties)	10,000,000	Requires GWRC Resource Consent	41,841.00
3	Rangiuru Road 1, 2, 6 and Matai 3,4,5	319	Piped infrastructure up to the river and other associated assets (manholes, stream outlets etc) and a pump station	10,000,000	Requires GWRC Resource Consent	31,347.96
				28,000,000		

Item	Infrastructure	Development Reference	Network Component	Item	Proposed Upgrading Scope	Reason for Upgrade	References
2	Stormwater						
		2.1 Rangiuru Road	Pipeline Network and stream improvements	2.1.1	DN725 replaced with DN600 Stormwater pipe, at 154 Rangiuru Road	Improve stormwater capacity	
				2.1.2	DN150 PE pipe, rising main along Rangiuru Road	Improve stormwater capacity	
				2.1.3	Down stream improvements	Improve stormwater capacity	
			Pumpstation	2.1.4	Construct new pumping station to service Rangiuru road	Lift SW flows to stream	
					Concept, Preliminary and Detailed Designs, Property Owner / Stake holder/ Iwi liaison , Resource Consents, Contract Administration ,		
			Designs , Contract admin	2.1.5	Construction monitoring		
			Project Management	2.1.6	Project Management		
		2.2 Anzac Road	Stream Widening Upgrade	2.2.1	Upgrade stream near proposed Anzac Road development (Old Te Awahohonu Drain) including culverts	Increase stormwater capacity	
			Diversion Channel	2.2.2	Surface water diversion channel (1000m)to prevent flows from the Cemetary above Anzac Road development	Cultural issue - prevent stormwater runoff from the cemetery	
				2.2.3	Down stream improvements	Improve stormwater capacity	
					Concept, Preliminary and Detailed Designs, Property Owner / Stake holder/ Iwi liaison , Resource Consents, Contract Administration ,		
				2.2.4	Construction monitoring		
		2.3 Te Roto Road	Pipeline Network	2.3.1	DN600 Stormwater main along Te Roto Road	Improve stormwater capacity	
		(Ciaki Race Course New Housing)	Culverts	2.3.2	Replace existing 975mm Culvert with DN1500 Culvert	Improve stormwater capacity	
				2.3.3	Down stream improvements	Improve stormwater capacity	
					Concept, Preliminary and Detailed Designs, Property Owner / Stake holder/ Iwi liaison , Resource Consents, Contract Administration ,		
				2.3.4	Construction monitoring		
		Resource Consents	Existing Streams/Channels	2.3.5	Project Management		

Unit	Qty	Rate	Baseline Cost Estimate	Inflation Rate	Inflation Adjustment	Total Adjusted Amount	Notes
m	150	$ 2,500	$ 375,000		$ -	$ -	
m	700	$ 1,000	$ 700,000		$ -	$ -	
LS	1	$ 3,500,000	$ 3,500,000				
LS	1	$ 2,000,000	$ 2,000,000		$ -	$ -	
LS	1	$ 2,600,000	$ 2,600,000				
LS	1	$ 823,000	$ 823,000				
			$ 9,998,000				
LS	1		$ 5,500,000		$ -	$ -	
LS	1		$ 700,000		$ -	$ -	
LS	1		$ 1,000,000				
LS	1		$ 2,175,000				
			$ 716,000				
			$ 10,091,000				
m	700	$ 2,500	$ 1,750,000		$ -	$ -	
LS	1	$ 1,000,000	$ 1,000,000		$ -	$ -	
LS	1	$ 2,500,000	$ 2,500,000				
LS	1	$ 1,925,000	$ 1,925,000				
LS	1	$ 594,000	$ 594,000		$ -	$ -	
			$ 7,769,000				
			$ 27,858,000				

Appendix C Scope of Work & Baseline Cost

Item	Infrastructure	Development Reference	Network Component	Item	Proposed Upgrading Scope	Reason for Upgrade	Reference	Unit	Qty	Rate	Baseline Cost Estimate
1	Water	Rangiuru Road New Housing	Pipeline Network	1.1	DN150, Ring main along Aotahi St, Hose Bank Rd and Main Hwy	Zone pressure improvement (fire & potable supply)	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	m	3600	$ 1,040	$ 3,940,000
				1.2	DN200, Along Rangiuru Road, from 284 - 142 Rangiuru Road	Zone pressure improvement (fire & potable supply)		m	1350	$ 1,000	$ 1,335,000
				1.3	DN100 replaced with DN150, Along Rangiuru Road, from 167-119 Rangiuru Road	Zone pressure improvement (fire & potable supply)		m	400	$ 680	$ 272,000
				1.4	DN100 replaced with DN150 along Robert Matuku Street	Zone pressure improvement (fire & potable supply)		m	300	$ 680	$ 204,000
				1.5	DN100 replaced with DN150 along The Avenue	Zone pressure improvement (fire & potable supply)		m	300	$ 680	$ 204,000
											$ [illegible]
		Anzac Road New Housing	Pipeline Network	1.6	DN20 replaced with DN 150. Water main along Anzac Road	Zone pressure improvement (fire & potable supply)		m	400	$ 870	$ 348,000
				1.7	DN100 replaced with DN150 along Aotahi St	Zone pressure improvement (fire & potable supply)		m	200	$ 870	$ 174,000
											$ [illegible]
		Te Roto Road (Otaki Race Course New Housing)	Pipeline Network	1.8	DN300, main along Rahui Road to new 5.5ML Otaki Reservoir	Zone pressure improvement (fire & potable supply)	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	m	4000	$ 1,030	$ 4,125,000
				1.9	DN150, Water main along Te Roto Road	Water supply		m	500	$ 1,050	$ 525,000
				1.10	2500m DN150 replaced with DN200 along Ringawhati Road	Zone pressure improvement (fire & potable supply)	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	m	2000	$ 1,050	$ 2,100,000
											$ [illegible]
		Water Supply Zone Upgrades	Storage Reservoir	1.11	Construct new Otaki Reservoir, next to existing reservoir near Waitohu Valley Road, approx size [illegible]	Security of water supply	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	LS	1	$ 1,500,000	$ 1,500,000
				1.12	Construct new Otaki Reservoir, near Ringawhati Road, approx size 5.5 ML	Security of water supply		LS	1	$ 8,000,000	$ 8,000,000
				1.13	DN300 BRV (DL150 Supply), near Ringawhati Road	Security of water supply		LS	1	$ 50,000	$ 50,000
			Pumping Station	1.14	Upgrade existing water pumping station near County Road and Rahui Road	Secure water supply	Otaki Master Plan Upgrade (Stantec - 30 Jul 2020)	LS	1	$ 1,500,000	$ 1,500,000
				1.15	DN200 Rising Main along Rahui Road and Ringawhati Road to New 5.5ML Reservoir	Secure water supply		m	2900	$ 950	$ 2,755,000
			New Supply Source (Bore)	1.16	New Bore pumping station (Location TBC) complete with connecting pipeline (DN150 - 200m Long)	Secure water supply		LS	1	$ 5,500,000	$ 5,500,000
											$ [illegible]
											$ 28,402,000
2	Stormwater	2.1 Rangiuru Road	Pipeline Network and stream improvements	2.1.1	DN525 replaced with DN600 Stormwater pipe, at 214 Rangiuru Road	Improve stormwater capacity		m	100	$ 2,500	$ 375,000
				2.1.2	DN150 PE pipe, rising main along Rangiuru Road	Improve stormwater capacity		m	700	$ 1,000	$ 700,000
				2.1.3	Down stream improvements	Improve stormwater capacity		LS	1	$ 4,500,000	$ 4,500,000
			Pumpstation	2.1.4	Construct new pumping station to access Rangiuru sink	Lift SW flows to stream		LS	1	$ 2,000,000	$ 2,000,000
			Designs, Contract admin	2.1.5	Concept, Preliminary and Detailed Designs, Property Owner / Stake holder / iwi liaison, Resource consents, Contract Administration, Construction monitoring			LS	1	$ 2,600,000	$ 2,000,000
			Project Management	2.1.6	Project Management			LS	1	$ 423,000	$ 423,000
											$ 9,938,000
		2.2 Anzac Road	Stream Widening (upgrade) Diversion Channel	2.2.1	Upgrade stream near proposed Anzac Road development (Old Te Awahohonu Drain) including culverts	Increase stormwater capacity		LS	1		$ 5,500,000
				2.2.2	Surface water diversion channel (100m) to prevent flows from the Cemetery above Anzac Road development	Cultural issue - prevent stormwater runoff from the cemetery		LS	1		$ 700,000
				2.2.3	Down stream improvements	Improve stormwater capacity		LS	1		$ 1,000,000
				2.2.4	Concept, Preliminary and Detailed Designs, Property Owner / Stake holder / iwi liaison, Resource Consents, Contract Administration, Construction monitoring			LS	1		$ 1,175,000
											$ 716,000
											[illegible]
		2.3 Te Roto Road (Otaki Race Course New Housing)	Pipeline Network Culverts	2.3.1	DN600 Stormwater main along Te Roto Road	Improve stormwater capacity		m	1900	$ 2,500	$ 4,750,000
				2.3.2	Replace existing 975mm Culvert with DN1500 culvert	Improve stormwater capacity		LS	1	$ 1,800,000	$ 1,800,000
				2.3.3	Down stream improvements	Improve stormwater capacity		LS	1	$ 3,500,000	$ 3,500,000
				2.3.4	Concept, Preliminary and Detailed Designs, Property Owner / Stake holder / iwi liaison, Resource Consents, Contract Administration, Construction monitoring			LS	1	$ 1,925,000	$ 1,925,000
		Resource Consents	Existing Streams/Channels	2.3.5	Project Management			LS	1	$ 594,000	$ 594,000
											$ 7,565,000
											$ 17,458,000
3	Wastewater	Rangiuru Road	Pump Station	3.1	Upgrade/Rebuild waste water pump station crossing Rangiuru Road	Increase wastewater capacity		LS	1	$ 500,000	$ 500,000
			Rising main	3.2	DN 200 new rising main near Riverbank Road	Increase wastewater capacity		m	500	$ 1,200	$ 600,000
			Pipeline Network	3.3	DN300 upgrade main on Rangiuru Road	Improve wastewater capacity		m	700	$ 1,150	$ 805,000
											$ [illegible]
		Anzac Road	Pump Station	3.4	Upgrade/Rebuild waste water pump station at Raukawa Street	Increase wastewater capacity		LS	1	$ 500,000	$ 500,000
				3.5	Upgrade waste water pump station at Matene Street (Rangatira Street)	Increase wastewater capacity		LS	1	$ 500,000	$ 500,000
			Rising mains	3.6	DN200 upgrade rising main along Raukawa Street	Increase wastewater capacity		m	100	$ 1,100	$ 220,000
				3.7	DN 250 upgrade rising main intersection of Rangatira Street and Aotahi Street	Increase wastewater capacity		m	500	$ 1,200	$ 600,000
			Pipeline Network	3.8	DN 300 upgrade main on Aotahi Street	Improve wastewater capacity		m	100	$ 1,300	$ 350,000
				3.9	DN 450 upgrade main Aotahi Street	Improve wastewater capacity		m	400	$ 1,500	$ 600,000
											$ [illegible]
		Te Roto Road (Otaki Race Course New Housing)	Pump Station	3.10	Upgrade waste water pump station at the Corner of Te Roto Road and Rahui Road	Increase wastewater capacity		LS	1	$ 500,000	$ 500,000
				3.11	Upgrade waste water pump station in County Road	Increase wastewater capacity		LS	1	$ 500,000	$ 500,000
				3.12	Upgrade waste water pump station in Arthur Street	Increase wastewater capacity		LS	1	$ 500,000	$ 500,000
			Rising mains	3.13	1km DN 200 upgrade rising main corner of Te Roto Road and Rahui Road	Increase wastewater capacity		m	20	$ 1,500	$ 30,000
				3.14	DN 250 upgrade rising main near Rahui Road	Increase wastewater capacity		m	400	$ 1,200	$ 480,000
				3.15	DN 250 upgrade rising main on Arthur Street and Dunstan Street	Increase wastewater capacity		m	400	$ 1,200	$ 480,000
			Pipeline Network	3.16	DN225 upgrade main on Te Roto Road	Improve wastewater capacity		m	500	$ 1,200	$ 600,000
				3.17	DN 300 upgrade main along Rahui Road and County Road	Improve wastewater capacity		m	500	$ 1,300	$ 650,000
				3.18	DN 350 upgrade main on Mill Road	Improve wastewater capacity		m	300	$ 1,300	$ 390,000
				3.19	DN 450 upgrade main on Dunstan Street	Improve wastewater capacity		m	300	$ 1,500	$ 450,000
				3.20	DN 400 upgrade main on Waerenga Road, Rimuru Avenue, Lemon Street and Ishia Street	Improve wastewater capacity		m	1600	$ 1,450	$ 2,320,000
				3.21	DN 450 upgrade main on Riverbank Road	Improve wastewater capacity		m	300	$ 1,500	$ 450,000
											$ [illegible]
		Downstream Upgrade	Main Pumping to WWTP (PS12)	3.22	Upgrade waste water pump station at Riverbank Road near wastewater treatment plant	Increase wastewater capacity		LS	1	$ 2,350,000	$ 2,350,000
											$ [illegible]
											$ [illegible]
4	Roading	Rangiuru Road	Roads	4.1	525m of Suburban Access Road, 2x3.0m Traffic lanes, with recessed parking and cycling facilities	Provide collector network for the area		m	525	$ 6,000	$ 3,150,000
				4.1a	400m Southern Suburban Access, 2x3.0m Traffic lanes, with recessed parking and cycling facilities	Provide collector network for the area		m	300	$ 6,000	$ 1,800,000
			Intersections	4.2	Upgrade existing intersection between Raoil Street and Aotahi Street, to include Pedestrian crossing	Provide safe access to Development		LS	1	$ 70,000	$ 70,000
				4.3	Proposed new intersection Between Rangiuru road and Suburban Access Road	Provide safe access to development		LS	1	$ 450,000	$ 450,000
				4.4	Proposed new intersection Between suburban access roads	Provide safe access to development		LS	1	$ 260,000	$ 260,000
			Extra costs	4.5	Road signage			LS	1	$ 20,000	$ 20,000
				4.6	Road drainage			LS	1	$ 210,000	$ 210,000
											[illegible]
		Anzac Road	Roads	4.7	Upgrade Anzac Road to Suburban to pedestrianised Road, with 5.5m Traffic lane, foot path and unsegregated cycling	Improve traffic capacity		LS	1	$ 450,000	$ 450,000
			Intersection	4.8	New intersection at Raukawa Street	Provide access to site		LS	1	$ -	$ -
				4.9	Intersection upgrade between Mill Road and Anzac Road	Provide safe access to development		LS	1	$ -	$ -
			Extra costs	4.10	Road Drainage			LS	1	$ 60,000	$ 60,000
											[illegible]
		Te Roto Road	Roads	4.11	Upgrade Te Roto Road to Rural Collector Road, 2x Traffic lane, 1.5m segregated footpath and shared off-road cycling facilities including intersection to Lal, Poulder and Tyler	Improve traffic capacity		LS	1	$ 870,000	$ 870,000
				4.11a	Upgrade Rahui Rd for 1100mm (with intersection), 3.5m Traffic lane, segregated footpath and urbanisation of the currently rural road	Improve traffic capacity		LS	1	$ 1,735,000	$ 1,735,000
			Intersection	4.12	Intersection upgrade between Rahui Road and Te Roto Road	Provide safe access to development		LS	1	$ 640,000	$ 640,000
				4.12a	Intersection upgrade Rahui Freeman - Install roundabout	Improve traffic capacity		LS	1	$ 2,000,000	$ 2,000,000
				4.13	Road Drainage			LS	1	$ 200,000	$ 200,000
			Extra costs	4.13a	Road Drainage (Rahui upgrade)			LS	1	$ 150,000	$ 150,000
											[illegible]
											$ [illegible]

Appendix D Updated Risk Register

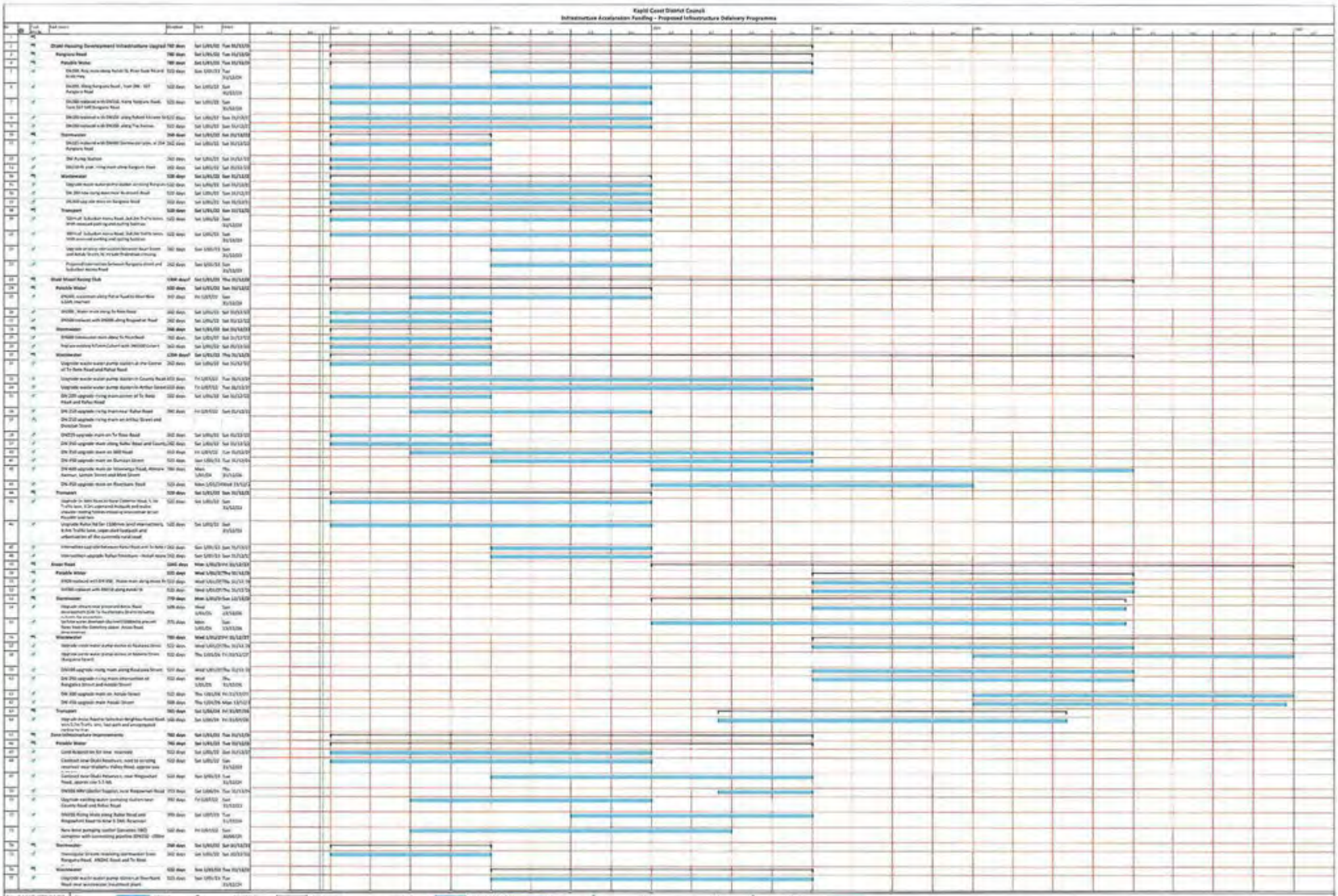
INFRASTRUCTURE ACCELERATION FUND – RISK REGISTER TEMPLATE: Eligible Infrastructure Project											
RISK NO.	RISK TITLE	DESCRIPTION Brief Description of the Risk	LIKELIHOOD % Probability the risk occurs [Note 1]	COST IMPACT ($) [Note 2] Provide the range of cost consequences should the risk occur			TIME IMPACT (Days Delay) [Note 2] Time delay as a result of risk			RISK TREATMENT STRATEGY Brief overview of how the risk is being managed & mitigated	CONTINGENCY PROVISION (Included in RFP) Contingency allowed for on the risk detailed
KEY RISKS: Required			%	Minimum	Most Likely	Maximum	Minimum	Most Likely	Maximum	Commentary	(Yes/No)
1	Resource Consents	Delays to securing the required consents for the eligible infrastructure project by the planned date. (Proposed stormwater channel upgrading works, Water Storage Reservoirs and Pumping Stations)	25%	$5,000	$15,000	$50,000	N/A	10Days	20Days	Early engagement with Local Iwi groups to obtain their consent for stormwater channel upgrading works prior to lodgeing the consent application as there are significant cultural interests in a section of the stream. The proposed option is the only viable option that keep the stream section alive maintaining their interests. All required consents will be obtained during the detailed design stage prior to tendering for all proposed pumping station upgrading works and reservoir construction works. Note: Resource consenting requirements for all trenching works and structural construction works will be clearly identified during the investigation phase prior to lodgeing the consent applications by a specilist planners	Yes
2	Infrastructure Projects – Interface Risk (Approvals, Design, Construction)	Interface with third party &/or asset owners leading to additional costs and delays (Changes required for the designs and construction methodologies to obtain acceptance of the local IWI groups)	25%	$25,000	$50,000	$100,000	N/A	20Days	30Days	As above. Early engagement with the stakeholders with adequate allowances on the design and construction programmes.	Yes
3	Infrastructure Projects – Upgrades to the Existing Networks are Required	Existing infrastructure is in a poorer condition &/or has less capacity than assumed. Upgrades are required leading to additional costs and delays	50%	$100,000	$150,000	$200,000	20Days	30Days	60Days	Site investigation works during the design satges to identify potential works required for the affected infrastsure works such as reconnecting new pipelines/services to the existing networks and provide adequate allowances in the design and construction programmes	Yes
4	Supply Chain (Cost Escalation &/or Supply Delays)	Unforeseen cost escalation and/or materials delivery delays	75%	$100,000	$150,000	$250,000	30Days	60Days	90Days	Early engagement with the material suppliers to communicate the potential material supply quantities and reserve or pre-order majority of materials during the design stage. Also Early Enagement of Contractors (ECI) process will be used to identify and confirm the extent of the materail requirement and get them to procure materails early prior to the construction starts. Adequate allowances will be made in the design and construction programmes.	Yes
5	Contamination	Unforeseen in-ground contamination is discovered leading to additional costs and delays	10%	$25,000	$50,000	$100,000	N/A	20Days	30Days	As the proposed works are in aready developed areas and it is unlikely to encounter a major level of contamination removal other than normal practice adopted for wastewaterr pumping station upgrading works. However adequate allowances will be made in the design and construction programmes following the site investigations.	Yes
6	Co-funding agreements	Delays to agreeing other funding sources eg, Waka Kotahi, IFF etc									
OTHER RISKS TO CONSIDER (examples include):											

7	Design Development	Detailed design refinements leading to additional scope which results in additional costs and delays	75%	$25,000	$50,000	$100,000	N/A	200days	100days	As the proposed works are in brownfield development area (Dtabi) with existing infrastructure network models, the impact of the most factorsinfluencing designs are expected to be mostly determined during the detailed investigation stage using model runs for the proposed upgrades and site condition (geotechnical) reports. Based on the available information on the existing network and its performance, additional allowances have been made within the proposed scope of works such as increase in sizes (pipe networks, water storage reservoirs and pumping stations). It is not expected to significant changes in the proposed sizes, however, if any increase in sizes are required, the cost impacts are expected to be minor due to installation costs which would be similar. As above, adequate allowances in the design and construction programmes will be made.	Yes
8	Utilities Infrastructure - Relocation / Protection	Encountering unknown utilities requiring relocation / protection leading to additional costs and delays	50%	$100,000	$150,000	$200,000	200days	300days	600days	Site investigation works during the design satges to identify potential works required for the affected infrastructure works such as reconnecting new pipelines/services to the existing networks and provide adequate allowances in the design and construction programmes.	Yes
9	COVID-19	Delays and disruption due to COVID-19 alert level restrictions leading to additional costs and delays	75%	$100,000	$150,000	$200,000	200days	300days	600days	Early engagement with the material suppliers and Contractors (ECI) process will be used to identify and confirm their COVID19 management protocols and adequate time allowances in the design and construction programmes. Cost impacts are expected to be applied only to additional transport or storage of materials required during restricted travel periods.	Yes
10	Archaeological Discoveries	Items of historical / archaeological significance are uncovered leading to additional costs and delays	10%	$25,000	$50,000	$100,000	N/A	200days	100days	As the proposed works are in brownfield development area (Dtabi) with currently operating infrastructure networks with regular maintenance and upgrading works being carried out, the likelyhood of any historital/archaeological finding to cause significant impact is considered as low. As above, adequate allowances in the design and construction programmes will be made for any unforseen circumstances.	Yes
11	Inclement Weather	Inclement Weather leading to additional costs and delays	25%	$0	$0	$0	100days	200days	300days	The proposed works will be planned allowing the potential wetweather days based on the historical weather records in the area appropriate to the season/construction periods. Adequate wetweater allowances in the construction programmes will be made.	Yes
12	Community Consultation	Additional requirements imposed as part of community consultation leading to additional costs and delays	25%	$5,000	$25,000	$50,000	N/A	100days	200days	Early engagement with Local Iwi groups and affected communities to address their concerns and to obtain their consent for the proposed works will be done using specilist communication team. As stated earlier, the proposed works are in already developed areas and any improvement to the existing infrastructure network will be seen as benifical to the community to provide added security of supplies.	Yes
13	*Availability of Contractors (Resources)*	Availability of contracting resources to deliver all the infrastructure projects within the stipulated programme. Additional costs/programme delays.	50%	$100,000	$250,000	$500,000	300days	600days	900days	Supplier availability study/research (in the market) and early Enagement of Contractors (ECI) processes will be used to identify and secure services from the potential contractors as a part of the procument strategy. In addition to local/regional contractors, potential contractor availability in the rest of the country will also be considred.	Yes

Appendix E Proposed Infrastructure Programme

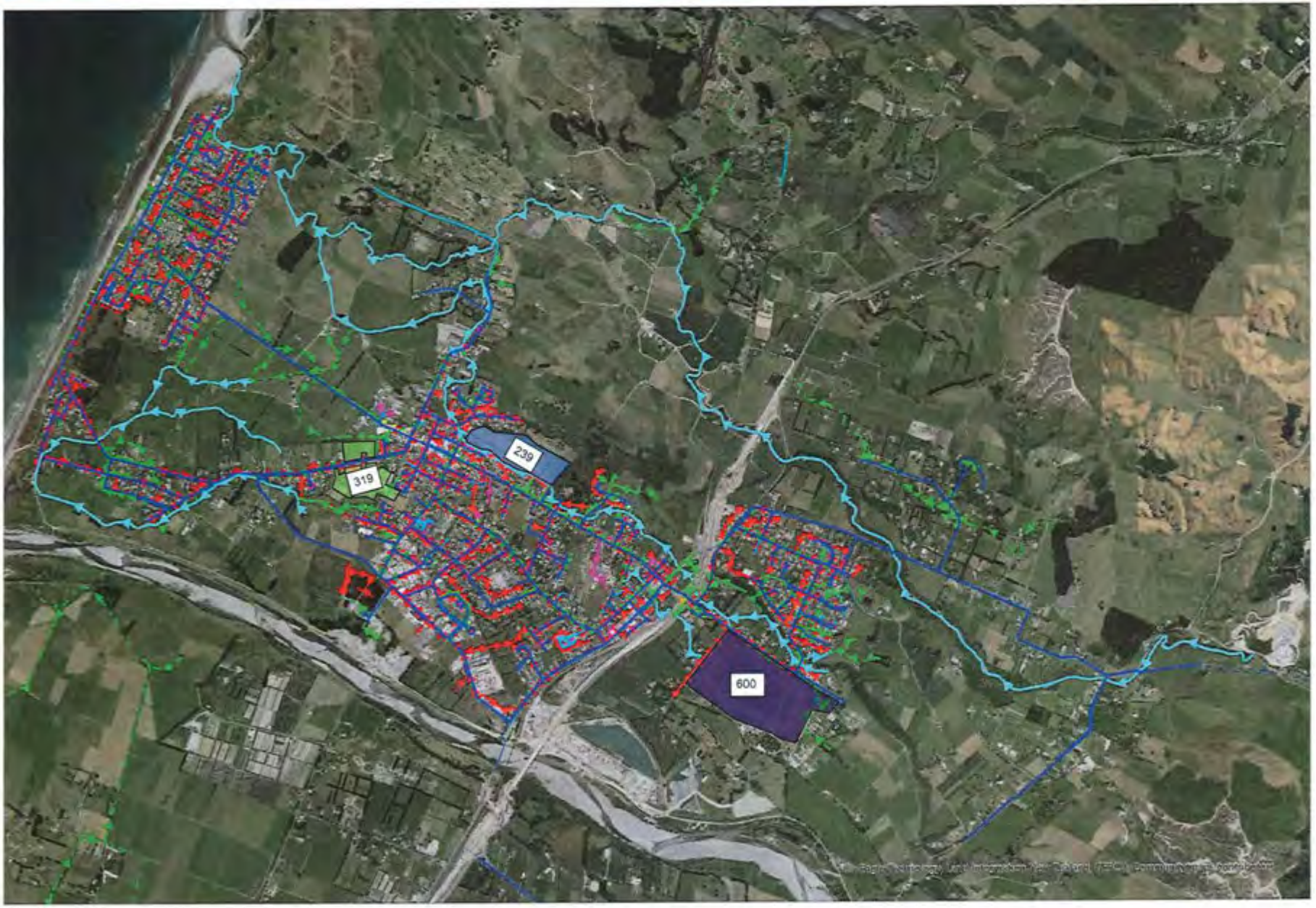
Kapiti Coast District Council

Infrastructure Acceleration Funding – Proposed Infrastructure Delivery Programme



Appendix F Proposed Infrastructure Upgrade Plans

Kapiti Coast District Council



Key to map symbols

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- Fire Service
- Rider Main
- Reticulation Main
- Trunk Main
- Other
- Abandoned
- Ws Plant - Polygon
- Service
- Fire Service
- Rider Main
- Reticulation Main
- Other
- Gravity main
- Rising main
- Abandoned
- Other
- Culvert
- Open channel
- Stream
- Private SW Pipe
- Main
- Rising main
- Abandoned
- Other
- Main
- Rising main
- Other

N

0 590 1,180 Metres

1:25,000

Date Printed: November 9, 2021

Kapiti Coast District Council

Key to map symbols

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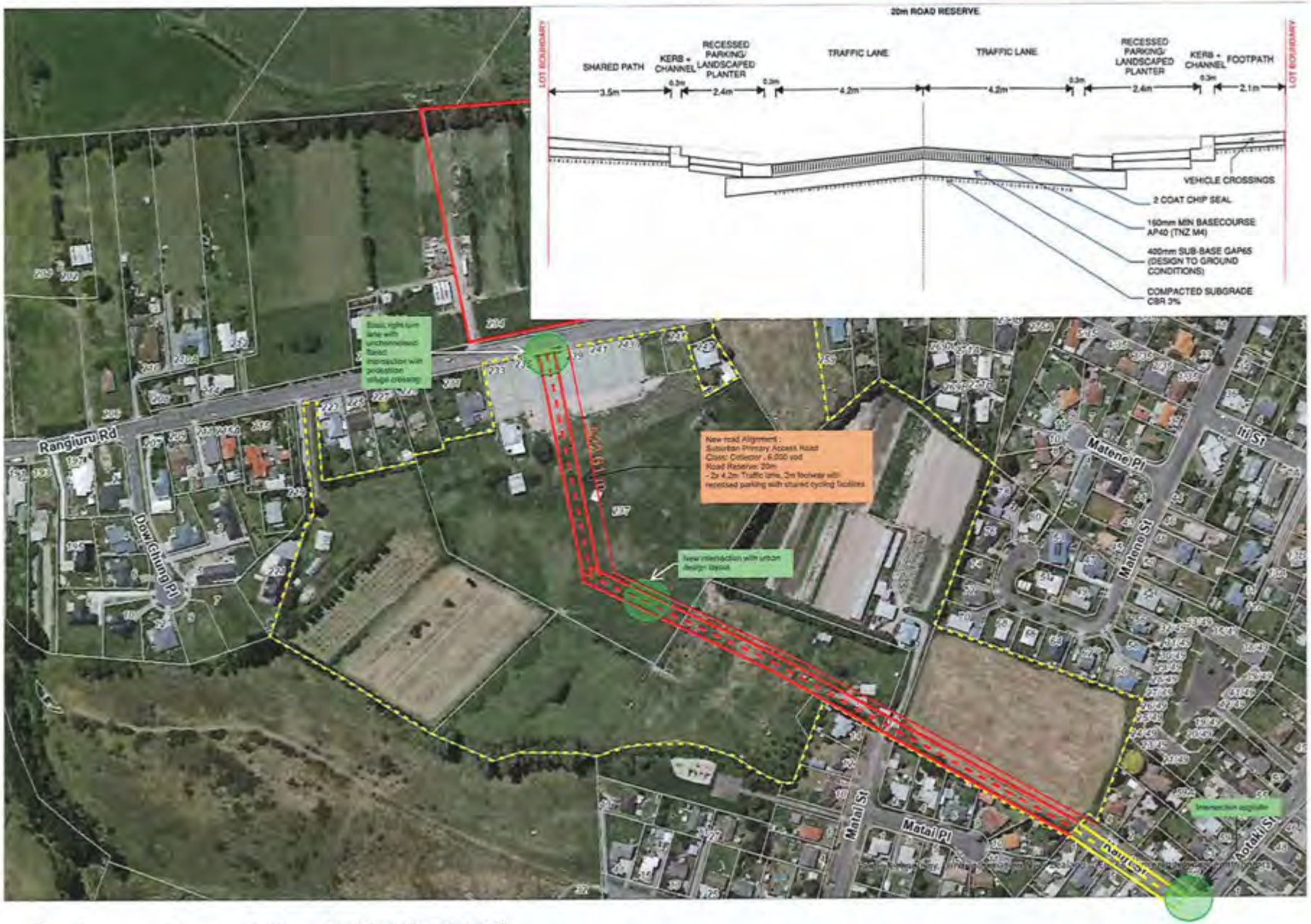
1:25,000

Date Printed: November 9, 2021

Kapiti Coast District Council



Key to map symbols

- Parcel Boundaries
- Street Numbers
- Road Names

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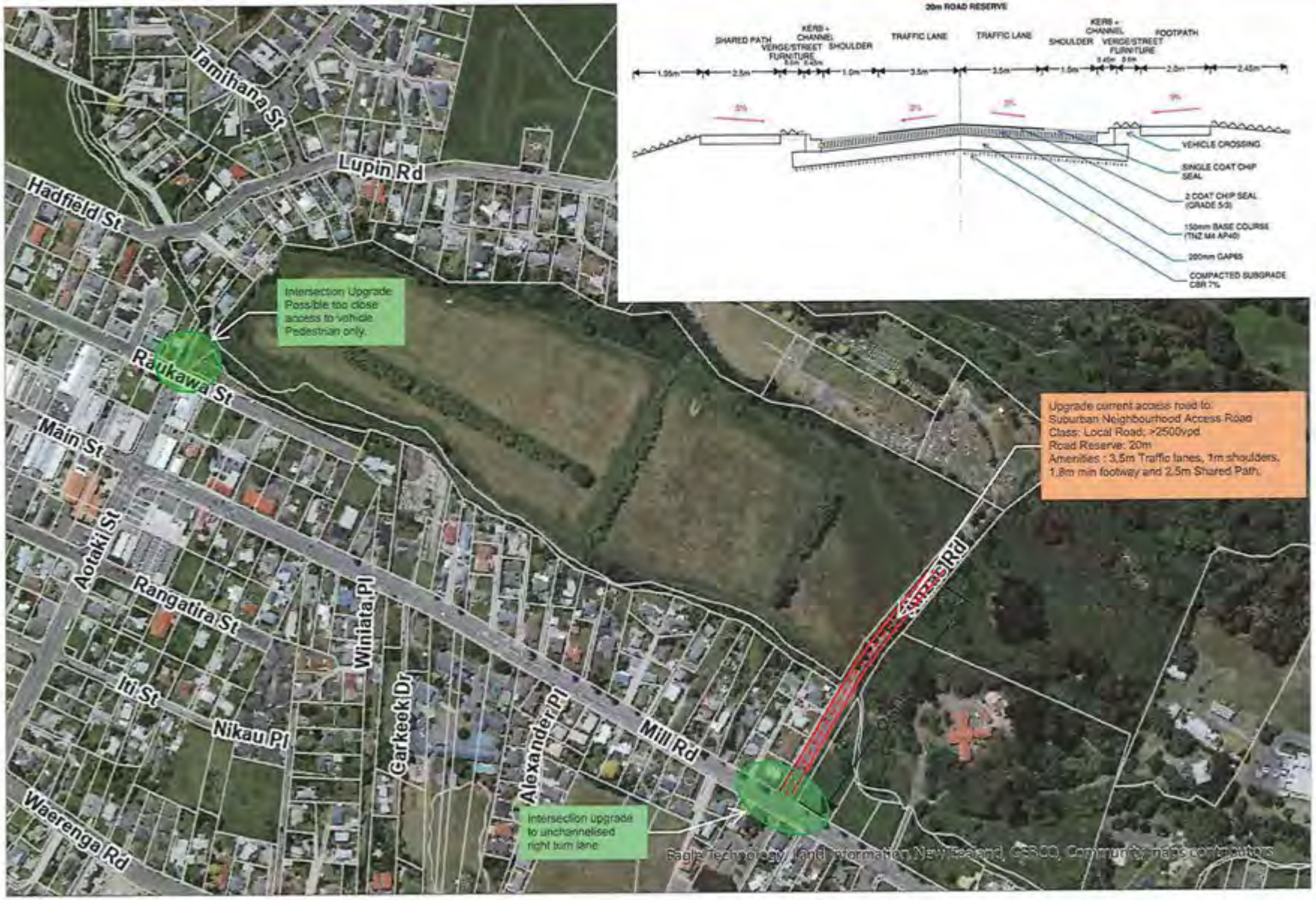
Date Printed: November 9, 2021

Kapiti Coast District Council



Key to map symbols

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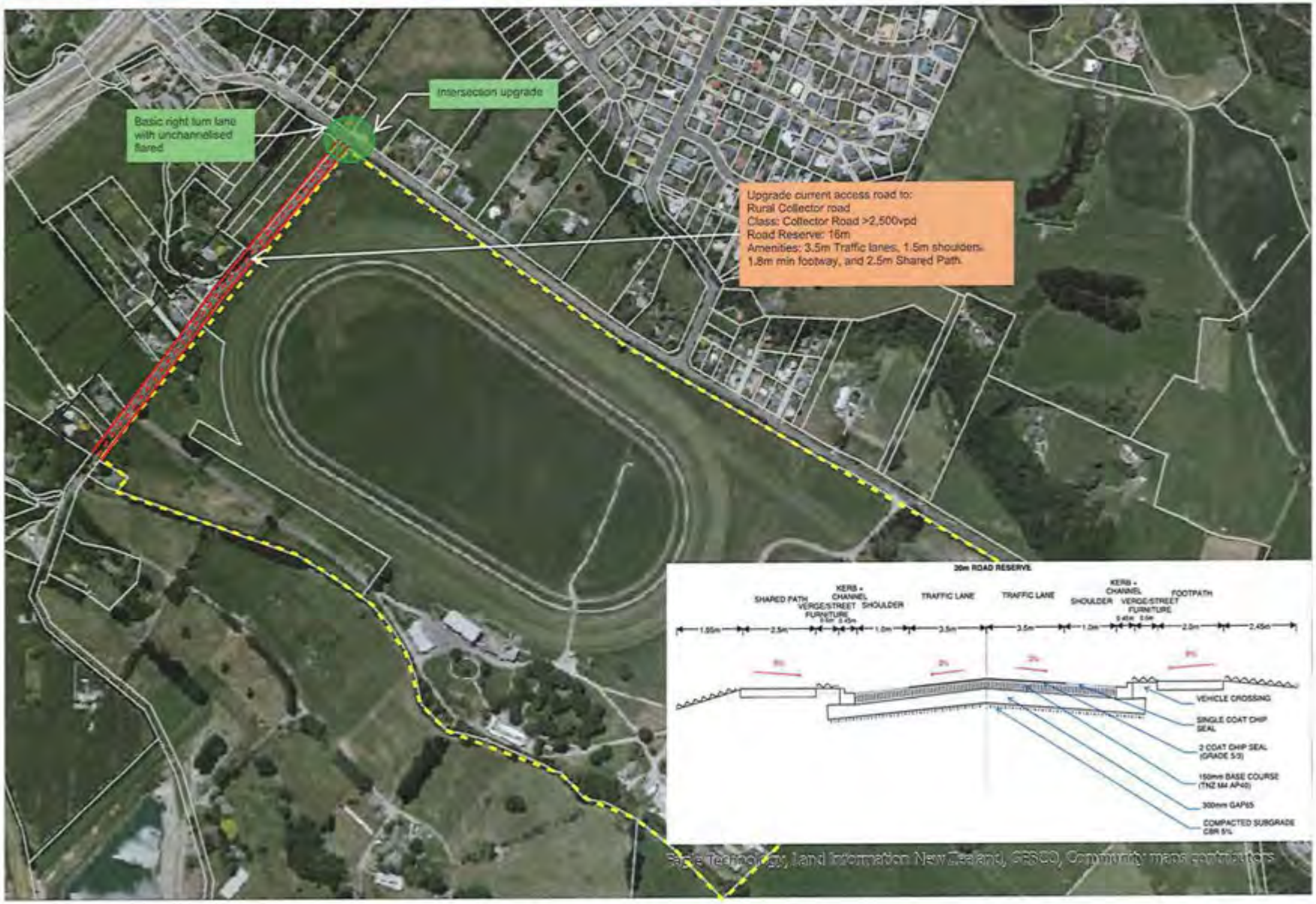
Date Printed: November 9, 2021

Kapiti Coast District Council

Kāpiti Coast DISTRICT COUNCIL



Key to map symbols

- Parcel Boundaries
- Road Names

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Date Printed: November 9, 2021

Kapiti Coast District Council

Key to map symbols

- Gravity main
- Rising main
- Abandoned
- Other
- Culvert
- Open channel
- Stream
- Private SW Pipe
- Development SW Discharge
- Stormwater Rising Main
- Affected KCDC Stream
- Affected GW Stream
- Stormwater Main

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1:25,000

Date Printed: November 9, 2021

Kapiti Coast District Council

Key to map symbols

- Manhole
- Sump
- Soakpit
- Inlet/Outlet
- Other
- Service
- Gravity main
- Open channel
- Stream
- Other
- Manhole
- Sump
- Inlet/Outlet
- Private SW Service
- Private SW Pipe
- Other
- Parcel Boundaries
- Road Names

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Date Printed: November 10, 2021

Kapiti Coast District Council

Key to map symbols

- Manhole
- Sump
- Soakpit
- Inlet/Outlet
- Other
- Gravity main
- Other
- Open channel
- Stream
- Sump
- Private SW Service
- Parcel Boundaries
- Street Numbers
- Road Names

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0 60 120 Metres

1:2,500

Date Printed: November 10, 2021

Kapiti Coast District Council

Key to map symbols

- Manhole
- Sump
- Soakpit
- Inlet/Outlet
- Other
- Service
- Gravity main
- Abandoned
- Other
- Culvert
- Open channel
- Stream
- Other
- Manhole
- Sump
- Soakpit
- Inlet/Outlet
- Other
- Private SW Service
- Private SW Pipe
- Other
- Parcel Boundaries
- Street Numbers
- Road Names

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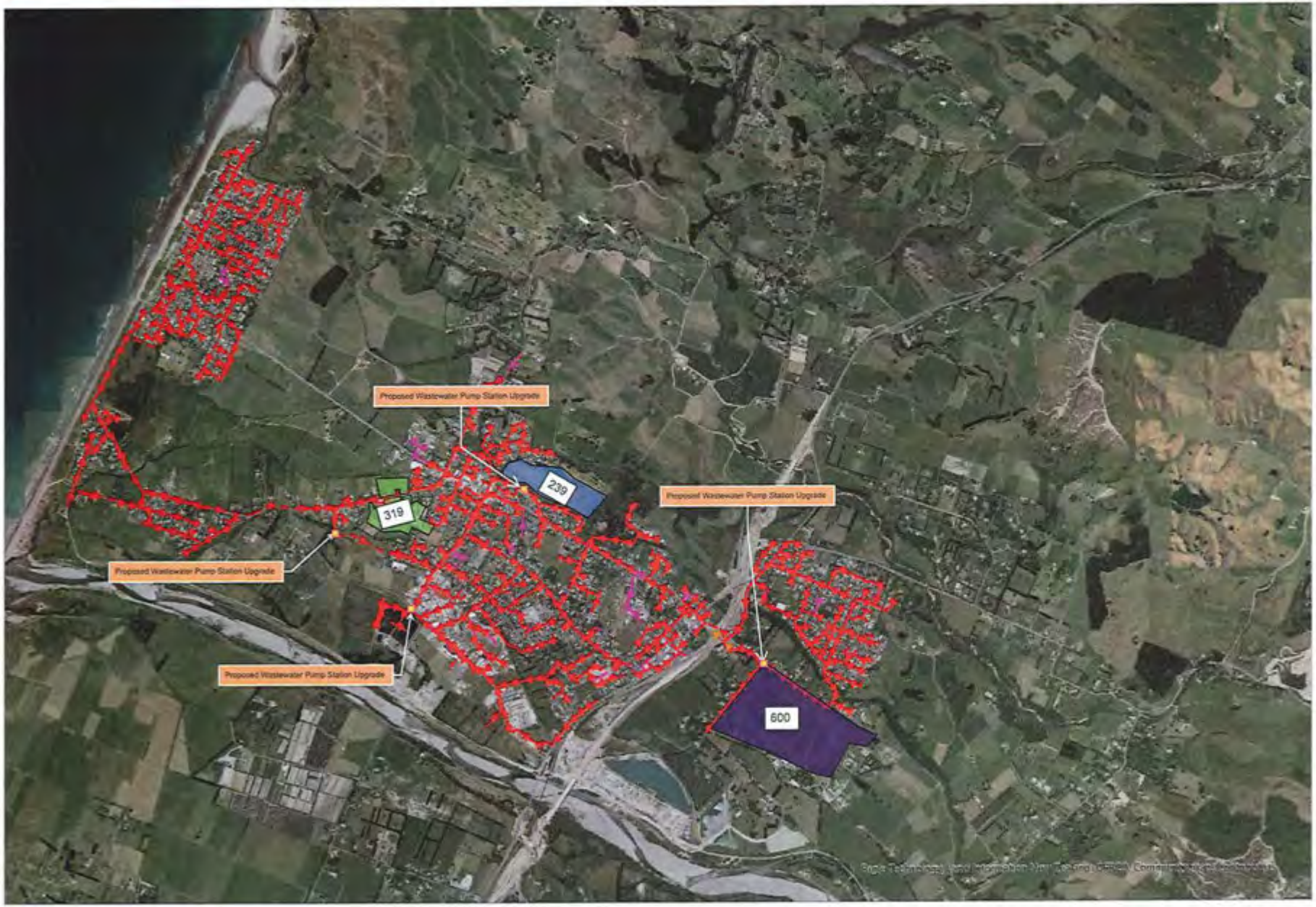
Date Printed: November 10, 2021

Kapiti Coast District Council



Key to map symbols

- Main
- Rising main
- Abandoned
- Other
- Main
- Rising main
- Other
- Water Pumping Station Upgrade

N

0 590 1,180 Metres

1:25,000

Date Printed: November 9, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Other
- WW Service
- Main
- Rising main
- Abandoned
- Other
- Pump Station
- Cleaning eye
- Private WW Service
- Parcel Boundaries
- Road Names
- Water Pumping Station Upgrade

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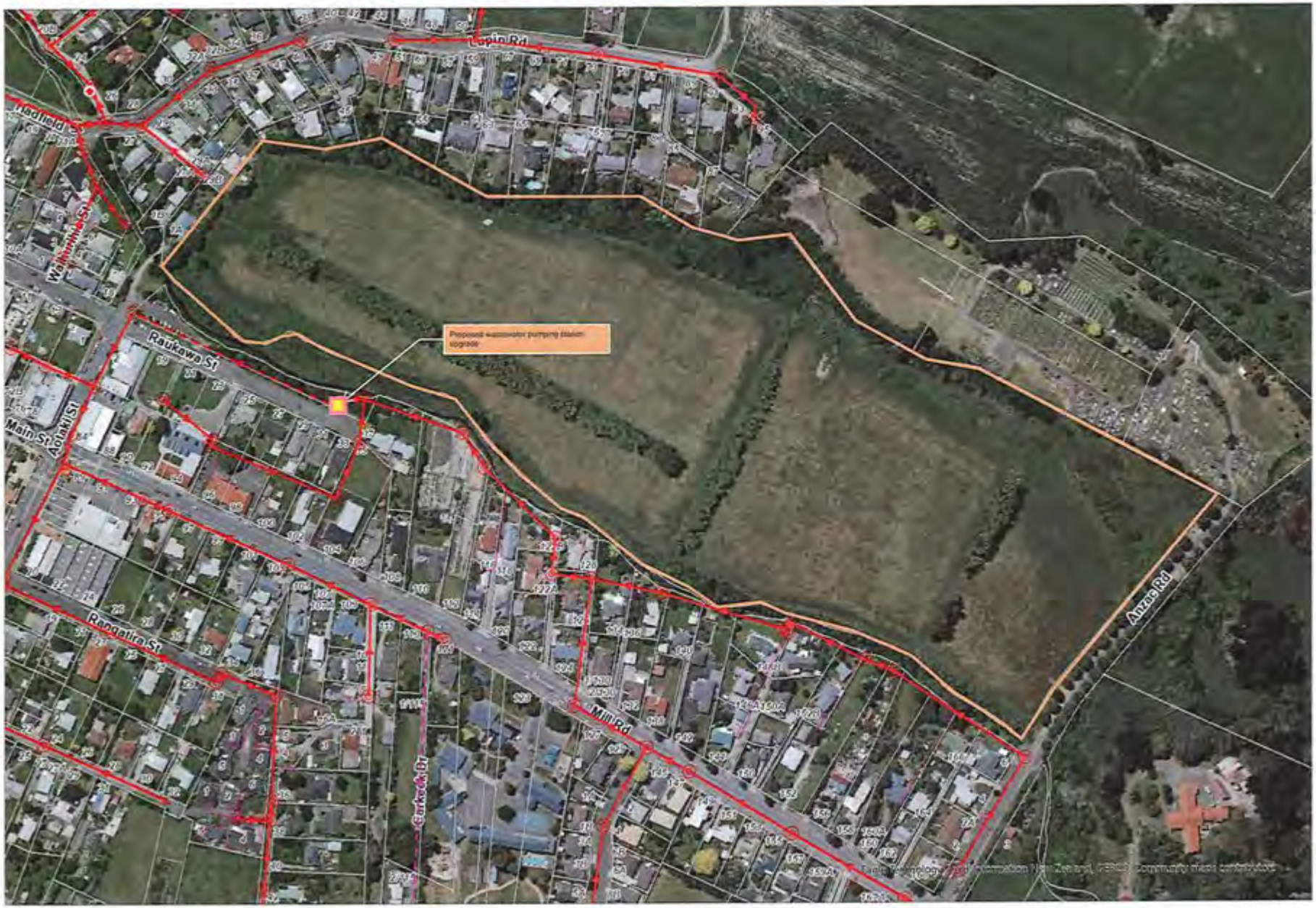
Date Printed: November 10, 2021

Kapiti Coast District Council



Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Other
- WW Service
- Main
- Rising main
- Other
- Pump Station
- Other
- Private WW Service
- Rising main
- Pump Station
- Parcel Boundaries
- Street Numbers
- Road Names
- Water Pumping Station Upgrade

N

0 60 120 Metres

1:2,500

Date Printed: November 10, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Valve
- Other
- WW Service
- Main
- Rising main
- Other
- Pump Station
- Manhole
- Other
- Private WW Service
- Main
- Parcel Boundaries
- Street Numbers
- Road Names
- Water Pumping Station Upgrade

N

0 60 120 Metres

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Date Printed: November 10, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Valve
- Other
- WW Service
- Main
- Rising main
- Abandoned
- Other
- Pump Station
- Other
- Manhole
- Private WW Service
- Main
- Parcel Boundaries
- Street Numbers
- Road Names
- Water Pumping Station Upgrade

N

0 70 140 Metres

1:3,000

Date Printed: November 30, 2021

Kapiti Coast District Council

Key to map symbols

- Manhole
- Other
- WW Service
- Main
- Rising main
- Abandoned
- Other
- Pump Station
- Private WW Service
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN225 Main
- Proposed DN350 Main
- Proposed DN200 Rising Main

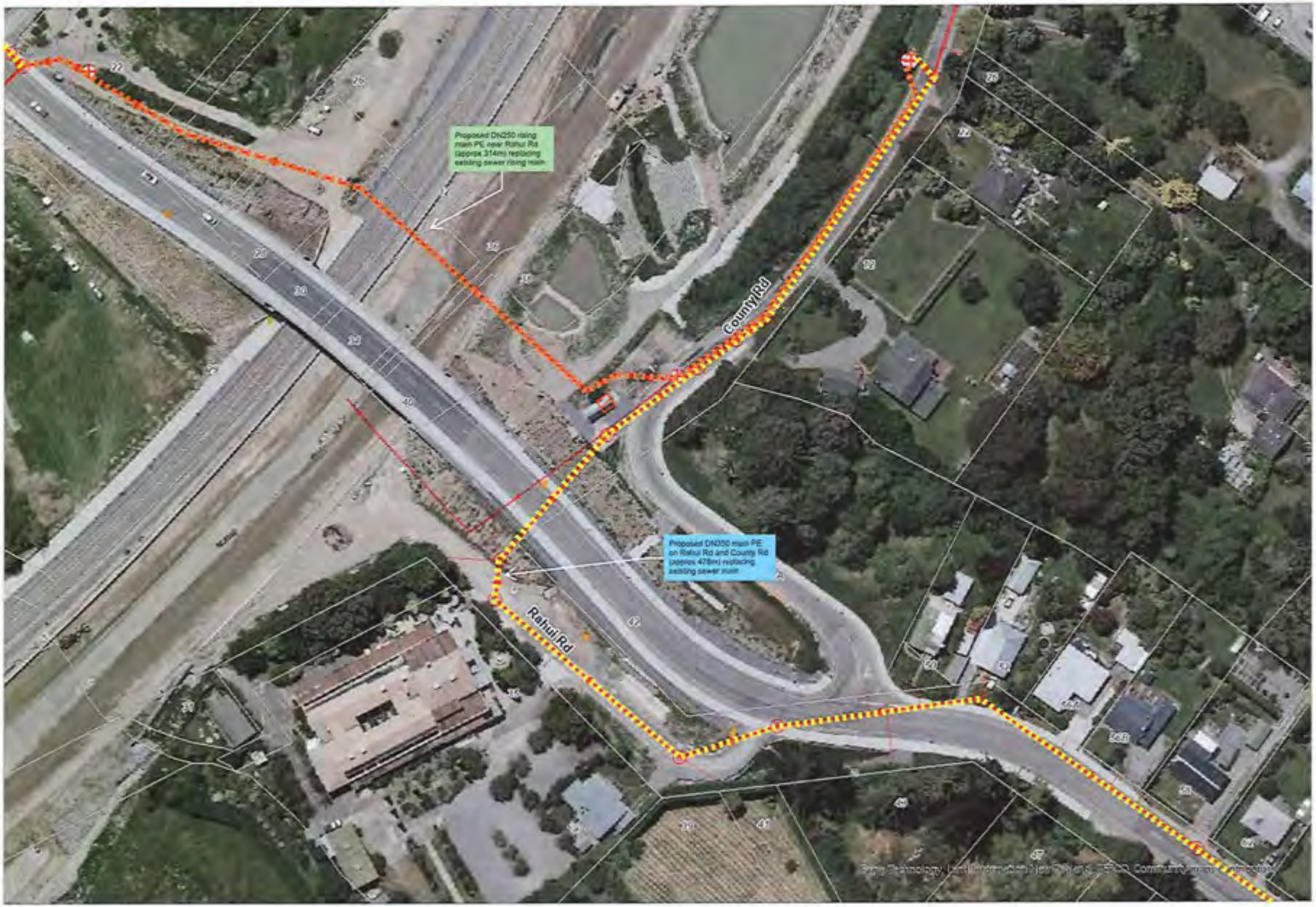
N

0 40 80 Metres

1:2,000

Date Printed: November 23, 2021

Kapiti Coast District Council



Key to map symbols

- Cleaning eye
- Manhole
- Valve
- Other
- WW Service
- Main
- Rising main
- Abandoned
- Other
- Pump Station
- Other
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN350 Main
- Proposed DN250 Rising Main

N

0 20 40 Metres

1:1,000

Date Printed: November 23, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Valve
- Other
- WW Service
- Main
- Rising main
- Abandoned
- Other
- Pump Station
- Other
- Manhole
- Private WW Service
- Main
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN350 Main
- Proposed DN400 Main
- Proposed DN450 Main
- Proposed DN250 Rising Main

N

0 40 80 Metres

1:2,000

Date Printed: November 23, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Valve
- Other
- WW Service
- Main
- Rising main
- Abandoned
- Other
- Pump Station
- Manhole
- Private WW Service
- Main
- Rising main
- Parcel Boundaries
- Road Names
- Proposed DN400 Main
- Proposed DN450 Main
- Proposed DN250 Rising Main

N

0 90 180 Metres

1:4,000

Date Printed: November 23, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Other
- WW Service
- Main
- Rising main
- Other
- Pump Station
- Other
- Private WW Service
- Main
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN400 Main
- Proposed DN450 Main

N

0 40 80 Metres

1:2,000

Date Printed: November 23, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Valve
- Other
- WW Service
- Main
- Rising main
- Other
- Pump Station
- Other
- Private WW Service
- Rising main
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN300 Main
- Proposed DN200 Rising Main

N

0 60 120 Metres

1:2,500

Date Printed: November 26, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Other
- WW Service
- Main
- Rising main
- Other
- Pump Station
- Other
- Manhole
- Pump station
- Other
- Private WW Service
- Main
- Rising main
- Pump Station
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN300 Main
- Proposed DN450 Main
- Proposed DN200 Rising Main
- Proposed DN250 Rising Main

N

0 40 80 Metres

1:2,000

Date Printed: November 23, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Valve
- Other
- WW Service
- Main
- Rising main
- Abandoned
- Other
- Pump Station
- Other
- Manhole
- Pump station
- Private WW Service
- Main
- Rising main
- Pump Station
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN450 Main
- Proposed DN250 Rising Main

N

0 70 140 Metres

1:3,000

Date Printed: November 23, 2021

Kapiti Coast District Council

Key to map symbols

- Cleaning eye
- Manhole
- Pump station
- Valve
- Other
- WW Service
- Main
- Rising main
- Other
- Pump Station
- Other
- Manhole
- Other
- Private WW Service
- Main
- Parcel Boundaries
- Street Numbers
- Road Names
- Proposed DN200 Main
- Proposed DN225 Main
- Proposed DN200 Rising Main

N

0 80 160 Metres

1:3,700

Date Printed: November 26, 2021

Kapiti Coast District Council

Key to map symbols

- Service
- Fire Service
- Rider Main
- Reticulation Main
- Trunk Main
- Other
- Abandoned
- Ws Plant - Polygon
- Service
- Fire Service
- Rider Main
- Reticulation Main
- Other
- DN300 PIPE
- DN200 PIPE
- DN150 PIPE
- DN200 RISING MAIN

N

0 590 1,180 Metres

1:25,000

Date Printed: November 9, 2021

Wellington Office

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MEMO

TO: **Sean Mallon**
FROM: **Nick Urlich**
DATE: **8 March 2023**
SUBJECT: Otaki Reservoir Property Acquisition Site Selection

This memo relates to proposed Otaki Reservoir Site

Background

A new water storage reservoir has been planned in Ōtaki for many years and was identified as a Capital project in the 2009 LTCCP. A reservoir for Ōtaki has been a Council and Ōtaki Community consideration since the mid 1990's.

On 12 MAY 2011 at PUBLIC EXCLUDED meeting relating to the ŌTAKI RESERVOIR CAPACITY AND SITE SELECTION, consideration was given to the capacity and site options for the proposed Ōtaki Water Supply Reservoir and the Site Option 1 (known as No.75 Te Manuao Road) represented the least total cost and has the lowest NPV over 30 years.This site is on the same parcel of land as the current proposed reservoir site but at a higher contour level.

There have been a series of reports across many years with the most recent Robert Bird - Eligible Infrastructure Services Planning Report -16 December 2021. The follow-up to this report was a Funding Agreement between Kāinga Ora and the Recipient dated 14 July 2022.

The table below sets out the expected annual payment profile of IAF funding with approximately **$6 million** allocated for the Otaki reservoir between 22/23, 23/24 and 24/25.

Financial Year	Original IAF	Variation 1 - Dec 2022
22/23	$860,000	$2,252,600
23/24	$4,825,000	$6,052,300
24/25	$8,600,000	$1,947,000
25/26	$6,072,000	$65,000
26/27	$8,216,000	$7,9508,00
27/28	$727,000	$11,032,300
	$29,300,000	$29,300,000

Why build a reservoir

- Storage for emergency and high demand times
- Ensure water quality compliance
- Ensure Resource Consent Compliance
- Operational Resilience
- Improved response to issues at Water treatments plants
- Improved response to issues in the reticulation
- Provide sufficient water to meet fire-fighting requirements
- Energy efficiency
- Avoid pumping at peak times and reducing maximium pumping rate

A water supply storage reservoir in Ōtaki will provide;

- a similar level of service: as provided to other District water supply networks;
- significant improvement to security of water supply: water will be supplied to customers from the reservoir by gravity flow and independent of electric power;
- emergency water supply: currently not provided. Will provide Ōtaki with a water storage volume for normal daily demand whilst providing improved fire fighting protection and availability of water during emergency and natural disaster situations;
- operational flexibility: allows water zones to be isolated for repair without affecting other water customers in the wider network;
- improved energy management: water can be treated and pumped during cheaper night time power rates leading to reduced long term operational costs;
- improved treatment opportunities: treated water from separate bore supplies can be abstracted during night time power rates and stored in one combined storage volume;
- reduced load on pipe infrastructure: reservoir will supply consistent pressure by gravity to customers during high daily demand periods;
- improved consistency with water quality (taste): improved water circulation and treatment balance within a storage reservoir;
- water quality: Council will be able to meet the Taumata Arowai drinking water apply standards and assurance rules.

Site Selection Outcomes

- Maintaining existing pumping arrangements
- Maintaining or improving existing level of service
- Minimise lowering pressure to existing properties, undesirable below 25m
- Avoiding increasing pressure to mitigate corresponding increase in leakage and reduction in asset life
- Minimising immediate upgrades to network to facilitate operability or reservoir
- Future proofing design to accommodate increases in population/demand
- Meeting desired fireflows.
- Sized to providing adequate storage (5,500 m3)

Preferred Site

- Sweet spot for new reservoir at 46 m contour level with a top water level of 52.0m as modelled by Stantec
- Existing Water Treatment plants at Tasman Rd and Rangiuru Rd pump into the network with a pressure of about 55 metres pressure head.
- Design pressure between 250kPa and 900kPa (25m to 90m head) at the point of supply.
- Improved fire flow from 60 l/s to 100-150 l/s
- Head losses on all principal mains remain under 5m/km with the addition of the new reservoir

Site Selection Process

Review of historic reports including ,

- SKM OTAKI RESERVOIR OPTIONS DRAFT v1.1 (3 December 2007)
- STANTEC - KAPITI COAST WATER MODELLING PHASES 4+5 - WATER NETWORK DEVELOPMENT PLAN - January 2017
- Stantec - Otaki Master Plan Update v3 -July 2019
- Robert Bird -Eligible Infrastructure Services Planning Report -16 December 2021

Multicriteria Analysis

Issue to consider	Criteria	Breakdown	Total
Delivery of Strategic Outcomes	**Resilience- Operational and Strategic for new developments and existing residential areas**	Does it meet the operational (business as usual) and strategic (emergency) needs of the hospital?	**40%**
		Is service access free of hazards?	
Constructability	**Construction and Operation**	Access to existing services to support reservoir function and service	**20%**
		Access to the site to construct, operate, maintain, repair and renew reservoir and/or support services	
	Geotech	Site suitability and constructability	**10%**
	Ownership/Cultural heritage	Ownership	**10%**
		Cultural and/or heritage values associated with the land	
Impact on the Environment	**Environmental**	Ecology Impact	**20%**
		Landscape and/or visual impact	
		Recreational impacts	
		Construction and operation impacts, noise, dust, light, discharges	

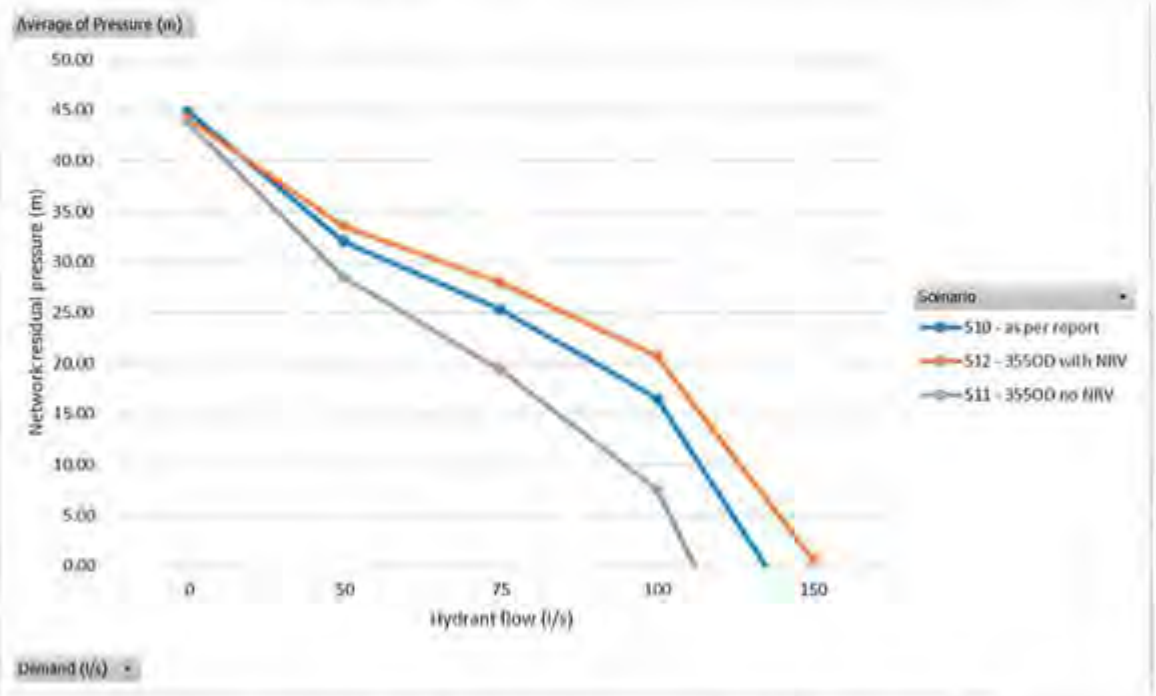
Why not other sites

- Very limited sites on the 46m contour close to reticulation that are not on steep ground
- The further away from County Road Pump Station requires larger pipes to minimise pressure losses in pipelines
- Other sites are within the flood zone or across the river so are less resilient.

Reservoir Level Selection - Modelling

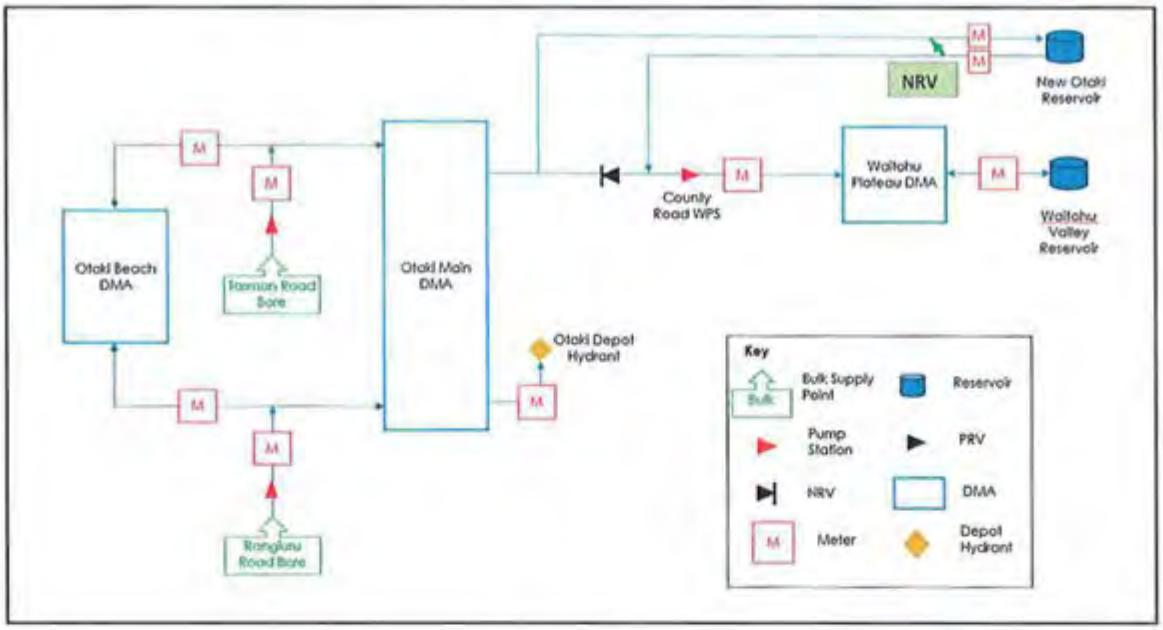
Methodology:
Stantec provided a report with outcomes in terms of pressures, flows and available fire flows based on the following

1, Update the Otaki current peak-day demand in the model
2, Develop a growth scenario for 2051.
3, Develop two supply scenarios to meet the increased demand:
   a. Tasman and Rangiuru continue at current supply levels, a new source near the existing Otaki river bridge will supply the balance.
   b. Tasman and Rangiuru decommissioned, all wqater delivered from new source near the existing Otaki river bridge.
4. In these scenarios, we will check the following configuration:
   - S10 – outlet 350mm ID, inlet main 250mm ID, as per report recommendations.
   - S11 – inlet and outlet mains both 303mm ID (355OD , PE100 SDR 13.6), no NRV connecting inlet and outlet.
   - S12 – inlet and outlet mains both 303mm ID (355OD , PE100 SDR 13.6), NRV connects inlet and outlet 5.

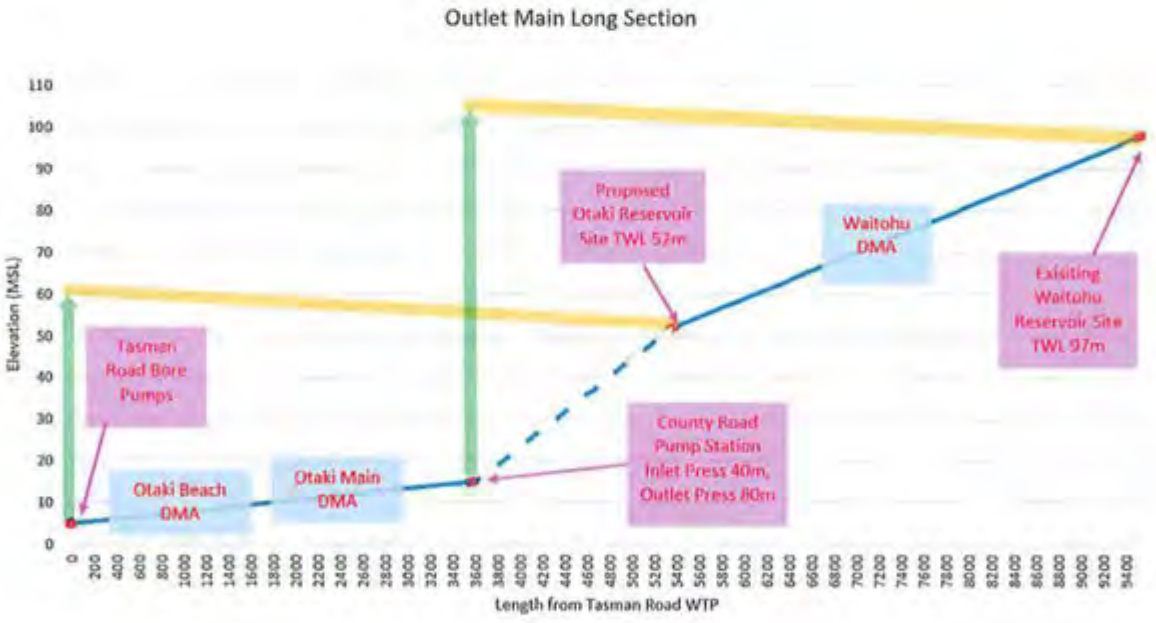


The modelling report concluded that the new reservoir with 300DN inlet and outlet mains connected with a NRV (non-return valve) at the reservoir would provide acceptable pressures and fire-flows and sufficient to replenish the reservoir if the network is run at 56m HGL. Flow into the reservoir is up to 30-35 l/s in all scenarios.

Network Schematic

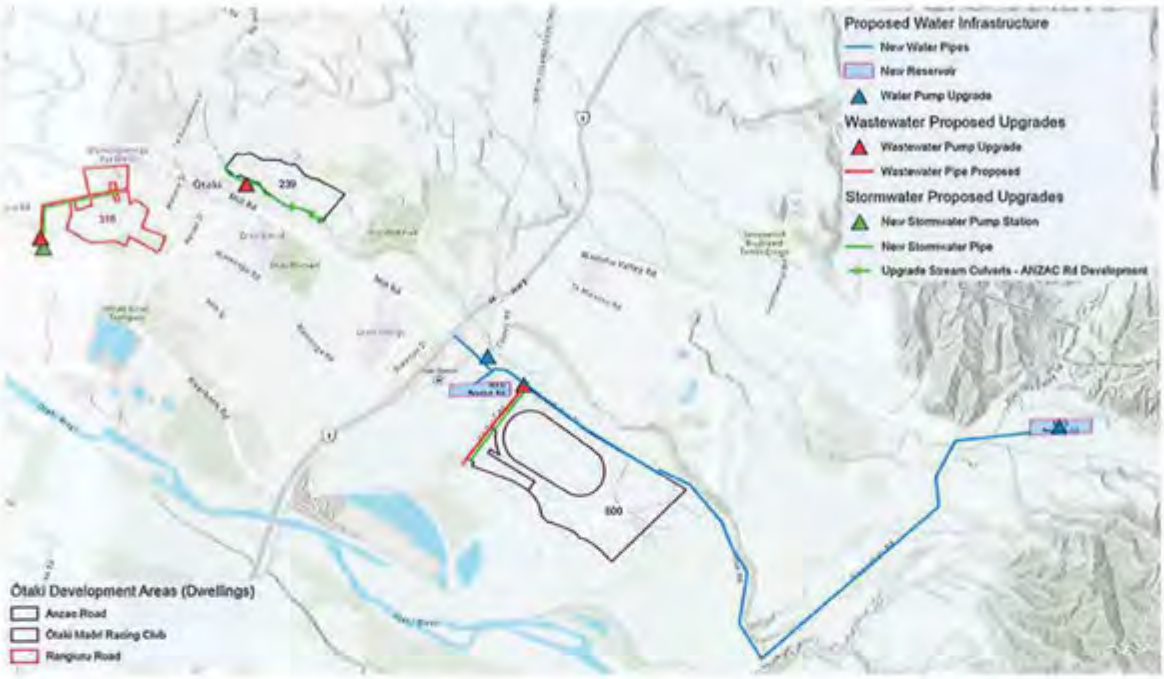


Network Elevation and Pumping Hydraulic Grade line

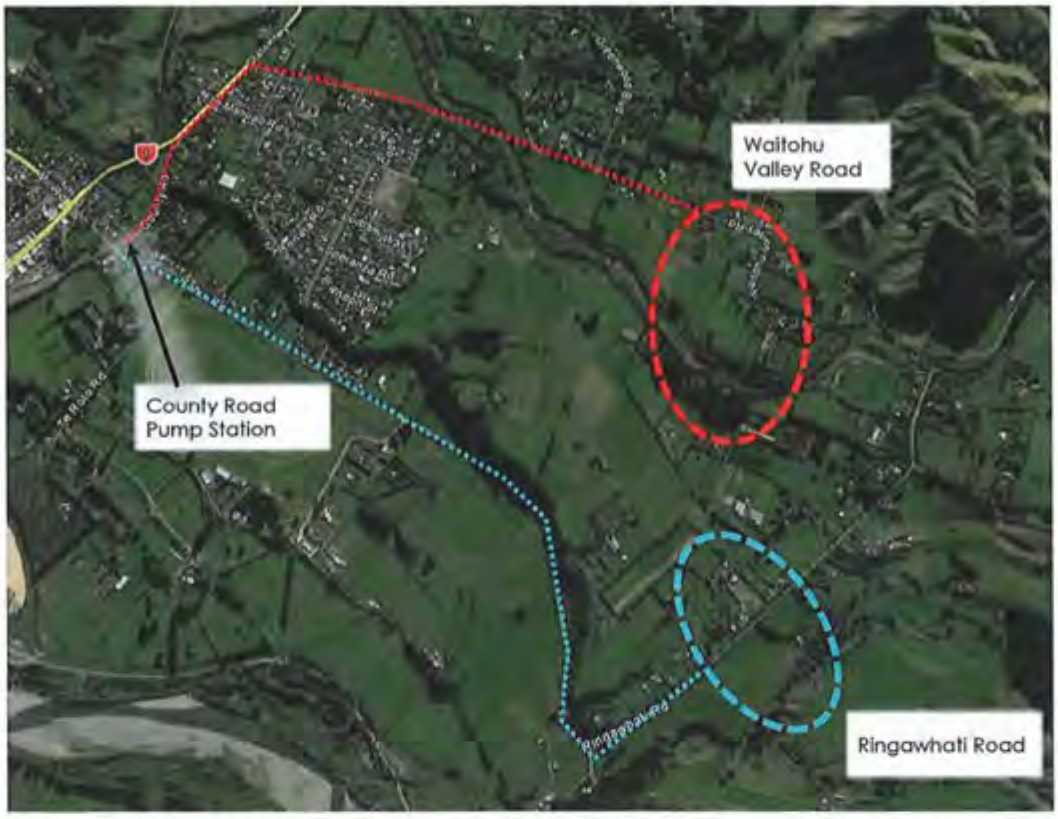


Robert Bird -Eligible Infrastructure Services Planning Report -16 December 2021

The new 5.5ML reservoir (Ringawhati Road) is proposed to have a dedicated rising main (inlet) from the County Road pumping station and Non-Return Valve

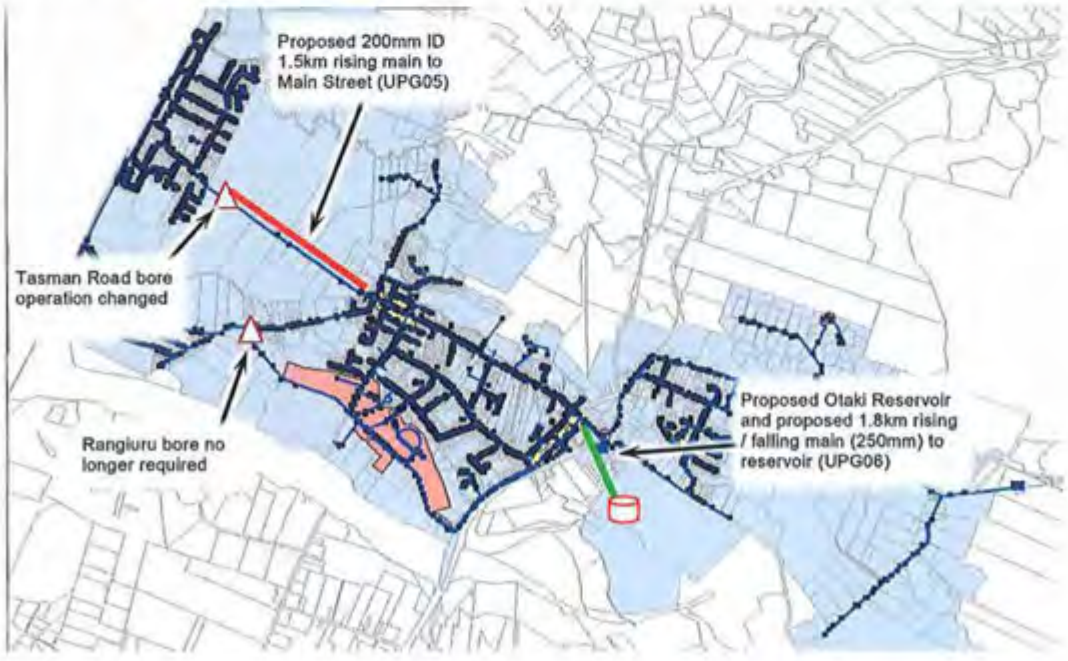


Stantec - Otaki Master Plan Update v3 -July 2019



STANTEC - KAPITI COAST WATER MODELLING PHASES 4+5 - WATER NETWORK DEVELOPMENT PLAN - January 2017

For storage purposes, a reservoir of 2,500m3 is required. After some trial and error a ground elevation of 47.5m was selected, with a reservoir depth of 3m providing a top water level of 50.5m.



SKM OTAKI RESERVOIR OPTIONS DRAFT v1.1 (3 December 2007)

Kapiti Coast District Council (KCDC) commissioned Sinclair Knight Merz (SKM) to investigate options for siting a new service reservoir for Otaki.

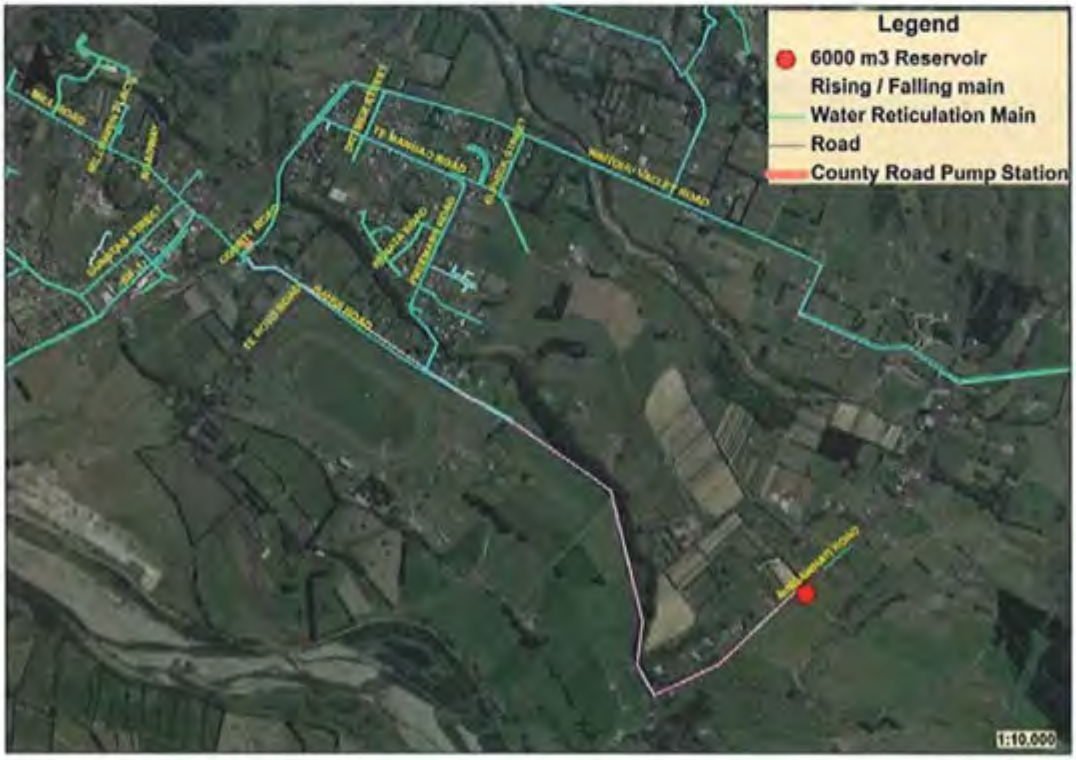
Option 1 - Northwest of the junction of SH1 and Waitohu Valley Road - Height at 45m MSL.

Option 2 South of the Otaki River 100 metres south of the junction of Old Hautere Road and Otaki Gorge Road

Option 3 located on the 67.5 m RL contour line at the end of the private road off Te Manuao Road

Option 4

The reservoir is located on the 67.5m RL contour line at 4, Ringawhati Road



Mayor and Councillors
CORPORATE BUSINESS COMMITTEE **12 MAY 2011**

Meeting Status: **PUBLIC EXCLUDED**

Purpose of Report: For Decision

ŌTAKI RESERVOIR CAPACITY AND SITE SELECTION

The reason for this report being considered in Public Excluded is:

General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Grounds under Section 48(1) for the passing of this resolution
Private land selection and associated acquisition process for the new Ōtaki Water Supply Reservoir.	Section 7(2)(i)-to enable the local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a): that the public conduct of the whole or the relevant part of the proceedings of the meeting would be likely to result in the disclosure of information for which good reason for withholding would exist.

PURPOSE OF REPORT

1 The purpose of this report is to consider the capacity and site options for the proposed Ōtaki Water Supply Reservoir.

SIGNIFICANCE OF DECISION

2 The Council significance policy will not be triggered by this report.

BACKGROUND

3 The water supply in Ōtaki is currently sourced from two groundwater bores near Ōtaki Beach.

Refer Appendix A: Map of Ōtaki Water Supply Network.

4 The groundwater is treated at point sources of abstraction and is pumped to the reticulated network at significant cost. A small proportion is pumped with a 94m lift, to a small 0.7 mega litre (ML) reservoir, 7km away in the Waitohu Valley. The reservoir provides water storage by gravity supply to the higher Plateau Zone only. The lower Beach Zones receive pump pressure supply from two groundwater bore pumps.

5 An engineering report completed in 2007, recommended a 6ML (1ML = 1000m3) water storage reservoir to meet the current and future projected water demands for the Ōtaki supply network. The reservoir needs to be constructed at a level of 68m above sea level to maintain the required minimum water pressure.

6 A new water storage reservoir has been planned in Ōtaki for many years and was identified as a Capital project in the 2009 LTCCP. A reservoir for Ōtaki has been a Council and Ōtaki Community consideration since the mid 1990's.

7 The 2009 LTCCP included funding of $5.6M for a new 6ML Ōtaki reservoir. The funding was allocated before a preferred site had been determined and was based on an assumed connecting infrastructure cost of $1M.

8 The Council currently operates and maintains water supply reservoirs within all of the District water supply networks, except for Ōtaki. A water supply storage reservoir in Ōtaki will provide;

- **a similar level of service:** as provided to other District water supply networks;
- **significant improvement to security of water supply:** water will be supplied to customers from the reservoir by gravity flow and independent of electric power;
- **emergency water supply:** currently not provided. Will provide Ōtaki with a water storage volume for normal daily demand whilst providing improved fire fighting protection and availability of water during emergency and natural disaster situations;
- **operational flexibility:** allows water zones to be isolated for repair without affecting other water customers in the wider network;
- **improved energy management:** water can be treated and pumped during cheaper night time power rates leading to reduced long term operational costs;
- **improved treatment opportunities:** treated water from separate bore supplies can be abstracted during night time power rates and stored in one combined storage volume;
- **reduced load on pipe infrastructure**: reservoir will supply consistent pressure by gravity to customers during high daily demand periods;
- **improved consistency with water quality (taste):** improved water circulation and treatment balance within a storage reservoir;
- **water quality grading:** Council will be able to apply to Regional Public Health for the Ōtaki water supply to be graded.

CONSIDERATIONS

9 To provide adequate pressure to maintain minimum levels of service; a reservoir needs to be located at a height that provides optimum efficiency when filling, while not exceeding maximum allowable pressures.

10 Since 2007, considerable investigations works have been undertaken to determine the optimum site for the proposed new Ōtaki reservoir, taking into consideration height, pressures, infrastructure costs etc. This work has included extensive network modelling. The project team considered a total of seven possible reservoir sites for selection.

11 In 2008, two sites were eliminated early due to their inappropriate contour level and inability to deliver minimum water pressure. In 2010, a further two sites were eliminated due to fatal flaws with outstanding landscape consenting issues and geotechnical issues.

12 Three sites progressed and were evaluated with a multi criteria assessment method using the following criteria:

- landscape and visual impacts;
- geotechnical appraisal;
- resource management consenting issues;
- archaeological;
- ability to mitigate visual impact;
- contour level to achieve minimum water pressure.

13 The three site options have also been compared against operational costs.

14 Refer Appendix B: Aerial photo showing site option locations.

15 Engineering cost estimates for a 6ML reservoir at the three site options range from $7.2M to $9.0M. Cost estimates for a 4ML reservoir at the three sites range from $5.8M to $7.6M.

16 The construction of a 4ML storage reservoir would meet Ōtaki water demand through to year 2040 with a second reservoir constructed on the site at that time to meet future demand.

17 The staging of the reservoir construction allows for all the proposed benefits but at a lower initial cost.

18 The proposed introduction of universal water metering would extend the capacity of the new reservoir by an additional 10 years.

19 All three site options have been selected to allow for future storage expansion.

Refer Appendix C: Site plan of reservoir layout and staging.

SITE CONSIDERATIONS

Site Option 1

20 Site Option 1 is known as No.75 Te Manuao Road and is located beyond the end of Te Manuao Road. The site is located on vacant farm land accessed via a private ROW. The land parcel is 22ha and privately owned by Wellington based company Cabrach Holdings Ltd. The legal property description is: LOT 2, DP 427946, C/T 510970.

21 The site selected is a 1ha block within the 22ha land parcel. The north western site boundary is located within close proximity to existing water infrastructure and is at the required 68m contour level.

22 A new 2.3km pipeline is required to connect the County Rd pump station to the proposed reservoir. The pipeline can be installed along Te Manuao Rd to the proposed site.

23 The property and surrounding area is zoned Rural and is planned for a future lifestyle property subdivision. Site Option 1 will reduce the area of one available lifestyle Lot from the future subdivision.

24 Site Option 1 will require visual mitigation as it is in direct line of sight from the state highway.

Refer Appendix D: Visual screening montages.

25 Initial contact with the landowner was through an appointed representative and Trustee (Trustee for Cabrach Holdings Ltd.). The appointed Trustee indicated that the Trust had a strong willingness to negotiate on the property site being used for a water reservoir.

26 Cabrach Holdings Ltd Trust withdrew from negotiations in May 2010, after two of the Trustees voted to oppose the site being used for a new reservoir. The grounds for opposition was; the reservoir utilising one of the 'better lifestyle Lots' within the proposed subdivision.

27 The proposed reservoir could supply water to any future property subdivision.

Site Option 2

28 Site Option 2 is located on Ringawhati Road on vacant farm land. The site selected is a 1Ha block near the north western property boundary and is located at the required 68m contour level.

29 Site Option 2 is not well located for water supply due to its distance from the existing water network. A new 3.7km pipeline is required to link to the County Rd water pump station with the site along Rahui Rd.

30 The site is part of a privately owned farm and contact to date indicates a willing vendor.

31 Site Option 2 will require visual mitigation as it is in direct line of sight from Ringawhati Rd. The visual mitigation proposed is similar to Site Option 1.

Refer Appendix D: Visual screening montages.

Site Option 3

32 Site Option 3 is located on Council owned property adjacent to the existing Waitohu Reservoir. The contour level at the site is 94m.

33 Pumping to this site will be an inefficient use of energy. Site Option 3 is 26m higher than required and has the highest operational pumping cost. Pipeline infrastructure will need to include a pressure reduction valve to drop the additional 26m of water pressure before supply to the Beach Zones.

34 Option 3 was once the site of the historic Ōtaki water treatment plant. Council still own the land at this site.

35 A new 4.7km pipeline is required to link to the County Rd water pump station with the site along Waitohu Valley Rd.

General Site Related Issues

36 All three sites have similar geotechnical profiles and do not present any concerns.

37 Earth bunding and planting can be used to screen the new reservoir from public view at Site Options 1 and 2. Site Option 3 is unlikely to require visual mitigation.

Site Cost Comparison

38 A 4ML storage volume can be constructed in 2013/14 with an allowance for a second reservoir to be constructed alongside the first,

39 The capital cost of a 4ML reservoir for each site option is set out in Table 1.

Table 1: 4ML Reservoir Costs and Programme

Site Option	Reservoir Volume Capacity	Land Acquisition & Consenting	Design, Tendering, Award & Start Construction	Complete Reservoir Constructio n		

1	4ML	$450K	$2,000K	$3,200K	$5,750K	$6 . 0M
2	4ML	$450K	$3,300K	$3,200K	$7,050K	$7 . 3M
3	4ML	$100K	$4,200K	$3,200K	$7,600K	$8 . 0M

40 The difference in cost associated with each site relates to connecting pipeline costs. Pipeline infrastructure is required to connect the proposed water reservoir to the existing network in order for treated water to be gravity supplied back to the Ōtaki network. Refer Table 2 for comparison of pipeline capital and operational pumping costs.

Table 2: Capital Pipeline & Operational Pumping Costs:

Site Option	Pipeline Length	Capital Pipeline Cost	Operational Pumping Costs
1	2.3km	$2.0M	$6. 9K/yr
2	3.7km	$3.3M	$7. 0K/yr
3	4.7km	$4.2M	$10. 0K/yr

Land Acquisition Process

41 The Public Works Act (PWA) allows for compulsory property acquisition for critical public infrastructure. The process can be used to acquire land from unwilling or willing vendors and provides a useful mechanism for land purchase of either site option. The land transfer process under the PWA can take 4 months to approximately 2 years.

42 The purchase of Site Option 1 would likely require use of the PWA because the landowner has previously indicated their un-willingness for the reservoir to be constructed on their land.

43 Before the Council may take any land compulsorily for public works, it must serve notice of its intention on the owner of the land and the District Land Registrar. The Council must then make reasonable endeavours to negotiate in good faith with the owner for a period of at least 3 months to try to reach agreement about purchase of the land for an appropriate level of compensation.

44 If negotiation does not result in agreement with the owner, the Council may survey the land and give notice to the owner and the public of the Council's intention to take the land. The notice must state the reasons why the Council considers the taking of the land to be reasonably necessary for the public work. The owner may object to the taking, and any objections are heard and determined by the Environment Court. The Environment Court considers the Council's objectives and the adequacy of consideration of alternatives before making its decision.

Programme

45 The proposed programme is for Land Acquisition and Consenting in 2011/12, Design, Tendering, Award & Starting Construction in 2012/13, Construction completion in 2013/14.

Legal Considerations

46 Legal costs have been budgeted for in each option. A willing buyer, willing vendor agreement is expected to minimise timeframes and legal costs.

Delegation

47 The decision to acquire land under the Public Works Act needs to be made by the Council. A conservative approach has been adopted in the present case, and the final decisions on the recommendations in this report will be made by the Council rather than the Corporate Business Committee.

Financial Considerations

48 The Ōtaki reservoir project is currently funded across three years commencing in 2011/12 with proposed Land Acquisition and Consenting, followed by Design and Tendering in 2012/13, and Reservoir Construction in 2013/2014. The funding for 2011/12 has been included within the draft 2011/12 Annual Plan.

49 The Draft 2011/12 Annual Plan has a budget of $450K which is based on proceeding with a 4ML reservoir at Site Option 1 or 2.

50 Site Option 1 represents the least total cost and has the lowest NPV over 30 years.

Consultation

51 There has been consultation on the proposal for a new reservoir within the Ōtaki water supply network through the 2006 and 2009 LTCCP process. The current Annual Plan process also includes the Ōtaki reservoir project.

Policy Implications

52 There are no policy issues for Council.

Publicity Considerations

53 A communication plan will be prepared and followed for each project stage, subject to the report and resolutions being released.

RECOMMENDATIONS

54 That the Committee recommend the following to Council:

54.1 That the Council approve construction of a 4ML water storage reservoir for the Ōtaki water supply network.

54.2 That the Council approve Site Option 1 (75 Te Manuao Rd) as the preferred site.

54.3 That the Council delegate to the Property Purchase Subcommittee power to proceed with the purchase of Site Option 1 for a new Ōtaki water supply reservoir with a land area of approximately 1ha, together with all easements (including rights of

way) and other rights and interests necessary for access to, and the construction operation and maintenance of the water supply reservoir.

54.4 That the Council approve invoking the Public Works Act processes to compulsorily acquire Site Option 1, together with all necessary easements and other rights and interests as referred to 52.3 above, and delegate to the Chief Executive the power to issue and serve all necessary notices and take all necessary statutory steps in relation to the compulsory acquisition.

54.5 That the report and minutes be released from public excluded.

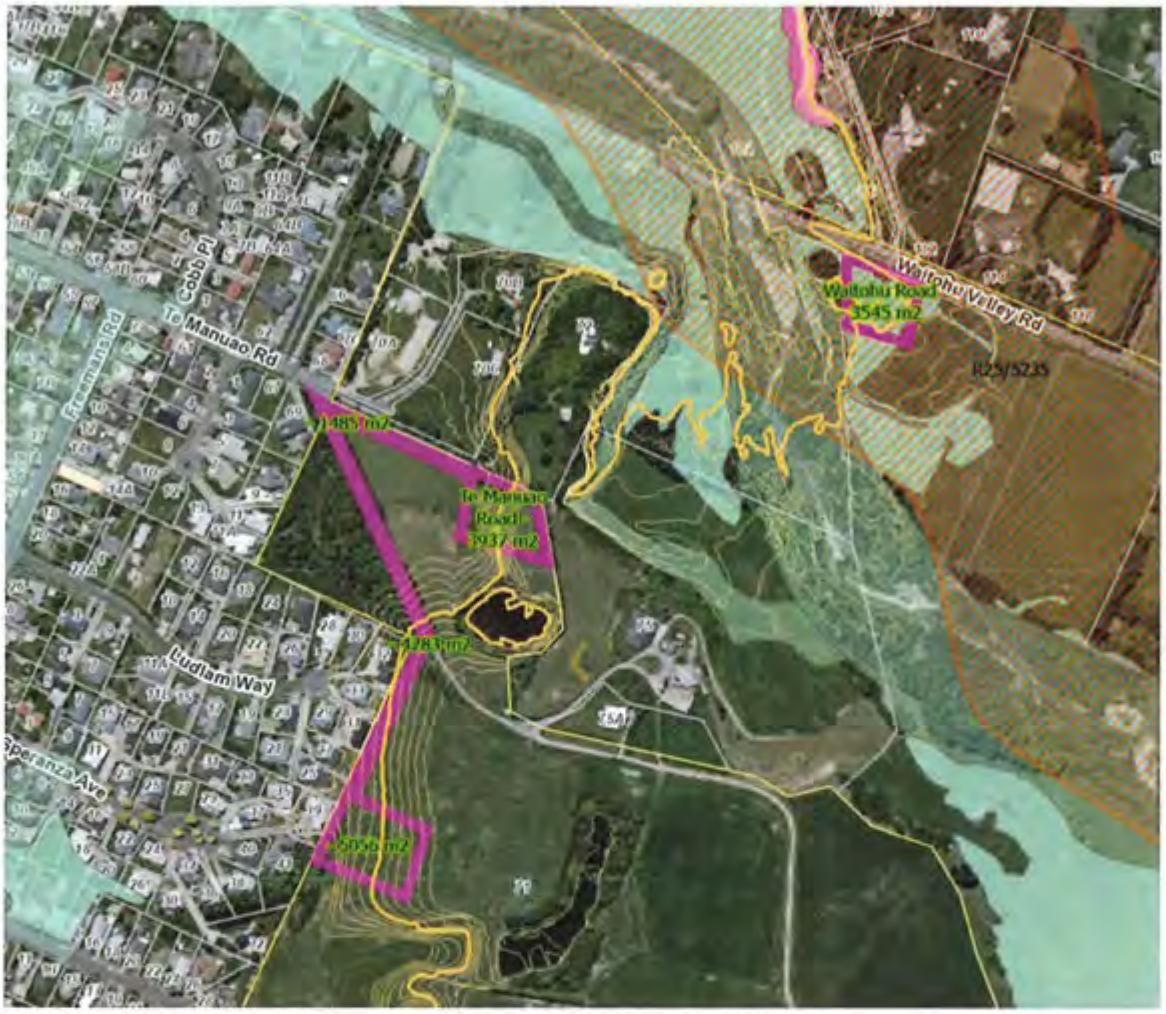
Report prepared by:	**Approved for submission by:**
Travis Wood **WATER & WASTEWATER ASSET MANAGER**	**Sean Mallon** **GROUP MANAGER INFRASTRUCTURE SERVICES**

ATTACHMENTS:

Appendix A:	Map of Ōtaki Water Supply Network
Appendix B:	Aerial photo showing site option locations
Appendix C:	Site plan of reservoir layout and staging
Appendix D:	Visual screening montages

Site	Site Name	Site Assumptions
1	1 - Waitohu Road (46m)	Land will need to be acquired to access a site that is at the appropriate contour. Access will be via Waitohu Road. Comparative Length of pipework 1.9KM The site has access to Electricity The overflow of the reservoir mis close to the stream. Assessed on the basis that a new inlet/out main will be installed Site may have potential for new WTP as a deep bore was drilled in adjacent boundary Good Connectivity for future HL reservoir The Site is in the Flood Hazard Zone The site is in the Water Protection Zone
2	2 -Te Manuoa Road - Northern Site 46m)	Land will need to be acquired to access a site that is at the appropriate contour. An easement also required for ROW Access will be via Te Manuoa Road. Comparative Length of pipework 1.8KM The site has access to Electricity The overflow of the reservoir may need to be discharged to the land as there is no reticulated connection or a new stormwater pipe to stream. Assessed on the basis that a new inlet/out main will be installed Good Connectivity for future HL reservoir Site is closer to stream The slope of site is steepish
3	3 -Te Manuoa Road - Southern Site (46m)	Land will need to be acquired to access a site that is at the appropriate contour. An easement also required for ROW Access will be via Te Manuoa Road. Comparative Length of pipework 1.8KM The site has access to Electricity The overflow of the reservoir may need to be discharged to the land as there is no reticulated connection or a new stormwater pipe to stream. Assessed on the basis that a new inlet/out main will be installed Good Connectivity for future HL reservoir The slope of ground is relatively flat Natural stream close to site

Waitohu Road (46m), Te Manuoa Road-Northern Site 46m and Te Manuoa Road-Southern Site (46m



Site	Site Name	Site Assumptions
4	4 - Waitohu Road (70m)	Land will need to be acquired to access a site that is at the appropriate contour. Access will be via Waitohu Road. Comparative Length of pipework 2.7KM The site has access to Electricity The overflow of the reservoir may need to be discharged to the land as there is no reticulated connection or new stormwater pipe to stream. Assessed on the basis that a new inlet/out main will be installed Site may have potential for new WTP as a deep bore was drilled in adjacent boundary Good Connectivity for future HL reservoir
5	5 - Te Manuoa Road (70m)	Land will need to be acquired to access a site that is at the appropriate contour. An easement also required for ROW Access will be via Te Manuoa Road. Comparative Length of pipework 1.9KM The site has access to Electricity The overflow of the reservoir may need to be discharged to the land as there is no reticulated connection or a new stormwater pipe to stream. Assessed on the basis that a new inlet/out main will be installed Not as good connectivity for future HL reservoir
6	6 - Ringawhati Road (70m)	Land will need to be acquired to access a site that is at the appropriate contour. Access will be via Ringawhati Road. \ Comparative Length of pipework 3.3KM The site has access to Electricity The overflow of the reservoir may need to be discharged to the land as there is no reticulated connection or a new stormwater pipe to stream. Assessed on the basis that a new inlet/out main will be installed Good Connectivity for future HL reservoir Closest location to fault zone (approximately 50m)

Waitohu (70m), Te Manuoa Road (70m) and Ringawhati Road (70m)

	Environmental	Ownership and cultural heritage	Geotech	Construction and Operation	Resilience and growth area
Weighting	**20%**	**10%**	**10%**	**20%**	**40%**
1 - Waitohu Road - Adjacent stream (45m)	4	4	3	4	4
2 -Te Manuoa Road - Northern Site (45m)	5	4	3	4	5
3 -Te Manuoa Road - Southern Site (46 m)	5	4	3	5	5
1 - Waitohu Road 46m Contour	Site development likely to give rise to: * minor or moderate effects (permanent and/or temporary) which may or may not be able to be avoided, but which can be effectively mitigated	Site, including site and service access, is privately or publicly owned (non-council) site with one owner and no recognised cultural and/or heritage values	Site has: * moderate or unknown geotechnical limitations, that will or may need to be addressed through moderate to significant engineering treatment to protect structure function and ensure post event functionality	Site access requires modest works to ensure that it is accessible for construction and operation, AND Site is in close proximity to trunk main and other services, but requires modest service extensions or upgrades to support effective strategic and operational reservoir function	Site has: * a moderate hazard risk (seismic, stability, Etc.) which is unlikely to compromise site function, and post event functionality, and AND * services from any future reservoir to the hospital will not cross areas exposed to moderate or significant hazard risks
2 -Te Manuoa Road - Northern Site 46m Contour	Site development likely to give rise to: * minor or moderate effects (permanent or temporary) that can either be avoided and/or effectively mitigated.	Site, including site and service access, is privately or publicly owned (non-council) site with one owner and no recognised cultural and/or heritage values	Site has: * moderate or unknown geotechnical limitations, that will or may need to be addressed through moderate to significant engineering treatment to protect structure function and ensure post event functionality	Site access requires modest works to ensure that it is accessible for construction and operation, AND Site is in close proximity to trunk main and other services, but requires modest service extensions or upgrades to support effective strategic and operational reservoir function	Site has: * a low hazard risk (seismic, stability, Etc.) which is unlikely to compromise site function, and post event functionality AND * services from any future reservoir will not cross areas exposed to moderate or significant hazard risks
3 -Te Manuoa Road - Southern Site 45m Contour	Site development likely to give rise to: * minor or moderate effects (permanent or temporary) that can either be avoided and/or effectively mitigated.	Site, including site and service access, is privately or publicly owned (non-council) site with one owner and no recognised cultural and/or heritage values	Site has * moderate or unknown geotechnical limitations, that will or may need to be addressed through moderate to significant engineering treatment to protect structure function and ensure post event functionality	Site is: * easily accessible for all construction and operation activities, AND * is immediately adjacent to trunk main and other services and these services only need minor/modest upgrade to service site and support site function	Site has: * a low hazard risk (seismic, stability, Etc.) which is unlikely to compromise site function, and post event functionality AND * services from any future reservoir will not cross areas exposed to moderate or significant hazard risks

	Environmental	Ownership and cultural heritage	Geotech	Construction and Operation	Resilience and growth area
Weighting	20%	10%	10%	20%	40%
4 - Waitohu Road (70m)	5	4	3	5	4
5 -Te Manuoa Road (70m)	5	3	3	4	5
6 - Ringawhati Road (70m)	5	4	3	4	4
4 - Waitohu Road 70 m Contour	Site development likely to give rise to: * minor or moderate effects (permanent or temporary) that can either be avoided and/or effectively mitigated.	Site, including site and service access, is privately or publicly owned (non-council) site with one owner and no recognised cultural and/or heritage values	Site has: * moderate or unknown geotechnical limitations, that will or may need to be addressed through moderate to significant engineering treatment to protect structure function and ensure post event functionality	Site is: * easily accessible for all construction and operation activities, AND * is immediately adjacent to trunk main and other services and these services only need minor/modest upgrade to service site and support site function	Site has: * a moderate hazard risk (seismic, stability, Etc.) which is unlikely to compromise site function, and post event functionality, and AND * services from any future reservoir to the hospital will not cross areas exposed to moderate or significant hazard risks
5 -Te Manuoa Road 70m Contour	Site development likely to give rise to: * minor or moderate effects (permanent or temporary) that can either be avoided and/or effectively mitigated.	Site, including site and service access, is privately owned (multiple owners) with no recognised cultural and/or heritage values OR Publicly owned with some recognised minor or moderate heritage and/or cultural values	Site has: * moderate or unknown geotechnical limitations, that will or may need to be addressed through moderate to significant engineering treatment to protect structure function and ensure post event functionality	Site access requires modest works to ensure that it is accessible for construction and operation, AND Site is in close proximity to trunk main and other services, but requires modest service extensions or upgrades to support effective strategic and operational reservoir function	Site has: * a low hazard risk (seismic, stability, Etc.) which is unlikely to compromise site function, and post event functionality AND * services from any future reservoir will not cross areas exposed to moderate or significant hazard risks
6 - Ringawhati Road 70m Contour	Site development likely to give rise to: * minor or moderate effects (permanent or temporary) that can either be avoided and/or effectively mitigated.	Site, including site and service access, is privately or publicly owned (non-council) site with one owner and no recognised cultural and/or heritage values	Site has: * moderate or unknown geotechnical limitations, that will or may need to be addressed through moderate to significant engineering treatment to protect structure function and ensure post event functionality	Site access requires modest works to ensure that it is accessible for construction and operation, AND Site is in close proximity to trunk main and other services, but requires modest service extensions or upgrades to support effective strategic and operational reservoir function	Site has: * a moderate hazard risk (seismic, stability, Etc.) which is unlikely to compromise site function, and post event functionality, and AND * services from any future reservoir to the hospital will not cross areas exposed to moderate or significant hazard risks

Weight / Rating	Criteria				
	20% **Environmental**	10% **Ownership and cultural heritage**	10% **Geotech**	20% **Construction and Operation**	40% **Resilience and growth area**
	Site development likely to give rise to: * **significant adverse permanent and/or** * **significant adverse temporary** effects that **can not be avoided** and are **unlikely to be mitigated**	Site, including site and service access, has: * **multiple owners** and * **significant cultural** and/or **heritage value/s** that **can not be avoided** or appropriately managed **and/or mitigated**	Site has: * **severe geotechnic limitations,** that are likely, even with extensive engineering, to potentially **compromise structure construction, function,** and/or severely affect **post event functionality**	**Physical access** to the site is * **severely** constrained **by topography** and a requirement to gain access through **developed private properties** which will **severely affect construction** and/or future **operations,** AND/OR **Access to trunk main and other services** needed to support **strategic reservoir** function is **severely constrained** by **distance to or state of service,** requiring **dedicated significant service extensions or upgrades**	Site is: * prone to **severe hazard risk/s** (i.e. within a significant fault rupture zone, prone to instability, Etc.) that are likely to **severely compromise site function,** and **post event functionality** **AND** Site location: * involves services from any future reservoir to one or more areas that are **exposed to significant hazard risks** that are highly likely to **severely compromise service function** and **post event functionality**
2	Site development likely to give rise to: * **adverse permanent and/or** * **significant adverse temporary effects** that **can not be avoided,** that are likely to be **difficult to effectively mitigate.**	Site, including site and service access, has: * **multiple owners** and * has **cultural** and/or **heritage value/s** that may or may not be able to be appropriately managed or mitigated **OR** Site is **Publicly owned** with **significant cultural and/or historic values**	Site has: * **significant geotechnical limitations,** that will **require significant engineering treatment,** and that may still **compromise structure construction and/or function** and/or potentially affect post event functionality.	**Physical access** to the site is: * **significantly** constrained **by topography,** and/or a requirement to gain access through **developed private properties** that **will constrain** some construction and operation activities, AND/OR Access to **trunk mains** and/or **other significant services** required to support **strategic reservoir** function is **significantly challenged** by **distance to or state of service** and will **require substantial service extensions and/or upgrade works** **AND/OR** **Site is below the 65m contour**	Site is: * prone to **significant hazard risk/s** (seismic, stability, Etc.) that are likely to **significantly impact site function,** and **post event functionality** AND/OR Site location: * involves services from any future reservoir crossing one or more areas that are **exposed to significant hazard risks** that are highly likely to **significantly compromise service function** and **post event functionality**

	Site development likely to give rise to: * **moderate permanent and/or** * **adverse temporary effects** that **can not be avoided**, but which may be able to be appropriately mitigated	Site, including site and service access, is **privately** owned (**multiple owners**) with **no recognised cultural** and/or **heritage** values OR **Publicly owned** with some **recognised minor or moderate heritage** and/or **cultural** values	Site has: * **moderate or unknown geotechnical limitations**, that will or may need to be addressed through **moderate to significant engineering treatment** to protect structure function and ensure post event functionality	Physical access to the site is * **constrainted** by **topography** and/or **private property** which is likely to **constrain some construction and operation activities**, AND/OR **Access to trunk mains** and/or other significant services required to support reservoir function **requires moderate extensions and/or upgrade works**, AND/OR **Site is between 65m and 75m contour**	Site has: * **moderate hazard risk/s** (seismic, stability, Etc.) which may have **some impact on site function**, and possibly affect **post event functionality** AND Site location: * requires services from any future reservoir crossing some areas **exposed to moderate hazard risks** requinng specialist engineering treatment to maintain largely uninterrupted water supply services. **OR** Site has: * very **low hazard risk/s** (seismic, stability, Etc.) which are unlikely to compromise site function, and post event functionality AND * requires services from any future reservoir to the hospital crossing some areas exposed to **significant hazard risks** that even with specialist engineering treatment are highly likely to **disrupt service function** and post event functionality
4	Site development likely to give rise to: * **minor or moderate effects (permanent and/or temporary)** which **may or may not be able to be avoided**, but which **can be effectively mitigated**	Site, including site and service access, is **privately** or **publicly owned** (non-council) site with **one owner** and **no recognised cultural** and/or **heritage values**	Site has: * **minor geotechnical limitations**, that can be appropriately addressed through standard engineering practices	Site access requires **modest works to ensure that it is accessible** for construction and operation, AND **Site is in close proximity to trunk main** and other services, but requires modest service extensions or upgrades to support effective strategic and operational reservoir function	Site has: * a moderate **hazard risk** (seismic, stability, Etc.) which is unlikely to **compromise site function**, and **post event functionality**, and AND * services from any future reservoir to the hospital will not cross areas **exposed to moderate or significant hazard risks**
	Site development likely to give rise to: * **minor or moderate effects (permanent or temporary)** that can **either be avoided** and/or **effectively mitigated.**	**Council Owned** (KCDC) site with **no heritage** and/or **cultural values**	Site **geotechnically suitable for construction and future operation**, with standard engineering practices.	Site is: * **easily accessible** for all construction and operation activities, AND * **is immediately adjacent to trunk main** and other services and these services only need minor/modest upgrade to service site and support site function	Site has: * a low **hazard risk** (seismic, stability, Etc.) which is unlikely to **compromise site function**, and **post event functionality** AND * services from any future reservoir will not cross areas **exposed to moderate or significant hazard risks**

Issue to consider	Criteria	Breakdown	Total	Assumptions
Delivery of Strategic Outcomes	**Resilience- Operational and Strategic for new developments and exisiting residential areas**	Does it meet the operational (business as usual) and strategic (emergency) needs of the hospital?	40%	Operational Resilience can be defined as business as usual (BAU) operation and being able to operate through or withstand BAU disruptions associated with typical network operation, maintenance and repair, including during minor hazard events
		Is service access free of hazards?		Strategic resilience can be defined as business as unusual operation, and being able to operate through and provide a desired service function following a significant hazard event/s. In the case of water supply this includes providing uninterrupted water supply for up to 30 working days following an event to key areas.
Constructability	**Construction and Operation**	Access to existing services to support reservoir function and service	20%	Cost of reservoir construction (i.e one reservoir versus two reservoirs, and reservoir size) is not part of the MCA site selection process. The MCA process does however provide for assessment of ease of construction and operation, taking account of required offsite services that may be required to supoport effective reservoir function.
		Access to the site to construct, operate, maintain, repair and renew reservoir and/or support services		Growth- growth is not an explicit factor in the MCA site selection. The growth element will be factored into the overall design and size of the reservoir once the site is chosen. It is noted that medium term growth in the catchment will be dominated by the 2/3 large sites site.
	Geotech	Site suitability and constructability	10%	It is assumed that all of the assessed sites are capable of holding a reservoir of suitable size
	Ownership/Cultural heritage	Ownership	10%	It is assumed that the inlet/outlet main project will go ahead, and can be assumed to be part of the servicing network available to a new reservoir, and that the pipeline will be located somewhere similar to the indicative location shown on the plan
		Cultural and/or heritage values associated with the land		
Impact on the Environment	**Environmental**	Ecology Impact	20%	
		Landscape and/or visual impact		
		Recreational impacts		
		Construction and operation impacts, noise, dust, light, discharges		

From: Ben Davies [mailto:Ben.J.Davies@nz.mwhglobal.com]
Sent: Wednesday, 1 February 2012 1:14 p.m.
To: John Saxton
Cc: Travis Wood; Cedric Papion; David Hogg
Subject: FW: Te Manuao Reservoir configuration problem

John –

I've had a look at the SKM model and have found that their sizing of the mains was carried out using a fixed-head node (effectively a bottomless reservoir) at the proposed reservoir site, and both Rangiuru and Tasman bore sites were disabled. This explains the need for Main Street pipe upsizes, and if the reservoir is designed to supply the Beach zone unaided (in case both Rangiuru and Tasman fail), then the pipe sizing may be correct.

However, this is not a realistic way to connect the reservoir to the network. We need to decide how the inlet / outlet pipe configuration will appear – how the reservoir will replenish and how pressures in the Beach zone will be managed to allow it to turn over. We have some thoughts on this, and would welcome discussion, but this is more work than the simple review we budgeted for.

Another issue is that the proposed top water level (74 m) is 9 m higher than the current outlet head of the Rangiuru and Tasman bore pumps (65 m). Connecting the reservoir to the Beach zone will raise pressures across the Beach zone by a similar amount, and a side-effect will be to increase leakage significantly. I just want to be sure you are aware of this aspect of the new reservoir operation.

I'll give you a call later in the day to discuss.

Regards,
Ben

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BUILDING A BETTER WORLD

KCDC Water Supply

OTAKI RESERVOIR OPTIONS

- DRAFT v1.1
- 3 December 2007

2. Geography

The township of Otaki covers an area of approximately 4000 ha and has a usually resident population of 5,466, based on Census 2006. The township includes Otaki Beach to the west and the so called plateau area, an urban development on higher ground to the east of State Highway 1 (SH1). SH1 and the main railway run north-south effectively splitting the plateau area from the main town.

The land is undulating with ancient sand dunes adjacent to the coast peaking at around 40m aMSL and the land rising in excess of 60m east of the plateau. The main town is around 20maMSL.

Hautere and Te Horo lie to the south side of the Otaki River. Hautere is a dispersed agricultural area with scattered farms. Te Horo is split between a road side settlement alongside SH1 and a beach community.

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3. Existing Water supply system

The water reticulation system at Otaki is split into 2 zones, the Bore Supply Zone and the Plateau Zone. The Bore Supply Zone consists of the section of the town to the west of State Highway 1 including Otaki Beach. The Plateau zone consists of the urban area to the east of State Highway 1 extending eastwards to the Waitohu Reservoir. The two zones are separated by a 150mm diameter permanently closed valve, located on the junction of County Road and Rahui Road. Water from the 2 bores is boosted to the Waitohu Service Reservoir through 3 booster pumps located in County Road. The pumps operate on a time and pressure control regime as follows:

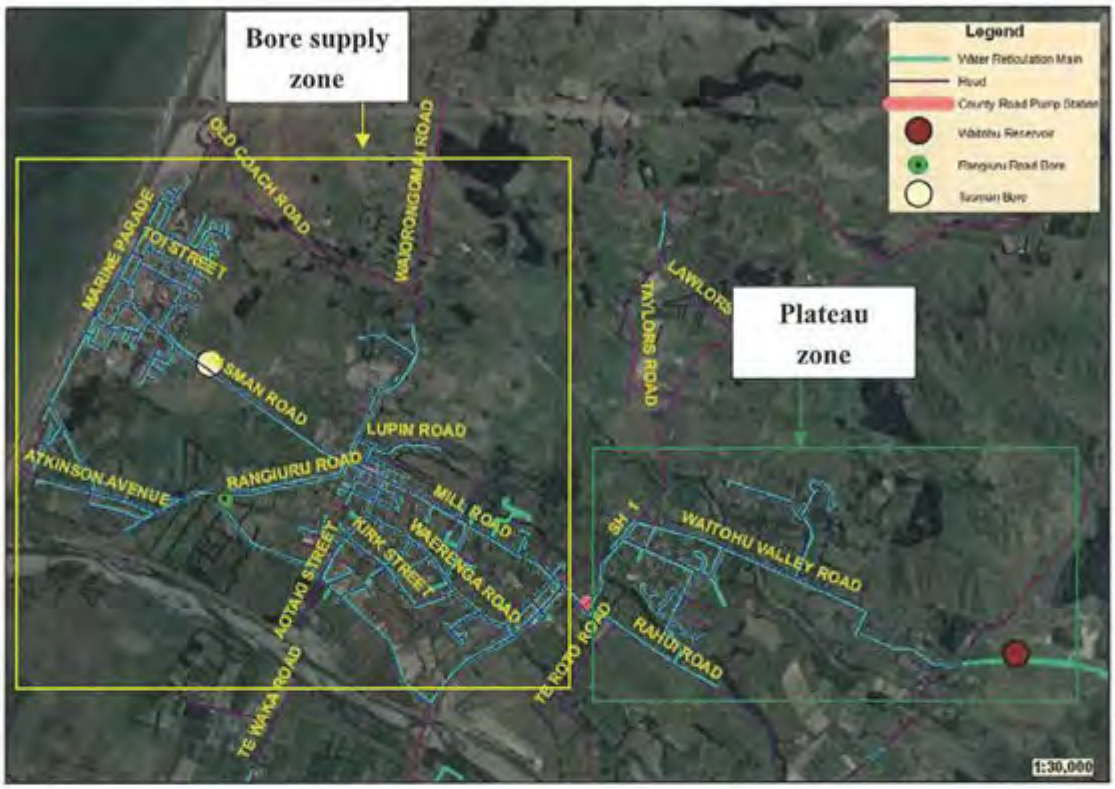
1) Pumping is only allowed between 10:00 pm and 7:00 am and between 10:30 am and 4:00 pm.
2) Pumps start within those times when the level in the Waitohu Service Reservoir falls to 65% of level and stops when it reaches 92%.

The time controls ensure that the mains pressure in the bore supply zone does not fall below 25m during periods of peak demand.

The current sources for the Otaki area water supply are two groundwater bores located in Tasman Road and Rangiuru Road. Given the absence of any storage, pressures within the bore supply zone are totally dependent on the bore pumps. Accordingly a generator and a second bore are provided at Tasman Road to cover the eventuality of electricity supply failure.

The Plateau zone is supplied from the same bores further boosted through the County Road Booster pumps. The booster pumps lift into the Plateau area supply with surplus water filling Waitohu Service Reservoir. When the County Road Booster pumps are not operating, the plateau zone is fed by gravity from the Waitohu Service Reservoir.

Figure 1 shows the extents of the bore supply zone and the plateau zone.



- Figure 1 Otaki Water reticulation system

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4. Options

4.1 Otaki water demand

Based on flow data obtained from KCDC of the Tasman, Rangiuru Road bores and the Waitohu Service Reservoir from 22nd August 2007 – 3rd September 2007, the average daily water demand of Otaki stands at 4037 m^3. Industrial and commercial water consumption makes up 4% of the total water demand, indicating that the majority of the town's water supply is consumed domestically.

The report entitled "Otaki – New Bore and Reservoir Investigation" by Jeff Booth Consulting Ltd dated June 2005 analysed flow records from 2004 - 2005 obtained from the Kapiti Coast District Council. No exact time period was given for the flow records, however, the results indicate that the peak to average ratio of daily demand is 1.6, with peak summer demand occurring in February 6, 2005 at 6246 m3 / day. The URS report entitled "Waikanae Borefield – Assessment of Environmental Effects" dated July 2004 indicates that the ratio for Waikanae, Paraparaumu and Raumati for the years of 1999 – 2004 was in the range of 1.34 to 1.57. Given the significantly larger proportion of horticultural activity present in Otaki, it would not be unusual for the peak to average demand for Otaki to be higher than the surrounding townships.

Results of median population projections using the 2001 population as a base by Monitoring and Evaluation Research Associates Ltd (MERA) in 2004 are presented in table 1.

The population of Hautere has not been included in these estimates for reservoir provision as they are currently supplied from dedicated tanks at a high level. If Hautere is to be supplied from Otaki consideration to a rising main to Hautere tanks should be considered. Given the low population of Hautere any additional storage requirement would be small and probably not significant given the nature of the overall population projection assessments.

- Table 1 Projected 2011 – 2026 population for Otaki

	2011	2016	2021	2026
Otaki	6,417	6,791	8,165	8,414
Otaki + Te Horo	7,146	7,566	9,018	9,296

It is normal practice to provide 24 hour storage capacity at the end of the projected life of the tank. Table 2 shows the 24 hour demand average and peak daily demand from 2011 – 2026. The average water demand was calculated by multiplying the ratio of the projected population and the

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current population by the current demand 4,037 m3/day. Peak daily demand was obtained by multiplying the average daily demand by a peak-to-average ratio of 1.6.

- **Table 2 24 hour storage capacity required for average and peak daily demand and KCDC storage requirements**

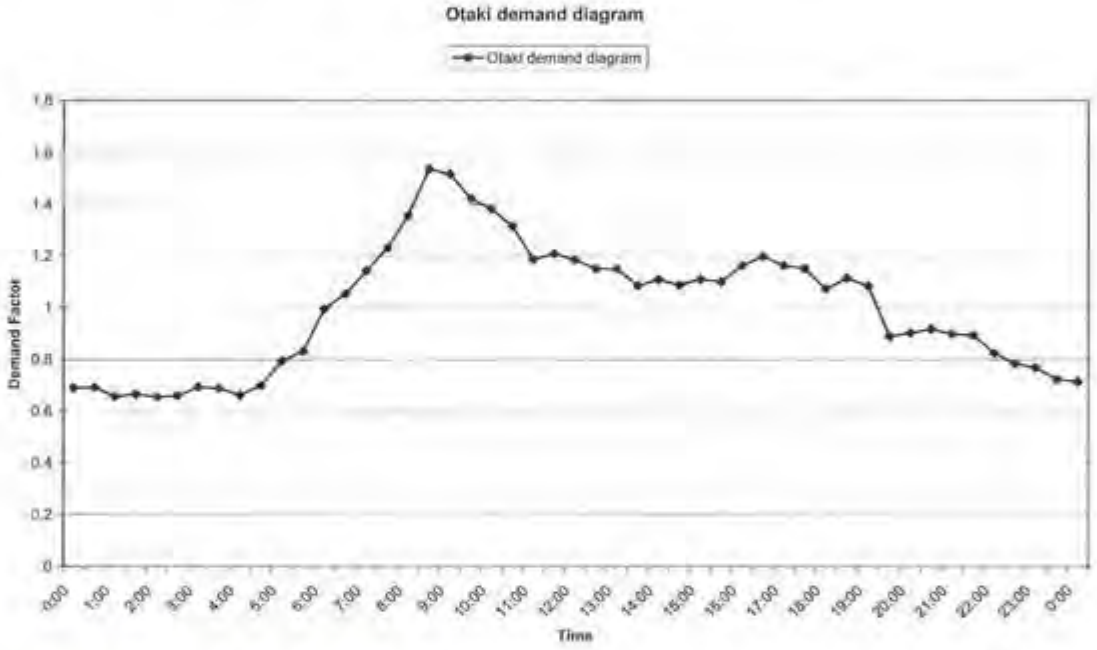
	2011		2016		2021		2026	
	Average (m3)	Peak (m3)	Average (m3)	Peak (m3)	Average (m3)	Peak (m3)	Average (m3)	Peak (m3)
Otaki (24 hour storage)	4,739	7,583	5,016	8,025	6,030	9,649	6,214	9,943
Otaki (600l/hd)	3900		4100		4950		5100	
Otaki + Te Horo (24 hour)	5,278	8,444	5,588	8,941	6,660	10,657	6,866	10,985
Otaki and Te Horo (600l/hd)	4300		4600		5500		5600	

The results indicate that the population is set to increase by 54% between now and 2026. Assuming specific consumption stays similar, average daily demand is set to increase to 6200 m3 per day by 2026. Taking Te Horo into consideration would result in a demand figure of approximately 6900 m3 per day.

KCDC's development requirements require a storage provision of 600 l/head with additional storage to comply with the fire code. Based on the year 2026 projections noted above this would require storage of c5100 for Otaki and 5600 with the addition of Te Horo. Given that the reservoir life should be well beyond 2026, the possible addition of Hautere and an operational desire to have 24 hours storage, the previous 6000m3 of new storage figure looks a reasonable basis on which to proceed.

Population figures from the 2006 Census for Otaki indicate that the usually resident population stands at 5,466. Based on this figure, the average water demand for Otaki stands at 739 l / person / day. This is significantly higher than that the results obtained for 1999 - 2004 for Waikanae, Paraparaumu and Raumati which range from 432 to 481 l / person / day from the URS report.

The demand diagram for Otaki, constructed from field test data from 22nd August 2007 – 3rd September 2007 indicates an unusually high overnight demand factor of between 0.75 – 0.8 for the period of 12:00 am to 5:00 am. The demand diagram is shown in figure 2.



- Figure 2 Otaki Demand diagram

In the absence of industries consuming large quantities of water over a 24 hour period, this could possibly be due to physical losses in the form of background leaks in pipes. It is recommended that further investigations be conducted to determine the root cause.

It is possible that the combinations of universal metering, further leakage investigations and continued mains replacement programmes could yield a major saving in leakage or other un accounted for water. Investigations into these matters should be pursued and if successful a smaller reservoir could be considered. However, for the purposes of this report it has been assumed that any gains from further leakage reduction work will be offset by continued deterioration of the overall network.

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4.2 Modelling scenarios

Two scenarios were modelled for each potential reservoir option:

1. At average daily demand
2. At peak daily demand

Demand figures used were calculated based on field testing done by SKM and KCDC in August 2007. The average and peak daily demand figures are listed below in table 3:

Table 3 Average and peak daily demand

Average daily demand (l / property / day)	Peak daily demand (l / property / day)
1146	1833

The number of private households used in the model was obtained from MERA projections for the year 2026. The breakdown of the projected number of occupied private households for Te Horo and Otaki is shown in table 4 below:

Table 4 Projected number of occupied private households in 2026

Heading	Otaki	Te Horo
Number of occupied private households	3704	402

The calibrated Infoworks WS model used in this exercise lists 3534 customer points in Otaki with 2924 of those located in the Otaki bore zone and 610 located in the plateau region. The customer points were obtained from importing parcel centroid positions from GIS. The additional 170 properties simulating growth to 2026, were added to the model as a demand node entitled "Otaki Beach" located 200 metres to the north of at the end of Moana Street. This area was selected to represent the additional growth as a worst case scenario and is not intended to represent real new housing locations. Demand to the Te Horo properties was represented by a new node at the end of a 7.5km pipeline (355 mm MDPE 100 PN 10 pipe) entitled "Te Horo". The additions to the network are shown in figures 3 and 4.

Figure 3 Additions to network for Moana Road

Figure 4 Additions to network at Te Horo

The dimensions of the 6000 m3 reservoir were in accordance to the BECA Stevens report "Otaki Reservoir Supply – Geotechnical Walkover of Proposed Reservoir Sites". Allowable top and bottom water levels at the reservoir were assumed to follow the convention of the Waitohu Service Reservoir. The figures used are shown in table 5 below.

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Table 5 Reservoir dimensions

Depth (m)	Top Water Level	Lowest Operating level
6.75	92% of reservoir depth	62.5% of reservoir depth

The rising / falling main connecting the reservoir to the reticulation system has been modelled as a 400 mm PE 100 medium density polyethylene pipeline. Polyethylene was chosen because of its high resistivity to soils containing high pH and alkalinity, which is representative of the soil characteristics in Otaki and also due to its high low modulus of elasticity which minimises the use of bends. A size of 400 mm was chosen because it is able to adhere to NZS 4404:2004 clause 6.3.9.4 which indicates that the maximum headloss in a pipeline cannot exceed 3 m / km for pipe sizes greater than 200mm.

4.3 Options description

4.3.1 Option 1

Option 1 comprises one of the original options from previous studies. It consists of locating the reservoir northwest of the junction of SH1 and Waitohu Valley Road on an old sand dune at c45m aMSL. The reservoir is connected to the reticulation system in the Otaki bore zone through a 1 kilometre rising / falling main at the SH1 roundabout. The proposed additions to the system are shown in figure 5.

- Figure 5 Option 1 additions

4.3.2 Option 2

Option 2 was also selected in previous studies. This option consists of locating the reservoir south of the Otaki River 100 metres south of the junction of Old Hautere Road and Otaki Gorge Road. A 3.5 km pipeline connects the reservoir to the Otaki bore zone at the junction of Riverbank Road and SH1. The proposed additions to the system are shown in figure 6.

- Figure 6 Option 2 additions

4.3.3 Option 3

This is a new option where the reservoir is located on the 67.5 m RL contour line at the end of the private road off Te Manuao Road. The reservoir is connected to the reticulation system by a 2.7 km pipeline running through the private road into Te Manuao Road before making a left turn into Freeman's Street and finally into Rahui Road before connecting to the tee at the junction of Rahui Road and County Road. The proposed additions are shown in figure 7.

- Figure 7 Option 3 additions

4.3.4 Option 4

The reservoir is located on the 67.5m RL contour line at 4, Ringawhati Road and is connected to the reticulation system through a 3.5 km pipeline running from Ringhwhati Road, turning right at Rahui Road before connecting at the junction of Rahui Road and County Road. The proposed additions are shown in figure 8.

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- Figure 8 Option 4 additions

4.4 Scenario analysis

4.4.1 Scenario 1 - Pump failure

The calibrated model has been used to simulate scenarios to demonstrate the viability of each option The first scenario will determine whether the combination of the new reservoir, new connections and the existing reticulation system is capable of supplying the Otaki bore zone with a pressure of 25m without the need of the Tasman and Rangiuru Road pumps operating eg in a pump failure condition. This simulation includes for the projected 2026 demands.

The results for the node with the lowest pressure, "Otaki Beach" at average daily demand and peak daily demand are presented in table 6.

- Table 6 Nodes with lowest pressure at average and peak daily demand

	Average daily demand	Peak daily demand
	Pressure (m)	Pressure (m)
Option 1	14.74	-19.61
Option 2	-2.68	-63.78
Option 3	30.88	-11.40
Option 4	29.74	-13.79

The results indicate that options 1 and 2, where the reservoir is at c 45m aMSL, cannot meet the residual pressure criteria even at average daily demand. Therefore, no further analysis will be conducted on both the options. Options 3 and 4 meet the required residual pressure criteria at periods of average daily demand but not during periods of peak day demand. Either one of the

Tasman or Rangiuru Road pumps would have to operate to sustain the pressure in the system at peak times.

The model was used to assess what new mains would be required to maintain pressures at peak without the bore pump running.

Figure 8 indicates the regions where head losses are greater than 5 m, highlighted in red, are experienced in the reticulation system during peak daily demand.

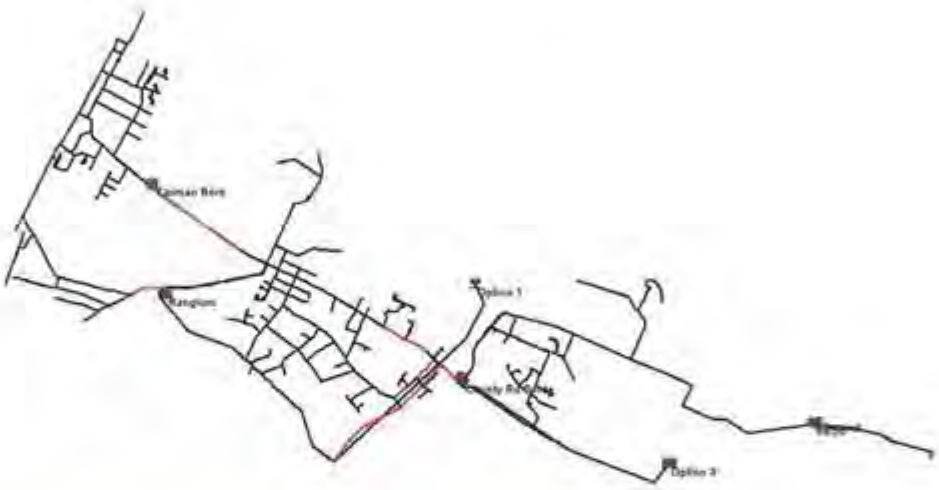

Figure 9 Areas of high head losses in reticulation system

It can be seen that the section of the trunk main immediately after the connection to the reservoir experiences very high head losses when conveying peak daily demand flow.

Two upgrade options have been investigated to rectify this problem. Option A ensures that a minimum pressure of 25m is maintained throughout the whole reticulation system during peak demand. Option B sustains a minimum pressure of at 10m throughout the whole reticulation system.

4.4.1.1 Option A upgrade

This option entails upgrading the existing trunk main to ensure that the pressure at the node "Otaki Beach" is able to meet 25m at peak demand during the event of pump failure.

Tables 7 and 8 presents the asset identification numbers for the pipes that require upgrades for Reservoir options 3 and 4 respectively. The proposed upgrades are in all cases to a 400 mm dia. PN 10 MDPE pipe.

- **Table 7 Proposed trunk main upgrades for Option 3**

Asset ID	Original dia (mm)	Proposed dia (mm)	Existing Material	Length (m)	Year of installation
OWG00007	200	400	AC	42.36	1980
OWG00033	200	400	AC	417.7	1980
OWG00069	200	400	AC	344.9	1980
OWG00109	200	400	AC	186.39	1980
OWG00111	200	400	PVC	38.76	1980
OWG00149	200	400	AC	2.2	1980
OWG00151	200	400	AC	99.85	1980
OWG00152	200	400	AC	1.23	1980
OWG00273	200	400	AC	252.15	1980
OWG00285	200	400	AC	197.76	1980
OWG00286	200	400	AC	7.88	1980
OWG00287	200	400	AC	229.32	1980
OWG00296	200	400	AC	25.94	1980
OWG00301	200	400	AC	62.95	1980
OWG00305	200	400	AC	22.15	1980
OWG00306	200	400	AC	71.65	1986
OWG00307	225	400	AC	59.81	1986
OWG00309	225	400	UPVC	191.2	1980

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- Table 8 Proposed trunk main upgrades for Option 4

Asset ID	Original dia (mm)	Proposed dia (mm)	Material	Length (m)	Year of installation
OWG00033	150	355	AC	417.7	1980
OWG00007	200	400	AC	42.36	1980
OWG00033	200	400	AC	417.7	1980
OWG00069	200	400	AC	344.9	1980
OWG00109	200	400	AC	186.39	1980
OWG00111	200	400	PVC	38.76	1980
OWG00121	200	400	AC	7.89	1980
OWG00148	200	400	AC	183.58	1980
OWG00149	200	400	AC	2.2	1980
OWG00151	200	400	AC	99.85	1980
OWG00152	200	400	AC	1.23	1980
OWG00273	200	400	AC	252.15	1980
OWG00285	200	400	AC	197.76	1980
OWG00286	200	400	AC	7.88	1980
OWG00287	200	400	AC	229.32	1980
OWG00296	200	400	AC	25.94	1980
OWG00301	200	400	AC	62.95	1980
OWG00305	200	400	AC	22.15	1980
OWG00306	200	400	AC	71.65	1986

OWG00307	225	400	AC	59.81	1986
OWG00309	225	400	UPVC	191.2	1980

The total length of pipeline of each diameter to be upgraded is summarised in table 9 for both options.

- **Table 9 Summation of total length of pipeline required**

Option	Nom pipe dia (mm) to be replaced	Total length (m)
Option 3	200	2003
	225	251
Option 4	150	418
	200	2011
	225	251

The minimum pressure experienced at the node "Otaki Beach" after the pipeline upgrades is shown in table 9.

- **Table 10 Minimum pressures at Otaki Beach node**

Option	Pressure (m)
Option 3	25.9
Option 4	25.5

4.4.1.2 Option B Upgrade

This option ensures that the furthest node of the reticulation system is served by a minimum pressure of 10m in the event of pump failure. For this option, the length of trunk main upgrades is similar for both options. Table 11 shows the proposed upgrades for both options.

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- Table 11 Proposed trunk main upgrades for option 3 and 4

Asset ID	Original dia (mm)	Proposed dia (mm)	Original Pipe Material	Length (m)	Year of installation
OWG00152	200	400	AC	1.23	1980
OWG00285	200	400	AC	197.76	1980
OWG00287	200	400	AC	7.88	1980
OWG00296	200	400	AC	229.32	1980
OWG00301	200	400	AC	25.94	1980
OWG00305	200	400	AC	62.95	1980
OWG00306	200	400	AC	22.15	1980
OWG00307	225	400	AC	59.81	1986
OWG00309	225	400	UPVC	191.2	1980

Table 12 presents the total length of pipe of each diameter to be upgraded.

- Table 12 Summary of total length of pipe to be upgraded

Nom pipe dia (mm)	Total length (m)
200	547.23
225	251.01

The minimum pressure experienced at the node "Otaki Beach" is shown in table 13.

- Table 13 Minimum pressure at node "Otaki Beach"

Option	Pressure (m)
Option 3	13.2
Option 4	10.7

4.4.2 Options Discussion

Tables 14 and 15 list the pros and cons for option 3 and 4.

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Table 14 Pros and Cons for Reservoir Option 3

Pros	Cons
• Shortest pipeline connections and shortest length of upgraded mains • Proximity to demand areas • Good access via existing track • Potential for using existing trees as screening • Potential for shorter cross country pipeline routes • Slope. The surrounding land where the reservoir is to be located has a 1 in 10 slope.	• Access to the reservoir is via a private road located off Te Manuao Road. • The potential route of the rising / falling main lies in front of residential properties along Freeman's Road. • The presence of other services located along Freemans Road would result in increased difficulty in pipe laying which has an impact on the construction costs • A site visit to the proposed location in July 2007 revealed the presence of a new residential development which was not present in the KCDC GIS system. There needs to be further discussion with the land owner to confirm future development plans within the site

Table 15 Pros and Cons for Option 4

Pros	Cons
• Construction costs. The absence of buried services along Ringawhati Road and the section of Rahui Road immediately after the junction of the two makes it easier for pipe laying. • The surrounding land where the reservoir is to be located has a 1 in 20 slope. • Site Aesthetics. The proposed location is far away from any current development which would make this a relatively minor issue • Easy access for maintenance. The proposed location of the reservoir is along Ringawhati Road. • Proximity to Hautere. The reservoir could potentially serve the Hautere area through a pipe link over the Otaki River given the closeness of the two locations. Although the feasibility of a crossing would be required.	• Capital costs. The length of the rising / falling main is considerably longer • a longer section of the existing trunk reticulation system needs to be upgraded.

4.4.3 Scenario 2 - Addition of proposed new bore in system

The calibrated model has been used to check operation of the new County Road Bore connection to the new reservoir. The scenario determines whether the new bore is able to keep filled the proposed

6000 m3 reservoir. It has been assumed that the new bore will be connected immediately upstream of the County Road Booster pumps, that is on or near the 225mm dia uPVC pump suction main.

The bore pump to be used was modelled based on pump curve information provided by KCDC personnel. The duty point of the bore pump is shown in table 14.

Table 16 Duty point of bore pump

Flow (l/s)	Head (m)
39	85

The bore rising main is assumed to be a 10m 225mm nom dia. PE100 PN10 pipe. The pumps are assumed to be as per the existing three County Road boosters and were set to operate on level control based on the allowable top and bottom water levels in the reservoir.

No change was made to the control regime of the County Road pump station.

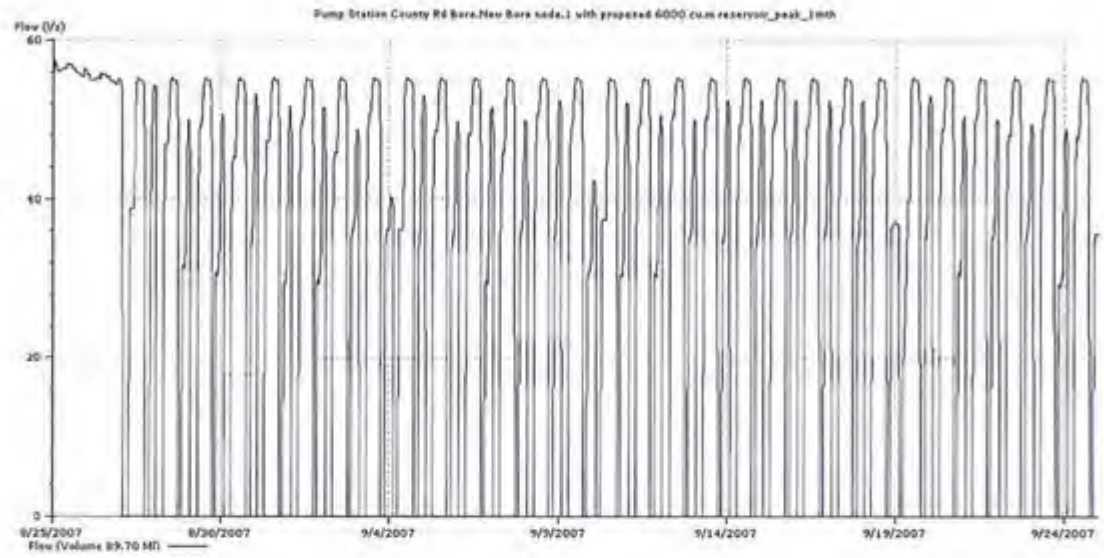
The scenario was run for 1 month to determine the time taken to fill the reservoir.

Results discussion

Modelling results indicate that only the Tasman Road pump station needs to be in operation to ensure the functionality of the scenario. The operating regimes of the pump station are shown in table 17.

Table 17 Operating regime of pump stations

Pump Station	Operating hours	Pressure at control node (m)
Tasman Road pump	24	70
Rangiuru Road pump	0	62
New bore pump	24	N.A.



- **Figure 10 Flow required from new bore pump**

No data is currently available on the yield of the new bore opposite the County Road pump station. Modelling results, as shown in figure 10, indicate that the yield of this new bore needs to be around 55 l / s for the whole system to work.

Based on the current pumping regime of the County Road Booster pump station, the levels of the Waitohu Service Reservoir will fall far below the 62.5% of reservoir depth. This is shown in figure 11.

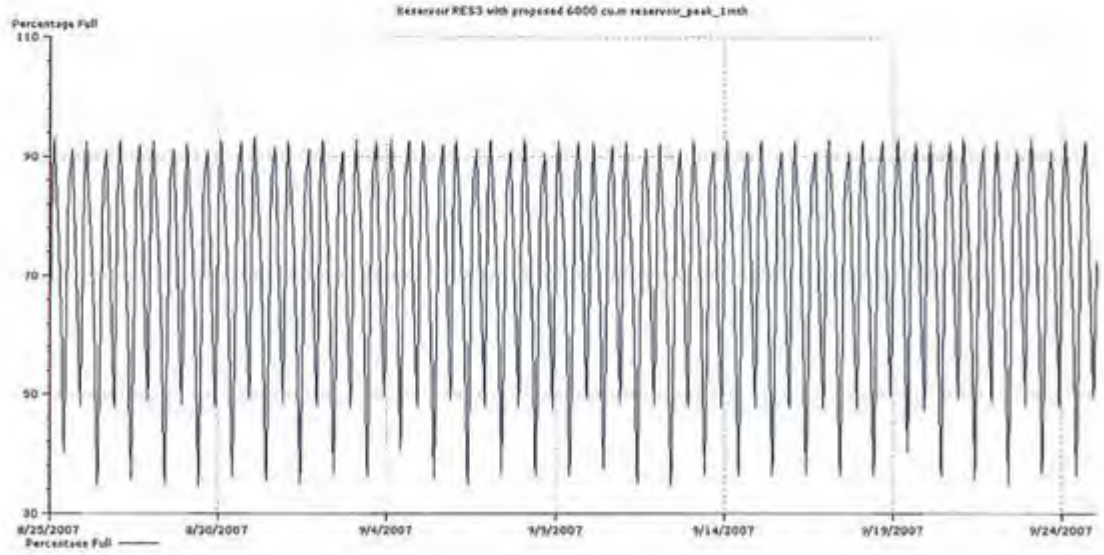


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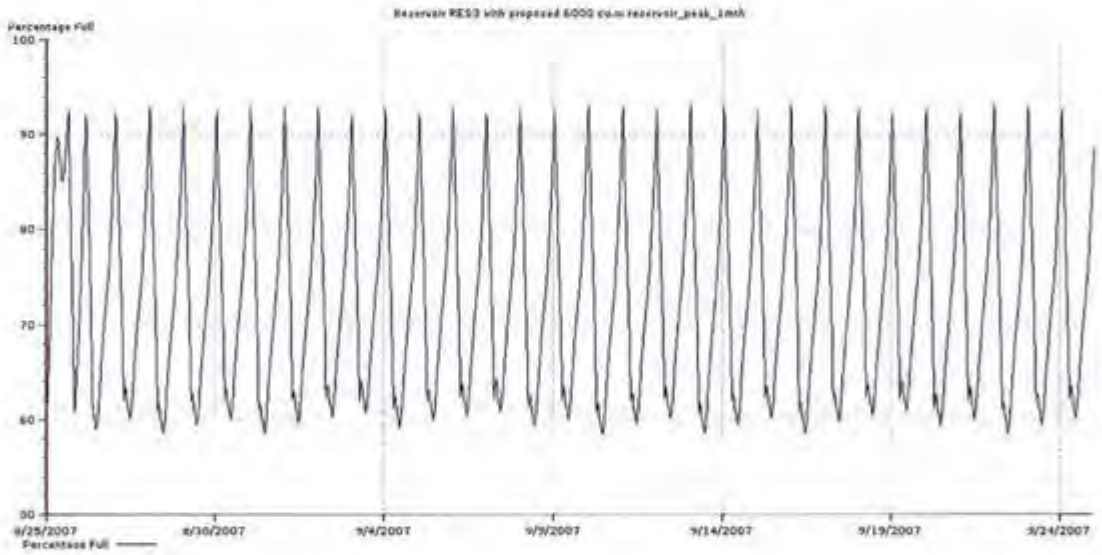
Figure 11 Waitohu Service Reservoir Levels

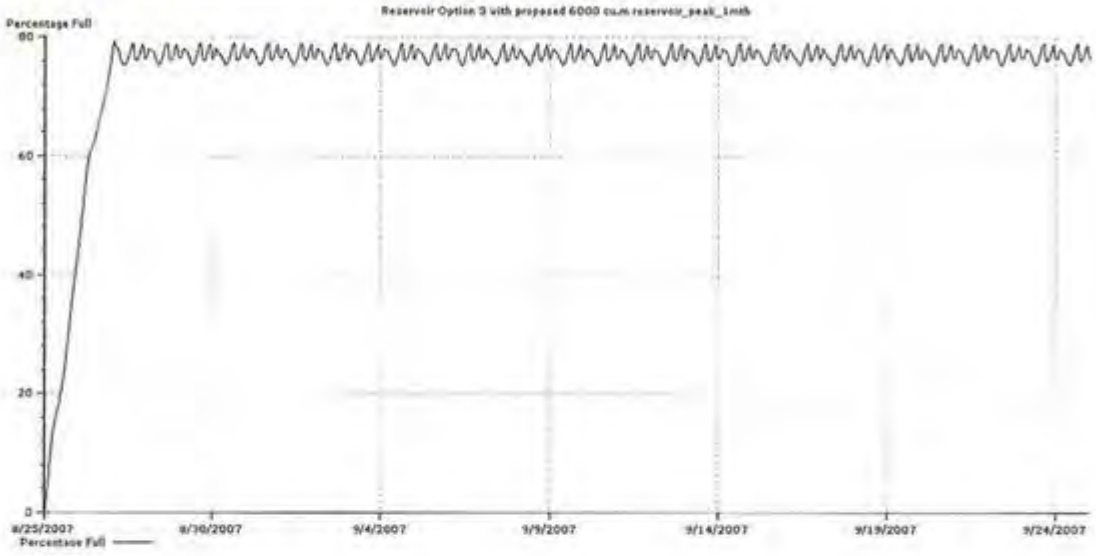
To resolve this, the current time and level control pumping regime of the County Road Booster pump station could be altered to a pure level control regime. The time controls in the regime were put in place to ensure that the Otaki bore zone has sufficient pressure in times of peak demand. With the presence of the 6000 m3 reservoir to act as a pressure regulator in times of peak demand in the system, the time controls can be removed. The next modelling scenario shows the results when the time controls are removed.

4.4.4 Scenario 3 - Removal of time control in County Road Booster Pump station

Figures 12 and 13 show the levels at the Waitohu Service Reservoir and the 6000 m3 reservoir after removal of the time controls at the County Road Booster pump station.

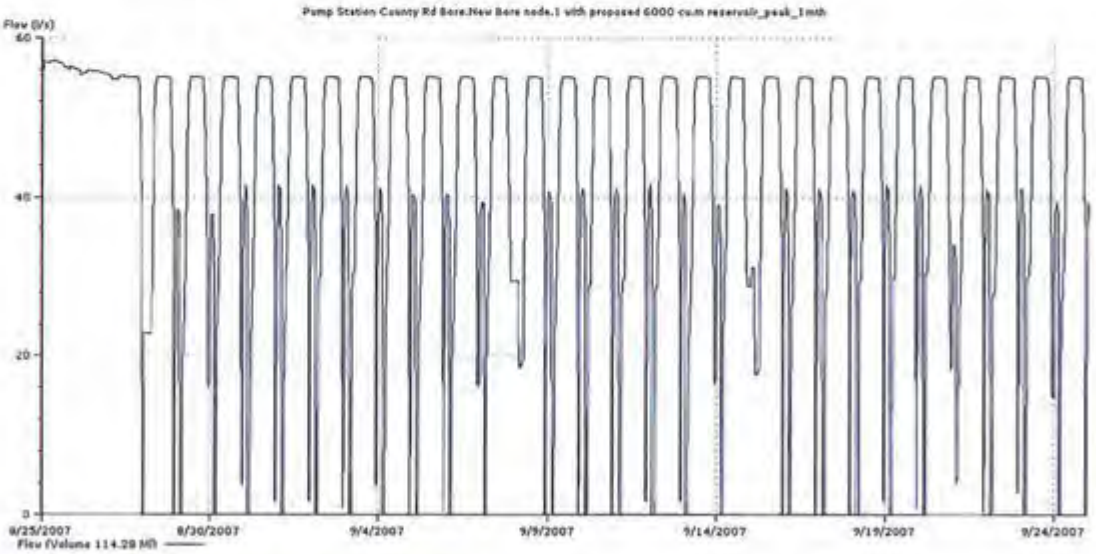


- **Figure 12 Waitohu Service Reservoir level**



- **Figure 13 6000 m3 reservoir level**

Results indicate that a pure level control regime is able to maintain the water levels at both the Waitohu Service Reservoir and the proposed 6000 m3 reservoir without affecting the pumping rate for the new bore pump which remains the same, as shown in figure 14.



- **Figure 14 New bore pump flow rate**

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5. Conclusions and Recommendations

- The calibrated model is a good tool for assessing options.
- A new c6000m3 service reservoir is of the right order of size to meet future demands of the Otaki area. The required size can only be confirmed when a decision is made on water supplies to Te Horo and Hautere.
- There are a number of possible sites along high ground north of the racecourse. We have considered two particular sites but a number of viable locations could be possible between Te Manuao rd and Ringawwhati Rd.
- Locating the reservoir at 45m aMSL will not provide sufficient pressure to maintain residuals above 25m during periods of average demand at 2026 population levels.
- Constructing the reservoir at 67.5m aMSL allows the reticulation system to be maintained at acceptable pressures during periods of average demand but not during peak demand in 2026. To enable satisfactory pressures under all flow conditions some 2km of the trunk main along Mill Road has to be upgraded.
- The yield of the new bore at County Road should be confirmed. Once confirmed storage and reticulation needs can be confirmed using the calibrated model. Initial modelling indicates that a yield of 55l/s is sufficient for needs up to 2026.
- The current time and pressure control regime operating for the County Road Booster Pump Station will need modification once the system is connected to a new reservoir. Simple changes to the regime indicate that it will be possible to keep both reservoirs filled over a medium term cycle.
- There are still some issues to be resolved regarding operation of the water supply model these need to be resolved before any further scenario assessment is undertaken.
- There are wider issues relating to the operation of the Otaki system which need to be investigated before major investment in storage is made. In particular the apparently high over night use.
- Initial enquiries regarding land ownership needs to be made in respect of the potential sites identified. These enquiries should be extended to include for any site in the area between options 3 and 4 provided that the ground level is above 60m.
- Following discussion with potential landowners a first sweep of ground condition should be made to further fine tune the preferred site in advance of major spend on site investigation.
- Initial meetings should be held with the Planning Authority to highlight any other potential constraints or clashes with other developments. Mitigation measures could be explored including planting, use of existing trees as screening, cross country pipeline routes etc.

7.4.2 Otaki Reservoir (UPG06)

7.4.2.1 Recommended Configuration

There is a significant storage shortfall in the current Otaki network, and fire flow is also unable to be supplied. Although security of supply has not been specifically assessed, the reliance of the Otaki network on the Tasman Road bore has historically been noted as a concern.

To address all three of these concerns, a reservoir is required in the Otaki network. The most effective place for this to connect to the existing network is immediately upstream of the County Road pump station, however there is no elevated land in this location. A location for the reservoir has not yet been identified, but based on previous investigations it is thought likely that the reservoir will be between 1.5km and 2km from this location.

A reservoir has been in the long term plan for a number of years. Locations have been proposed and recommended in the past, but none have been progressed. Rather than modelling the reservoir in a location which could be contentious, the reservoir has been placed in the model directly adjacent to County Road as shown in Figure 7-9, and the length of the short connection to the County Road network has been forced in the model to reflect a distance of 1,750m.

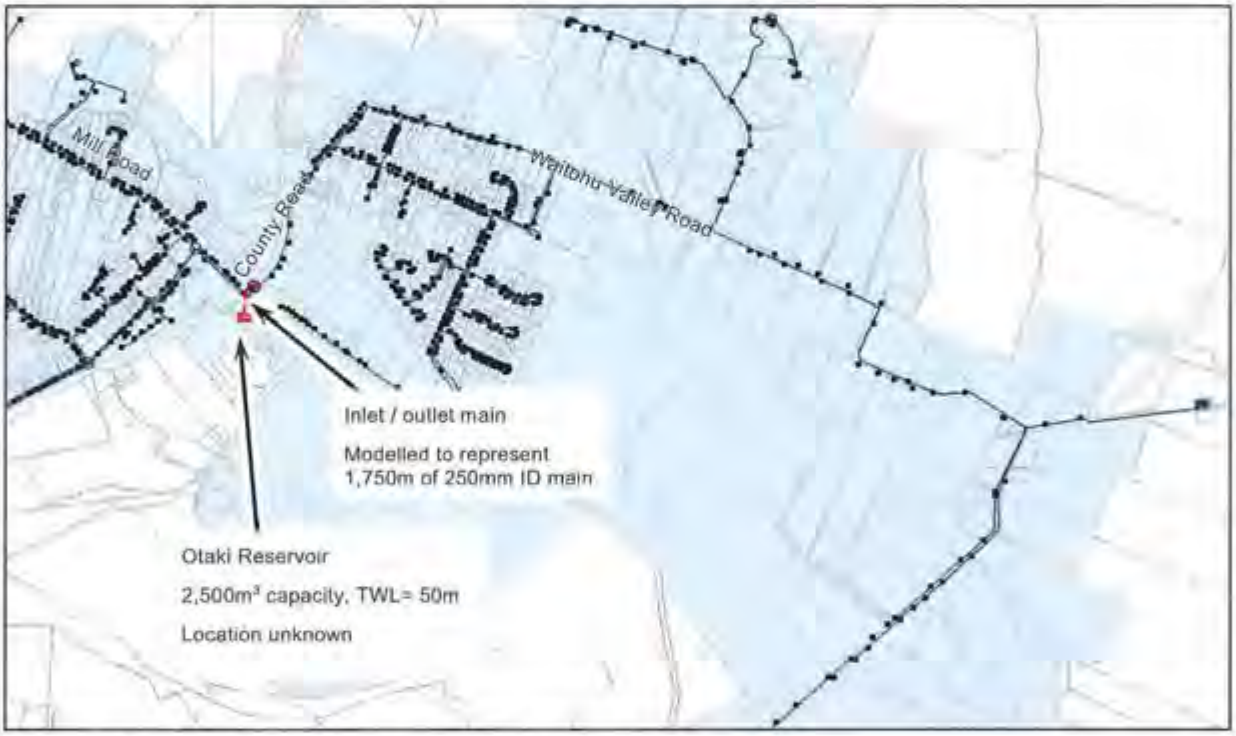

Figure 7-9 : Otaki Reservoir (as modelled - location unknown)

For storage purposes, a reservoir of 2,500m^3 is required. After some trial and error a ground elevation of 47.5m was selected, with a reservoir depth of 3m providing a top water level of 50.5m.

The Tasman Road pumps were altered to act as a refill pump, turning on to deliver 58m HGL (53.5m pressure) when the reservoir drops to 2.0m depth and turning off again when the reservoir reaches 2.9m depth. It was found that unless the Tasman Road Trunk Main (UPG05, Section 7.4.1) was implemented, the Tasman Road bores need to run at much higher pressure to refill the reservoir. This in turn results in high pressures across the Otaki Beach DMA.

In addition to the core reservoir infrastructure as shown in Figure 7-9, the reservoir requires the Tasman Road upgrade (UPG05) and some operational changes to operate effectively. These are shown in Figure 7-10.

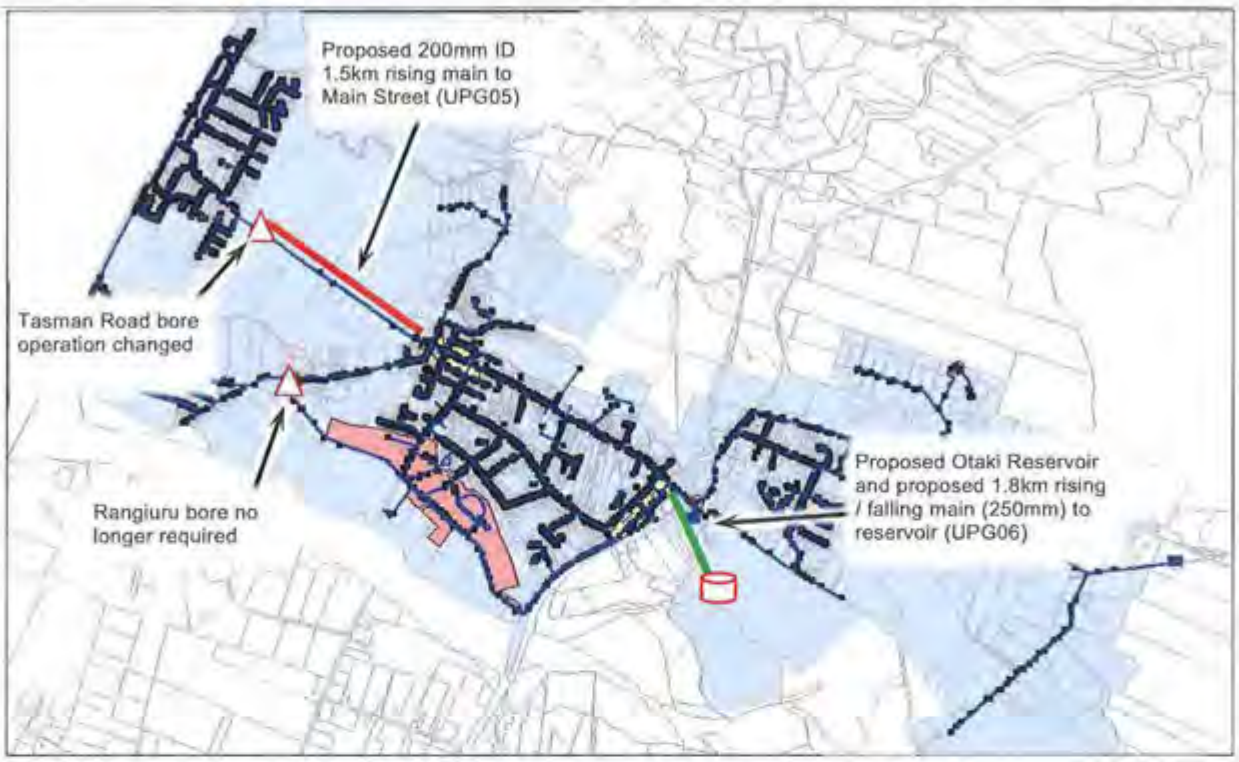

Figure 7-10 : Otaki System Upgrades required for Otaki Reservoir

The reservoir is required immediately to address fire flow, storage and security of supply issues. It has been implemented in the 2016 scenario in the model.

7.4.2.2 Alternative Configuration – Dedicated Feed

An assessment was carried out to determine what additional upgrades would be required to turn the Otaki network into a dedicated feed system.

Potential advantages of dedicated feed systems are:

- More stable pressures, resulting in less wear on the network and components
- Less reliance on continuity of supply from the source
- Improved water quality through reduced water age

7.4.2.2.1 Upgrades

Figure 7-11 shows the upgrades required to turn Otaki into a gravity system with dedicated feed to Otaki Reservoir. Pumping mains were sized to keep head loss to under 2.5 m/km with the Tasman Bore pumps operating 80% of the time under peak summer demand. Note that the location of the Otaki Reservoir is not yet known – the location shown on the plan is indicative only. It is assumed that the reservoir will be around 1.8km from County Road, where the reservoir will connect to the existing network.

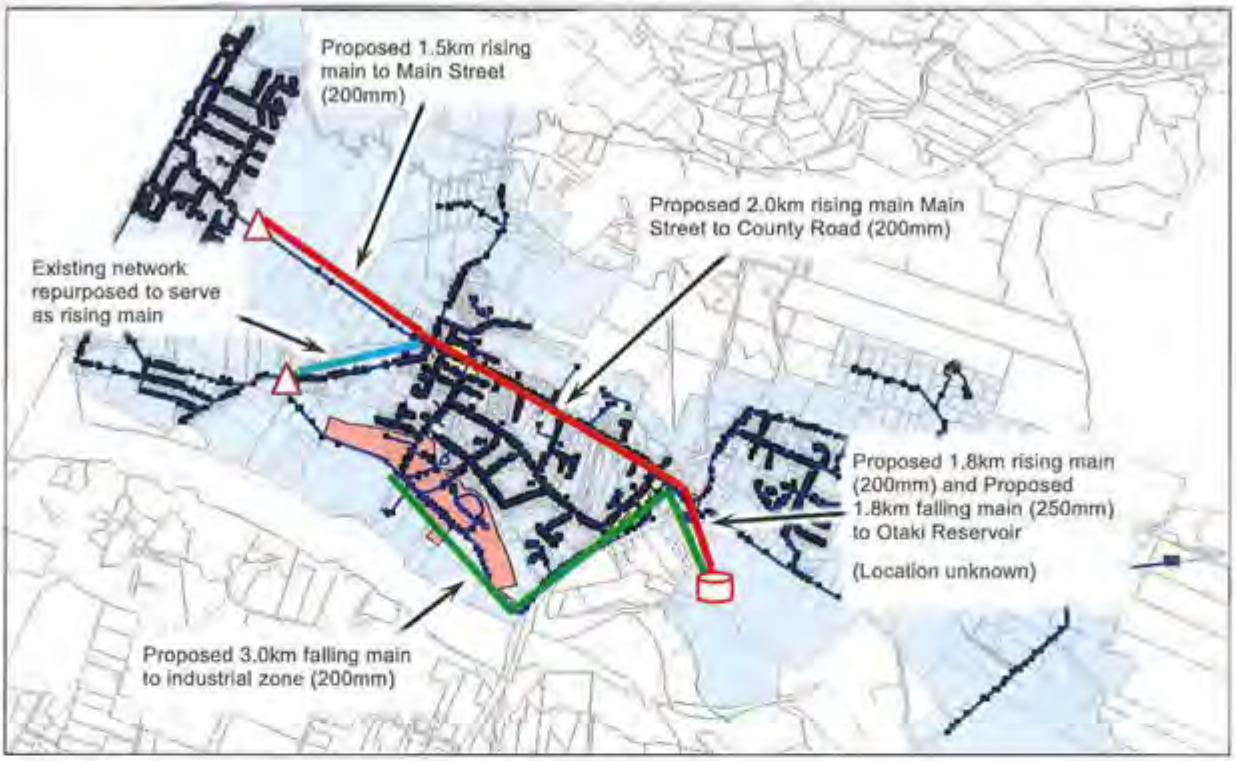

Figure 7-11 : Otaki Dedicated Feed System Upgrades

The upgrades shown in Figure 7-11 are listed below, along with notes to compare each upgrade to the requirements for a push-pull system.

1. 1.5km rising main to Main Street (200mm) – this upgrade has already been proposed (Section 7.4.1) to address connectivity issues between Tasman Road bores and the Otaki township.
2. 2.0km rising main from Main Street to County Road (200mm) – this upgrade is additional to the upgrades already proposed.
3. 1.8km rising main (200mm) and 1.8km falling main (250mm) to Otaki Reservoir. The upgrades already proposed require only one combined rising / falling main (Section 7.4.2.1). The second 200mm diameter rising main is an additional upgrade.
4. 3.0km falling main to industrial zone (200mm) – this upgrade is already proposed to improve fire flow in the Industrial area to 100 l/s (Section 7.6.1).
5. A 150mm main in Rangiuru Road has been repurposed as a rising main, with the parallel 200mm diameter main remaining as part of the gravity network. Although the Rangiuru Bore does not operate under normal conditions, it is thought this would provide some limited backup in the event of a failure at Tasman Bore or on the dedicated rising main from Tasman Road to Main Street.

7.4.2.2.2 Performance

Even with the additional upgrades, the gravity system does not operate as effectively as the push-pull system initially proposed. In the push-pull configuration the network can be jointly supplied by the reservoir and bores under peak or fire demand. In the gravity system, there is only one point of supply - all peak and fire demands must travel down the falling main from the reservoir before distributing through the reticulation.

This results in available fire flows below 50 l/s in the industrial zone unless the SH1 and Riverbank Road network is upgraded, and fire flows below 50 l/s remain in the Main Street commercial area. Figure 7-12 shows these locations.

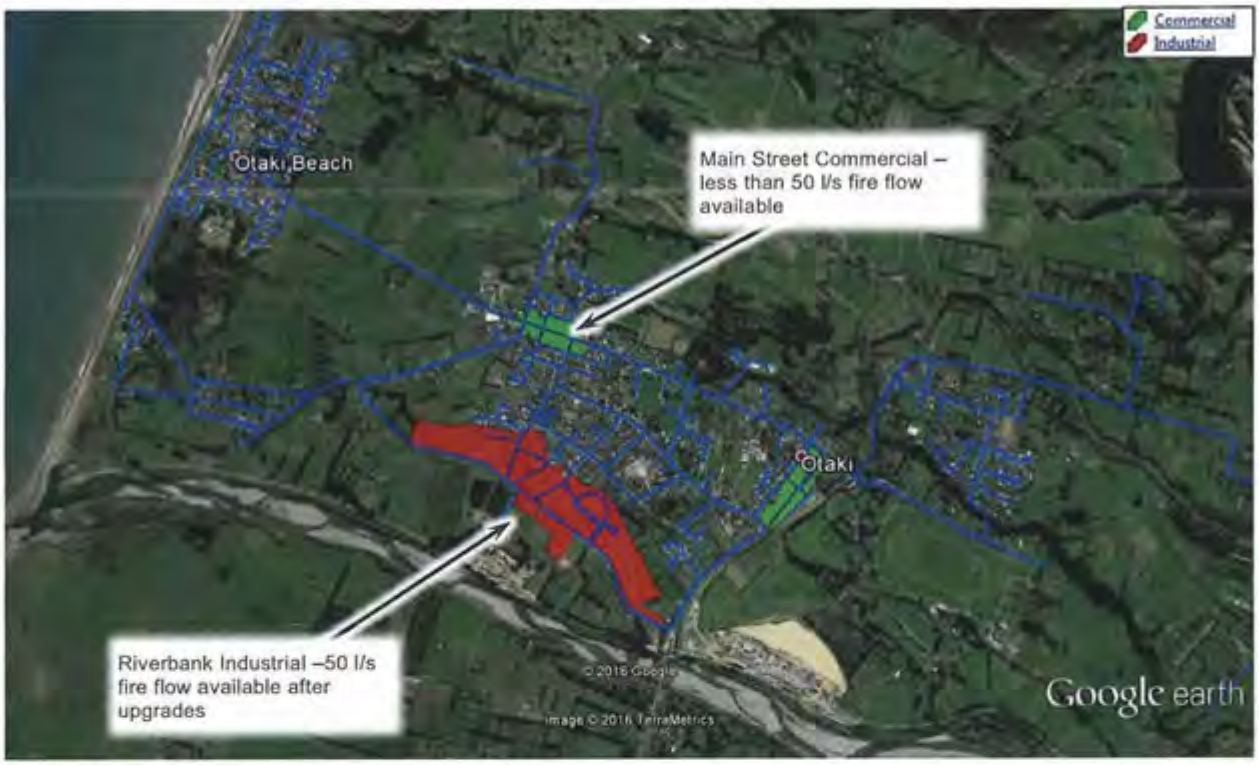

Figure 7-12 : Otaki Dedicated Feed Fire Flow Performance

In terms of water age, there is significant improvement in reservoir water age under the dedicated feed configuration. Figure 7-13 shows the comparison.

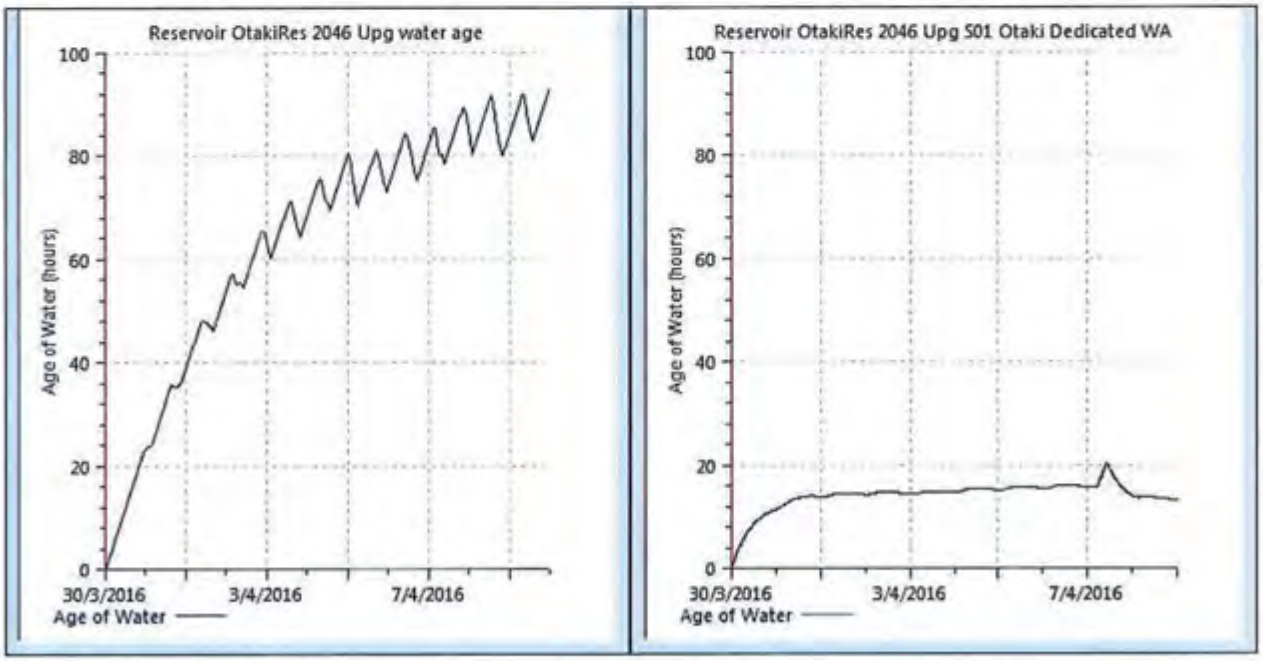

Figure 7-13 : Water Age Comparison

Although water age in the push-pull system is significantly higher, modelling also shows high water age in the existing Waitohu Reservoir. As there are no apparent problems with water quality at this reservoir, it is not thought that this is a major concern.

4.4 Stormwater

The existing stormwater networks consists of series of pipelines along the roading network, mainly discharging to GW maintained Te Awahohonou Drain which connect to Mangapouri Stream within the Ōtaki area. Part of the stormwater network in Ōtaki area is currently discharging to Ragiuru Stream and channels in the proposed Rangiuru development area as shown in Figure 4 below.

Figure 4: Existing Stormwater Pipes and Channel Network (Source: KCDC GIS)

5 Infrastructure Needs Assessment

5.1 General

The purpose of this assessment is to understand the current status of the existing infrastructure and to determine the extent of the required upgrading works. This assessment is based on the information available in the Stantec Report, as well as the information gathered from consultations with KCDC operational staff.

Following discussion with Greater Wellington Regional Council (GW), a planning advice was obtained to confirm the feasibility of receiving resource consents for the proposed upgrading works required for the infrastructure networks specially for the works required to upgrade the existing scheduled stormwater channels.

5.2 Water

5.2.1 General

A new 5.5ML reservoir in the area opposite No.35 Ringawhati Road and the duplication of the existing reservoir at the current location have been proposed together with pipe network upgrades as recommended in Stantec report. This report has been prepared to improve the supply to the Ōtaki Zone together with new pipe network upgrades to improve fire flow capacities within the existing water supply network as shown in Figure 5 below.

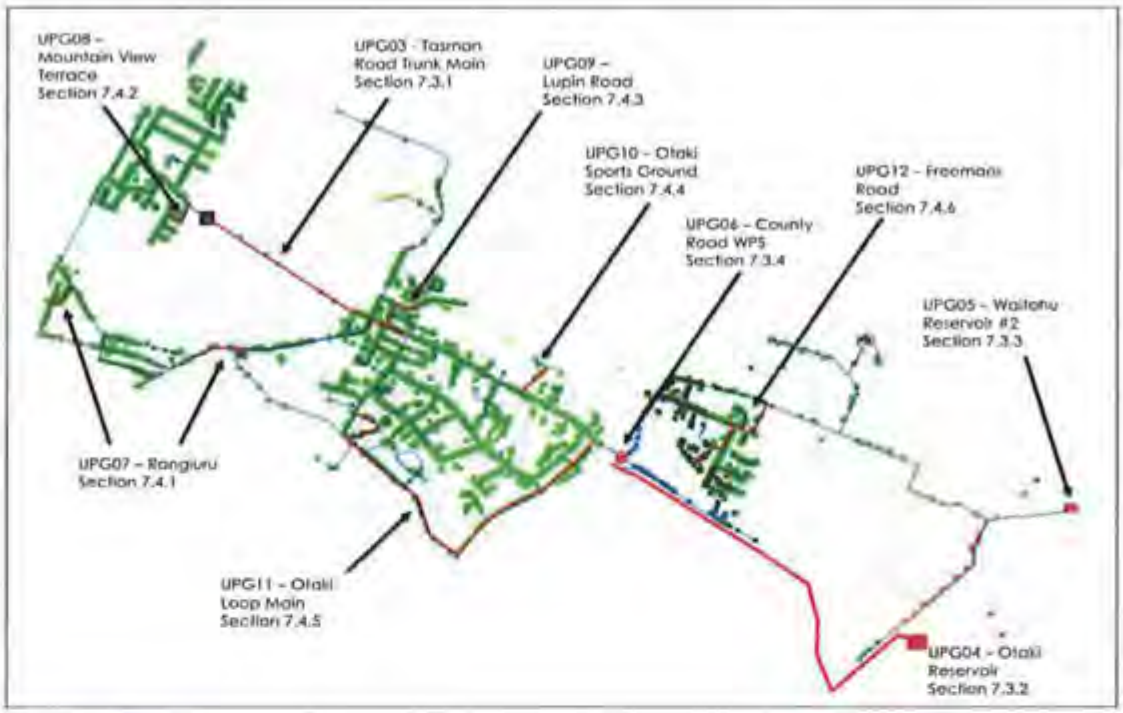

Figure 5: Proposed Water Supply Network Upgrades (Source: Stantec Report July 2019)

As the above upgrading work have been determined prior to the demand from the new developments, additional pipe network upgrading works have been identified to improve the network performance to service the area including the new developments.

5.2.2 Proposed Water Supply Upgrading Work

5.2.2.1 Water Storage Reservoirs

As recommended in Stantec report, a new 5.5ML reservoir in the area opposite No.35 Ringawhati Road together with duplication of the existing reservoir with a new 0.65MLreservoir at the current location have been proposed.

As the existing storage reservoir is directly supplied from the existing pipe network (i.e common inlet and outlet pipe) the new duplication reservoir will be connected to the common inlet and outlet main which will be upgraded to DN200 to increase the supply capacity within the network.

The new 5.5ML reservoir (Ringawhati Road) is proposed to have a dedicated rising main (inlet) from the County Road pumping station and Non-Return Valve on the outlet main to avoid network pressure issues due to the elevation difference between Waitohu Valley (existing) reservoir site and new reservoir site.

5.2.2.2 Pump Stations

A new (dedicated) pump set is proposed at the existing County Road pumping station to supply the new 5.5ML reservoir (Ringawhati Road) with a dedicated DN200 rising main.

5.2.2.3 Pipe Network

The proposed upgrading works required for the water supply pipe network are in the table below.

6.4 Existing Storage Deficiencies

The previous WNDP has identified significant storage shortfall in Otaki. Calculations for the reservoir sizing has been done based on the Water Supply Code of Australia (WSA) 03-2011 version 3.1, and the Wellington Water guidelines.

6.4.1 WSA (Water Supply Code of Australia) Guidelines

The WSA states that for surface reservoirs, useable reservoir capacity (including reserve storage capacity should be equal to a minimum of 8-24 h consumption at peak day demand, depending on the needs of the specific system. This is interpreted as reservoir capacity equivalent to the peak day demand.

6.4.2 Wellington Water Guidelines

Wellington Water has guidelines for storage requirements, in terms of operational and seismic resilience. For operational resilience, 100% of the storage volume should be at least equal to the greater of:

- 2 times Average Day Demand, assuming current per-capita consumption.
- Peak Day Demand + 20% + Fire Fighting Storage.

Based on the Fire Service Code of Practice, firefighting storage according to fire class is as follows:

- FW2 – 45 m^3
- FW3 – 180 m^3
- FW4 – 540 m^3

Both Otaki Beach and Waitohu Plateau are classified as FW2 and Otaki Main is classified as FW4.

The storage required for seismic resilience is intended for a survival consumption of 20 l/person/day, as well as critical users and businesses with various levels of priority. 70% of the total storage should be sufficient for:

- From Day 8 to Day 30:
  - Public distribution points.
  - Critical users category 1 (civil defence centres, major hospitals, lifelines).
- From Day 14 to Day 30:
  - Critical users category 2 (aged care facilities, medical centres).
- From Day 21 to Day 30:
  - Critical users category 3 (education).

Under the seismic criteria for calculating storage volume, the following assumptions were used:

- Otaki Main allocates 10m^3 for critical users consumption, and a population of 6,200 in 2047.
- Otaki Beach and Waitohu Plateau allocates 5m^3 each for critical users consumption, and a 2047 population of 3,800 and 2,000, respectively.

6.4.3 Reservoir Sizing

Table 6-4 below summarises the required storage volume based on both WSA and Wellington Water guidelines.

Table 6-4: Required storage volume based on WSA and Wellington Water guidelines

Water Supply Area	Criteria	Required Storage	Shortfall
Otaki Beach + Otaki Main	1xPDD (WSA)	4,072	4,072
	2xADD (WWL)	7,074	7,074
	1.2xPDD+FF (WWL)	5,472	5,472
	Seismic (WWL)	5,060	5,060
Waitohu Plateau	1xPDD (WSA)	1,062	387
	2xADD (WWL)	1,236	561
	1.2xPDD+FF (WWL)	1,320	645
	Seismic (WWL)	1,150	475

The chart in Figure 6-13 summarises the required storage volume for Otaki based on the specified guidelines.

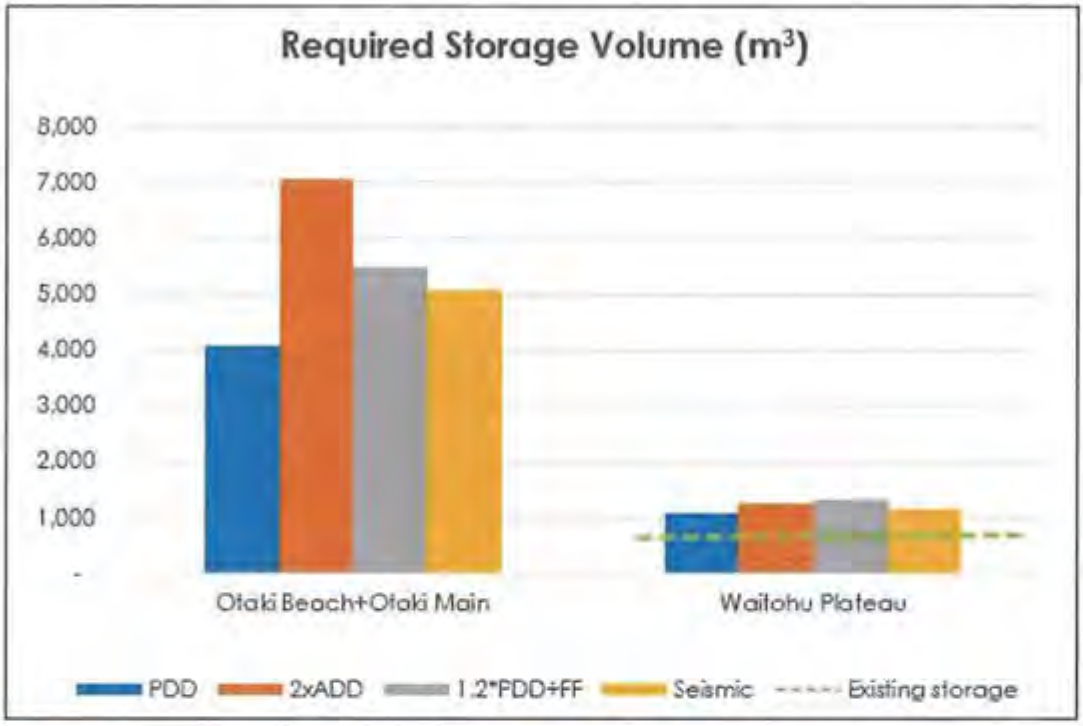

Figure 6-13: Required storage volume based on WSA and Wellington Water guidelines

For the purpose of preliminary sizing and costing of upgrades, we adopted Wellington Water's guideline for operational resilience where the storage volume must be equal to or greater than the peak day demand + 20% + firefighting storage. This is a middle ground between the WSA value and the highest WWL value. **KCDC needs to confirm their target Level of Service for water storage.**

Under this criterion, the combined storage shortfall for Otaki Main and Otaki Beach is 5,472 m³. In the Waitohu Plateau zone, the required storage volume is 1,320 m³. The existing Waitohu Reservoir volume is 675 m³, leaving a shortfall of 645 m³ for the zone.

Stantec

OTAKI RESERVOIR AND MAINS UPGRADES

19 August 2022

Prepared for:
Kapiti Coast District Council (KCDC)

Prepared by:
K Waterland / B Davies

Project Number:
310101208 - Task 26

Revision	Description	Author	Date	Quality Check	Date
5	Final Draft	K Waterland / B Davies	19.08.2022	A Babar	23.08.2022

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1 Introduction

KCDC has engaged Stantec to report on the operation of the water supply network following the addition of three new pieces of infrastructure:

1. The proposed Otaki Reservoir, including dedicated inlet and outlet mains
2. The Otaki Fire Loop main including Aotaki Street
3. The Mill Road "spine" mains upgrade

1.1 Background

The Otaki water network is split into two distinct pressure zones, with the beach and most of the town in the low-lying Otaki Main area, and a smaller number of properties at a higher elevation on the Otaki Plateau.

Water is supplied to the Otaki Main system from two bores at Rangiuru Road and Tasman Road. Some water is delivered from these sources to Otaki Beach but the majority is delivered to Otaki township. The County Road pump station delivers water from the Otaki Main system into the plateau, where a small reservoir (675m^3 capacity) in Waitohu Valley Road provides a limited amount of storage.

There is no storage in the low level, which means not only do the bores need to meet the instantaneous demand for the Otaki Main network but must also respond to increase supply when the County Road pump station turns on. Should the bores fail, water supply to the Otaki Main system would immediately fail.

A Water Network Development Plan (WNDP) report was developed in 2017 by MWH, in which a 2.5ML reservoir was recommended to connect with the Otaki Main with a top water level around 50.5m. At the time no location was identified, but inlet / outlet mains around 1.8km in length were assumed.

The WNDP also identified a lack of fire flow in the commercial / industrial land in Riverbank Road. A fire loop main was proposed, sized at 200mm ID (internal diameter).

More recent work has identified a location for the Otaki Reservoir, and further works have been proposed to improve the network connectivity between Tasman Road and County Road pump station.

1.2 Network Configuration

Figure 1-1 shows the network upgrades as proposed by KCDC.

Figure 1-2 shows a schematic of the proposed Otaki network configuration including the reservoir. Note that although the location identified for the reservoir sits on the Otaki Plateau, it supplies the Otaki Main water network. A new NRV will ensure the County Road pump station can only draw water from the reservoir. This will ensure turnover of the reservoir and will also limit the effects of the pump station on the Otaki Main network.

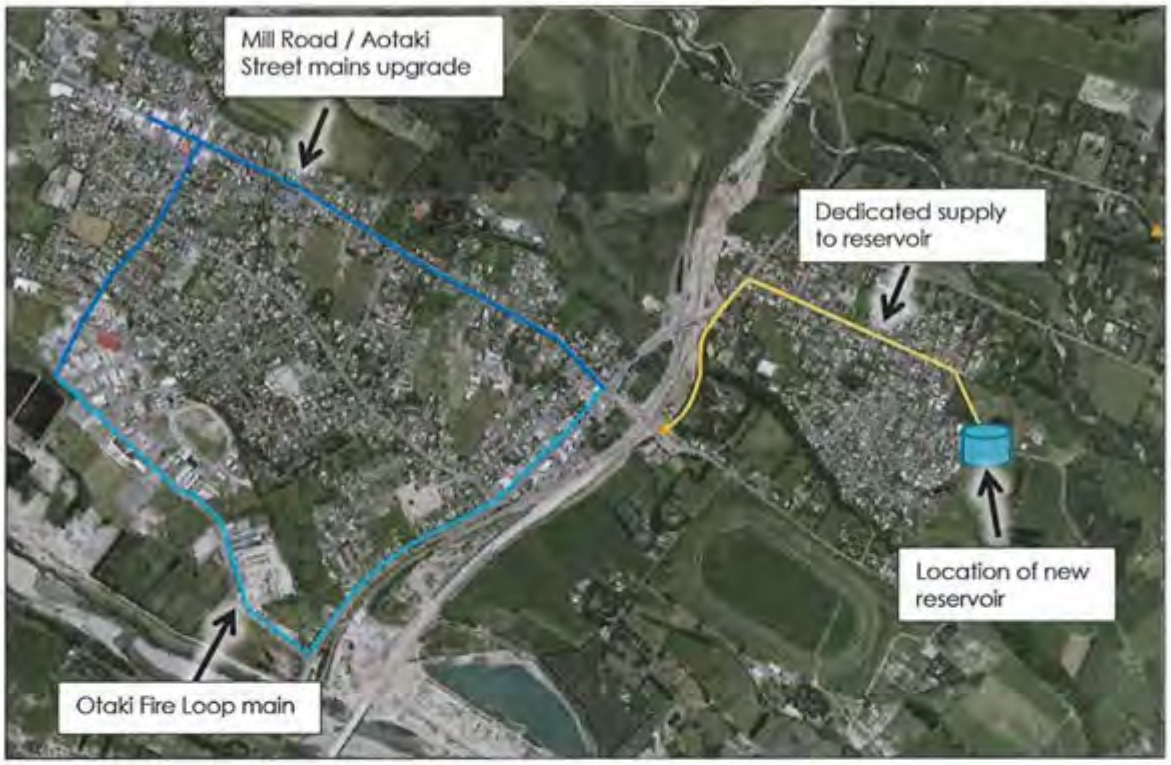

Figure 1-1: Location of new reservoir and configuration of loop main

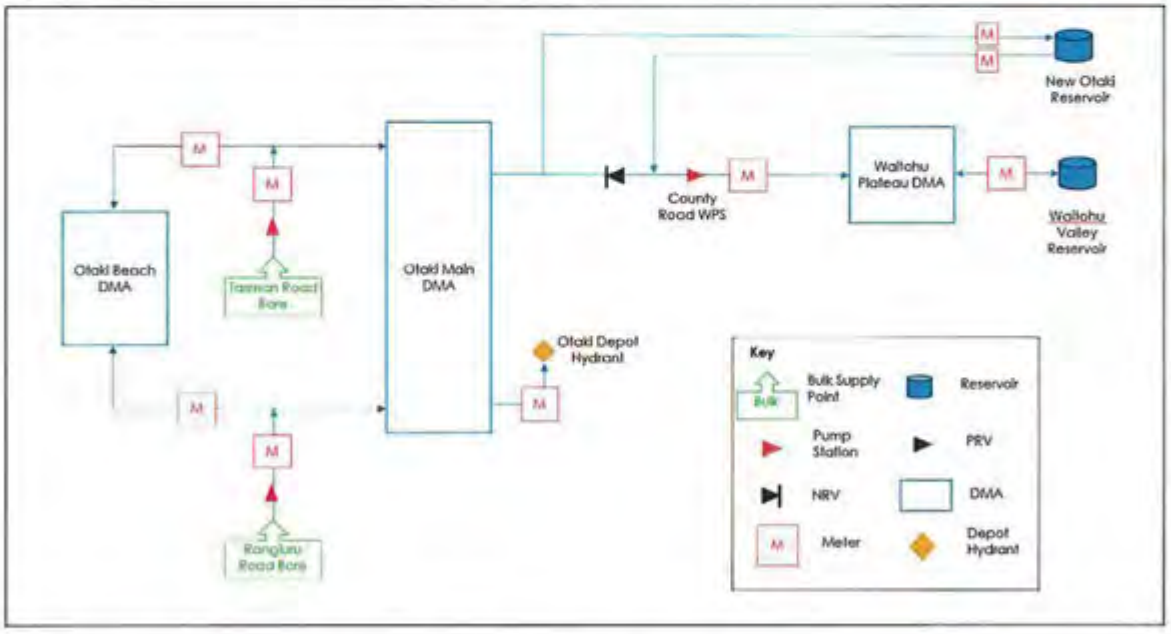

Figure 1-2: Otaki network schematic with new reservoir

2 Water Supply Requirements

2.1 Design Pressure

Schedule 6 of the Kapiti Coast District Councils Subdivision and Development Principles and Requirements, 2012 (SDPR), states that the design pressure (i.e. during Average Day Peak Week demand) shall be between 250kPa and 900kPa (25m to 90m head) at the point of supply.

2.2 Available Fire Flow

Table 2 of SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice (the Fire Code) states that for residential properties the minimum firefighting water supply required is 12.5L/s flow within a distance of 135m of the building and a further 12.5L/s within 270m, with minimum 10m pressure at each source during 60% of annual peak demand.

There is a non-residential area in Riverbank Road requiring higher fire flow – see Figure 2-1. The fire class of individual buildings in the area is unknown but Fire and Emergency NZ (FENZ) have raised this in the past as an area of concern – up to FW6 (200 l/s total) may be required.

Fire flow has been reviewed in the current demand scenario only. When fire flows get to FW5 or FW6 levels (150-200 l/s), these flows normally dwarf the effects of growth on local network capacity.

Figure 2-1: Riverbank Road Industrial Area

3 Model Setup

For reference, the modelling is based on the master planning model KCDC WS MPL06, using the 2018 and 2051 upgraded scenario. A variation named "**KCDC WS MPL06 C08 Otaki Res and Loop Main**" has been created for this assessment.

To ensure that the new reservoir and mains upgrades will continue to supply the Otaki network, modelling was undertaken in both the current scenario and the 2051 future scenario.

3.1 Growth

KCDC has adopted growth projections developed by Sense Partners in 2021.

In order to accurately assess the impact of the new reservoir, Sense Partners growth figures were used to estimate future demand in the existing Otaki water network.

A summary of the future growth in the Otaki network is shown below:

Table 3-1: Sense Partners population prediction

	Otaki Beach	Otaki Main	Waitohu
Population 2016 (in model)	1,672	3,329	883
Population 2051 (sense partners)	2,852	7,422	1,357
Change (2016 to 2051)	1,180	4,093	474

As agreed with KCDC, for the purposes of this assessment we did not identify any particular developments contributing to growth for the 2051 future scenario. All growth demand was scaled evenly relative to the Sense Partners across Otaki.

- Peak summer demand in Otaki in 2018 is 3,920 m^3/day.
- Peak summer demand in Otaki in 2051 is 6,300 m^3/day.

For future technical reference, growth was added in the model by directly scaling up the specific consumption at each customer point. A demand scaling factor object is used in simulations, but this only represents scaling from average to peak summer demand.

3.2 Upgrades

A full list of the upgrades proposed and used in various scenarios in this study is given here.

3.2.1 OTAKI RESERVOIR

The new Otaki Reservoir has been modelled with a size of 5.5ML and 6m deep (this equates to a 34m diameter). The top water level (TWL) has been modelled as 52m, with a bottom water level (BWL) of 46m.

Separate dedicated inlet and outlet mains have been proposed for the reservoir, each initially sized at 256mm ID. These are approximately 1.7km long, and connect into the existing network adjacent to the inlet for the County Road PS. The alignment for the mains and the location of the reservoir is shown in Figure 3-1. From modelling, the outlet main was required in many scenarios to be upsized to 350mm ID.

Figure 3-1: Location of new reservoir and configuration of fire loop main

3.2.2 TASMAN AND RANGIURU BORE FLOW RESTRICTIONS

With the new reservoir in place to buffer the instantaneous peak demand, it is possible to reduce the rate of flow at the existing bores to maximise the life of the bores. After discussion with KCDC, flows at both Rangiuru and Tasman bores was restricted to a maximum of 30 l/s at each.

3.2.3 FIRE LOOP AND MILL ROAD SPINE

The fire loop main to support firefighting in Riverbank Road has been modelled as a 200mm ID main running alongside the existing 150mm main in Riverbank Road. The fire loop continues as a 200mm ID main in parallel to the existing 150mm main along Aotaki Road back to Mill Road. Modelling showed that along the current SH1 this should be sized at 300mm ID to connect the new source (see below) to Mill Road.

A recent upgrade in Tasman Road and Main Road is also planned for extension along Mill Road from Matene Street to the current SH1, parallel to the existing 200mm Mill Road main. This Main Street /

Mill Road "spine" is sized at 300mm ID, and connects the Tasman bore to both ends of the proposed fire loop.

See Figure 3-1 for the alginment of the proposed mains. We did not rewview any alternative routes as part of this assessment.

3.2.4 NEW SOURCE (RIVERBANK)

To meet future growth a new source will be required. A location for this has not been finalised but from discussions with KCDC a potential source was added to the model at the corner of Riverbank Road and the current SH1. This was set up to deliver water at a hydraulic grade (HGL) equal to the existing Tasman and Rangiuru bores, i.e. 56m HGL. Ground elevation is around 13m, so this represents 43m local pressure.

In the model the bore has been set up to provide as much water as required to the network to maintain pressure at 56m HGL – there is no flow limitation.

3.2.5 RAHUI ROAD TWIN MAIN

Regardless of the diameter of the proposed reservoir outlet main, the existing network contains a restriction in Rahui Road between the railway and the main highway, where a single 200mm main is all that is available to carry flow from the reservoir back to the Otaki Main network. In almost all scenarios this causes both the following:

We note that where this main passes under the new highway it has been twinned. We recommend extending the twin main for the full distance between County Road and the existing SH1. Modelling shows this would reduce head losses in this configuration and improve resilience in the supply to and from the reservoir.

Figure 3-2 shows the current and recommended configurations in this area.

Figure 3-2: Rahui Road 200mm mains

3.2.6 RIVERBANK BORE "EMERGENCY" MODE

Although the new source (Section 3.2.4) was not required for normal network operation in the current scenario with Tasman and Rangiuru operating, it could provide a lot of assistance for fire flows in Riverbank Road. If Tasman and Rangiuru are taken out of service, the new source will be required to provide backup to the supply from the reservoir.

In the model, an adjustment was made to the settings for the Riverbank source set out in Section 3.2.4 so that it operates in two modes:

1. Refill mode – as before, the bore delivers water at 56m HGL, sufficient to refill the reservoir. This triggers when the reservoir drops to 4.5m.
2. Draindown "emergency" mode – the bore closes if the level in the reservoir exceeds 5.8m to reduce the level in the reservoir. However, if pressure in the Riverbank Road network drops below 48m HGL (due to a mains break or fire flow), the bore re-opens and delivers enough water to the network to maintain supply at 48m HGL.

3.3 Scenarios

We assessed two supply scenarios to meet demand in the current scenario and the increased demand in the future planning horizon:

1. Tasman and Rangiuru supply points continue at current supply levels (delivering a fixed flow of 30l/s each), with the new Riverbank Road source suppling the balance.
2. Tasman and Rangiuru decommissioned, and all water delivered from the new Riverbank source.

The two supply scenarios were assessed with and without the new Otaki Reservoir, to assess how supply may be maintained if the reservoir does not go ahead.

Sizing for the mains was reviewed, but alternative routes or alternative options for supply or delivery were not assessed. Performance of the Waitohu Plateau zone was outside of the scope of this study and was not assessed.

4 System Performance

4.1 Current Peak Day (2018) – Existing Bores in Service

In this scenario, the Otaki reservoir is in place with pipes sized at 256mm ID. The Tasman and Rangiuru bores are restricted to 30 l/s each.

It was found that with both Tasman and Rangiuru delivering up to 30 l/s to the network and the reservoir providing support for peak instantaneous demand, the new source was not required for replenishment of the reservoir in the current peak summer day.

With the addition of the new reservoir and proposed new supply, minimum pressures of 25m can be met at all properties, excluding areas of existing low pressures in the Waitohu Plateau (which are not part of the current study)

4.1.1 PRESSURES

With the limit on the flow at the Tasman Bore, we found the critical point in the Otaki Main network is in Otaki Beach, in Manuka Street, at around 15m elevation. shows the location, along with the current minimum pressure.

Before the addition of the new reservoir and with bores running in their current configuration, Tasman Road bore was required to deliver up to 60 l/s and minimum pressures in Manuka Street were around 38m, with low pressures occurring when demand is high and County Road pump station runs to refill the Waitohu Reservoir.

It was found that introduction of the Reservoir and restriction of the flow at Tasman bore reduces this to around 34m (Figure 4-1). At peak demand, existing bores can only supply a total of 60 l/s and the small amount of remaining demand must be met from the reservoir. As the driving head at the reservoir is between 50 and 52m HGL, pressures across the network are lower when demand exceeds the 60 l/s available at Tasman and Rangiuru.

Head losses on all principal mains remain under 5m/km with the addition of the new reservoir, with the exception of the two mains supplying Otaki Beach (in Rangiuru Raid and Tasman Road). Both mains currently experience between 6 and 7m/km head loss, and this is unchanged in the upgraded scenarios.

Upgrades required:

- Otaki Reservoir
- 250mm ID reservoir in/out mains are sufficient

Figure 4-1: Current peak day pressures (m) at Manuka Street

4.1.2 FIRE FLOWS

Several upgrades and network changes were required to deliver FW6 fire flows to Riverbank Road. The scenarios as modelled are set out below, and the upgrades are detailed in Section 3.2.

- **Base scenario**

The current available fire flow (without the reservoir, loop main or any upgrades) at the shown hydrant is around 60l/s.

- **FW4 requirements (100 l/s total)**

FW4 supply required the following upgrade:

- the Rahui Road upgrade.

- **FW5 requirements (150 l/s total)**

FW5 supply required the following upgrades:

- Rahui Road.
- Reservoir outlet main must be 350mm ID.

- **FW6 requirements (200 l/s total)**

FW6 supply required the following upgrades:

- Rahui Road.
- Reservoir outlet main must be 350mm ID.
- New source at Riverbank, with "Emergency Mode" trigger set to maintain network pressure at 35m (48m HGL).

We note there are some existing residential areas where fire flows are non-compliant, e.g. in Otaki Beach. These are due to local network issues, and were not affected by the reservoir or any associated upgrades. These may require local upgrades to resolve, however this is out of scope for the current study.

4.2 Current Peak Day with Existing Bores Closed

In this scenario Tasman and Rangiuru bores are closed completely, and the new Riverbank bore is set up with off/on controls based on level of the reservoir.

- If the reservoir exceeds 5.8m, the bore turns off. The network is supplied entirely from the reservoir.
- When the bore drops below 4.5m the bore restarts and delivers water at 56m HGL (sufficient to replenish the reservoir).

With these settings, the bore delivers up to around 80 l/s to the network when refilling the reservoir.

4.2.1 PRESSURE

Initially it was found that in this configuration, pressure in Otaki Beach (Manuka Street) dropped to around 15m – well below the required minimum pressure of 25m.

As the bore shuts off when the reservoir level exceeds 5.8m, the network must be able to deliver all the required flow for Otaki Main area from the reservoir. Upgrades are required as follows:

Upgrades required:

- Reservoir outlet main 350mm ID
- Riverbank Bore (on/off only)

With these upgrades, pressures in Manuka Street increased from around 15m to around 28m, as shown in Figure 4-2

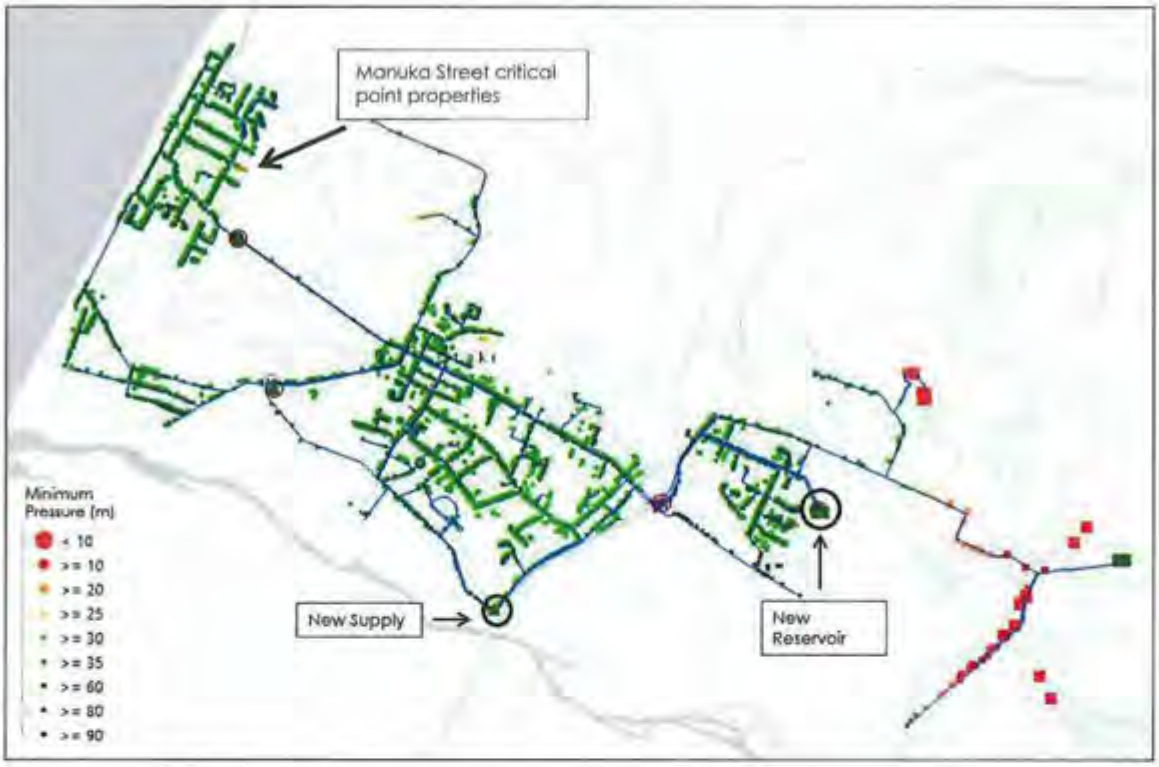

Figure 4-2: Current peak day pressure (m) with Tasman and Rangiuru out of commission

4.2.2 FIRE FLOWS

Without the Tasman and Rangiuru bores upgrade requirements are generally higher for the same level of fire flow. The upgrades and network changes required to deliver fire flows to Riverbank Road are set out below. The upgrades are detailed in Section 3.2.

- **FW4 requirements (100 l/s total)**

FW4 supply requires the following upgrades:

- Rahui Road twin mains.
- Reservoir outlet main must be 350mm ID.

- **FW5 requirements (150 l/s total)**

FW5 supply required the following upgrades:

- Rahui Road twin mains.
- Reservoir outlet main must be 350mm ID.
- New source at Riverbank, with "Emergency Mode" trigger set to maintain network pressure at 38m (51m HGL).

- **FW6 requirements (200 l/s total)**

FW6 supply required the following upgrades:

- Rahui Road twin mains.
- Reservoir outlet main must be 350mm ID.
- New source at Riverbank, with "Emergency Mode" trigger set to maintain network pressure at 37m (50m HGL). Riverbank delivers up to 185 l/s. We also note that with this higher trigger, Emergency Mode triggers during normal operation – further investigation may be required.

4.3 Future Peak Day (2051) – Existing Bores in Service

In the future peak day scenario, the growth (set out in Section 3.1) was spread evenly across Otaki, and no specific developments were included. Peak day demand in Otaki in 2051 is anticipated to be around 6,300 m^3/day.

In this scenario, Tasman and Rangiuru bores are restricted to 30 l/s each, and the new Riverbank bore is set up with off/on controls based on level of the reservoir. If the reservoir exceeds 5.8m, the bore turns off. When the bore drops below 4.5m the bore restarts and delivers water at 56m HGL (sufficient to replenish the reservoir).

An additional change was made at the County Road pump station. It was found that the existing pump station no longer has the capacity to deliver the required volume of water to the Plateau under 2051 demand. Although the Plateau zone is outside the scope of this study, an additional pump was added to the County Road pump station to ensure the full volume of water required by the Plateau was exported from the Otaki Main system.

4.3.1 PRESSURES

It was found that even with Tasman and Rangiuru each delivering up to 30 l/s to the network, the new source was required to deliver around 2 MLD to the network. The model shows flows at the Riverbank bore of up to 55 l/s when refilling the reservoir.

It was found in this scenario that pressures at Manuka Street drop to 17m under 2051 peak summer demand.

Upgrades required:

- Riverbank Bore in simple on/off mode
- 250mm ID reservoir in/out mains are sufficient

4.3.2 RESILIENCE

The most critical failure in this scenario would be an outage of the Riverbank bore.

In the event of an outage at the Riverbank bore, pressures at Manuka Street would be maintained above 25m and supply could be maintained for 3 days (assuming Tasman and Rangiuru can continue to deliver 30 l/s each).

4.4 Future Peak Day – Existing Bores Closed

In this scenario Tasman and Rangiuru bores are closed completely, and the new Riverbank bore is set up with off/on controls based on level of the reservoir.

- If the reservoir exceeds 5.8m, the bore turns off. The network is supplied entirely from the reservoir.
- When the bore drops below 4.5m the bore restarts and delivers water at 56m HGL (sufficient to replenish the reservoir).

With these settings, the bore delivers up to around 80 l/s to the network when refilling the reservoir.

4.4.1 PRESSURES

Even with the new bore in on/off mode and all network upgrades, pressures in Otaki Beach drop below 25m at peak demand if the Tasman and Rangiuru bores are decommissioned. This can be resolved by implementing the 'emergency mode' for the new source

Upgrades required:

- Riverbank Bore with Emergency Mode
- Reservoir outlet 350mm
- Rahui Road twin mains

4.4.2 RESILIENCE

The most critical failure in this scenario would be an outage of the Riverbank bore. In the event of an outage at the Riverbank bore, pressures at Manuka Street would be maintained above 20m but supply would last less than 24 hours under peak summer demand before the reservoir drained.

4.5 Future Peak Day – no Reservoir

If the reservoir is taken out of service, or if it is not possible to build it at all, the new source would be used as a direct supply to customers rather than as a refill pump for the reservoir.

The pumps would be required to meet the peak instantaneous demand of up to 130 l/s for Otaki Main, and to support the County Road pump station which could require a further 25 l/s. A total of up to 155 l/s would therefore need to be delivered direct from the new source, with the speed of the pump varying across the day to maintain pressure at 56m HGL.

The required flow could be reduced to 95 l/s if the two existing sources at Tasman and Rangiuru are retained at a maximum flow of 30 l/s each.

Pressures under this scenario are not a concern as the pumps run at variable speed. However, fire flows would be limited by the capacity of the pumps. The Fire Code requires flows to be delivered at 60% of the instantaneous peak summer demand, so if FW5 (150 l/s) is required, the pumps (all sources combined) would need to be able to deliver the 150 l/s in addition to 60% of 155 l/s, i.e. 243 l/s.

5 Upgrades Summary

A number of upgrades are proposed, which will allow the system to deliver increasing levels of service. Assessments of the required upgrades were carried out considering two scenarios:

1. Existing bored at Tasman and Rangiuru were retained and able to deliver up to 30 l/s each.
2. Existing bores at Tasman and Rangiuru were decommissioned.

Table 5-1 and Table 5-2 show the requirements reviewed, and the upgrades required to meet these requirements in each scenario.

Table 5-1: Existing sources retained at 30l/s each

Requirement	Reservoir	Reservoir Outlet Main 350mm	Rahui upgrade	New Source	New Source Emergency Mode
Current demand, FW3 fire flow	yes	no	no	no	no
Future demand	yes	no	no	yes	no
FW4 fire flow	yes	no	yes	no	no
FW5 fire flow	yes	yes	yes	no	no
FW6 fire flow	yes	yes	yes	yes	yes

Table 5-2: Existing sources decommissioned

Requirement	Reservoir	Reservoir Outlet Main 350mm	Rahui upgrade	New Source	New Source Emergency Mode
Current demand, FW3 fire flow	yes	yes	no	yes	no
Future demand	yes	yes	yes	yes	yes
FW4 fire flow	yes	yes	yes	yes	no
FW5 fire flow	yes	yes	yes	yes	yes
FW6 fire flow	yes	yes	yes	yes	yes

6 Conclusion

Several model scenarios have been assessed with the addition of a new reservoir and source setup as well as mains upgrades for the Otaki water network. Modelling results show that the new reservoir and source will be able to supply Otaki in the future and could be able to meet the fire code requirements for FW6 class buildings.

The proposed reservoir top water level of 52m and height of 6m should be sufficient to maintain pressures across Otaki Main in almost all configurations. However, it is recommended to size the reservoir outlet at 350mm, as well as the NRV delivering water back to Otaki Main from the reservoir.

A 200mm main in Rahui Road has been duplicated under the new highway, it is recommended this duplication should be extended to SH1 to effectively connect the reservoir to the Otaki Main network. The length of this stretch is estimated at 150m.

A new source will be required to support growth in future, or to support higher fire flows in the shorter-term. Ideally this would plug into the network somewhere along SH1 between Mil Road and Riverbank Road. This could operate in two modes to manage the level in the proposed reservoir:

1. Refill mode – the bore delivers water at 56m HGL, sufficient to refill the reservoir.
2. Draindown mode – the bore stops to allow the reservoir to drain. However, if pressure in the network drops below 48m HGL (this could be due to a mains break or high-volume fire flow), the bore restarts and delivers enough water to the network to maintain supply at 48m HGL.

The size of the fire loop upgrade (along SH1, down Riverbank Road and back to Mill Road along Aotaki Street) depends to an extent on the location of a new source. If the source can be plgged into the existing network in SH1, the SH1 stretch of the fire loop should be 300mm ID. For the rest of the fire loop 200mm ID is sufficient.

The Mil Road "spine" upgrade should be 300mm to ensure water can get to Otaki Beach at sufficient pressure from the proposed reservoir.