



NAPIER
CITY COUNCIL
Te Kaunihera o Ahuriri

Napier Civic Building
231 Hastings Street
t +64 6 835 7579
e info@napier.govt.nz
www.napier.govt.nz

EXTRAORDINARY MEETING OF COUNCIL

Open Agenda

Meeting Date:	Thursday 7 May 2020
---------------	---------------------

Time:	10am
-------	------

Venue:	Via Zoom livestreamed on Council's facebook page
--------	--

Council Members	Mayor Wise, Deputy Mayor Brosnan, Councillors Boag, Browne, Chrystal, Crown, Mawson, McGrath, Price, Simpson, Tapine, Taylor, Wright
-----------------	--

Officer Responsible	Interim Chief Executive
---------------------	-------------------------

Administrator	Governance Team
---------------	-----------------

Next Ordinary Meeting of Council
Thursday 4 June 2020

ORDER OF BUSINESS

Apologies

Conflicts of interest

Public forum

Nil

Announcements by the Mayor including notification of minor matters not on the agenda

Note: re minor matters only - refer LGOIMA s46A(7A) and Standing Orders s9.13

A meeting may discuss an item that is not on the agenda only if it is a minor matter relating to the general business of the meeting and the Chairperson explains at the beginning of the public part of the meeting that the item will be discussed. However, the meeting may not make a resolution, decision or recommendation about the item, except to refer it to a subsequent meeting for further discussion.

Announcements by the management

Agenda items

- | | | |
|---|---|----|
| 1 | Water Master Planning | 3 |
| 2 | Review of Napier City Mobile Sign Bylaw | 93 |

Minor matters discussion (if any)

AGENDA ITEMS

1. WATER MASTER PLANNING

<i>Type of Report:</i>	Operational and Procedural
<i>Legal Reference:</i>	Health (Drinking Water) Amendment Act 2007
<i>Document ID:</i>	912288
<i>Reporting Officer/s & Unit:</i>	Russell Bond, 3 Waters Programme Manager

1.1 Purpose of Report

To introduce the Water Master Plan to Council and to identify critical projects that are needing to be programmed and delivered in the 2020/21 Annual Plan.

Officer's Recommendation

That Council:

- a. Receive the report.
- b. Approve the approach to developing Borefield #1 in advance of the Global Resource Consent application, with the aim to provide low manganese source water as soon as practical.
- c. Accept that this approach has potential financial risks with the installation of the larger pipeline that connects the proposed bore to the existing network.

Mayor's Recommendation

That the Council consider and debate the officer's recommendation.

1.2 Background Summary

Napier City Council has been working on the development of the Water Supply Hydraulic Model and the associated Water Supply Network Master Plan since 2017. Late in 2019, Council received the master plan, which was based on the final calibrated model, and outlines the key projects required to deliver a "safe, clean, resilient water supply" to the people of Napier. The master plan covers a 30-year planning horizon and will be a key input into the next Long Term Plan.

The current water supply network has a number of isolated bores that have minimal treatment (emergency chlorination) which pump through the network and eventually to our storage reservoirs. The system as it currently stands met previous drinking water standards (DWS) and was a cost effective way to manage the supply.

Following Havelock North, Public Water Suppliers are now entering a new regulatory environment with changes to the Drinking Water Standards that are moving Council's needs beyond the current network design to the requirement of being more resilient,

better management of risks to our supply, improving water treatment and increasing our operational flexibility.

Master Plan 2019

With the change in requirements, Council has developed a Water Supply Network Master Plan that identifies how Napier will have a safe, clean, resilient supply from now into the future.

The plan introduces the philosophy to move our network from isolated bores feeding through the network with little operational control to a resilient network with two main bore “zones”.

The plan proposes a Taradale Zone and a Napier City Zone that eventually will be able to operate independently but support each other if the need arises.

Each zone will consist of a cluster of bores (a borefield), a treatment plant (likely to be UV and chlorine in line with Drinking Water Standards and new Water Safety Plan requirements) and dedicated pipes taking the water up to reservoirs from which the network can then be fed by gravity.

Over the last few months Council Officers have been reviewing the outputs of the master plan and this process will continue through to the development of the LTP.

Due to the current issues around dirty water, particular attention has been given to the projects, or parts of projects that will help to address the dirty water issues. Consideration has also been given to how Council might expedite these projects.

There are three critical path items that could hold this process up and has led to some changes around how Council might phase the projects in the Master Plan. These are:

1. The need for a new Global Resource Consent and the overlap with the Hawkes Bay Regional Council (HBRC) TANK plan change being notified.
2. Finalising the location of the future borefield sites.
3. Any major work that Council undertake will drive the need for a new Water Safety Plan under the new 2018 Framework.

Resource Consent

Council's current resource consent for source water extraction is due to expire on 31st May 2027. Typically, a consent application for renewal of this type of activity is required to be submitted between 6-12 months prior to a consents expiry date. This allows for the continued use of the existing consent until the new one is completed.

With the changes required to Napier's water supply network, a consent renewal is required to meet the conditions required under the Resource Management Act 1991 (RMA) and the HBRC's TANK Plan which is being finalised and is likely to be notified in the next few months. There is currently uncertainty around the timing and requirements for the consent with the TANK Plan change not yet being operative. It is likely that Council's consent will be the first application of its size to be tested under the TANK plan.

A key part of this consent will be to understand where Council can locate the new borefields, their impact on the surrounding water users and the local rivers. Water conservation will be a key input into our Resource Consent application as well as assessments around the environmental impacts of the proposed water takes.

HBRC has confirmed that NCC's new consent will be notified which could potentially result in a two year process to obtain the new consent. Originally, Council had planned to establish both borefields at the same time and gain the new consent. Now that the consent will be notified Council needed to look at other ways to deliver improved water quality outcomes quickly.

Consent Variation

One of the primary drivers of Council's programme is good quality water. Initially the plan was to develop a borefield around the existing Awatoto bores. Since the introduction of chlorine and after further investigation and testing, the water quality at this location is not appropriate for our needs as it is high enough in manganese to cause water clarity issues.

The main options to manage this are to move where the water quality is better or to provide for manganese treatment on site.

One potential option for Council is to locate two replacement bores (for A1 and C1) into a location away from higher manganese water that could be developed and consented as part of a *variation* to our existing consent. This option will also help to mitigate the immediate dirty water concerns and the long-term goals of the WSMP.

Borefield Location Selection

There have been 6 sites investigated to determine a suitable location for a new borefield that would form part of the Napier Central Zone. Water quality samples have eliminated 4 of these sites due to the manganese concentrations in neighboring bores. It was noticed that the greater the distance from the A1 location the lower the manganese concentration became.

Due to the high cost of treating manganese, it is prudent to locate this borefield in a location with good quality water with as low as possible manganese concentration as possible.

Initial Options

There are three potential options to consider that will allow Napier to move away from higher manganese water to help with dirty water issues whilst still working towards delivery of our Master Plan.

Option One: Obtain Global Consent

This option looks at waiting to obtain our "Global Water Take Consent" before developing the two new borefields and providing good quality water.

The timeframe associated with this would be around 2-5 years depending upon how much risk Council would like to take on (i.e. starting development the borefields prior to achieving consent).

Water quality issues would not be addressed quickly.

Option Two: Partial Borefield and Consent Variation

This option will swap out the two high Manganese bores (A1 and C1) with two new bores located at the new borefield site for the city zone.

This project would allow for low manganese water entering our supply so that Council can stop introducing more manganese into the system.

The risk of doing this work is that Council have an issue getting consent to have our whole borefield located here which means the cost of the pipe connecting the borefield to the network is more expensive than it needs to be. (The pipeline will cost around \$5m for a full borefield and could potentially be less due to cheaper material costs, although installation costs would be the same, potential amount at risk \$1m).

Option Three: Treat for Manganese at A1

This option would include the installation of a greensand filter located near A1 to remove the manganese before the water enters the supply.

The Capital cost for the greensand filter is estimated to be \$6m for one bore.

Additional to the treatment plant there are the associated costs for 300,000L a day of backwash water to be disposed. The current services in this area are roadside drainage that would need to be upgraded to manage the flow demand. The pipeline would need to be 3.5km in length to reach the Cross-country drain. This would also require a pump and tank to manage the flow. This system has been estimated at an additional \$5million to make a total budget capital cost for Manganese treatment of A1 of \$11million. In addition, the greensand would need to be replaced frequently and there would be increased operational costs.

Option Recommendation

Dealing with dirty water is a key driver for Council and the quickest, most cost effective solution to remedy this is moving to a low manganese water source. Option Two above will deliver this and is the first key step to implementing the master plan programme.

Other Water Quality Projects

The other key project that is being investigated is the zoning of Tamatea and Parklands into a separate zone. Tamatea has been the most badly impacted by dirty water issues and this is in part due to A1 feeding directly into the network in Tamatea.

The dirty water issues are a combination of biofilm, manganese oxides and changes in flow. By zoning off Tamatea/Parklands Council can supply the network directly from the Taradale reservoir which is low in manganese, flows can be better managed with one supply point and targeting cleaning can be done to get this zone clean.

The long term plan for the network is to break the network into zoned areas or DMAs (district Metered Areas) that assists with flow and leakage management. This project would be the first step in setting these zones up.

The initial estimates are around \$300,000 to deliver the zone as Council need to address some firefighting capacity issues. The project has become more complex than expected and the team are working through options with the modelling consultant to identify the best way forward.

Water Supply Master Plan Projects

Apart from the above critical projects that the team are working on, the main outputs of the water network master plan are:

- Two bore fields will be constructed in the outskirts of Napier's Urban area
- Two treatment plants will be installed at two bore field sites
- Reduced manganese levels would be required in the water supply

- Enfield reservoir will be replaced with a new reservoir system at the same location or at a higher site on Hospital Hill, allowing for future growth and demand
- Taradale bore field will pump water directly into Taradale reservoir system and Awatoto bore field will pump water directly into new reservoir system at Hospital Hill
- Water network will be divided into two distinct zones. Southern side of the city will be one zone and northern side of the city and Bayview will be the second zone
- The southern zone will be gravity fed from Taradale reservoir system and northern and Bayview zone will be gravity fed from the new reservoir system located on Hospital Hill. In emergencies, the two supply zones can be interconnected for resilience and supply continuity.
- Upgrading of pipes to meet future growth and demand areas
- Upgrading of pipes to meet firefighting requirements due to the changes in network flows
- Operational projects to manage water demand and improved system control

The total capital cost of achieving the goals of water network master plan over the next 30 years has been estimated at \$41.5m. Our initial peer review shows that these costs are low in some instances. These figures will be confirmed for the LTP and prioritized accordingly.

1.3 Issues

Below is a more detailed discussion around the key elements and issues that the master plan has been developed to address.

Contamination risk from bores

With the exception of the Awatoto water bore (A1) and the bore located in Tareha Park (T6), all the other water bores are located in urban areas within close proximity to the City's wastewater network. While a low risk, a small number of wastewater main failures occur annually and these present a risk of contamination to the water supply network. Recent condition assessment of these bores revealed that the bore conditions are moderate to poor. The only exception is A1 bore which is in a good condition. The location of bores in close proximity to the wastewater network poses a potential risk of contamination of water supply through the bores.

Water clarity issues

At present, there is a significant issue of water clarity due to manganese in water and biofilm buildup in the water network. The manganese level is elevated in two bores, A1 and C1 (Coverdale bore). DWS aesthetic guidelines for manganese in water is 0.03 ppm and the manganese level from these two bores is 0.06 ppm. Historically, there have been water clarity complaints from customers but the situation got significantly worse following the introduction of chlorination. The proposed option to move away from Awatoto and to form a partial borefield will address these issues.

Condition of Enfield reservoir

Enfield reservoir is the main reservoir supplying water to a large area of Napier. The reservoir is over 80 years old and leaking. A high-level seismic assessment of the reservoir structure indicated that there are some structural issues associated with the reservoir. The reservoir also has some operational challenges due to its design and location. It is also not sized to meet future supply requirements.

Renewal of Older Assets

Some underground assets are nearly at the end of their expected life and our knowledge of their condition is poor which means that Council have less information around how they might fail and when and the potential impacts and costs.

Temporary chlorination system

The current chlorination systems were installed were as a response to E.coli transgressions incidents. The systems were installed with urgency and these systems are not permanent and have not been designed to meet industry standards in terms of Environmental and Health & Safety requirements. Permanent treatment processes will assist in managing risk and will improve operational control around residual levels of chlorine in the network and odour complaints.

Direct pumping into network

The current operating system is pumping water directly into reticulation creating localized peak pressure areas and introduces hydraulic shocks during pump stops and starts, causing significant water clarity issues in the network. This is evident mainly in the areas where water is pumped directly into the reticulation. It also limits our operational control across the network.

Capacity for future demand

New infrastructure is required to service future growth and demand. If there are significant developments in the western hills and Te Awa areas, new pipelines & reservoir storage is required to service these areas.

1.4 Significance and Engagement

Water Programme Changes

With the potential impacts on other users and the aquifer at large, HBRC has signaled that a renewal of our Citywide Water Supply Resource Consent would require a public notification process. Due to the size and complexity of the consent and the overlay of the TANK Plan Change, it is expected that the consent process could take up to two years. In order to reduce this time delay in our programme it is proposed to apply for a variation to the existing consent by replacing bores A1 and C1 with 2 new bores in the Meeanee area.

This process cannot be applied to the full proposed master plan changes as the full impact of changes trigger a full consent renewal process. This step change does allow Council to move forward with the required changes to achieve the target of a manganese free water supply.

Our overall capital spend for the next year is similar to that signaled previously, but Council have adjusted the priorities somewhat. The pipeline of work that Council are aiming to deliver next year follows:

- 2 x test bores to confirm the quality and flow at our proposed new borefield sites and finalising their location
- 2 new production bores, treatment and mains connecting into our network to have low manganese water
- Ongoing investigation into an appropriate site for our replacement reservoir on Hospital Hill and potential site purchase (if not already completed in 2019-2020 FYR)

- Development of a zone for Tamatea and Parklands to manage dirty water and to start on leakage management
- Design of the water treatment plants
- Design of the mains connecting proposed borefields to reservoirs and back to the network
- Design of improvements to the network to maintain firefighting levels of service
- More access points to the network for improved network cleaning

The benefit of this programme of work is to fast track projects that will assist with our dirty water issues whilst still taking us forward to a safe, resilient and clean water supply.

1.5 Implications

Financial

The LTP 2018-2028 financial year for the 2020/21 had a capital budget total of \$11million. The proposed changes to this Annual Plan with the water capital plan will look to re-profile this expenditure. The total proposed capex budget for the adjusted programme is \$15 million (incl renewals).

Social & Policy

N/A

Risk

Key risk for this report are;

- Resource Consent Renewal
- TANK timing and impact to consent application
- Financial Risk of Pipeline investment
- Peer review process
- Delays due to Covid- 19
- Unknown cost and timing impacts on construction industry (Government projects etc)

The financial risks with this programme is in the programme estimates as a whole and in the timing of key projects within the WSMP. There have been some indicative budgeting estimates in the master plan that will require further investigation to provide a higher level of accuracy in the numbers that will be required for the LTP process. This process is already underway to better understand the financial implications of the WSMP.

There is also a potential financial loss associated with the increase in pipe size with the pipeline proposed from the new bores in Meeanee to the A1 site. The programme is currently proposing to install a larger diameter pipe of DN550 instead of DN400. This would future proof the pipeline for the proposed borefield development. The risk with this investment is the cost of upsizing the pipe and the associated fittings. As the permission to develop and draw the required water for the full borefield is still subject to a successful citywide consenting process. If the consent process were unsuccessful, the financial risk would be the cost differential between the two pipe sizes. This could be in order of \$1-1.5M.

The current pandemic, impacts on the construction industry, implications of the Government's recovery programme and the regional economic recovery programme etc.

are currently unknown. Council have added additional time onto our projects to allow for delays and cost fluctuations are expected. Council are uncertain at this stage around this impact.

1.6 Options

The options available to Council are as follows:

- a. **Option One:** Obtain Global Consent (Majority of Master Plan)
- b. **Option Two:** Partial Borefield and Consent Variation (\$8.5m, note identified risk)
- c. **Option Three:** Treat for Manganese at A1 (\$11m plus operations)
- d. **Option Four:** Tamatea/Parklands Zone Pilot (\$300k)

The following table shows how the above projects fit in with the Annual Plan forecast for 2020/21.

	20/21 Annual Plan (to be agreed) (\$,000)
Water Supply	
Awatoto Industrial & Phillips Road Bore	800
Awatoto Trunk main extension	
Borefield No.1 Rising Main	5,000
Borefield No.2 Land Purchase	1,500
District Modelling Projects	808
FW2 Fireflow Network Upgrades	100
Hospital Hill Falling Trunk Main	250
Network access points	100
New bores in Awatoto	1,500
New Taradale Bore Field	500
New Water Treatment Plant	2,000
Replacement of Enfield reservoir	1,500
Taradale Falling Trunk Main	150
Water Control System minor works	5
Water Meter Renewals	5
Water Pipes Renewals	265
Marewa Kennedy Road Trunkmain Crossing	280
SCADA Upgrade	250
Borefield #2 Rising Main	150
Total Water Supply	15,163

1.7 Development of Preferred Option

See attached Water Master Plan 5yr Programme detailing the proposed work programme. With the continued review and detailed development of the work in the WSMP, timing of these works can change and these changes will be managed through the LTP process.

1.8 Attachments

- A Napier Water Supply Network Master Plan (Nov 2019) [↓](#)
- B Water Master Plan 5yr Programme [↓](#)

WATER SUPPLY NETWORK MASTER PLAN

PREPARED FOR NAPIER CITY COUNCIL

November 2019



This document has been prepared for the benefit of Napier City 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

Ben Davies

PROJECT TECHNICAL LEAD

Cedric Papion

PREPARED BY

Cedric Papion

15/11/2019

CHECKED BY

Jessel Villaflor

15/11/2019

REVIEWED BY

Ben Davies

15/11/2019

APPROVED FOR ISSUE BY

Ben Davies

15/11/2019

WELLINGTON

Level 13, 80 The Terrace, Wellington 6011
PO Box 13-052, Armagh, Christchurch 8141
TEL +64 4 381 6700, FAX +64 4 473 1982

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by

Executive Summary

Objectives

Napier City Council (NCC) has engaged Stantec to develop a master plan identifying investigations and capital upgrades required for the water supply network to meet the Level of Service now and in the future.

This report summarises the key drivers for the Napier water supply, the work done to date and the recommended way forward.

Drivers

The over-arching vision is that of a modern water system that can reliably supply safe water to customers, now and in the future.

The drivers are:

- **Safe** water is distributed to customers.
- **Clean** water is distributed to customers.
- Water is distributed with sufficient **pressure**.
- The network is **resilient** to shocks and stresses.

Master Plan

A series of capital works will be required to achieve the performance objectives of these drivers. Some of these works are not scoped accurately at this stage and will require preliminary investigations.

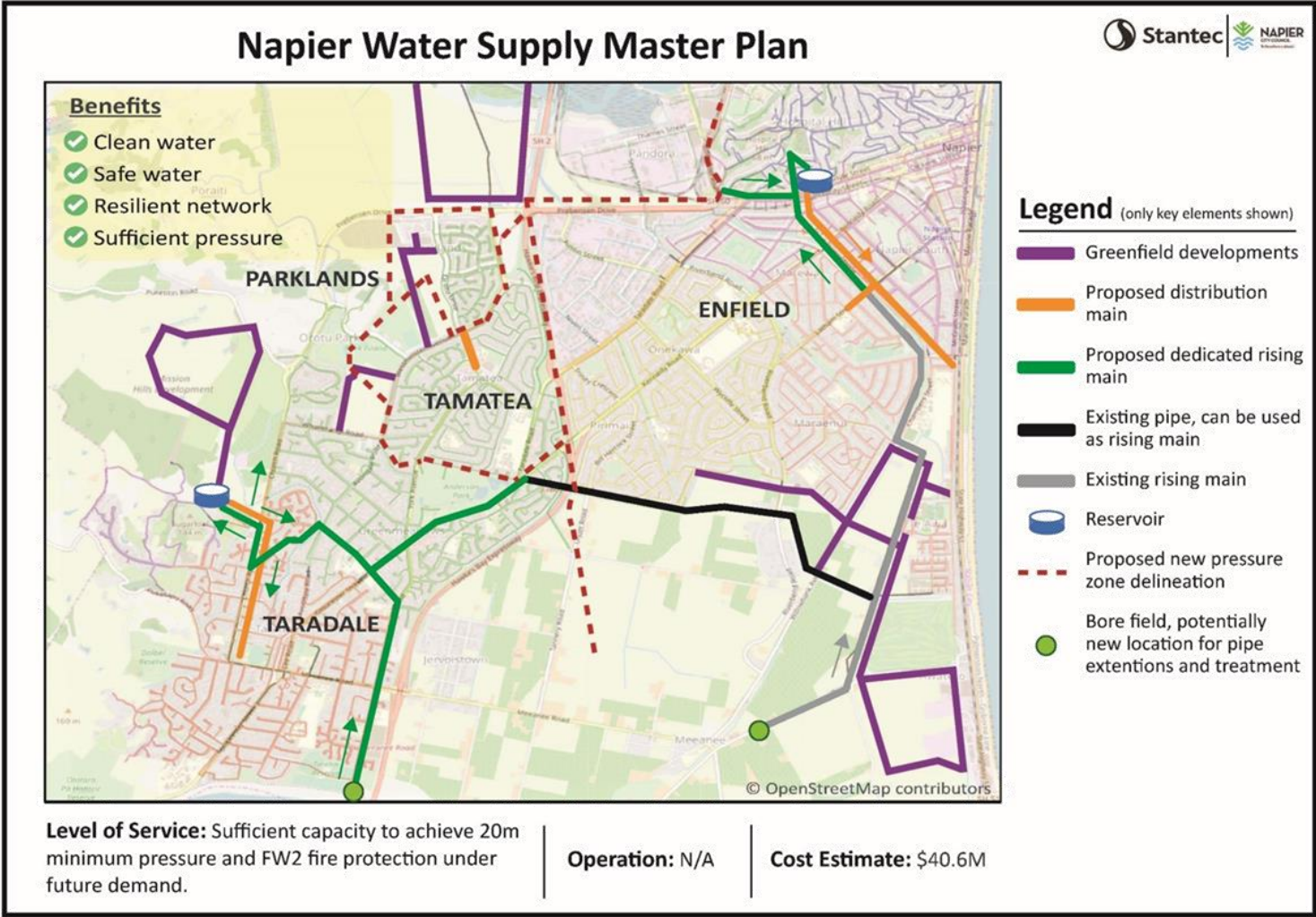
The master plan includes works and investigations already in progress as well as future stages. The master plan is presented in nine work packages, some of which may be undertaken in parallel.

Table 0: Master Plan Summary

Package	Driver	Cost	Risks, opportunities	Status
1: Reduce the manganese load	Safe Clean	\$2.7M	Cost estimate is a place holder only. This tasks needs to be scoped in more detail.	In progress. High priority as it enables several other tasks to proceed.
2: Delineate Taradale / Enfield	Safe Clean	\$0.1M	Marginal performance in Tamatea	Can be started any time
3: Dedicate Taradale	Safe Clean	\$10.6M	Cost estimate may change depending on Package 1.	Requires some of Package 1
4: Dedicate Enfield	Safe Clean Pressure Resilient	\$11.6M	High uncertainty regarding cost for Enfield Reservoir	In progress. High priority as it enables several other tasks to proceed.
5: Manage demand	Resilient	\$6.6M	Includes OPEX for leak detection and repair	Can be started any time
6: Connect Awatoto to Taradale	Resilient	\$2.1M	Cost estimate may change depending on Package 3.	Requires Package 3
7: Rationalise Thompson Reservoir pipework	Resilient	\$0.3M	Cost estimate is a place holder only. This tasks needs to be scoped in more detail.	Can be started any time
8: Ensure FW2 Fire Flow Availability	Pressure	\$4.0M		Can be started any time
9: Enable growth	Pressure	\$3.5M	Cost estimate of greenfield developments not included, assumed paid by developer.	

The key features of the proposed system are:

- The water sources should be separated from the distribution; customers are less at risk of contamination than currently.
- The hydraulic and chemical conditions in the distribution network should be less conducive to discoloration events.
- Key pipe upgrades should be implemented, mainly in Taradale; the level of service for minimum pressure and fire fighting capacity is met.
- Water demand should be managed efficiently; population growth is supported.
- The network should be able to operate with either bore field taken out of service for a certain period of time.



Napier City Council

Water Supply Network Master Plan

CONTENTS

Executive Summary	i
1. Introduction	1
1.1 Objectives	1
1.2 Previous Work	1
1.3 Updated Master Plan	1
2. Network Overview	2
2.1 General	2
2.2 Topography	2
2.3 Water Source	3
2.4 Water Network	4
2.5 Water Usage	5
3. Drivers and Strategies	6
3.1 General	6
3.2 Safe Water is Distributed to Customers	6
3.3 Clean Water is Distributed to Customers	6
3.4 Water is Distributed with Sufficient Pressure	8
3.5 The Network is Resilient to Shocks and Stresses	9
4. Master Plan	10
4.1 Overview	10
4.2 Package 1: Reduce Manganese Load	11
4.3 Package 2: Delineate Taradale / Enfield	13
4.4 Package 3: Dedicate Taradale	15
4.5 Package 4: Dedicate Enfield	18
4.6 Package 5: Manage Demand	20
4.7 Package 6: Connect Awatoto Bores to Taradale	22
4.8 Package 7: Rationalise the Thompson Reservoir Pipework	24
4.9 Package 8: Ensure FW2 Fire Flow Availability	26
4.10 Package 9: Enable Growth	29
5. Recommendations	32

LIST OF TABLES

Table 2-1: Assumed Water Demand by Type	5
Table 4-1 Master Plan Summary	10
Table 4-2: Fire Upgrades	26

LIST OF FIGURES

Figure 2-1: Topography	2
Figure 2-2: Approximate Extent of the Heretaunga Plain Aquifer around Napier [based on NCC AMP]	3
Figure 2-3: Network Schematic	4
Figure 3-1: Water Clarity Complaints (October 2018, varies in location and intensity over time)	7

APPENDICES

Appendix A	Costing Assumptions
Appendix B	Field Checks
Appendix C	Flow Meters
Appendix D	Fire Upgrades
Appendix E	Master Plan, Packages and Tasks

1. Introduction

1.1 Objectives

Napier City Council (NCC) has engaged Stantec to develop a master plan identifying investigations and capital upgrades required for the water supply network to meet the Level of Service now and in the future.

This report summarises the key drivers for the Napier water supply, the work done to date and the recommended way forward.

1.2 Previous Work

Stantec prepared an initial assessment of the water network performance ("Napier Water Supply Model Development", 2017). This was based on an un-calibrated hydraulic model, which was sufficient to broadly outline the future of the network, but still required validation ("Napier Interim Master Plan", 2018).

The main difficulty for the hydraulic model calibration was the lack of flow metering equipment throughout the water network. NCC and Stantec undertook a significant amount of work throughout 2019 to plan, deploy and test temporary flow meters, intended to collect sufficient data to enable model calibration ("NCC Water Supply Model Calibration", 2019).

1.3 Updated Master Plan

This calibrated model was used to develop a series of scenarios, representing the envisioned evolution of the water supply network, assessing its hydraulic performance and identifying required capital works.

The key drivers have changed slightly between the interim master plan and this 2019 update, and this is reflected in the recommended work programme.

2. Network Overview

2.1 General

This section provides a brief overview of the water supply network. For a more in-depth description of the network, please refer to the "Napier Water Supply Model Development" report (Stantec, 2017).

2.2 Topography

Most of the city is located at the north end of the Heretaunga Plain and therefore at low elevation. Napier Hill near the city centre represents a key exception as it rises up to elevations close to 100m above sea level. The Western Hills also harbour residential properties, albeit sparser.

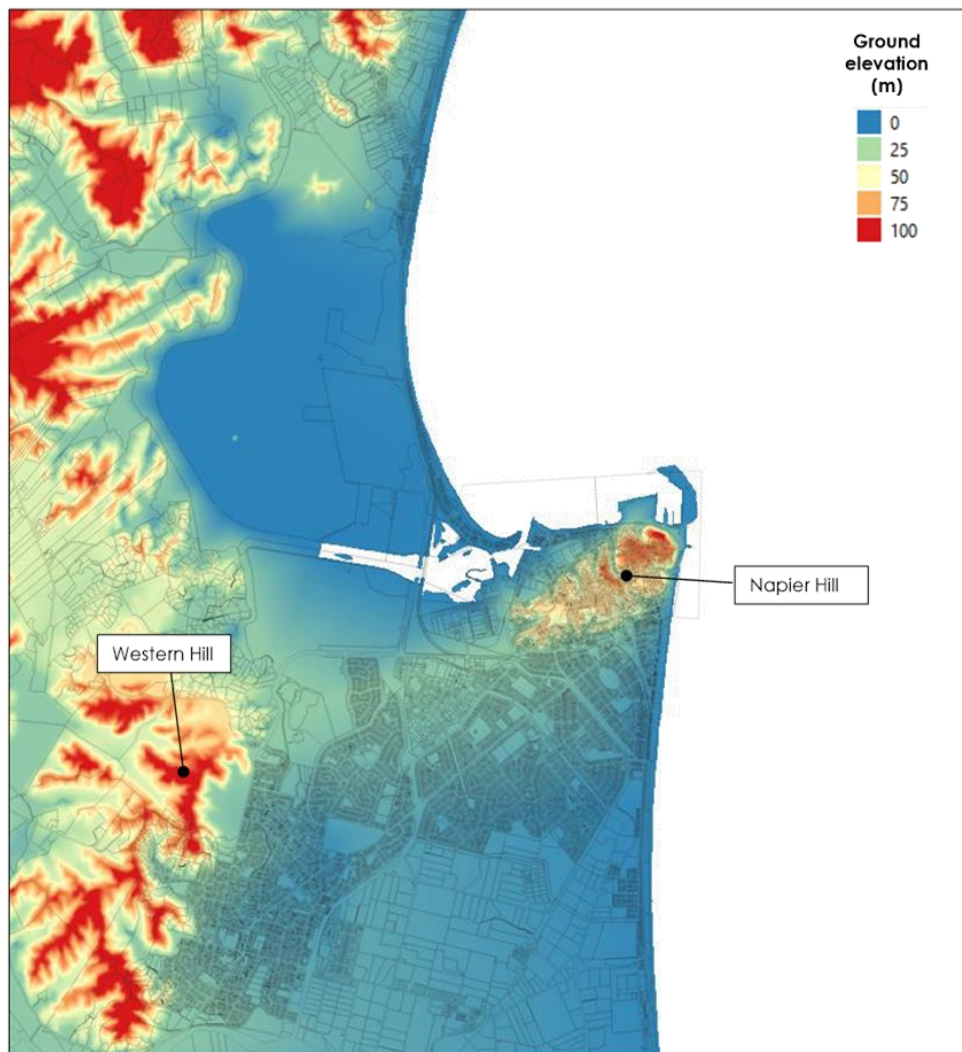


Figure 2-1: Topography

2.3 Water Source

Napier's water supply is sourced from the Heretaunga Plain aquifer, which is shared with Hastings.

Water is pumped from the aquifer into the network by a series of bores, shown in Figure 2-2.

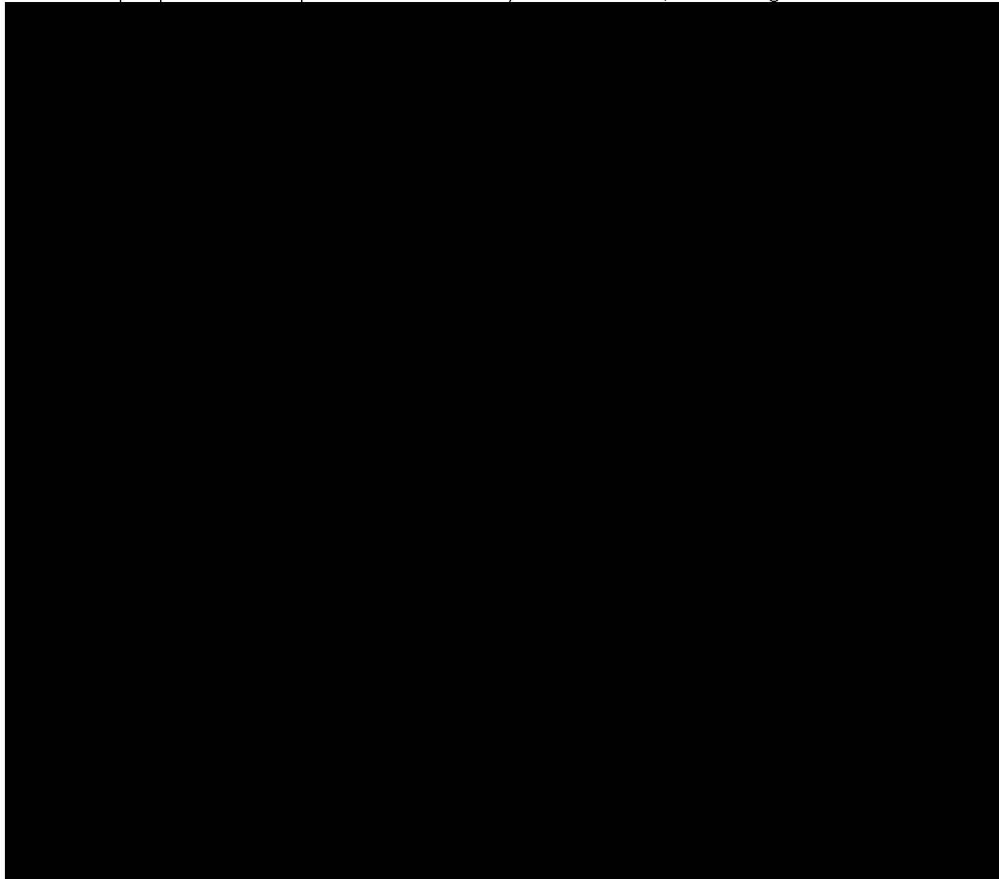


Figure 2-2: Approximate Extent of the Heretaunga Plain Aquifer around Napier [based on NCC AMP]

The resource consent conditions dated 1 March 2010 indicate that:

- The maximum rate of taking and maximum 7-day volume for each well shall not exceed set values for each bore (refer to the "Model Development" report for details on each bore set value).
- The instant cumulative rate of take from all wells shall not exceed 784 l/s.
- The cumulative 7-day volume take from all wells shall not exceed 387,744 m³ (equivalent to 55,392m³/day).

2.4 Water Network

From the bores, water is pumped directly into a 480km distribution network. The main feature of the system is the large Taradale / Enfield zone, which contains the majority of the customers and infrastructure. Several small pressure zones are located in high elevation areas, and constitute District Metered Areas (DMAs). Figure 2-3 provides an overview of the pressure zones.

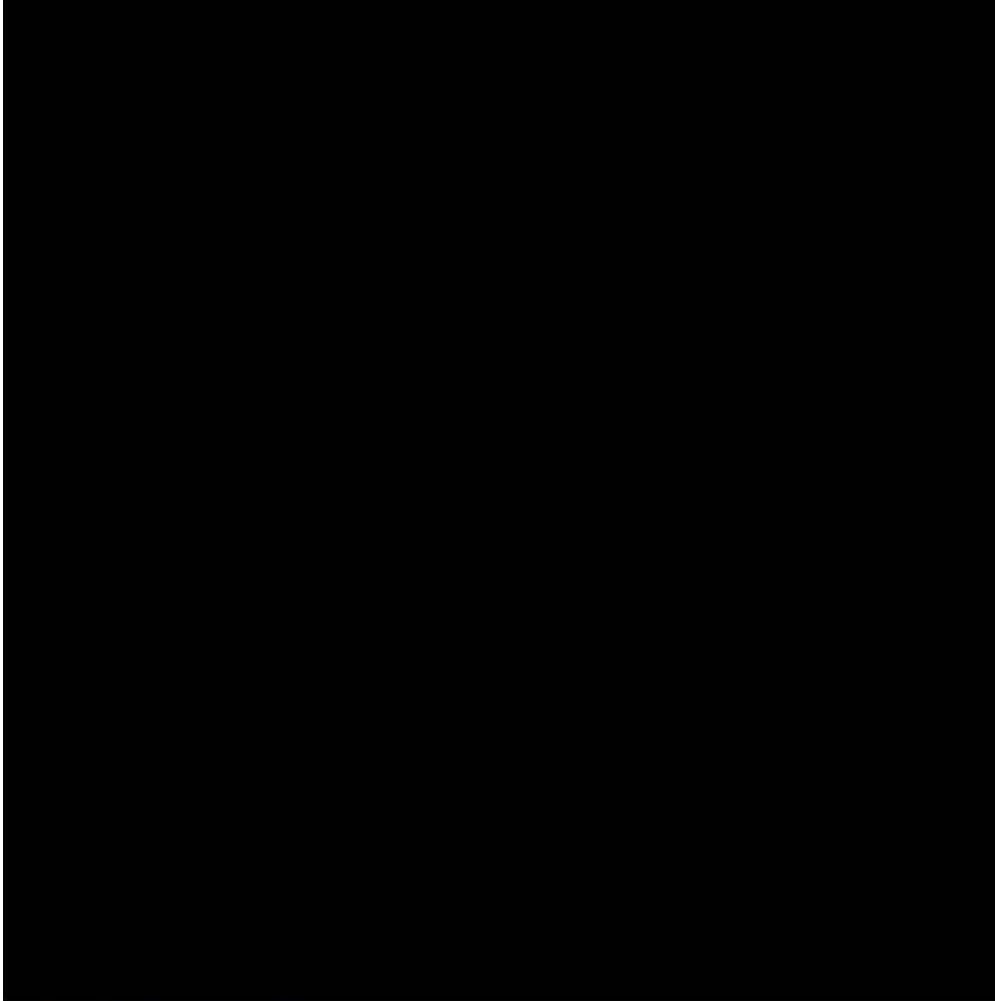


Figure 2-3: Network Schematic

The Enfield (11ML) and Taradale (9ML) reservoirs constitute the main storage in the city. Both reservoirs have a top water level of 61.5m and supply low level customers down to sea level.

A second Taradale Reservoir (also 9ML) is built but not commissioned at the time of writing.

The Enfield Reservoir has known structural issues and requires repair or upgrade, either at its current site or in another site.

Six other reservoirs provide storage for the high elevation areas; the highest property serviced by the network is located at approximately 105m.

- The Thompson Reservoir (109m elevation) is located on Bluff Hill; it comprises of three storage tanks connected by a complicated set of pipes. The fact that these are not well located or understood and are very hard to access presents a risk to the continuity of supply.
- The Church Road booster pump station is located near the Taradale reservoir; it is used to push water from the bores to the Enfield Reservoir, which is located hydraulically further than the Taradale Reservoir.
- The Westshore and Tannery booster pump stations convey water from the Enfield system to the Bay View area.
- The other booster pump stations serve local high elevation areas.

Current best practice consists in separating water sources from the network distribution. This facilitates water treatment and reduces risk of contamination to customers. While the city has made efforts in the past to combine all the sources into dedicated rising mains, this is not completed yet. There are several pathways from the bores directly to distribution, either through direct connections, pressure reducing valves or via the Church Road Booster.

2.5 Water Usage

The water network supplies approximately 60,000 people through 26,117 connections, the vast majority of them being un-metered residential. The existing water network is essentially one very large zone with multiple boundary points such as PRVs, bores and pump stations. The complex nature of the zone and the lack of adequate flow metering equipment has made accurate demand analysis difficult.

NCC has commissioned Thomas Consultants to undertake a water balance every year ("NCC Water Balance Brief report 2019"). The key findings for Napier are as follows:

- A high level of authorised unbilled demand, through parks and sports fields.
- A relatively high level of leakage, around 25% across the city.
- A yearly usage of approximately 11,000 ML/year.
- A peak day usage of approximately 42ML/day.

The demand analysis work undertaken during the hydraulic model calibration has confirmed this estimated level of leakage.

The water demand used for the master plan represents the average day of peak week (ADPW) for two planning horizons:

- Current (2017)
- Future (ultimate development based on the Heretaunga Plains Urban Development Strategy including intensification and greenfield growth, both residential and non-residential).

Future per-capita demand was conservatively assumed to remain as per the existing value. Residential intensification often leads to a reduction of per-capita demand. This was not considered as part of this work but NCC may wish to investigate how this may affect future water needs.

The demand for both planning horizons is presented in Table 2-1.

Table 2-1: Assumed Water Demand by Type

Type	Current PDD (m ³ /day)	Future PDD (m ³ /day)
Residential	30,935	41,388
Non-Residential	6,273	6,731
Leakage	5,238	5,711
Total	42,446	53,830

More detail on the demand calculations and allocation are provided in "NCC Water Supply Model Calibration".

3. Drivers and Strategies

3.1 General

NCC have identified a number of drivers to guide the development of the water supply network. These are presented in this section. The over-arching vision is that of a modern water infrastructure that can reliably supply safe water to customers, now and in the future.

The drivers are:

- **Safe** water is distributed to customers.
- **Clean** water is distributed to customers.
- Water is distributed with sufficient **pressure**.
- The network is **resilient** to shocks and stresses.

3.2 Safe Water is Distributed to Customers

3.2.1 Where We Are

Until 2017, the water from the aquifer was distributed without treatment. Following the Havelock North contamination and the detection of very small amounts of *E. coli* in the Napier reservoirs, NCC decided to exercise caution and undertook a review of the contamination risk of its water bores.

A number of bores were found to present particular risk, for example being relatively close to sewer pipes, and were taken out of service. In-line chlorination (sodium hypochlorite) was implemented just downstream of the remaining bores to provide a disinfectant residual within the distribution network.

The current best practice for water safety consists in creating multiple barriers of protection. The confining geological layers of the aquifer and the aquifer material itself form the first barrier. Disinfection forms a second one and chlorine residual in the distribution network forms a third one. Napier is currently investigating alternatives to retaining a chlorine residual in the distribution.

Changes to the Drinking Water Standards and requirements on water utilities are expected to be implemented in the near future, although the details are not clear at present.

3.2.2 Where We Want To Be

NCC wants to continue meeting the Drinking Water Standards' requirements.

Currently water is pumped directly from the aquifer to the network, which is not desirable. Pumping water through a dedicated supply main to the reservoir before distribution would give Operations more time to react to an emergency, dilute a potential contamination and provide an additional point for emergency treatment.

3.2.3 How We Get There

To achieve this goal, NCC has set out the following measurable objectives:

- Abandon bores deemed unsafe from a micro-biological point of view.
- Treat water supplied by the remaining bores. As the targets and principles pertaining to disinfection and chlorine residual are not defined, this aspect is not included in this master plan.
- Separate the supply (from the bores) and the distribution network (from the reservoirs).

3.3 Clean Water is Distributed to Customers

3.3.1 Where We Are

The introduction of chlorination led to a large number of customer complaints because of dirty or discolored water coming out of the tap.

After two years, discoloration issues still occur and cause extreme public discontent.

Most of the issues have been recorded around the centre of the city, broadly at the interface between the Taradale and Enfield zones.



Figure 3-1: Water Clarity Complaints (October 2018, varies in location and intensity over time)

The current understanding of the issue can be broadly presented as follows:

- Over the years, manganese present in dissolved form in the aquifer water has accumulated in the biofilm inside the distribution pipes.
- The pH and oxido-reduction potential (ORP) conditions of the water contributed to manganese remaining mostly in dissolved form, thus invisible.
- The introduction of sodium hypochlorite has caused the biofilm to either degrade and be dislodged or to release manganese compounds into the water.
- The chlorine has also changed the ORP, making the water more prone to the presence of manganese in oxidised form (black deposits) rather than dissolved (invisible).
- Manganese in oxidised form tend to deposit in thin layers on the pipe surface, but can be dislodged easily if the flow in the pipe reverses.

3.3.2 Where We Want To Be

NCC's goal is to return the number of water aesthetics complaints to pre-chlorination levels.

3.3.3 How We Get There

To achieve this goal, NCC has a broad strategy consisting in:

- Understanding the issue better.
 - Undertaking sample analysis at various points of the system.
 - Recording complaints effectively.
 - Linking discoloration episodes to hydraulics using the model.

- Reducing the manganese loading in the system.
 - Considering alternative sources containing less manganese.
 - Considering treatment to remove manganese.
- Removing manganese and biofilm deposits.
 - Active pigging and flushing programme.
- Avoiding conditions prone to oxidation of manganese.
 - Considering replacing chlorination by other treatment systems, thereby restoring pre-chlorination ORP and making the water less prone to manganese in oxidised form (black deposits).
 - Avoiding flow reversals in the network by:
 - Not using A1 bore, McLean Park Pump Station, Chaucer Booster Pump Station until they can be isolated from the distribution, so they don't disturb the local distribution hydraulics.
 - Closing connections between the supply from the bores and the distribution network.
 - Delineating the Taradale and Enfield supply zones.

3.4 Water is Distributed with Sufficient Pressure

3.4.1 Where We Are

The hydraulic model was used to simulate current and future peak day demand, along with hydrant fire demand, in order to identify constraints in the network and areas where this level of service cannot be met.

No major issue was found with the current network operating in its current configuration with current peak demand. However, new pipes are required to retain the current Level of Service after the separation of the supply from the distribution ("Safe water" and "Clean water" drivers), the delineation of Taradale from Enfield ("Clean water" driver), the creation of metered areas ("Resilient network" driver) and the increased demand from future growth ("Resilient network" driver).

3.4.2 Where We Want To Be

NCC has the following measurable objectives:

- Normal Conditions: The system pressure should ideally remain between 40m and 60m at the point of supply. The minimum and maximum target pressures are 20m and 80m respectively.
- Asset Outage: The system pressure should remain above 10m at all customer supply points, in the event of a pipe or pump outage.
- Fire-Fighting Demand: NCC's target is to provide 25 l/s at 10m residual pressure within 270m of the hazard, following the road¹. This is equivalent to class FW2 as per the Fire Code.

3.4.3 How We Get There

To achieve these objectives, it is recommended that:

- NCC investigates, locates and eliminates the suspected network restrictions identified during the calibration of the hydraulic model. These represent inexpensive quick wins to slightly improve the network performance.
- NCC undertakes the pipe upgrades and extensions listed in the various work packages presented in Section 4.

It is important to note that several pipe upgrades are contingent on decisions being taken on the location of potential future bore sites and the location and elevation of a potential new Enfield Reservoir.

¹ SNZ PAS 4509:2008 (the Fire Code) indicates that half this flow must be available within 135m of the hazard. This was assessed using the hydraulic model under peak demand, with fire flow simulated at a time where the demand is equivalent to 2/3 of daily peak demand.

3.5 The Network is Resilient to Shocks and Stresses

3.5.1 Where We Are

3.5.1.1 Supply / Demand Balance

Sections 2.3 and 2.5 indicate that the current peak day demand usage is around 43MLD, and is expected to increase to 52MLD in the future. This is not far from the current maximum 7 day extraction consent of 55MLD, and the future adequacy of supply is therefore sensitive to assumptions made around the future number of users, the future water consumption per user and the future leakage volume.

We understand that NCC has not set a target for leakage and has not completed an Economic Level of Leakage assessment.

3.5.1.2 Source Redundancy

Napier currently uses two main areas for extracting ground water: the Taradale/Coverdale area to the west and the Awatoto area to the east. While it is possible to operate the network without Awatoto, it is not currently possible to do the same without the Taradale/Coverdale bores.

3.5.1.3 Enfield Reservoir Condition

There are known concerns with the structure of the Enfield Reservoir, and it is due for replacement between 2022 and 2025.

Replacing the reservoir in its existing location will not be possible without taking the reservoir out of commission for a long period of time. This is undesirable because the reservoir is needed to maintain the Level of Service in the eastern part of the city.

Replacing it at the same elevation in another part of Napier Hill may be difficult because of the scarcity of flat sites and the difficulty in acquiring already-developed land.

Replacing it at a higher elevation has hydraulic consequences, both positive and negative which will be discussed in a separate document.

In all cases, changing the location of the reservoir would require expensive pipe extensions.

3.5.1.4 Enfield Reservoir Water Level

Most of the water bores are located close to the Taradale Reservoir, while the water demand is distributed between both the Taradale and Enfield reservoirs. During periods of high demand, Operations sometimes have difficulty replenishing all reservoirs overnight. Enfield Reservoir is generally the most problematic. It is therefore essential that the balance between supply and demand is maintained, now and in the future, under normal conditions and during the outage of any network component.

3.5.1.5 Thompson Reservoir Pipework

The pipework in/out and between the Thompson reservoirs has developed organically over the years and is now complex and hard to access and operate. It leaves NCC vulnerable to a failure that would result in a costly, long and complicated shut-down and emergency repair.

3.5.2 Where We Want To Be

NCC wishes to address all these issues to reduce the risk of loss of supply to customers.

To assess the hydraulic performance of the network we have assumed that the leakage volume would not increase in the future, but ideally it would reduce to provide more buffer in the supply/demand balance.

3.5.3 How We Get There

To improve the resilience of the network, NCC has the following objectives:

- Manage Supply
 - While considering alternative bore locations for water quality reasons, ensure that Council retains the ability to draw about 55MLD from the aquifer in average over 7 days.
- Manage Demand (this is in line with the "Pressure" driver)
 - Understand leakage and genuine water use better by installing flow meters and setting up metered zones that can be monitored effectively.
 - Actively search for leaks and repair leaky assets.
 - Consider other active demand management actions.
- Upgrade the Enfield Reservoir

- Confirm preferred location for the proposed Enfield Reservoir.
 - Procure the new reservoir.
- Improve supply to the Enfield Reservoir
 - Construct the dedicated rising main required for the "Safe water" driver.
- Consider infrastructure needed to supply the system only from the Awatoto bores, at least temporarily.
- Rationalise the Thompson reservoirs pipework.

4. Master Plan

4.1 Overview

A series of capital works will be required to achieve the performance objectives of the various drivers listed in Section 3. Some of these works are not scoped accurately at this stage and will require preliminary investigations.

The master plan includes works and investigations already in progress as well as future stages. It is presented in nine work packages, some of which may be undertaken in parallel.

Costing assumptions are presented in Appendix A. Table 4-1 presents a summary of the works proposed. Details of the tasks within each package are set out in sections 4.2 to 4.10, and are presented in tabular form in Appendix E.

Table 4-1 Master Plan Summary

Package	Driver	Cost	Risks, opportunities	Status
1: Reduce the manganese load	Safe Clean	\$2.7M	Cost estimate is a place holder only. This task needs to be scoped in more detail.	In progress. High priority as it enables several other tasks to proceed.
2: Delineate Taradale / Enfield	Safe Clean	\$0.1M	Marginal performance in Tamatea	Can be started any time
3: Dedicate Taradale	Safe Clean	\$10.6M	Cost estimate may change depending on Package 1.	Requires some of Package 1
4: Dedicate Enfield	Safe Clean Pressure Resilient	\$11.6M	High uncertainty regarding cost for Enfield Reservoir	In progress. High priority as it enables several other tasks to proceed.
5: Manage demand	Resilient	\$6.6M	Includes OPEX for leak detection and repair	Can be started any time
6: Connect Awatoto to Taradale	Resilient	\$2.1M	Cost estimate may change depending on Package 3.	Requires Package 3
7: Rationalise Thompson Reservoir pipework	Resilient	\$0.3M	Cost estimate is a place holder only. This task needs to be scoped in more detail.	Can be started any time
8: Ensure FW2 Fire Flow Availability	Pressure	\$4.0M		Can be started any time
9: Enable growth	Pressure	\$3.5M	Cost estimate of greenfield developments not included, assumed paid by developer.	

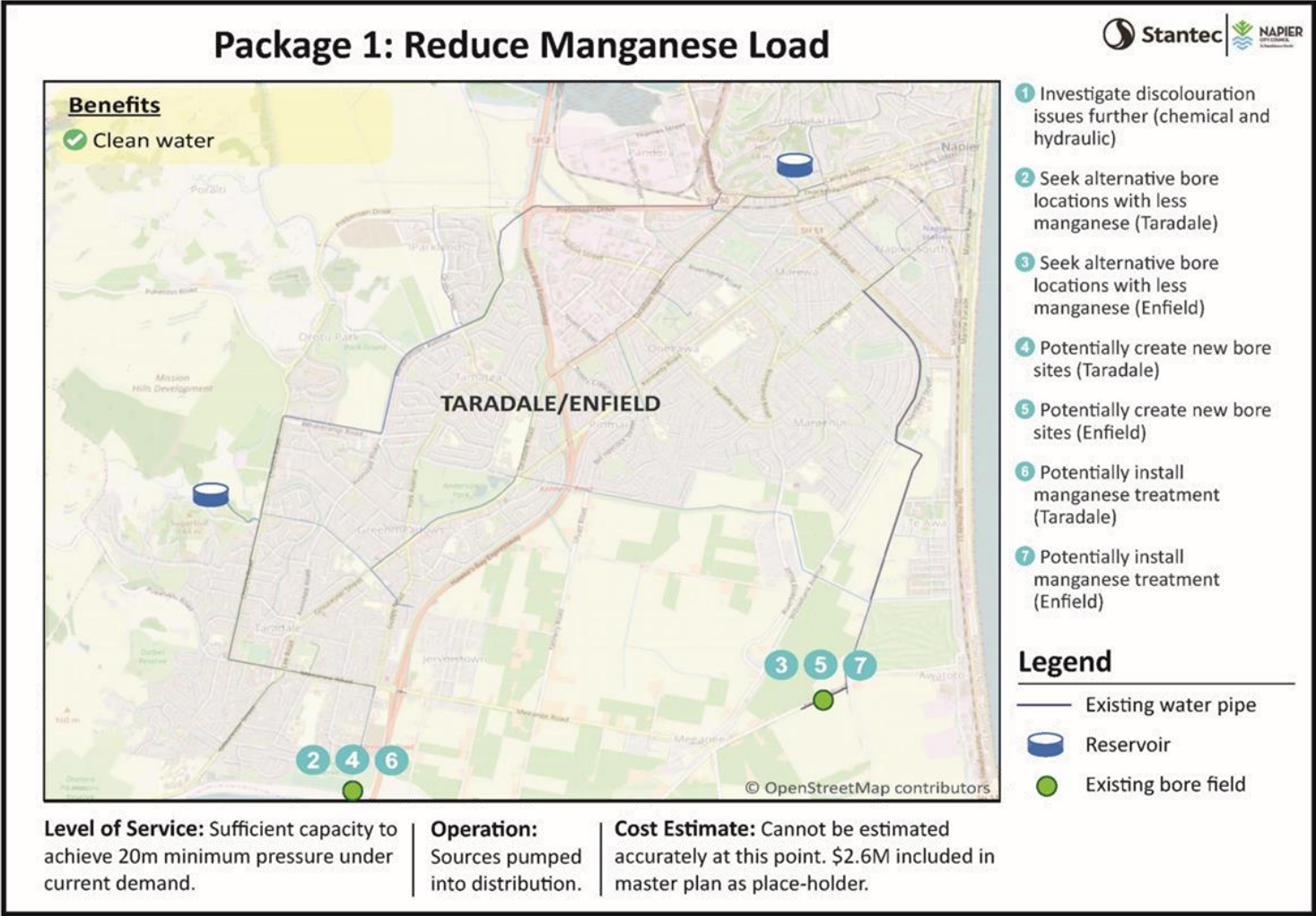
4.2 Package 1: Reduce Manganese Load

This work package is aligned with the "Safe water" and "Clean water" drivers. It essentially implements the strategy presented in Section 3.

It consists in reducing the frequency of discoloration episodes by:

- **Task 1-1:** Understanding the issue better.
 - Recording complaints effectively (already in place).
 - Undertaking sample analysis at various points of the system (already under-way but may be improved).
 - Link discoloration episodes to hydraulics using the model.
- Reducing the manganese loading in the system.
 - **Tasks 1-2 to 1-5:** Considering alternative sources containing less manganese (investigations currently under-way).
 - **Tasks 1-6 and 1-7:** Considering treatment to remove manganese.
- Removing manganese and biofilm deposits.
 - Active pigging and flushing programme (already in place).
- Avoiding conditions prone to oxidation of manganese.
 - **Part of Tasks 1-6 and 1-7:** Considering replacing chlorination by other treatment systems, making the water less prone to manganese in oxidised form (black deposits).

Because of the numerous unknowns regarding the nature of the issue, the ground water quality and the treatment options, no reliable cost estimate can be proposed for this work package at this point. Nominal allowances for the various tasks totalling \$2.6M were included in the work programme as place holders, but this is not based on any substantial knowledge at this stage.



4.3 Package 2: Delineate Taradale / Enfield

This work package is aligned with the "Safe water" and "Clean water" drivers: it creates additional safety barriers and reduces the flow reversals which are likely to contribute to the discoloration problem. It forms part of the "Safe water" strategy outlined in Section 3.2.3.

Task 2-1 consists in closing all valves between the Enfield and Taradale systems. A potential contamination in the Enfield system will be physically isolated from the Taradale system. This constitutes an improvement from the current situation.

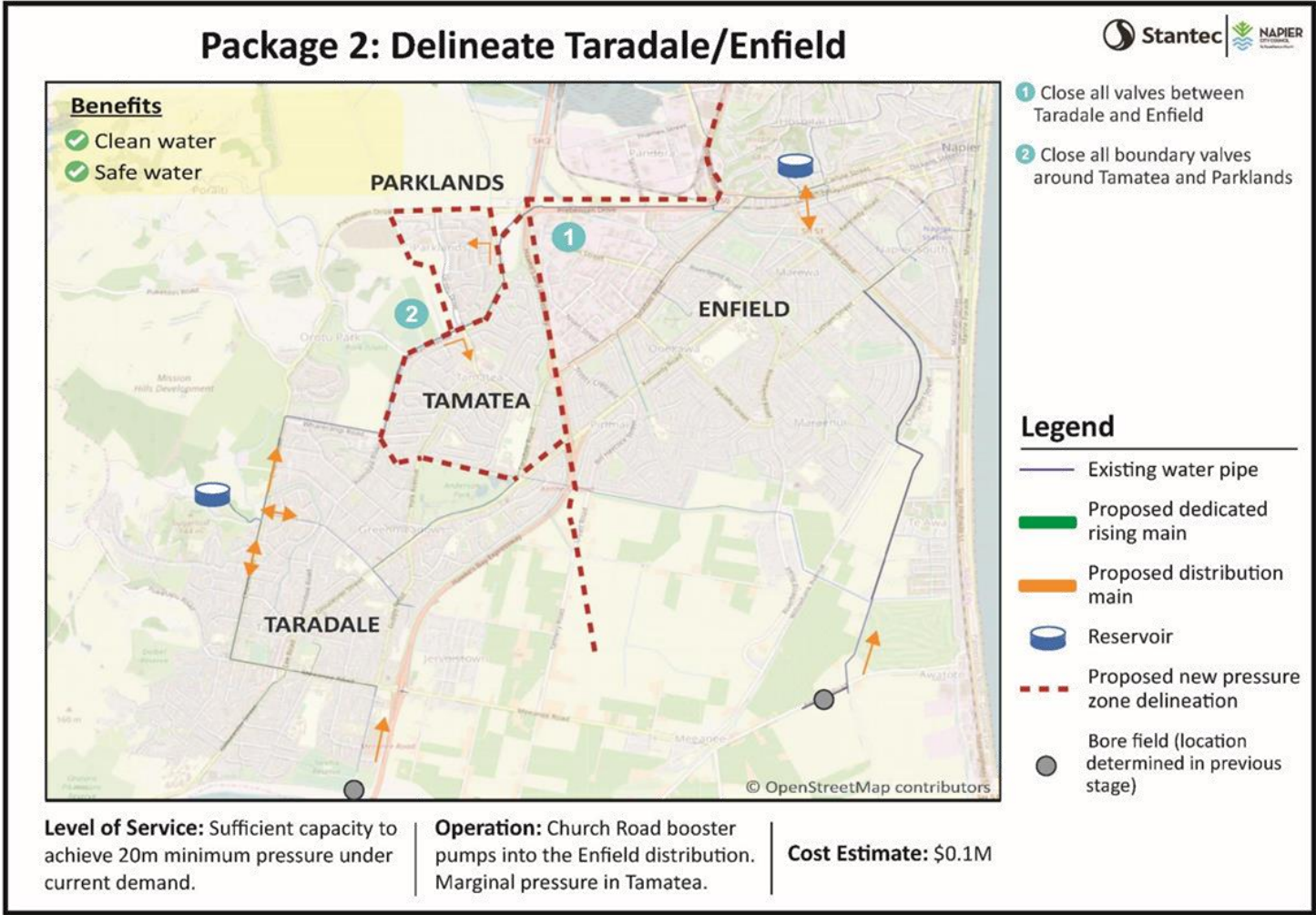
At this stage, the Enfield system will be reliant on the Awatoto and Coverdale bore for normal operation, with the Church Road Booster Pump Station assisting for high demand periods; the water sources will still be connected to the distribution in this part of the network. The Coverdale and Awatoto bores supply about 200 l/s combined, so under peak summer demand it is necessary to run the Church Road Booster Pump Station approximately 6 hours a day to maintain the water level at the Enfield Reservoir.

Task 2-2 consists in closing additional valves around the Tamatea area, so it is single-fed from Durham PRV. This in turn will naturally create a single-fed 'Parklands' zone supplied from the Pacific PRV.

This is intended to avoid flow reversals in Tamatea and Parklands and therefore reduce the frequency of discoloration episodes.

This does significantly increase the velocity (2.5m/s) and head losses through the existing pipe downstream of the Durham PRV during peak demand. This may result in shearing of biofilm and result in new discoloration complaints, although this may be manageable through preventive pigging. A FW2 fire flow availability will be only marginally achieved at the extremity of the proposed pressure zone. This performance is improved by Task 3-5.

Consideration should be given to modifying the connectivity of the Tannery booster pump station at the same time. Currently the booster is drawing water from downstream of the Pacific PRV, while it may be more efficient to draw water from upstream of the PRV. This is likely to require only minor works.



4.4 Package 3: Dedicate Taradale

This work package is aligned with the "Safe water" and "Clean water" drivers: it creates additional safety barriers and reduces the flow reversals which are likely to contribute to the discoloration problem. It forms part of the "Safe water" strategy outlined in Section 3.2.3.

Separating the supply and distribution in Taradale means that all the water in the Taradale system will be first pumped to the Taradale reservoirs, then will gravitate to the distribution. The instant peak flow through the inlet and outlet of the reservoirs will be significantly increased. This therefore requires additional capacity for both the inlet and outlet pipes.

Task 3-1: An additional 450mmØ dedicated rising main (4km in length) is required from the Taradale bores to the Taradale Reservoir. It is recommended that, instead of building parallel to the existing Meeanee Road rising main, the new pipe should be laid along Osier Road. This will reduce the risk of both pipes being damaged by a single event and also make it easier to connect to the Awatoto bore field (Package 5).

Before this can be designed, it is necessary to confirm the preferred location of the future Taradale bores (Package 1).

For the purpose of this work programme we have included a new parallel pipe for the rising main and a combination of additional pipe and pipe upgrade for the distribution. This level of detail is sufficient to estimate the extent and the cost of the works required, but the detail of the preferred layout need to be confirmed during the design stage.

The cost estimate captured in this document assumes that the Taradale bores will remain approximately in their current location. If this is not the case, this would increase the length of the required rising main.

There are three main pathways for the water distributed from the Taradale reservoirs:

- South towards Puketapu along Church Road.
- East towards Greenmeadows under existing properties.
- North into Tamatea via the Durham PRV.

While there are capacity constraints through all three, only the southern route is proposed for upgrade: the northern route is less stressed and upgrading the existing 375mm pipe east towards Greenmeadows was considered too challenging.

Task 3-2: Construct a new 600mmØ outlet pipe from the Taradale Reservoir down to Church Road. Additionally, upgrade the existing 150mmØ south along Church Road to 375/450mmØ down to Puketapu Road.

It may be possible to repurpose the existing rising main along Church Road as a distribution main. This may reduce or eliminate the need for the Church Road 375/450mmØ upgrade, but would require an increase in the size of the proposed rising main in Task 3-1. This option should be investigated.

Task 3-3: To retain FW2 fire flow availability it will be necessary to:

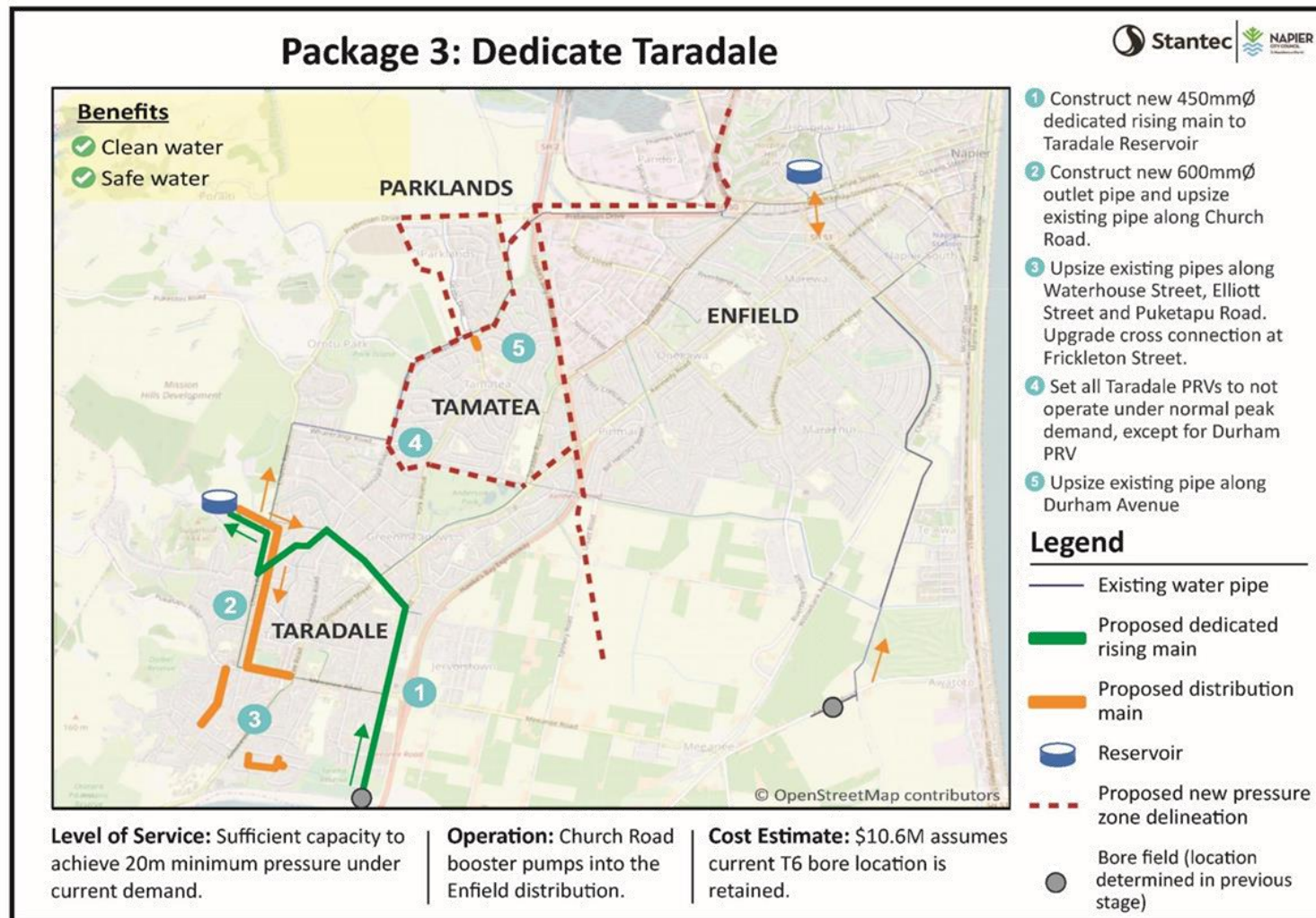
- Upgrade existing 150mm 1973 AC pipe along Waterhouse Street to 200mm, from Puketapu Road to O'Dowd Road (640m in length).
- Upgrade existing 200mm 1972 AC pipe along Puketapu Road to 300mm, from Church Road to Gloucester Street (400m in length).
- Upgrade existing 100mm cross-connection at the intersection of Howard Road and Frickleton Street to 150mm (50m in length).
- Upgrade existing 100mm cross-connection at the intersection of Gloucester Road and Roskilda Crescent to 150mm (50m in length).
- Upgrade existing 100mm 1972 AC pipe along Elliott Street and Murphy Road to 150mm, from Howard Road to Frickleton Street (520m in length).

Some of these upgrades may not be required if NCC retains the Lee Road PRV as emergency-only, so it would only operate during fire flow demand.

Task 3-4: It is necessary to set all Taradale PRVs to only operate during emergencies, except for Durham PRV.

Task 3-5: To alleviate the marginal performance caused by the isolation of the Tamatea zone in Package 2, it is necessary to upgrade the existing 200mm/150mmØ pipe along Durham Avenue to 300mm/250mmØ, from Westminster Avenue to Southwark Avenue (110m in length).

This was not included in Package 2 to make it clear that the isolation of Tamatea and Parklands is recommended, at least as a trial, without the need for pipe upgrades.



4.5 Package 4: Dedicate Enfield

This work package is aligned with all “Safe water”, “Clean water”, “Sufficient pressure” and “Resilient network” drivers.

Task 4-1: First it is necessary to confirm a preferred location for the Enfield Reservoir. Investigations are already under-way to identify candidates, to confirm the selection methodology and list possible risks and opportunities.

Task 4-2: NCC will then be able to proceed with land acquisition, if required, and then to construction.

Based on the relatively recent Taradale reservoir 2 construction, NCC estimates that the cost for this task is in the order of \$7M including investigations/planning, land acquisition, earthworks and construction. We have added \$1M to renew the pipework to and from the reservoir.

This will make the network more resilient by eliminating the risk associated with the poor condition of the Enfield Reservoir.

Task 4-3: Once a preferred location for the Enfield Reservoir is identified, it will be possible to finalise the Awatoto rising main, probably to the foot of the hill under the Enfield Reservoir.

Task 4-4: Extend the rising main from the Church Road Booster Pump Station up to the Awatoto rising main, probably at the foot of the hill under the Enfield Reservoir.

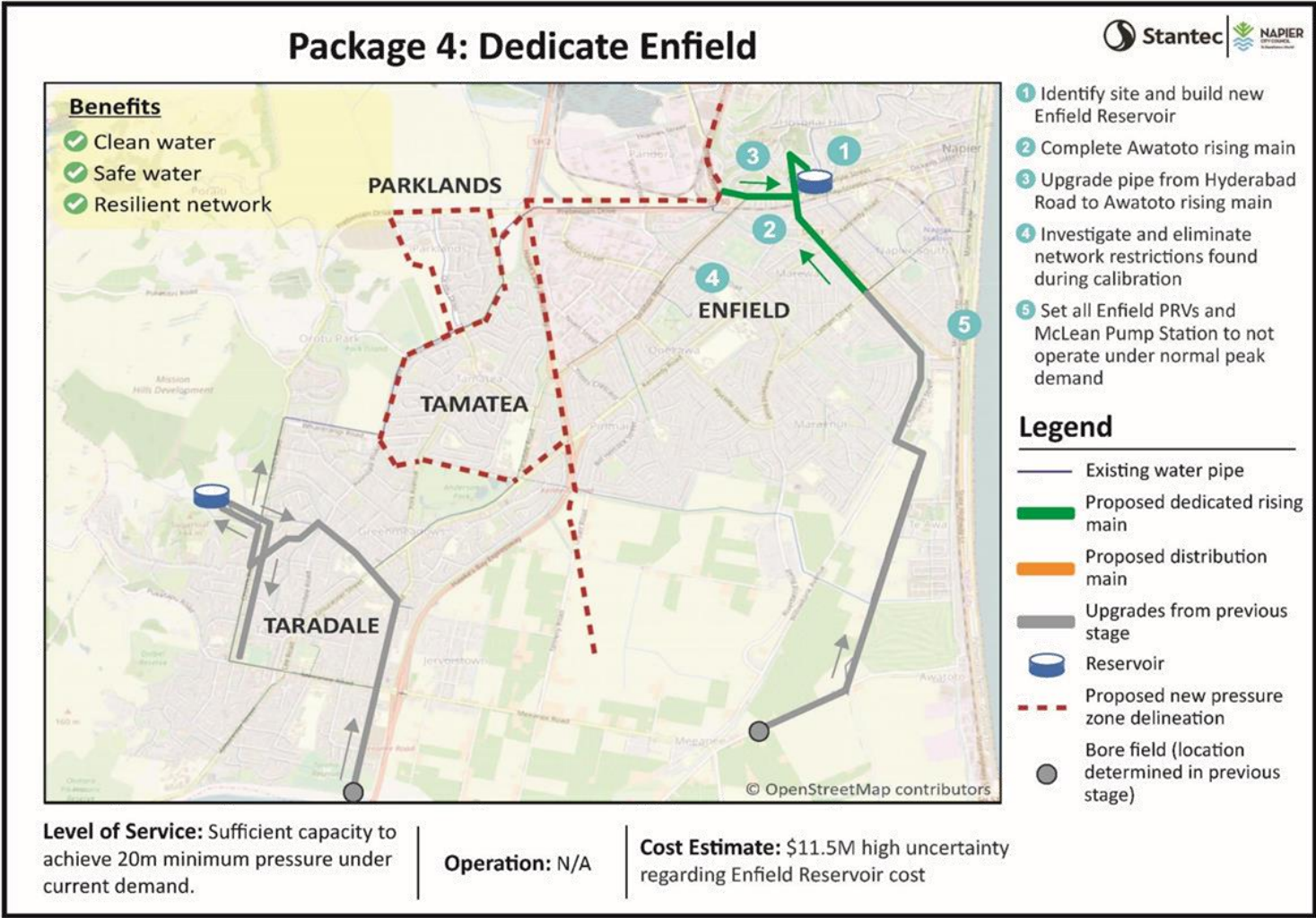
The cost estimates included in the work programme for Task 4-3 and 4-4 are based on the current location for the Enfield Reservoir: if the reservoir is relocated, this will lead to longer pipes and higher costs.

Task 4-5: To maintain sufficient pressure in the distribution network, the network restrictions identified during Calibration will need to be confirmed, located and eliminated. This is unlikely to require significant expense as they are likely to be a small number of closed valves or pipes being physically disconnected without this being captured in GIS. A series of field checks have been identified to try and identify these restrictions; these are presented in Appendix B.

Task 4-6: At this stage, NCC will be able to set all PRVs on the Enfield side and the McLean Pump Station to only operate during emergencies. However, as the Chaucer Booster would need to operate longer hours to compensate for McLean Park Pump Station (about 20 hours per day under PDD), NCC may wish to consider upgrading the Chaucer Pump Station. The Chaucer Pump Station would also need to take water from the Enfield Reservoir directly and not from the distribution. These were not included in this work programme.

This Work Package will complete the “Safe water” strategy of separating the water sources from the distribution.

It is important to note that the elevation of the new Enfield Reservoir is likely to have an impact on the upgrades required on the distribution. A higher reservoir is likely to reduce the need for pipe upgrades, while creating new costs and risks. This will be investigated as part of Task 3-1.



4.6 Package 5: Manage Demand

This work package is aligned with the "Resilient network" driver: by reducing the water demand NCC will reduce the risk of exceeding the extraction limits from the aquifer, reduce the effect of a pipe or pump failure and increase the length of time the stored water volume can last in an emergency. It will also generate financial savings and demonstrate good stewardship of a natural asset.

Task 5-1: Undertake active leakage management by systematically looking for leaks. This can be done using different techniques such as acoustic detection, thermal imagery or hydrophones.

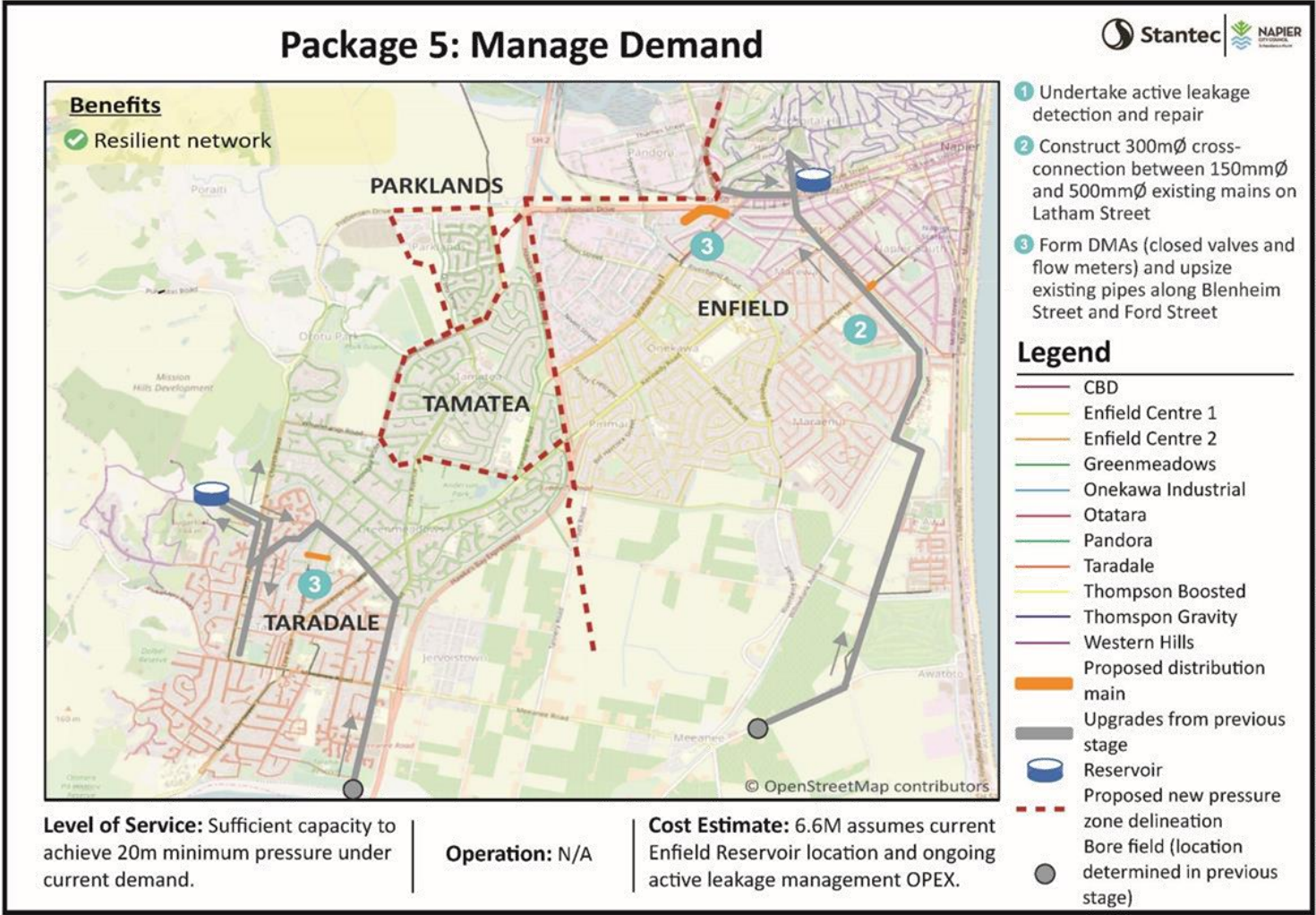
The cost for Task 5-1 cannot be estimated accurately as neither the goal, the techniques or the providers are known at present. A nominal allowance of \$100,000 per year was included in the work programme as a place holder, but it is not based on any substantial knowledge at this stage.

Tasks 5-2: To enable the subsequent setup of DMAs and maintain 20m pressure under peak demand, it is necessary to install a new cross connection between the 150mm and 500mmØ pipes at the intersection of Latham Street and SH51.

Task 5-3: It is recommended that the DMA layout identified in previous work by both Thomas Consultant (2017) and Stantec (2018) be implemented. This will require installing approximately 22 flow meters, detailed in Appendix C. To retain FW2 fire flow availability it will be necessary to:

- Upgrade existing 100mm 1975 AC pipe along Blenheim Street, to 150mm (170m in length).
- Upgrade existing 100mm 1950 CI pipe laid along the Ford Street accessway, to 150mm between Taradale Road and No60 / Superfly amusement Park (330m in length).

This will enable NCC to better monitor water usage, night flow and leakage, thus speeding up leak detection and repair. It will also provide better information to support decisions and consultation pertaining to customer usage.



4.7 Package 6: Connect Awatoto Bores to Taradale

This work package is aligned with the "Resilient network" driver: by providing a dedicated pipe between the Awatoto bores and the Taradale system, it enables the water supply to operate for a period of time if the Taradale bores are out of operation.

As the future location and capacity of the Awatoto bores is still the subject of investigations (Package 1), it is not yet possible to confirm how long the network could operate solely with an Awatoto supply. For the purpose of this work, we assumed that the Awatoto bore field can produce 500 l/s and that the Taradale bore field is not operational.

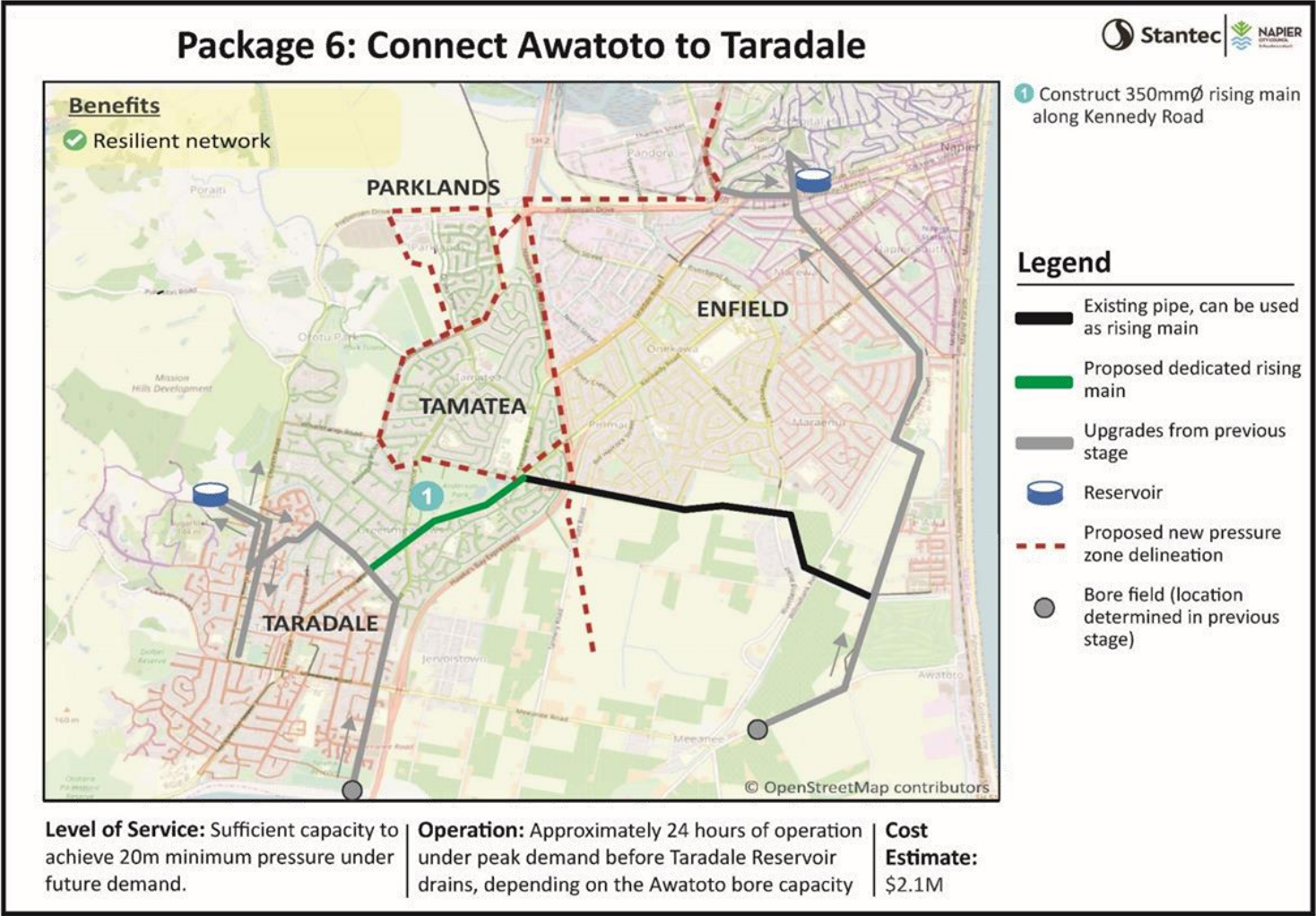
Water will normally be pumped from the Awatoto bore field into the dedicated rising main finalised in Work Package 4. Work Package 6 consists in using the existing 300mmØ branch going west from Eriksen Road along Harold Holt Avenue up to Taradale Road. This pipe is currently shut but from Work Package 3 onwards it is expected to be part of the distribution network and to remain open. However, it may be used in emergency situations to convey water from the Awatoto bores to the Taradale rising main if:

- Operations close existing valves to isolate the pipe from the distribution.
- The pipe is extended to connect to the Taradale rising main.

Task 6-1: Extend the existing 300mmØ pipe from the intersection of Kennedy Road and Taradale Road, along Kennedy Road to the proposed rising main from the Taradale bores (Work Package 3). This requires constructing 1.6km of 350mmØ pipe.

The hydraulic model suggests that, with this upgrade and 500 l/s pumping capacity at the Awatoto bores, the supply can be maintained for approximately 30 hours under current peak demand. After that time, the Taradale reservoirs drain entirely and the supply will be interrupted in the Taradale zone unless NCC modifies the network configuration. For example the delineation valves between Taradale and Enfield could be temporarily re-opened.

It should be noted that the current system can already operate if the Awatoto bores are out of service, essentially because the Church Road Booster Pump Station can transfer water from Taradale to Enfield.



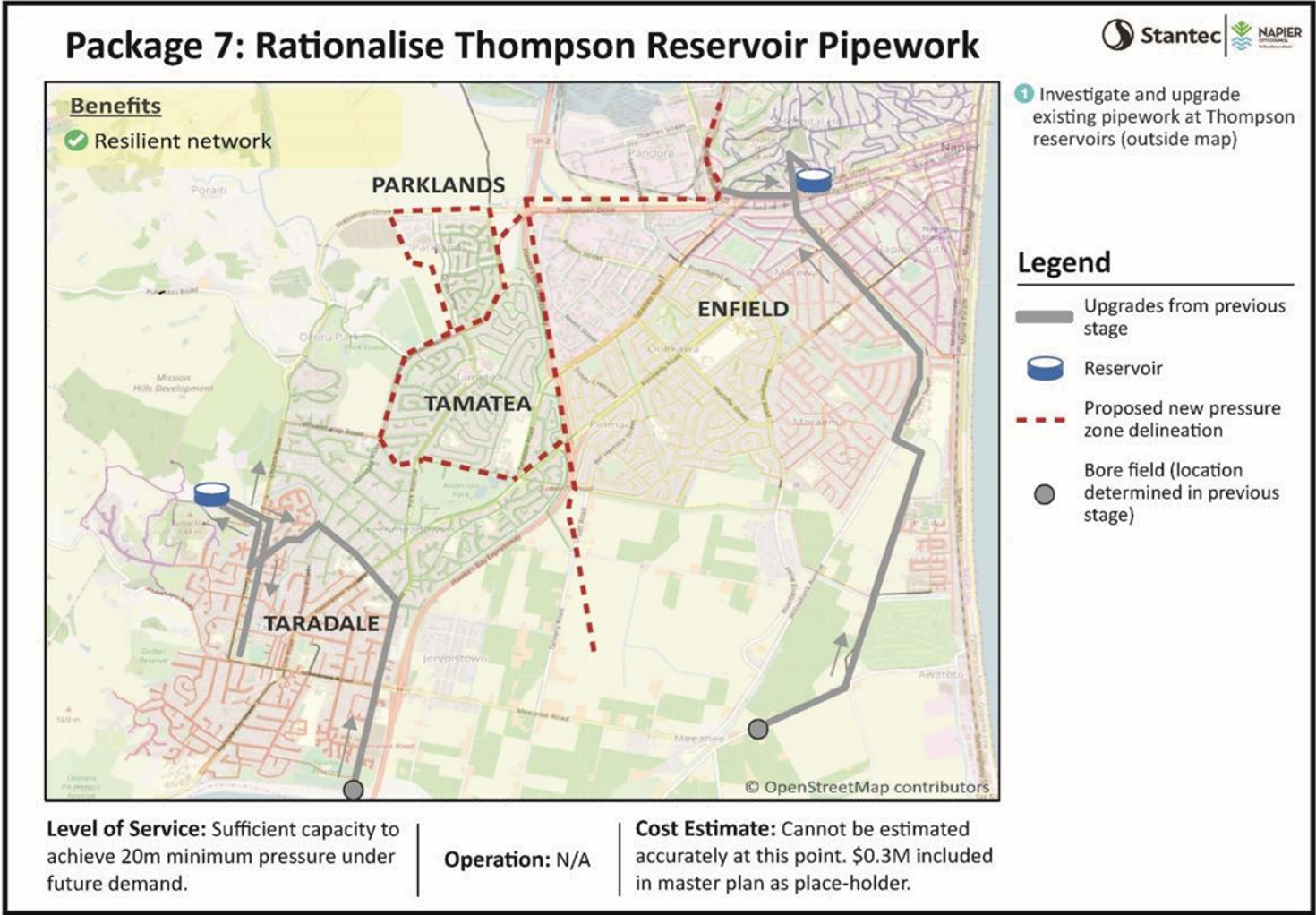
4.8 Package 7: Rationalise the Thompson Reservoir Pipework

This work package is aligned with the "Resilient network" driver: by simplifying the pipework around the Thompson Reservoir, NCC will reduce the time and complexity of a possible emergency pipe repair near the reservoir.

Task 7-1 is only loosely defined, and is expected to include:

- An investigation phase with an excavation of existing pipes, some of which are known to be as deep as 4-5m.
- A planning phase to confirm the preferred arrangement with the three existing tanks in the future.
- A design phase to confirm the preferred pipework layout.
- A construction and commissioning phase.

The cost for this cannot be estimated accurately at this point. A nominal allowance of \$300,000 has been included in the work programme but this needs to be confirmed once the preferred layout is identified and pipe marking/localisation has been completed.



4.9 Package 8: Ensure FW2 Fire Flow Availability

This work package is aligned with the "Pressure" driver. Pipe upgrades are required in several parts of the existing network to ensure FW2 fire flow availability.

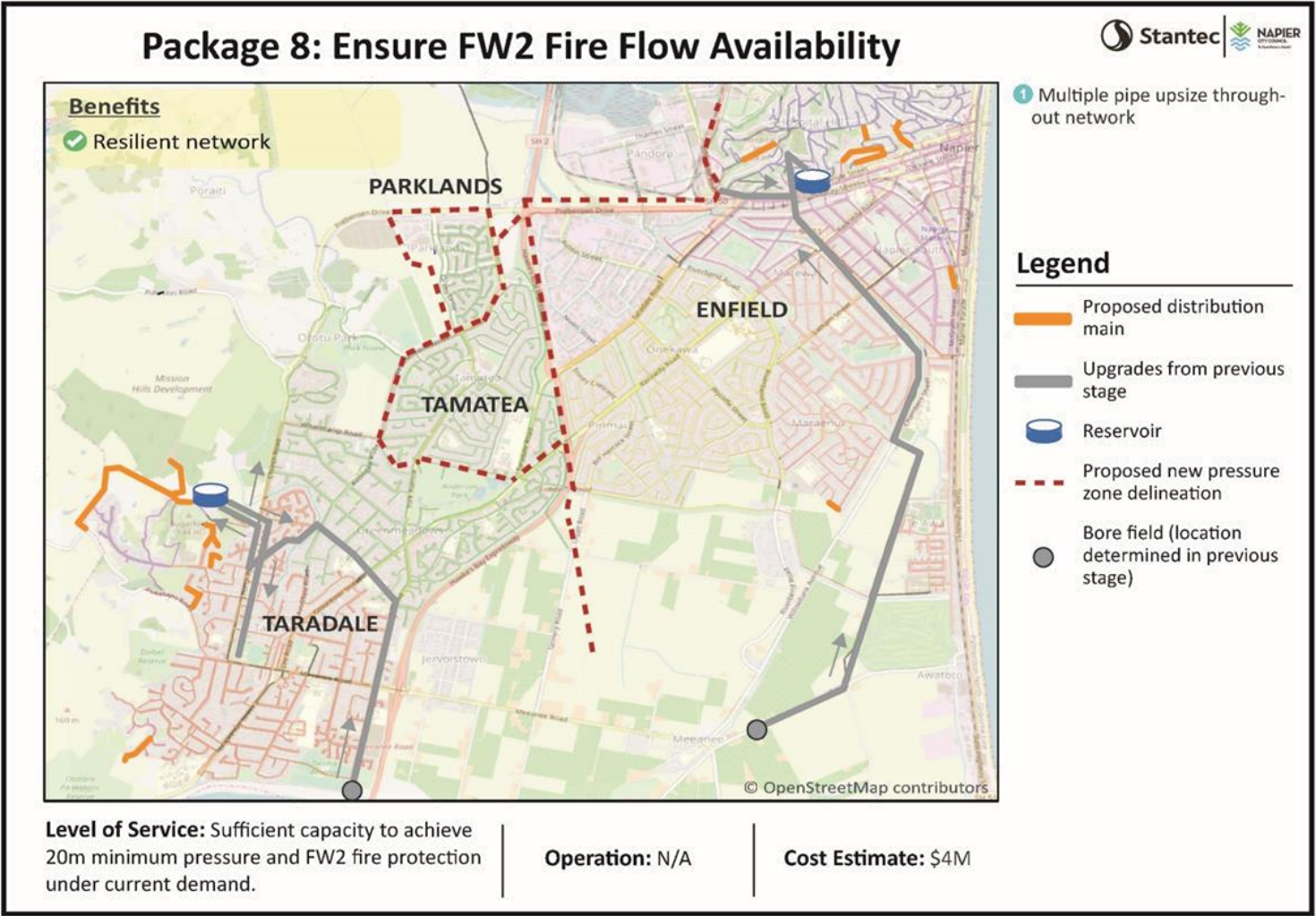
Existing fire deficiencies which are eliminated by upgrades captured in previous work packages are not addressed in this section. Fire deficiencies which are created by previous work packages are addressed by upgrades included in the relevant work package.

Existing upgrades which are not eliminated by previous work packages require a series of 16 pipe upgrades, listed in Appendix D and shown in the plan below.

Table 4-2: Fire Upgrades

8-1: Upgrade existing 150mmØ pipe along Franklin Road/Le-Quesne Road to 200mmØ, between Main North Road and No. 48 Le-Quesne Road (1700m in length).
8-2: Upgrade existing 100mmØ pipe along Onehunga Road to 150mmØ, between No. 190 and No. 262 Onehunga Road (790m in length).
8-3: Upgrade existing 150mmØ pipe along Hill Road to 200mmØ, between Terrace Road and Petane Road (130m in length). Additionally, construct a new 150mmØ cross-connection between the existing 150mmØ pipe at the proposed 200mmØ pipe at the intersection of Main North Road and Hill Road (near node Asset ID XXXX000002, 50m in length). Additionally, upgrade existing 100mmØ pipe along Hill road to 150mmØ, between Franklin Road and Terrace Road (350m in length) and between Petane Road and No. 80 Hill Road, excluding the existing section of 150mmØ pipe in between (430m in length).
8-4: Upgrade existing 100mmØ crossing the property at No. 54 The Esplanade to 150mmØ (90m in length). Additionally, upgrade existing 50mmØ/75mmØ pipe along The Esplanade to 150mmØ, between No. 54 and 99 The Esplanade (680m in length)
8-5: Upgrade existing 150mmØ along Kipling Avenue to 200mmØ, between Napier Terrace and Hooker Avenue (170m in length). Additionally, upgrade existing 75mmØ along Faraday Street to 150mmØ, between Hooker Avenue and Smale Terrace (410m in length). Move the boundary valve to south of the hydrant at the intersection of Smale Terrace and Faraday Avenue. Additionally, upgrade existing 100mmØ along May Avenue to 150mmØ, between Hooker Avenue and No. 23 May Avenue (180m in length).
8-6: Extend existing 100mmØ pipe at No. 4 Guys Hill Road and connect to the existing 75mmØ pipe along Chaucer Road South (50m in length). Additionally, upgrade existing 75mmØ/100mmØ main at the intersection of Chaucer Road South and Guys Hill Road to 150mmØ (10m in length), and create a 150mmØ cross-connection between existing 350mmØ rising main and proposed upgraded pipe (10m in length).
8-7: Create a new 100mmØ cross connection between the existing 75mmØ and 100mmØ pipes at the intersection of George Street and Bracken Street.
8-8: Upgrade existing 100/50mmØ pipe along Main Street to 150mmØ, between Spencer Road and No. 25 Main Street (260m in length).
8-9 Upgrade existing 75mmØ pipe along Milton Road to 150mmØ, between Cameron Road and No. 6 Milton Road (230m in length).
8-10: Upgrade existing 100mmØ pipe along Tironui Drive/Puketapu Road to 150mmØ, between No. 62 Tironui Drive and No. 255 Puketapu Road, excluding the existing section of 150mmØ pipe in between (1700m in length). Additionally, upgrade existing 150mmØ pipe outlet from Western Hill Reservoir to No. 82 Tironui Drive to 200mmØ (460m in length).

8-11: Construct a new 100mmØ pipe between existing 100mmØ pipe at Masefield Avenue and existing 100mmØ pipe at Mason Avenue (130m in length).
8-12: Upgrade existing 100mmØ pipe along Birdwood Street/Harpham Street to 150mmØ, between Nicholas Street and No. 12 Birdwood Street (220m in length).
8-13: Upgrade existing 100mmØ pipe along Ewan Place/Kent Terrace to 150mmØ, between Nicholas Street and No. 9 Ewan Place (130m in length).
8-14: Upgrade existing 100mmØ pipe to 150mmØ from Halliwell Reservoir to Cumberland Rise Extension (210m in length).
8-15: Upgrade existing 100mmØ pipe to 150mmØ from Otatara Reservoir to Poaka Place (340m in length).
8-16: Upgrade existing 75mmØ pipe along Wellesley Road to 100mmØ, between Todd Street and No. 26 Wellesley Road (270m in length).



4.10 Package 9: Enable Growth

This work package is aligned with the "Pressure" driver: urban intensification and greenfield expansion will add more demand onto the system, leading to higher velocity in pipes and less pressure for customers. To retain the Level of Service, several pipe upgrades will be required.

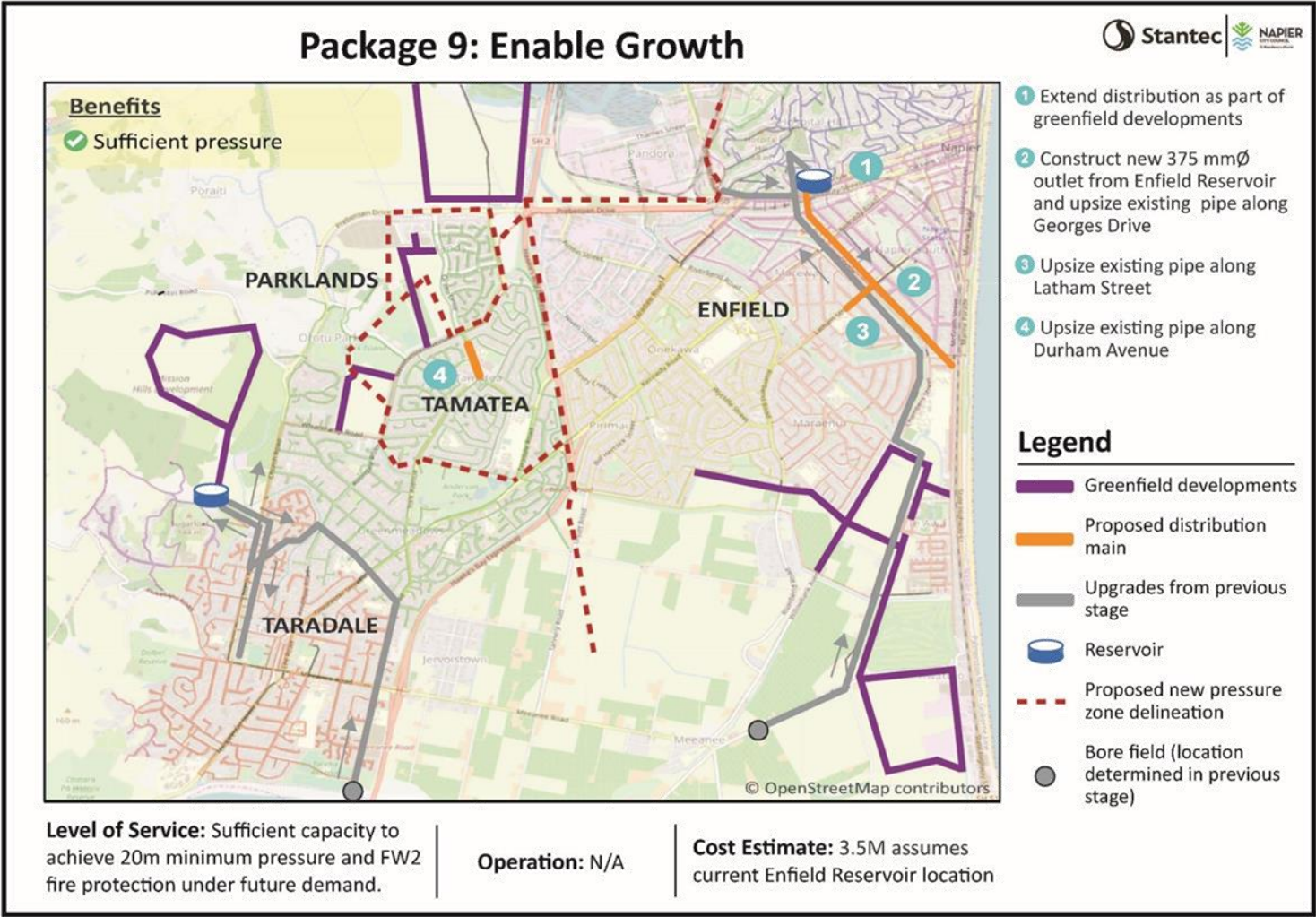
The works presented in this section assume that all pipe upgrades included in other work packages have been completed. It also requires knowing the preferred location of the Enfield Reservoir (Task 4-1).

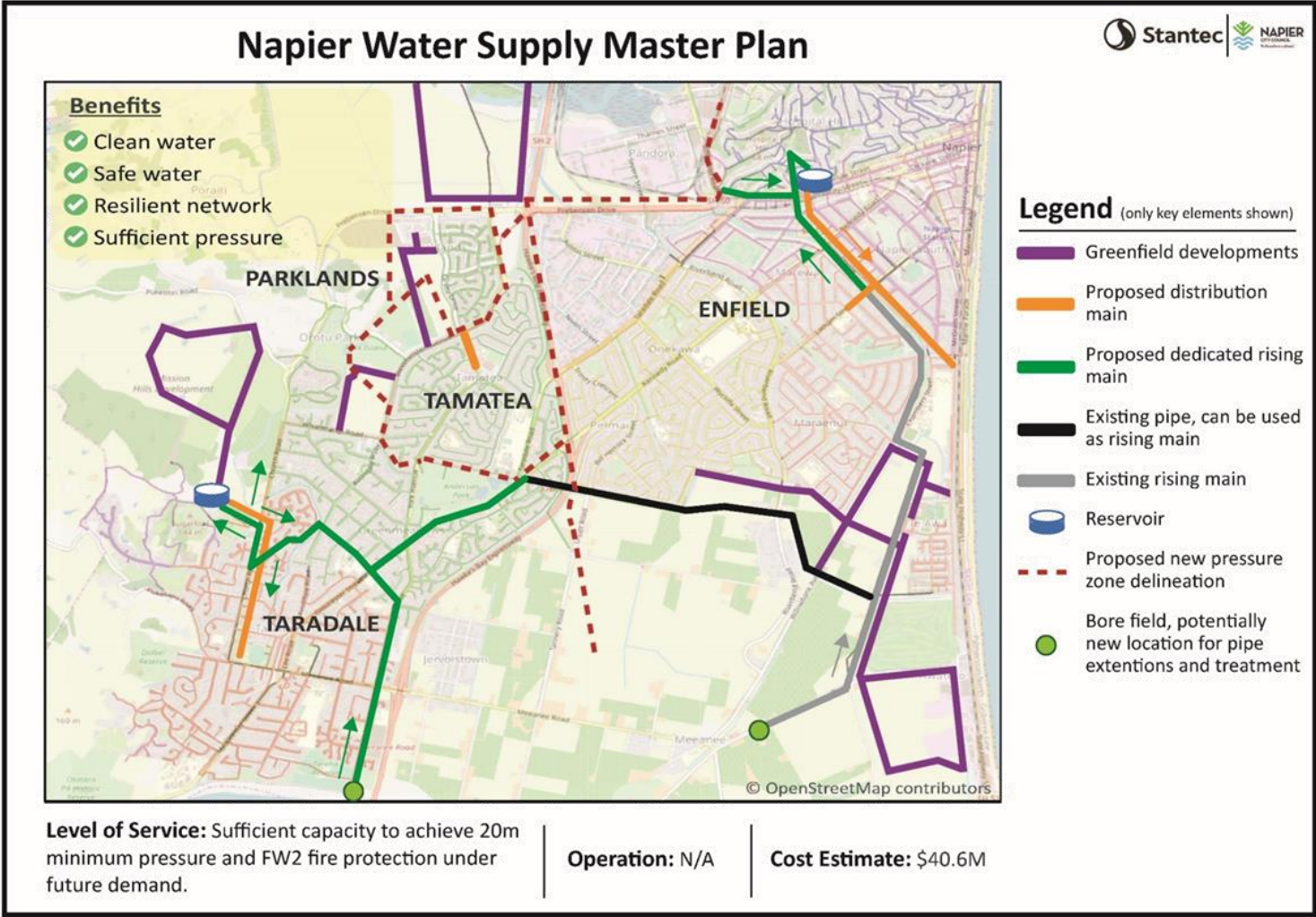
Task 9-1 consists in providing distribution network extensions to reach and supply greenfield developments. These extensions have been estimated based on the zones drawn in the HPUDS, but they will need to be revised as more details become available regarding the greenfield developments. As these are expected to be paid for by developers, no cost estimate was included in the work programme.

It will also be necessary to increase the capacity between the Enfield Reservoir and the south-eastern part of the city. In particular this includes:

- **Task 9-2:** Construct a new 375mmØ distribution main from the Enfield Reservoir, down to Thackeray Street. Additionally, upgrade the existing 100mmØ pipe along SH51 from Thackeray Street to Te Awa Avenue (2,170m in length).
- **Task 9-3:** Construct a new 300mmØ main along Latham Street from Douglas McLean Avenue to Barker Road (230m in length).
- **Task 9-4:** Upgrade existing 150mmØ 1970 AC pipe along Durham Avenue to 200mmØ, from Southwark Avenue to York Avenue (110m in length).

It is important to note that the elevation of the new Enfield Reservoir is likely to have an impact on the upgrades required on the distribution. A higher reservoir is likely to reduce the need for pipe upgrades, while creating new costs and risks. This will be investigated as part of Task 4-1.





5. Recommendations

It is recommended that:

- NCC reviews and confirms the work programme presented in this document.
- NCC stages the work programme (1-, 3-, 10- and 30-years horizons), either based on available budget or on required outcomes.
- NCC continues the investigations currently under-way for the most urgent tasks, which will allow other tasks to be started:
 - “Clean water” driver:
 - Understand the mechanisms at play in the discoloration episodes.
 - Confirm preferred bore locations.
 - Confirm the treatment strategy.
 - Clarify costs associated with the preferred option and update this master plan.
 - “Resilient network”:
 - Confirm the preferred location for the Enfield reservoir.
 - Clarify costs associated with the preferred option, in particular the impact on pipe upgrades, and update this master plan.
 - Clarify water demand management objectives and activities.
- NCC undertakes an option assessment comparing:
 - Increasing the network capacity so the Lee Road PRV does not operate, even under FW2 fire demand (as per this master plan).
 - Relying on the Lee Road PRV even for FW2 fire demand.
- NCC undertakes an option assessment comparing:
 - Constructing a new rising main and a new distribution pipe to and from Taradale Reservoir (this master plan).
 - Using the existing 450mm rising main along Church Road as a distribution main and increasing the size of the proposed rising main.
- NCC updates this master plan regularly and when critical new information becomes available, in particular assumptions regarding the population growth, greenfield developments or future water use.



Appendix A Costing Assumptions

The cost estimates presented in this report include:

- Construction cost.
- Professional services (planning, design, investigations, stakeholder engagement...)
- Risk and contingency.

Pipe rates were based on figures used for Tauranga City Council since 2009, and anecdotally verified to be still valid in that region. We included a 15% mark-up for professional services and an additional 40% contingency.

Description	Pipe Diameter (mm)							
	50	100	150	200	250	300	350	375
Pipe & Fittings supply and installation (2008/2009)	\$105	\$150	\$250	\$350	\$500	\$700	\$820	\$820
incl. Professional Services (15%)	\$121	\$173	\$288	\$403	\$575	\$805	\$943	\$943
incl. Risks and Contingency (40%)	\$169	\$242	\$403	\$564	\$805	\$1,127	\$1,320	\$1,320
Adopted rate for 2019 NCC master plan	\$169	\$242	\$403	\$564	\$805	\$1,127	\$1,320	\$1,320
	166	237	395	553	791	1107	1297	1297

Description	Pipe Diameter (mm)							
	400	450	500	525	550	600	700	800
Pipe & Fittings supply and installation (2008/2009)	\$900	\$983	\$1,035	\$1,035	\$1,150	\$1,150	\$1,260	\$1,360
incl. Professional Services (15%)	\$1,035	\$1,130	\$1,190	\$1,190	\$1,323	\$1,323	\$1,449	\$1,564
incl. Risks and Contingency (40%)	\$1,449	\$1,582	\$1,666	\$1,666	\$1,852	\$1,852	\$2,029	\$2,190
Adopted rate for 2019 NCC master plan	\$1,449	\$1,582	\$1,666	\$1,666	\$1,852	\$1,852	\$2,029	\$2,190
	1423	1554	1637	1637	1818	1818	1992	2151

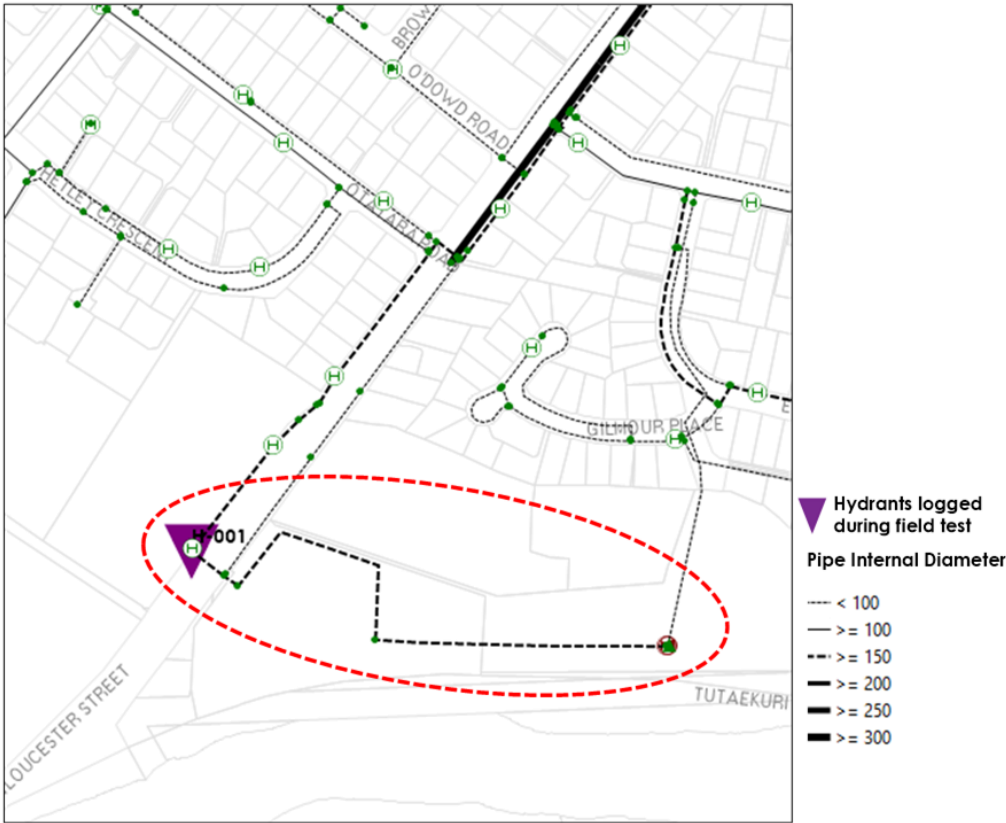
There are multiple **miscellaneous items** in the master plan, which were estimated at a high level and captured directly in the schedule of works. Where possible, these were based on experience and recent projects Stantec was involved in.

The largest unknown is the cost pertaining to the **Enfield Reservoir upgrade**. Recent reservoir construction works in the Wellington region suggest a cost of \$9M for a 11ML reservoir. As the site for the Enfield Reservoir is likely to be challenging, Stantec considers this should be considered a minimum. Recent construction works in Napier suggest a cost closer to \$7M. At NCC's request, this \$7M figure was included in the master plan, along with \$1M to renew the pipework to and from the reservoir.

Appendix B Field Checks

B.1 Gloucester Street

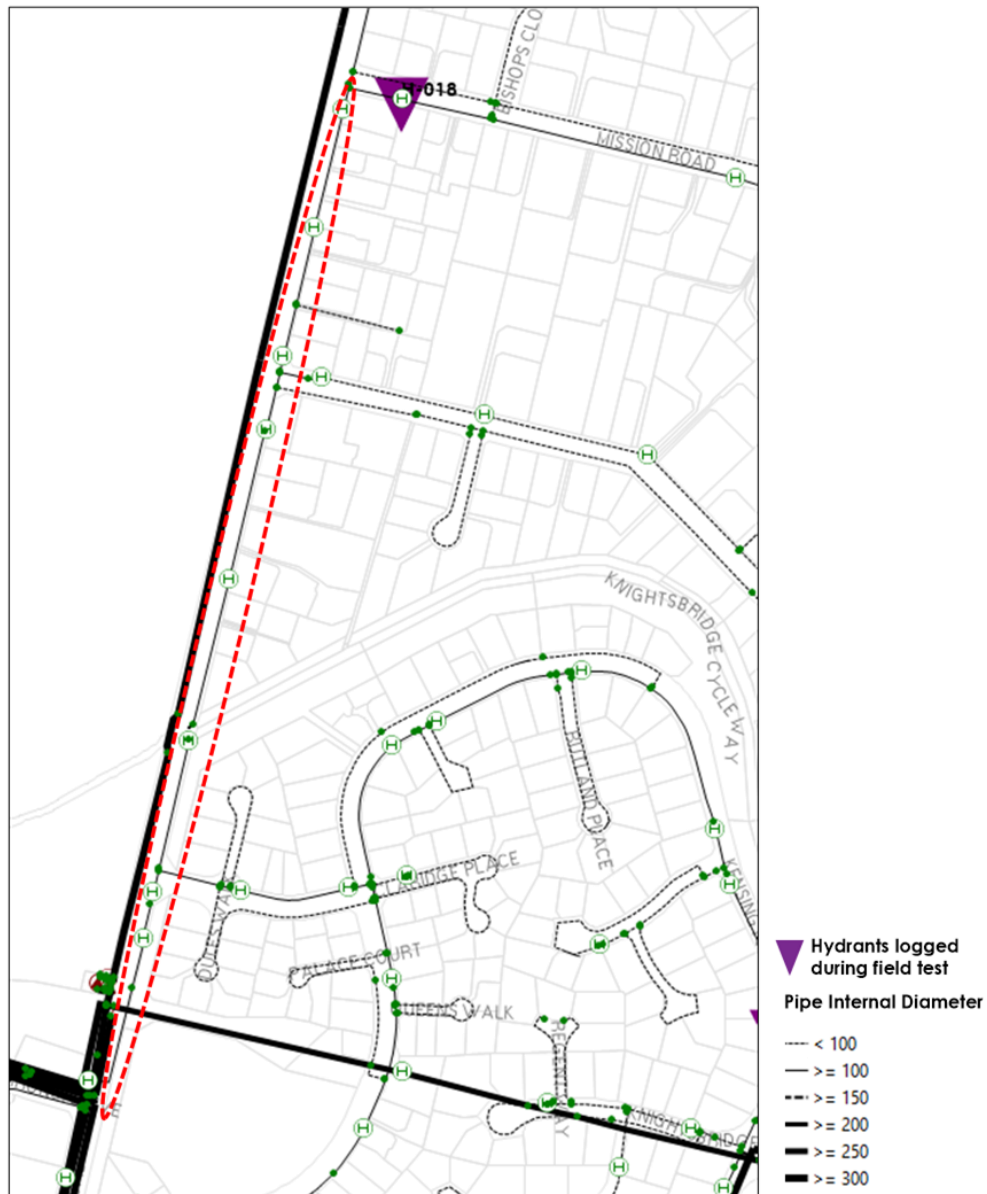
There is a possible restriction along the 200mmØ pipe between Taradale 3 Bore and hydrant H-001.
Check all valves along this pipe.



B.2 Church Road

There is a possible restriction along the 150mmØ pipe on Church Road between Tironui Drive and Mission Road, parallel to the 450mmØ Tamatea trunk upstream of hydrant H-018.

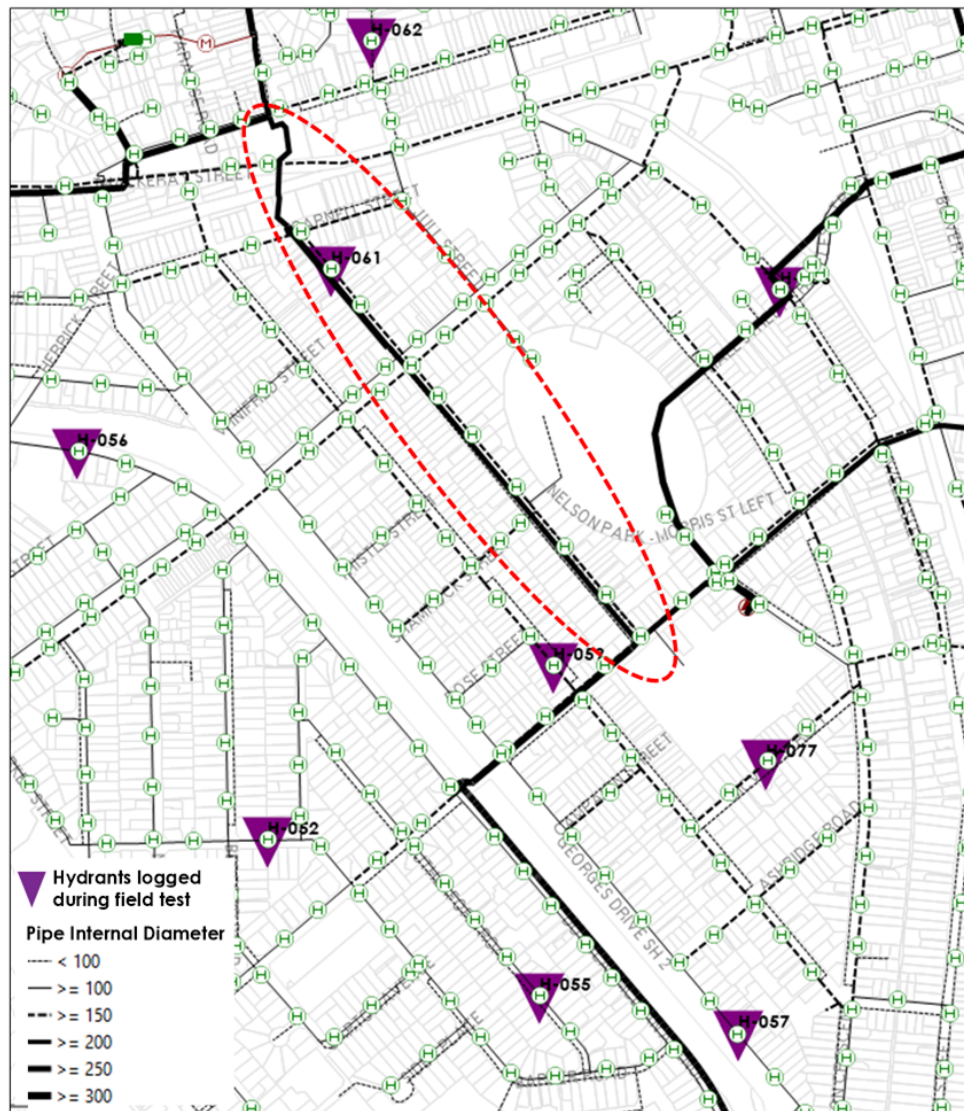
Check all valves along this pipe.



B.3 McDonald Street

There is a massive restriction in the network which affects the hydrants on the right side of the network, some of which are shown below (H-059, H-077, H-055, H-057).

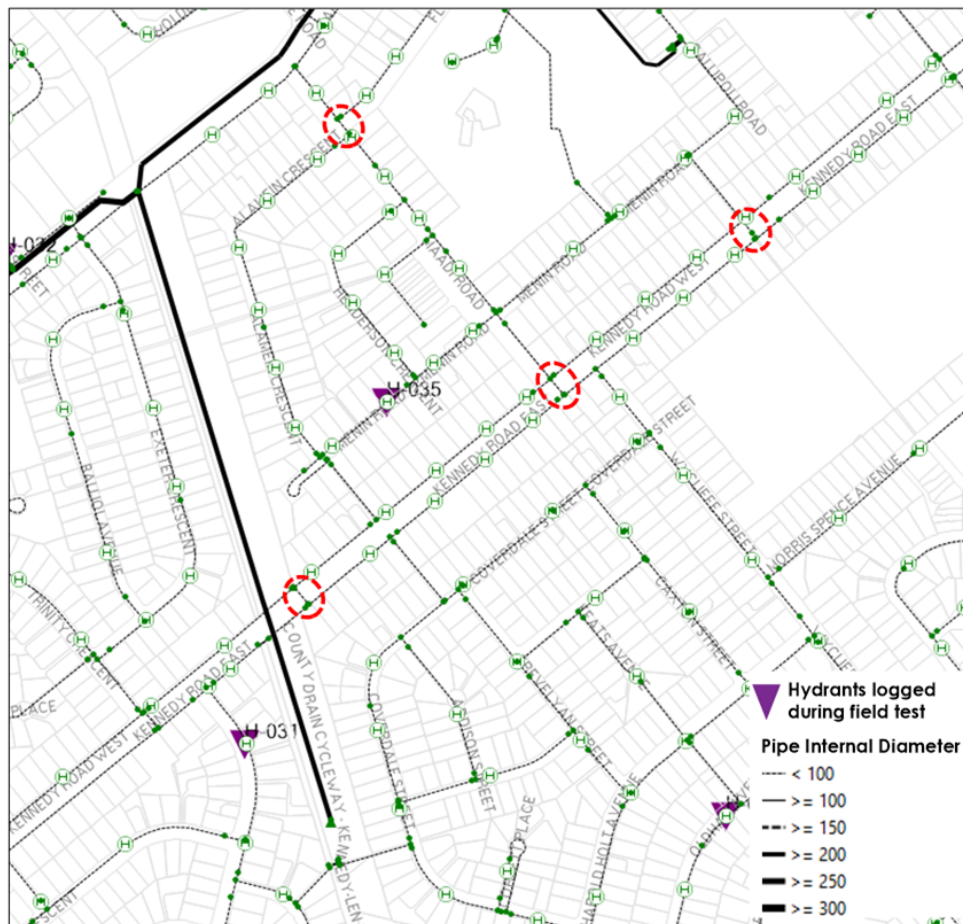
In the model, when a valve was closed in the 300mmØ pipe along McDonald Street, the matches in head between field and model data improved. Check all valves along this main. If checks come back clear of all valves along McDonald Street, the anomaly may be present in other mains and may not be restricted to just one main. A series of hydrant flow tests in the area may be necessary.



B.4 Kennedy Road/Maadi Road

When a combination of valves was closed in the model as shown below, there were improved matches between field data and model results. Opening these valves is likely to improve the pressures in the area. However, the pressure is sufficient in the area with the valves closed. Retaining the valves closed may reduce the number of flow reversals, and therefore limit the risk of discolouration.

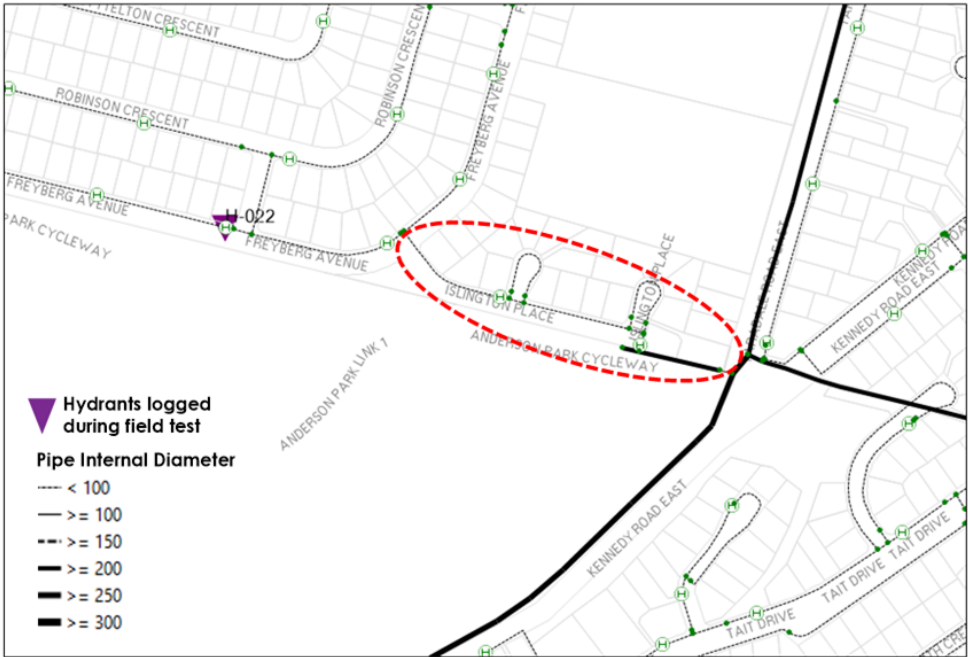
Check all valves along Maadi Road and Kennedy Rod between the County Drain and Douglas McLean Avenue to confirm open/close status for replication in the working model and GIS.



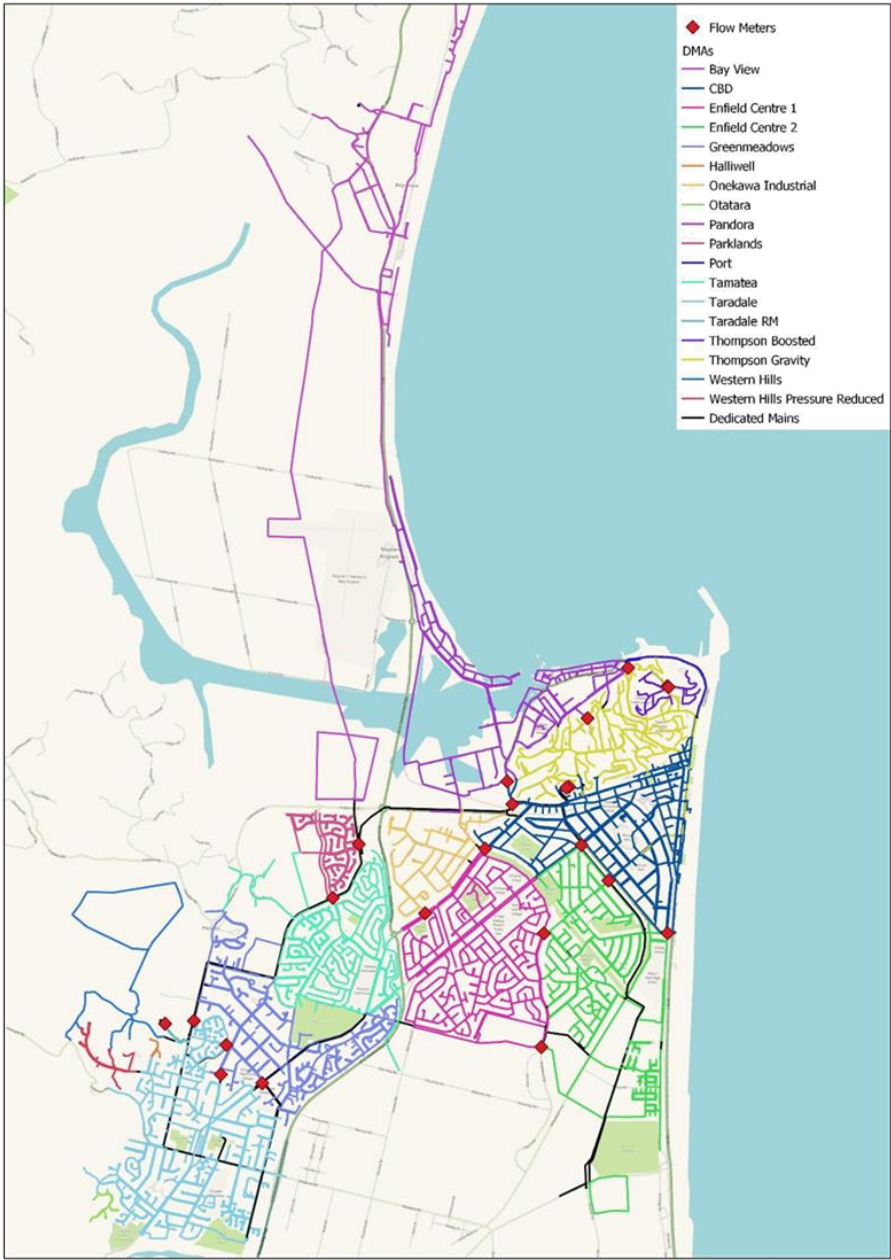
B.5 Islington Place

The model under-predicts the head at H-022 (along Freyberg Avenue). When a valve along the 300mmØ pipe between Kennedy Road and Islington Place was closed, the match between field and model data improved.

Check all the valves along this main and on the 150mmØ main along Islington Place.



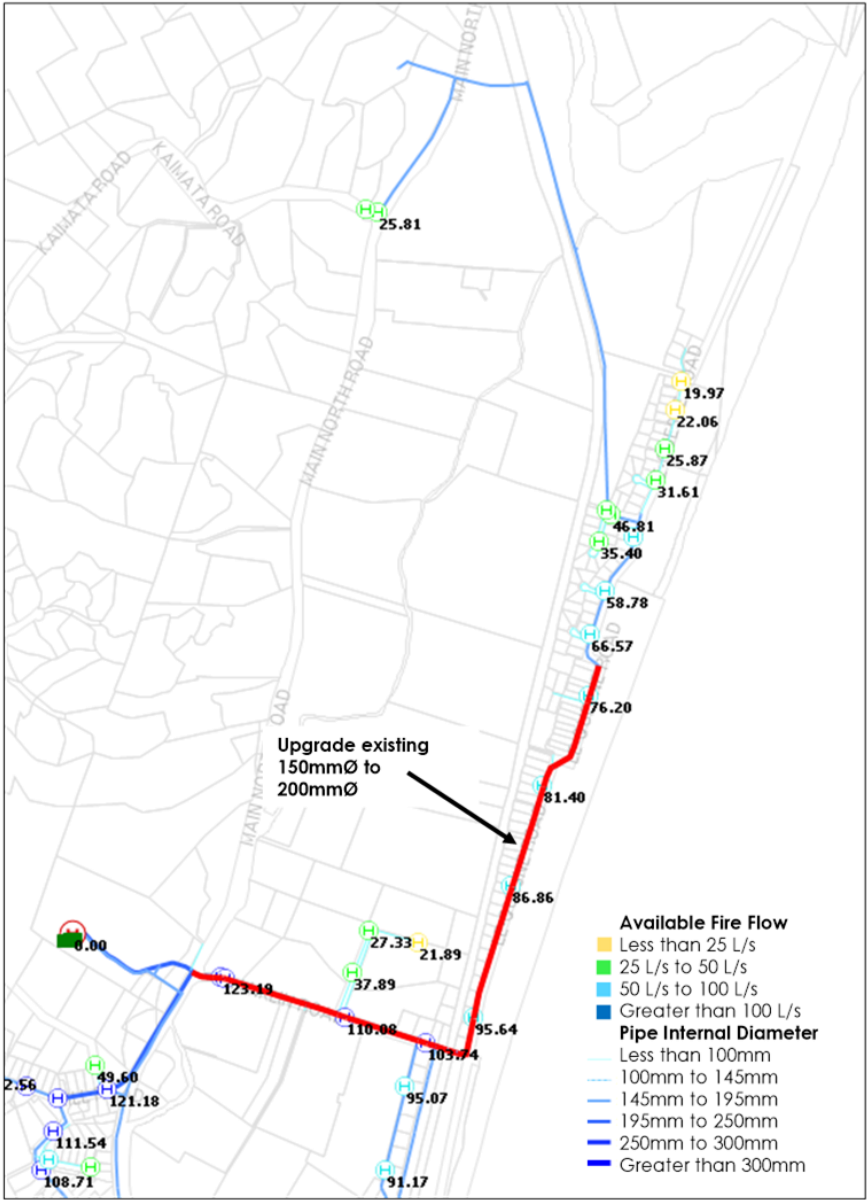
Appendix C Flow Meters



	Meter Location	Pipe Diameter (mm)	Pipe Material
1	Gloucester Street/Osier Road	200	AC
2	Avondale Road/Balmoral Street	150	AC
3	Brompton Drive	300	AC
4	259 Church Road	150	PVC
5	Taradale Reservoir Inlet	350	DI
6	Downstream of Durham PRV	200	PVC
7	Downstream of Pacific PRV	200	PVC
8	Niven Street	200	AC
9	Taradale Road/Riverbend Road	375	ST
10	Riverbend Road/Latham Street	150	CI
11	Riverbend Road/The Loop	300	AC
12	Te Awa Avenue/Georges Drive	150	PVC
13	Latham Street/Douglas McLean Avenue	300	PVC
14	Kennedy Road/Douglas McLean Avenue	150	ST
15	Prebensen Drive	450	DI
16	Enfield Reservoir Inlet	375	ST
17	Enfield Reservoir Outlet	300	ST
18	61 Hyderabad Road	300	AC
19	Downstream of Burns PRV	200	PVC
20	Downstream of Seapoint PRV	200	PVC
21	Thompson Square Reservoir Inlet	150	AC
22	Thompson Round Reservoir Inlet	300	CI

Appendix D Fire Upgrades

D.1 Franklin Road/Le-Quesne Road



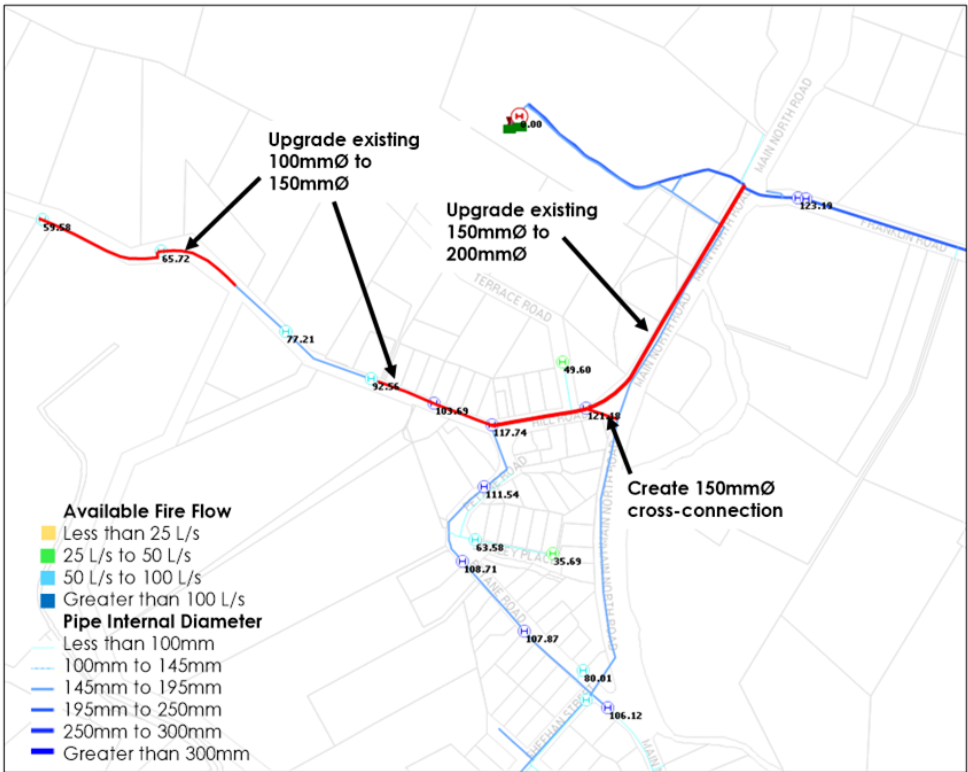
*Available fire flow after upgrade

D.2 Onehunga Road



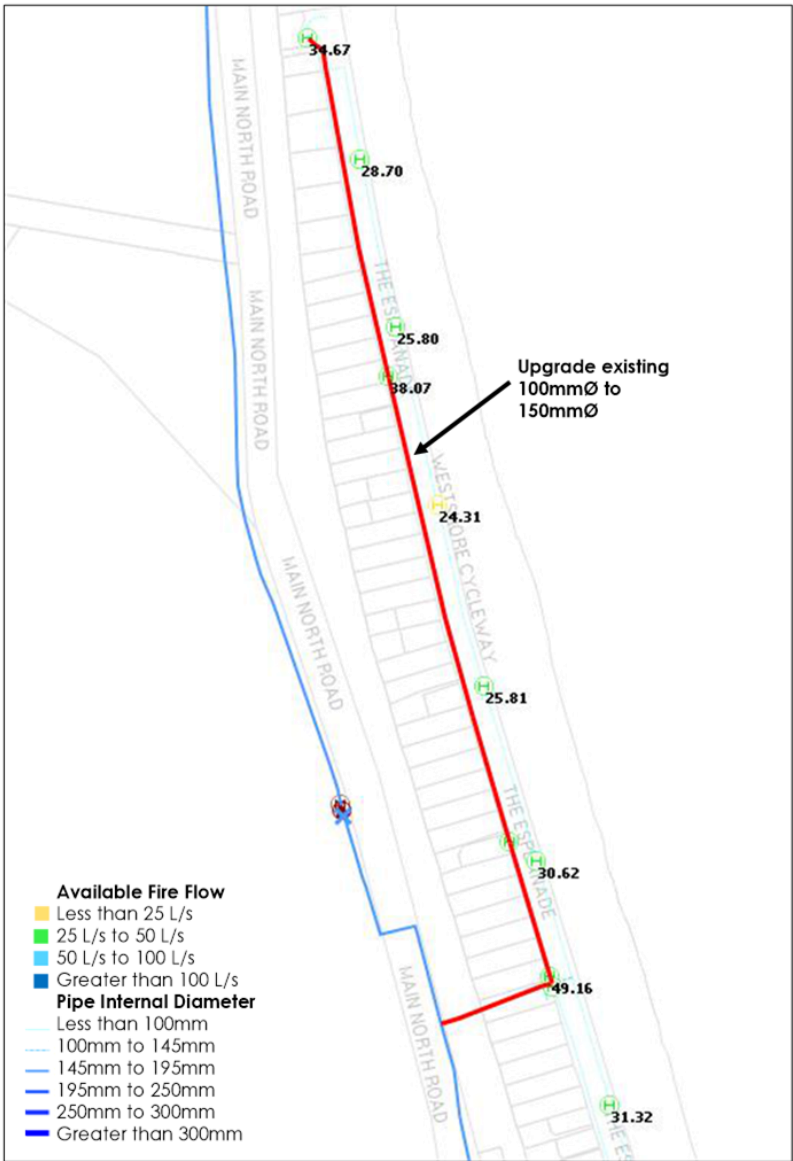
*Available fire flow after upgrade

D.3 Hill Road



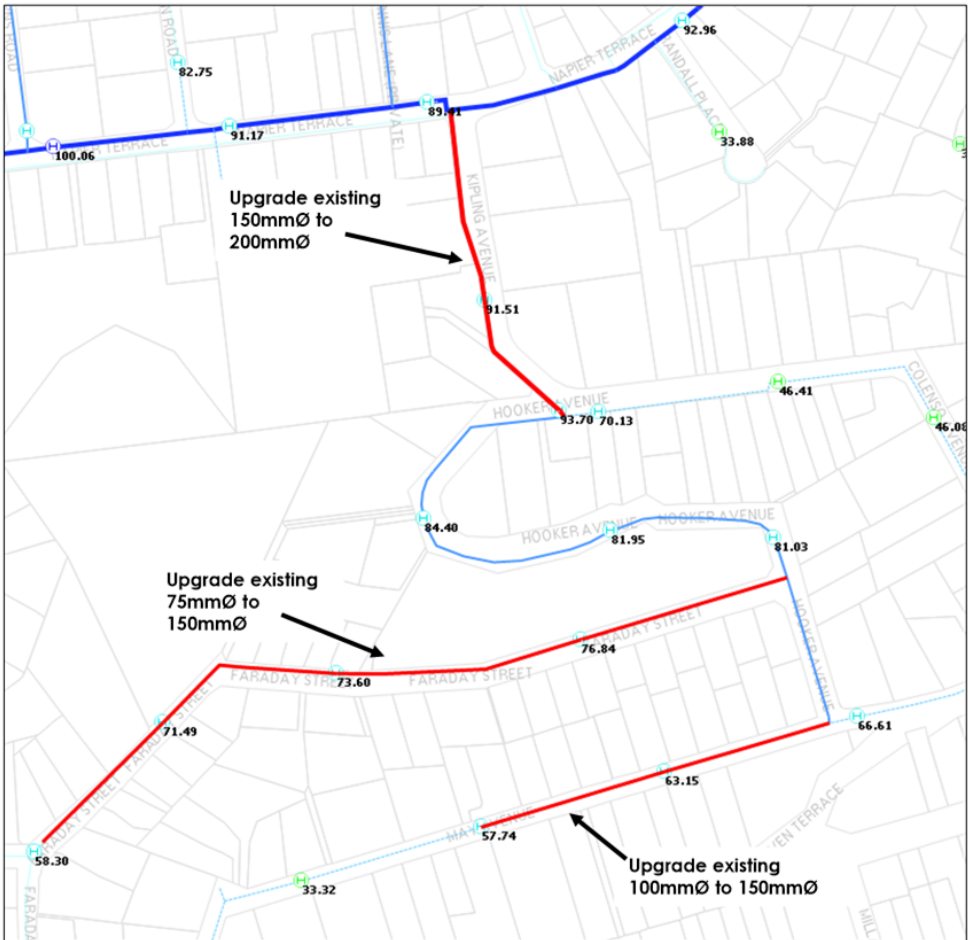
*Available fire flow after upgrade

D.4 The Esplanade



*Available fire flow after upgrade

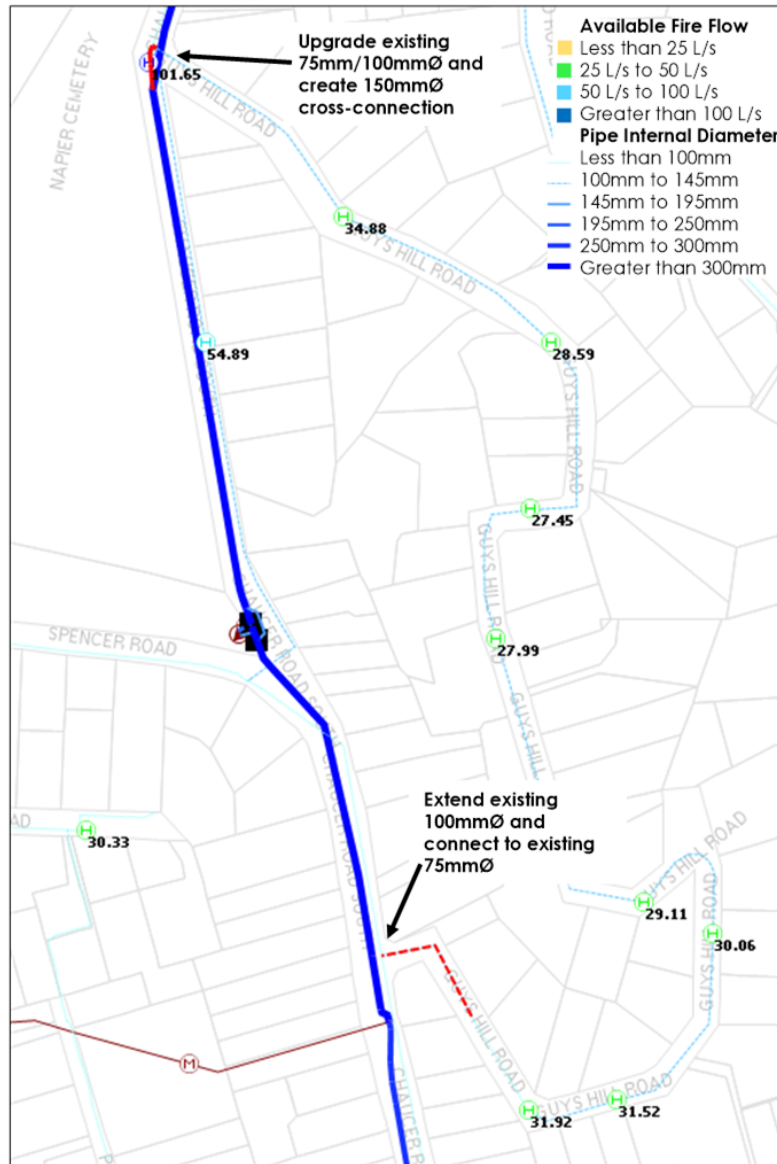
D.5 Kipling Avenue/Faraday Street/May Avenue



*Available fire flow after upgrade

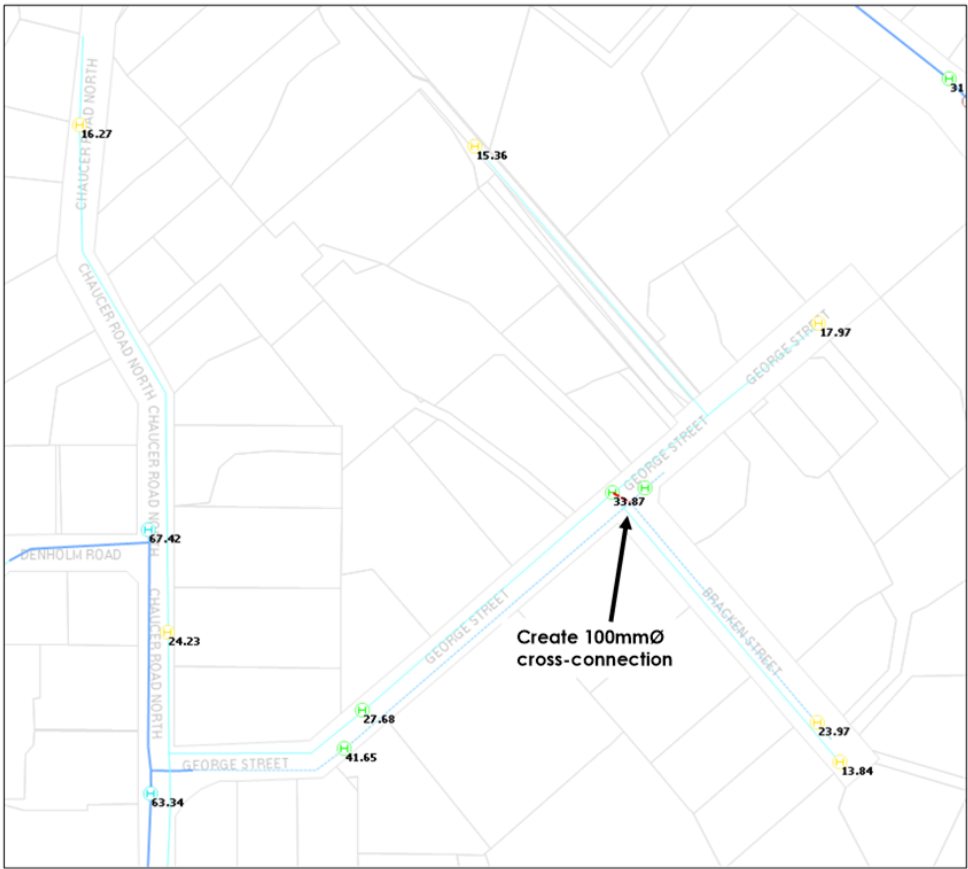
- Available Fire Flow**
- Less than 25 L/s
 - 25 L/s to 50 L/s
 - 50 L/s to 100 L/s
 - Greater than 100 L/s
- Pipe Internal Diameter**
- Less than 100mm
 - 100mm to 145mm
 - 145mm to 195mm
 - 195mm to 250mm
 - 250mm to 300mm
 - Greater than 300mm

D.6 Guys Hill Road/Chaucer Road South



*Available fire flow after upgrade

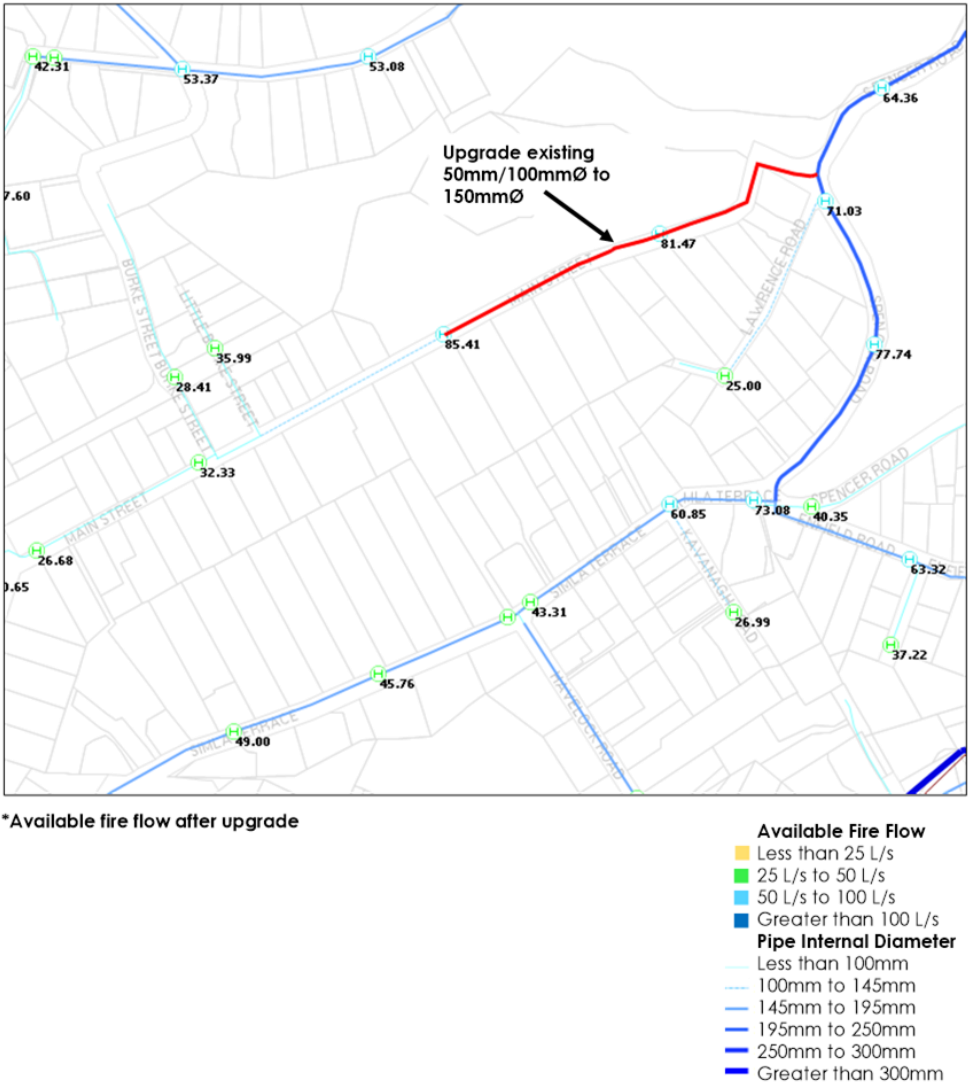
D.7 George Street/Chaucer Road



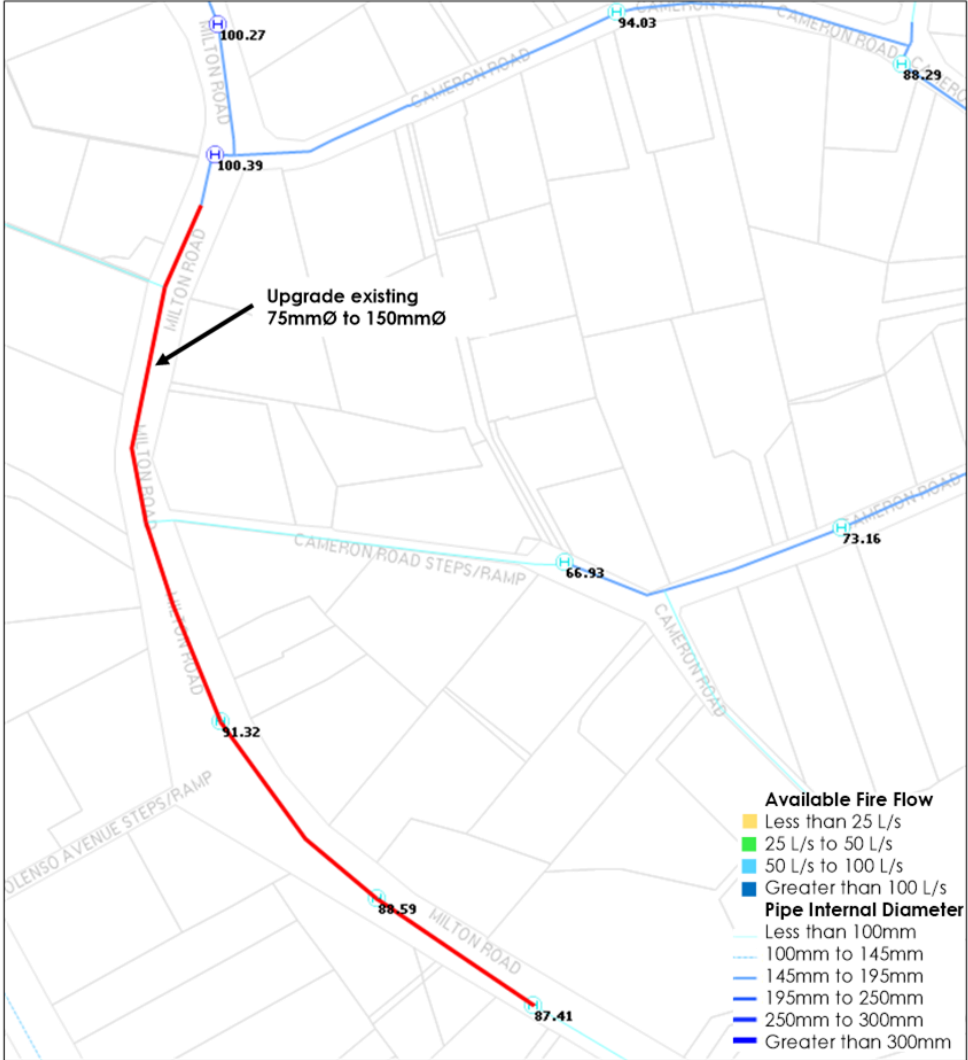
*Available fire flow after upgrade

- Available Fire Flow**
- Less than 25 L/s
 - 25 L/s to 50 L/s
 - 50 L/s to 100 L/s
 - Greater than 100 L/s
- Pipe Internal Diameter**
- Less than 100mm
 - 100mm to 145mm
 - 145mm to 195mm
 - 195mm to 250mm
 - 250mm to 300mm
 - Greater than 300mm

D.8 Main Street

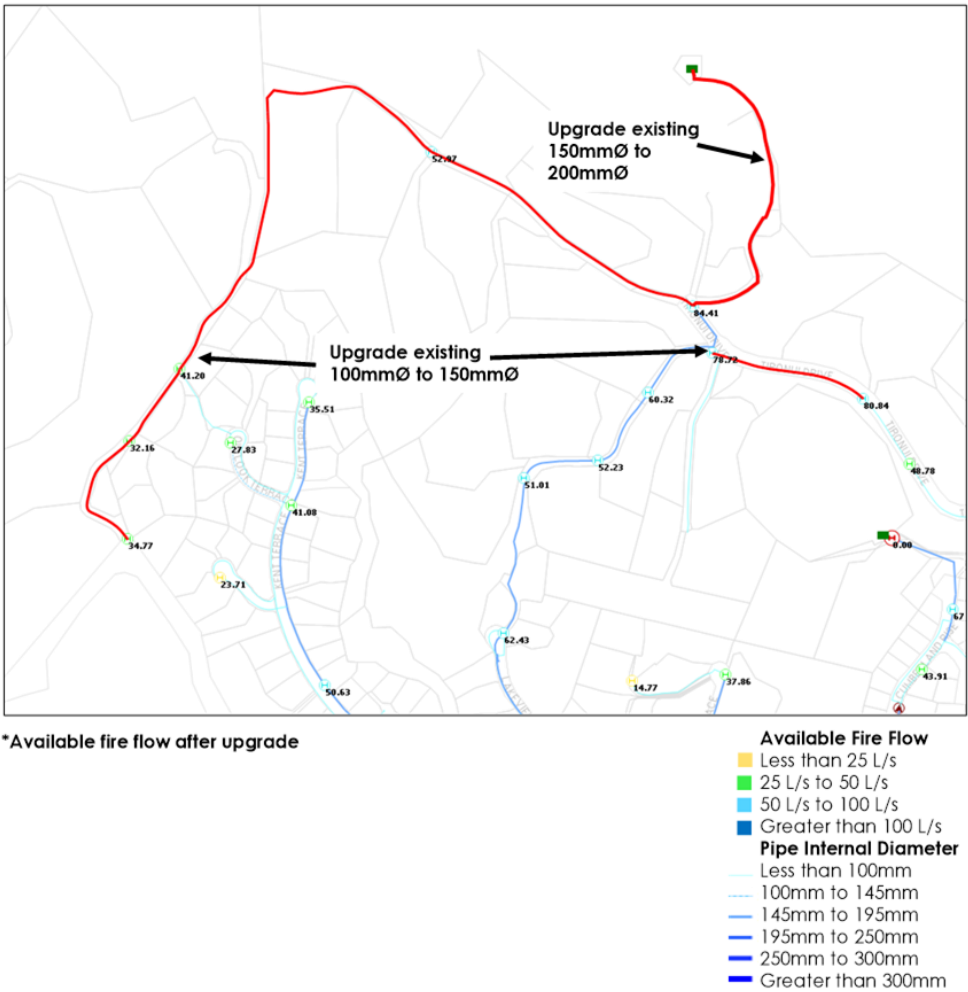


D.9 Milton Road

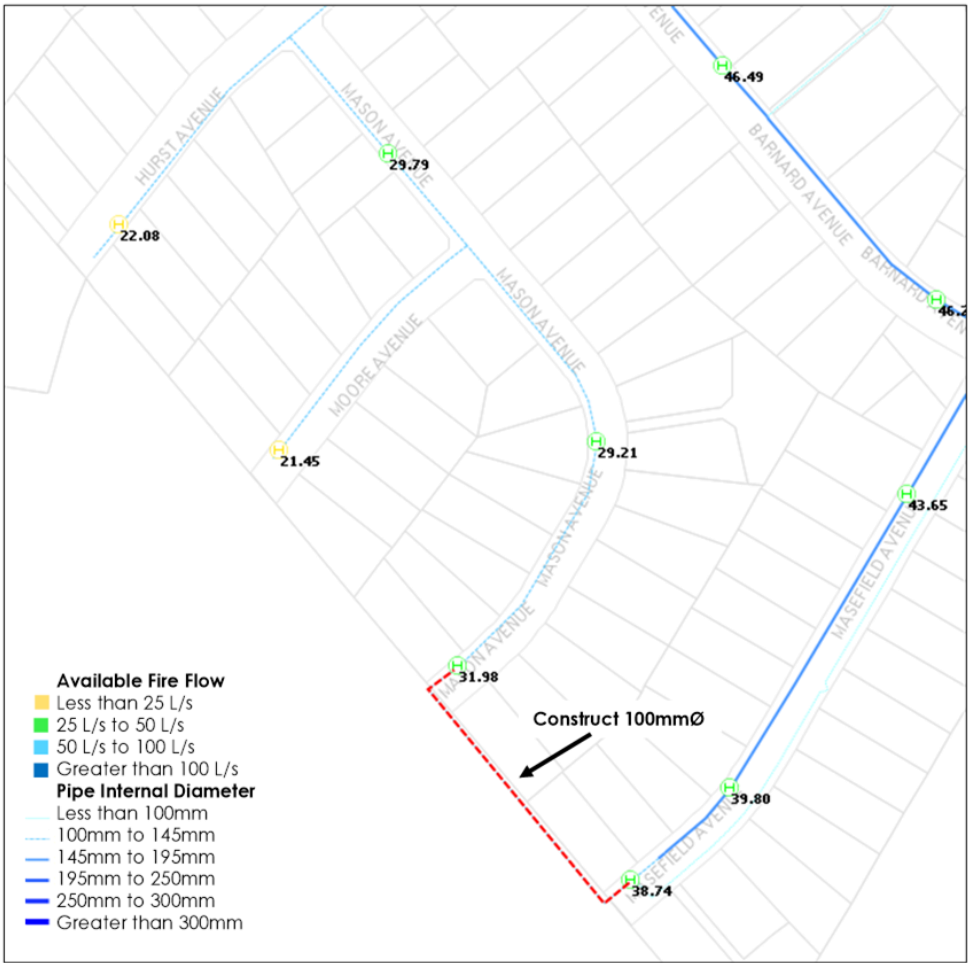


*Available fire flow after upgrade

D.10 Tironui Drive/Puketapu Road

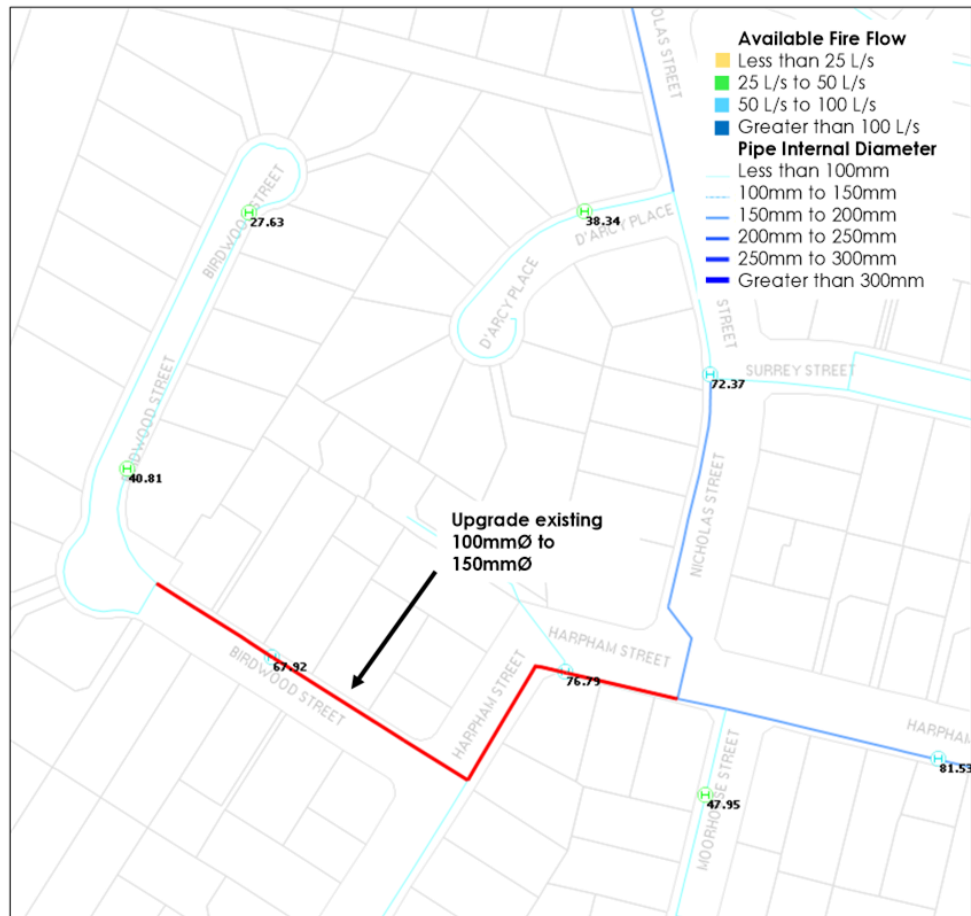


D.11 Mason Avenue/Masefield Avenue

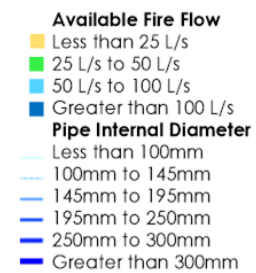


*Available fire flow after upgrade

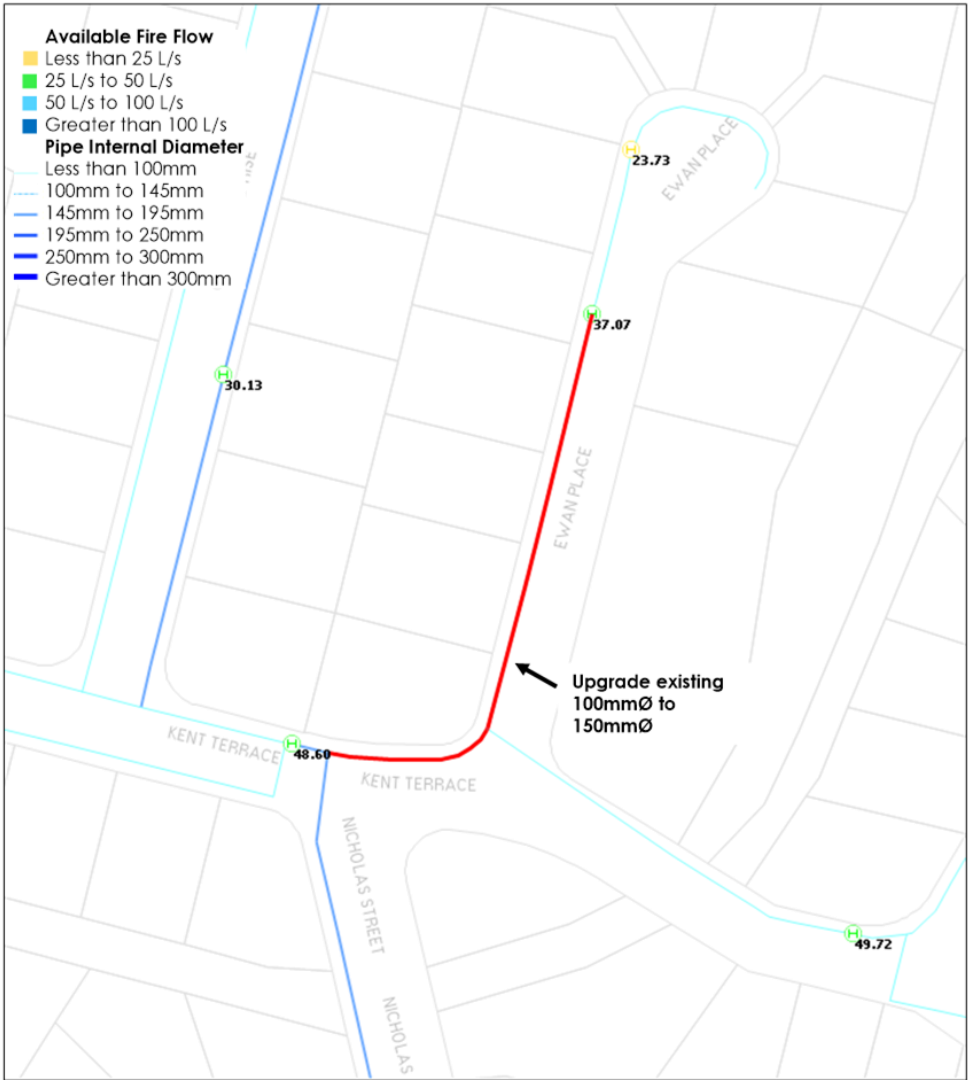
D.12 Birdwood Street/Harpham Street



*Available fire flow after upgrade

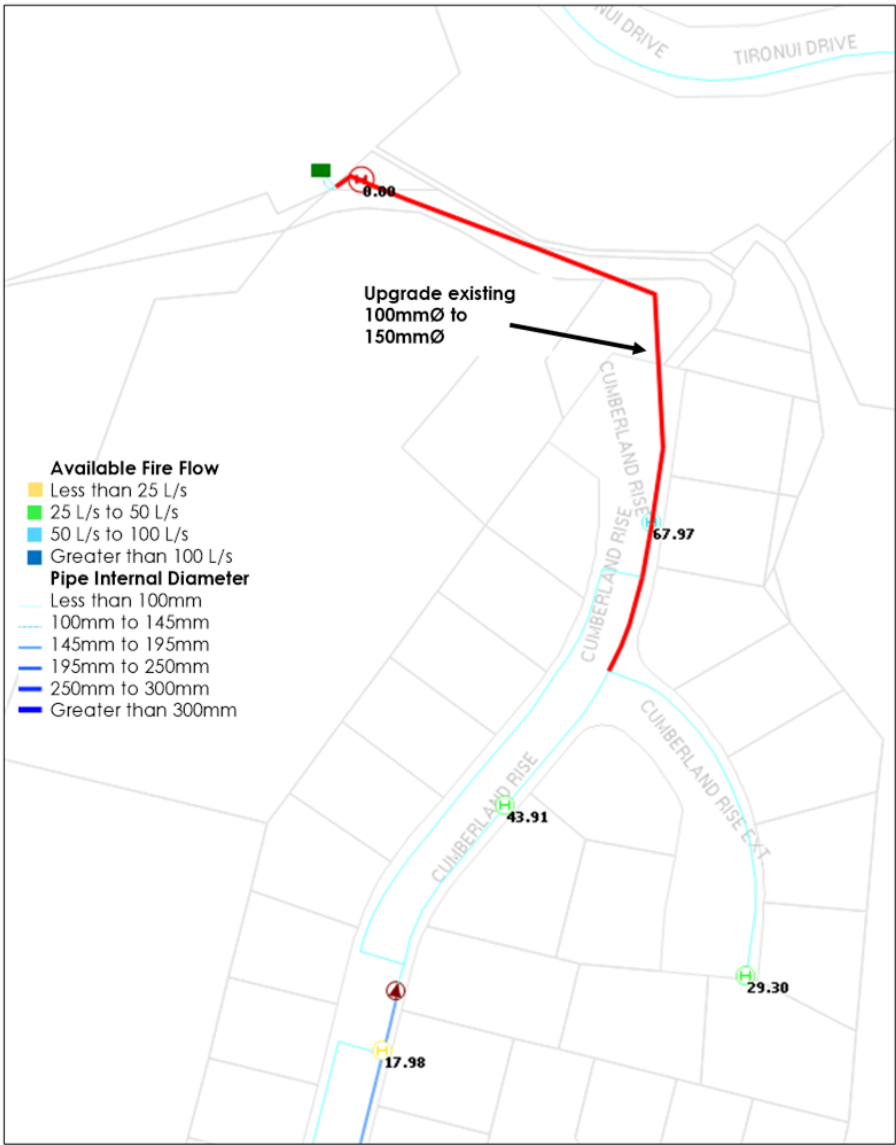


D.13 Ewan Place/Kent Terrace



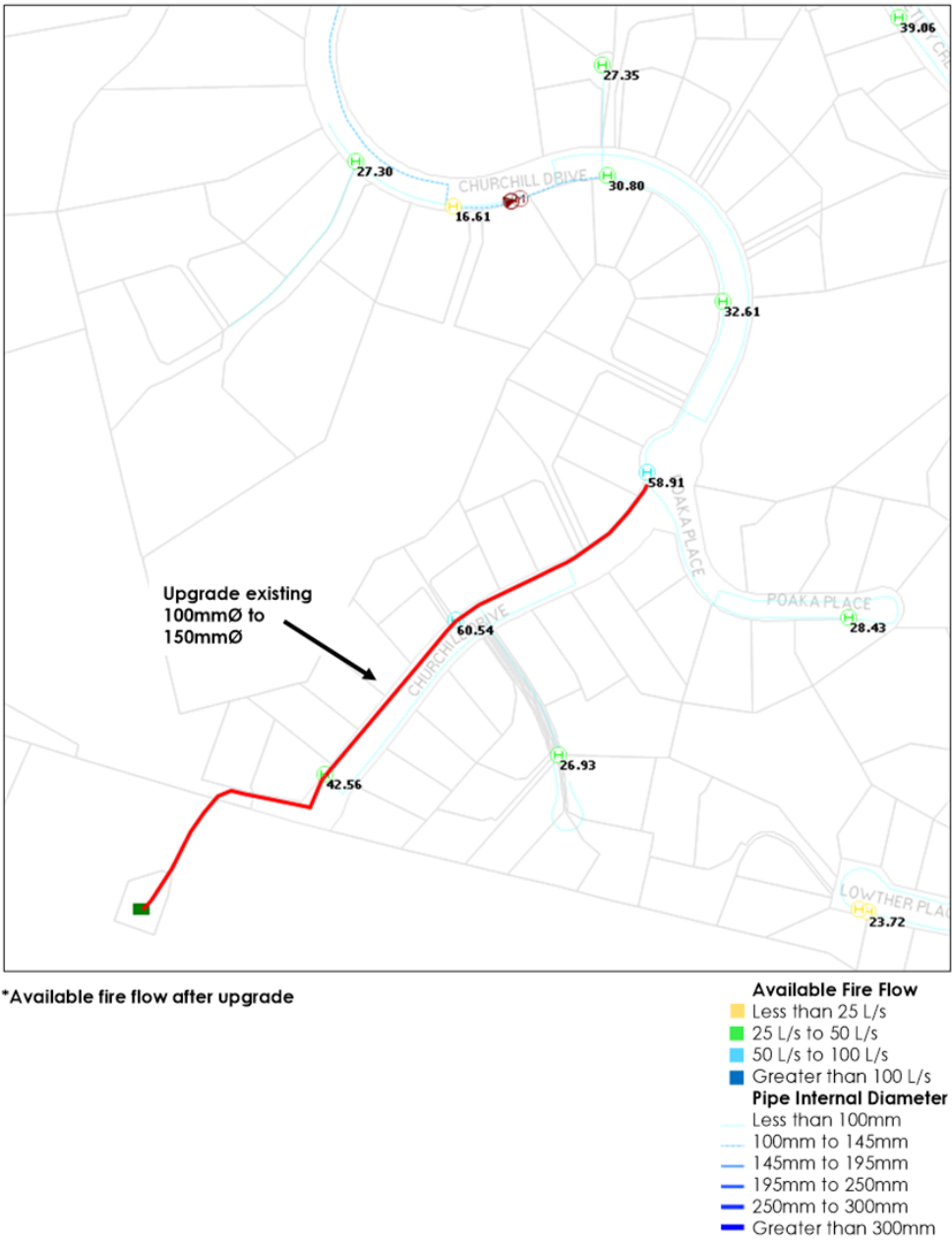
*Available fire flow after upgrade

D.14 Halliwell

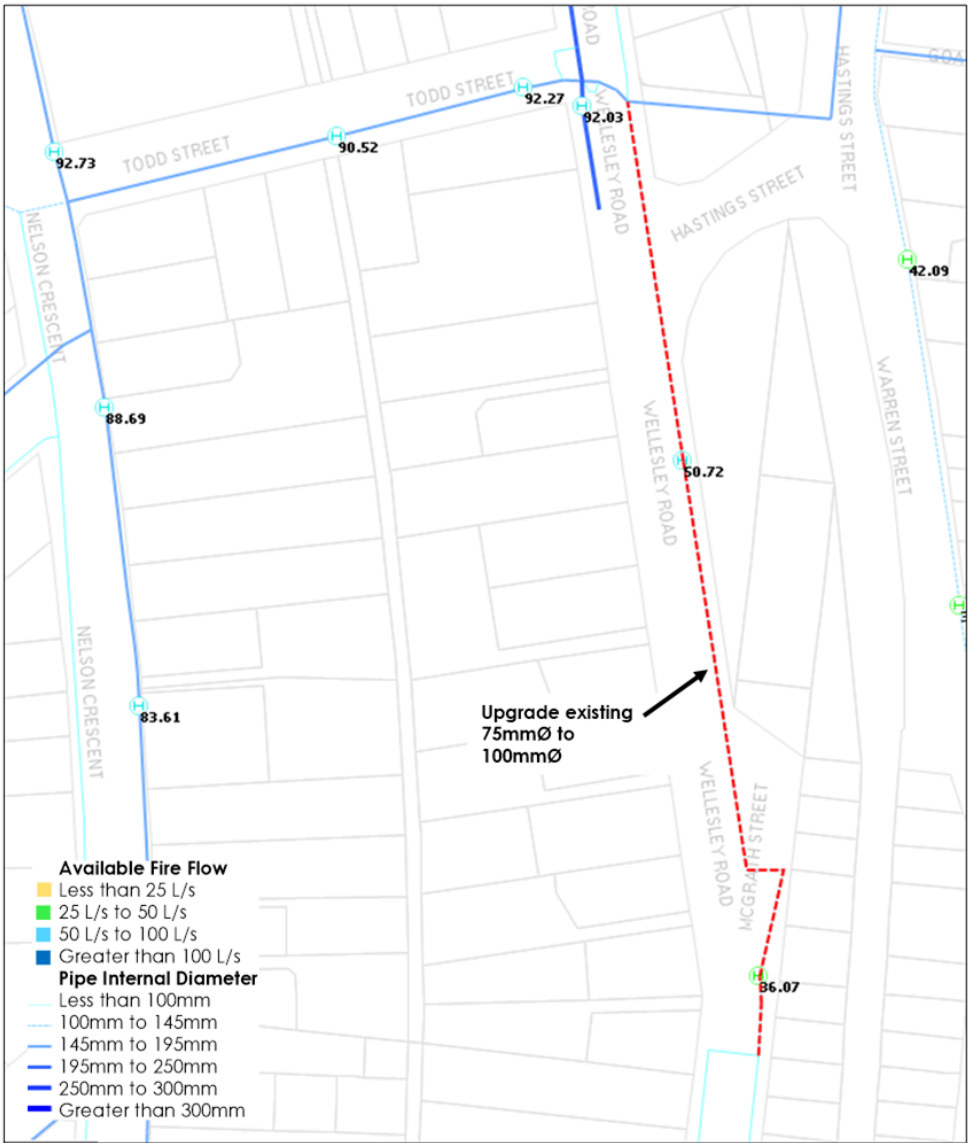


*Available fire flow after upgrade

D.15 Otafara



D.16 Wellesley Road



*Available fire flow after upgrade

Appendix E Master Plan, Packages and Tasks

Package	Activity	Outcome category	Tasks	Cost	Risks, opportunities	Status
Package 1	Reduce the manganese load	S, C	1-1: Investigate discoloration issues further (chemical and hydraulic).	\$ 50,000	Cost estimate is a placeholder only. This task needs to be scoped in more detail.	In progress. High priority as it enables several other tasks to proceed.
			1-2: Seek alternative bore locations with less manganese (Taradale side).	\$ 100,000	Cost estimate is a placeholder only. This task needs to be scoped in more detail.	In progress. High priority as it enables several other tasks to proceed.
			1-3: Seek alternative bore locations with less manganese (Enfield side).	\$ 100,000	Cost estimate is a placeholder only. This task needs to be scoped in more detail.	In progress. High priority as it enables several other tasks to proceed.
			1-4: Potentially create new bore sites (Taradale side).	\$ 200,000	Cost estimate is a placeholder only. It requires previous tasks to be completed	Requires 1-1 and 1-2
			1-5: Potentially create new bore sites (Enfield side).	\$ 200,000	Cost estimate is a placeholder only. It requires previous tasks to be completed	Requires 1-1 and 1-3
			1-6: Potentially install manganese treatment (Taradale side)	\$1,000,000	Cost estimate is a placeholder only. It requires previous tasks to be completed	Requires 1-1, 1-2 and potentially 1-4.
			1-7: Potentially install manganese treatment (Enfield side)	\$1,000,000	Cost estimate is a placeholder only. It requires previous tasks to be completed	Requires 1-1, 1-3 and potentially 1-5.
Package 2	Delineate Taradale / Enfield	S, C	2-1: Close all valves between Taradale and Enfield to delineate both systems.	\$ 10,000		Can be started any time

			<p>2-2: Close all valves between Greenmeadows and Tamatea. Durham PRV to feed the Tamatea area.</p> <p>Additionally, close the 350mmØ connection from the Durham PRV going north along Ororu Drive.</p> <p>Additionally, change the Tannery Booster suction from downstream of the Pacific PRV to upstream of the PRV.</p>	\$ 50,000	High velocities and head loss downstream of Durham PRV may lead to substandard pressure and/or discolouration. This needs to be monitored and managed.	Requires 2-1.
Package 3	Dedicate Taradale	S, C	3-1: Construct a new 450mmØ dedicated rising main from the Taradale bores to the Taradale Reservoir (4,100m in length).	\$6,470,000	Cost estimate based on current T6 location.	Requires 1-1 and 1-2, potentially 1-4
			3-2: Construct a new 600mmØ outlet pipe from Taradale Reservoir (490m in length) and upgrade existing 150mmØ to 450/375mmØ along Church Road down to Puketapu Road (1,410m in length).	\$2,900,000	May be reduced/optimised if existing rising main is used as a distribution main, and proposed rising main is upsized.	Requires 3-1 to confirm sizing
			<p>3-3: Upgrade existing 150mm 1973 AC pipe along Waterhouse Street to 200mm, from Puketapu Road to O'Dowd Road (640m in length).</p> <p>Additionally, upgrade existing 200mm 1972 AC pipe along Puketapu Road to 300mm, from Church Road to Gloucester Street (400m in length).</p> <p>Additionally, upgrade existing 100mm cross-connection at the intersection of Howard Road and Frickleton Street to 150mm (50m in length).</p> <p>Additionally, upgrade existing 100mm cross-connection at the intersection of Gloucester Road and Roskilda Crescent to 150mm (50m in length).</p> <p>Additionally, upgrade existing 100mm 1972 AC pipe along Elliott Street and Murphy Road to 150mm, from Howard Road to Frickleton Street (520m in length).</p>	\$1,080,000	May not be required if Lee Road PRV is retained for emergencies	Can be started any time
			3-4: Set all PRVs on the Taradale side to not operate under normal peak demand, except for Durham PRV.	\$ 5,000		Requires 3-2
			3-5: Upgrade existing 200mm/150mmØ pipe along Durham Avenue to 300mm/250mmØ, from Westminster Avenue to Southwark Avenue (110m in length).	\$ 120,000		Requires 2-1 and 2-2.

Package 4	Dedicate Enfield	S, C, P, R	4-1: Identify site for new Enfield Reservoir	\$ 50,000		In progress. High priority as it enables several other tasks to proceed.
			4-2: Procure new Enfield Reservoir	\$8,000,000	Significant unknown about construction costs	Requires 4-1
			4-3: Complete the Awatoto rising main. Construct 450mmØ dedicated rising main from Latham Street to Enfield Reservoir (1,580m in length)	\$2,490,000	Cost estimate based on current Enfield Reservoir location	Requires 1-3 and 4-1, potentially 1-5
			4-4: Construct a new 450mmØ dedicated rising from Prebensen Drive/Hyderabad Road to the Awatoto dedicated rising main on Carlyle Street (650m in length).	\$1,030,000	Cost estimate based on current Enfield Reservoir location	Requires 4-1
			4-5: Investigate and eliminate network restrictions found during calibration.	\$ 50,000		Can be started any time
			4-6: Set all PRVs on the Enfield side and McLean PS to not operate under normal peak demand.	\$ 5,000	Assumes no upgrade to Chaucer Booster PS	Requires 4-1 to 4-5
Package 5	Manage demand	R	5-1: Undertake active leakage detection and repair.	\$3,000,000	Based on \$100,000 per year over 30 years	Can be started any time
			5-2: Construct 300mmØ cross-connection between the existing 150mmØ and 500mmØ mains on Latham Street (35m in length). Additionally, upgrade existing 100mm 1975 AC pipe along Blenheim Street, to 150mm (170m in length). Additionally, upgrade existing 100mm 1950 CI pipe laid along the Ford Street accessway, to 150mm between Taradale Road and No60 / Superfly amusement Park (330m in length).	\$ 300,000	May not be required, depends on 4-1	Can be started any time
			5-3: Form DMAs (closed valves and flow meters).	\$3,300,000		Requires 3-4
Package 6	Connect Awatoto to Taradale	R	6-1: Construct 350mmØ Awatoto to Taradale rising main along Kennedy Road so the Awatoto bores can supply Taradale Reservoir (1,620m in length).	\$2,140,000		Requires 3-1
Package 7	Rationalise Thompson Reservoir pipework	R	7-1: Investigate and upgrade the existing pipework at the Thompson reservoirs.	\$ 300,000	Cost estimate is a place holder only. This tasks needs to be scoped in more detail.	Can be started any time
Package 8	Ensure FW2 Fire Flow Availability	P	8-1: Upgrade existing 150mmØ pipe along Franklin Road/Le-Quesne Road to 200mmØ, between Main North Road and No. 48 Le-Quesne Road (1700m in length).	\$ 920,000		Can be started any time

			8-2: Upgrade existing 100mmØ pipe along Onehunga Road to 150mmØ, between No. 190 and No. 262 Onehunga Road (790m in length).	\$ 320,000		Can be started any time
			8-3: Upgrade existing 150mmØ pipe along Hill Road to 200mmØ, between Terrace Road and Petane Road (130m in length). Additionally, construct a new 150mmØ cross-connection between the existing 150mmØ pipe at the proposed 200mmØ pipe at the intersection of Main North Road and Hill Road (near node Asset ID XXXX000002, 50m in length). Additionally, upgrade existing 100mmØ pipe along Hill road to 150mmØ, between Franklin Road and Terrace Road (350m in length) and between Petane Road and No. 80 Hill Road, excluding the existing section of 150mmØ pipe in between (430m in length).	\$ 450,000		Can be started any time
			8-4: Upgrade existing 100mmØ crossing the property at No. 54 The Esplanade to 150mmØ (90m in length). Additionally, upgrade existing 50mmØ/75mmØ pipe along The Esplanade to 150mmØ, between No. 54 and 99 The Esplanade (680m in length)	\$ 310,000		Can be started any time
			8-5: Upgrade existing 150mmØ along Kipling Avenue to 200mmØ, between Napier Terrace and Hooker Avenue (170m in length). Additionally, upgrade existing 75mmØ along Faraday Street to 150mmØ, between Hooker Avenue and Smale Terrace (410m in length). Move the boundary valve to south of the hydrant at the intersection of Smale Terrace and Faraday Avenue. Additionally, upgrade existing 100mmØ along May Avenue to 150mmØ, between Hooker Avenue and No. 23 May Avenue (180m in length).	\$ 330,000		Can be started any time
			8-6: Extend existing 100mmØ pipe at No. 4 Guys Hill Road and connect to the existing 75mmØ pipe along Chaucer Road South (50m in length). Additionally, upgrade existing 75mmØ/100mmØ main at the intersection of Chaucer Road South and Guys Hill Road to 150mmØ (10m in length), and create a 150mmØ cross-connection between existing 350mmØ rising main and proposed upgraded pipe (10m in length).	\$ 20,000		Can be started any time

			8-7: Create a new 100mmØ cross connection between the existing 75mmØ and 100mmØ pipes at the intersection of George Street and Bracken Street.	\$ 1,000	This deficiency may be addressed by the development of The Loop greenfield.	Can be started any time
			8-8: Upgrade existing 100/50mmØ pipe along Main Street to 150mmØ, between Spencer Road and No. 25 Main Street (260m in length).	\$ 100,000		Can be started any time
			8-9 Upgrade existing 75mmØ pipe along Milton Road to 150mmØ, between Cameron Road and No. 6 Milton Road (230m in length).	\$ 90,000		Can be started any time
			8-10: Upgrade existing 100mmØ pipe along Tironui Drive/Puketapu Road to 150mmØ, between No. 62 Tironui Drive and No. 255 Puketapu Road, excluding the existing section of 150mmØ pipe in between (1700m in length). Additionally, upgrade existing 150mmØ pipe outlet from Western Hill Reservoir to No. 82 Tironui Drive to 200mmØ (460m in length).	\$ 900,000		Can be started any time
			8-11: Construct a new 100mmØ pipe between existing 100mmØ pipe at Masfield Avenue and existing 100mmØ pipe at Mason Avenue (130m in length).	\$ 30,000		Can be started any time
			8-12: Upgrade existing 100mmØ pipe along Birdwood Street/Harpham Street to 150mmØ, between Nicholas Street and No. 12 Birdwood Street (220m in length).	\$ 90,000		Can be started any time
			8-13: Upgrade existing 100mmØ pipe along Ewan Place/Kent Terrace to 150mmØ, between Nicholas Street and No. 9 Ewan Place (130m in length).	\$ 50,000		Can be started any time
			8-14: Upgrade existing 100mmØ pipe to 150mmØ from Halliwell Reservoir to Cumberland Rise Extension (210m in length).	\$ 80,000		Can be started any time
			8-15: Upgrade existing 100mmØ pipe to 150mmØ from Otatara Reservoir to Poaka Place (340m in length).	\$ 140,000		Can be started any time
			8-16: Upgrade existing 75mmØ pipe along Wellesley Road to 100mmØ, between Todd Street and No. 26 Wellesley Road (270m in length).	\$ 70,000		Can be started any time
Package 9	Enable growth	P	9-1: Extend distribution as part of greenfield developments	None	Cost estimate not included, paid by developer.	Build as part of greenfield developments

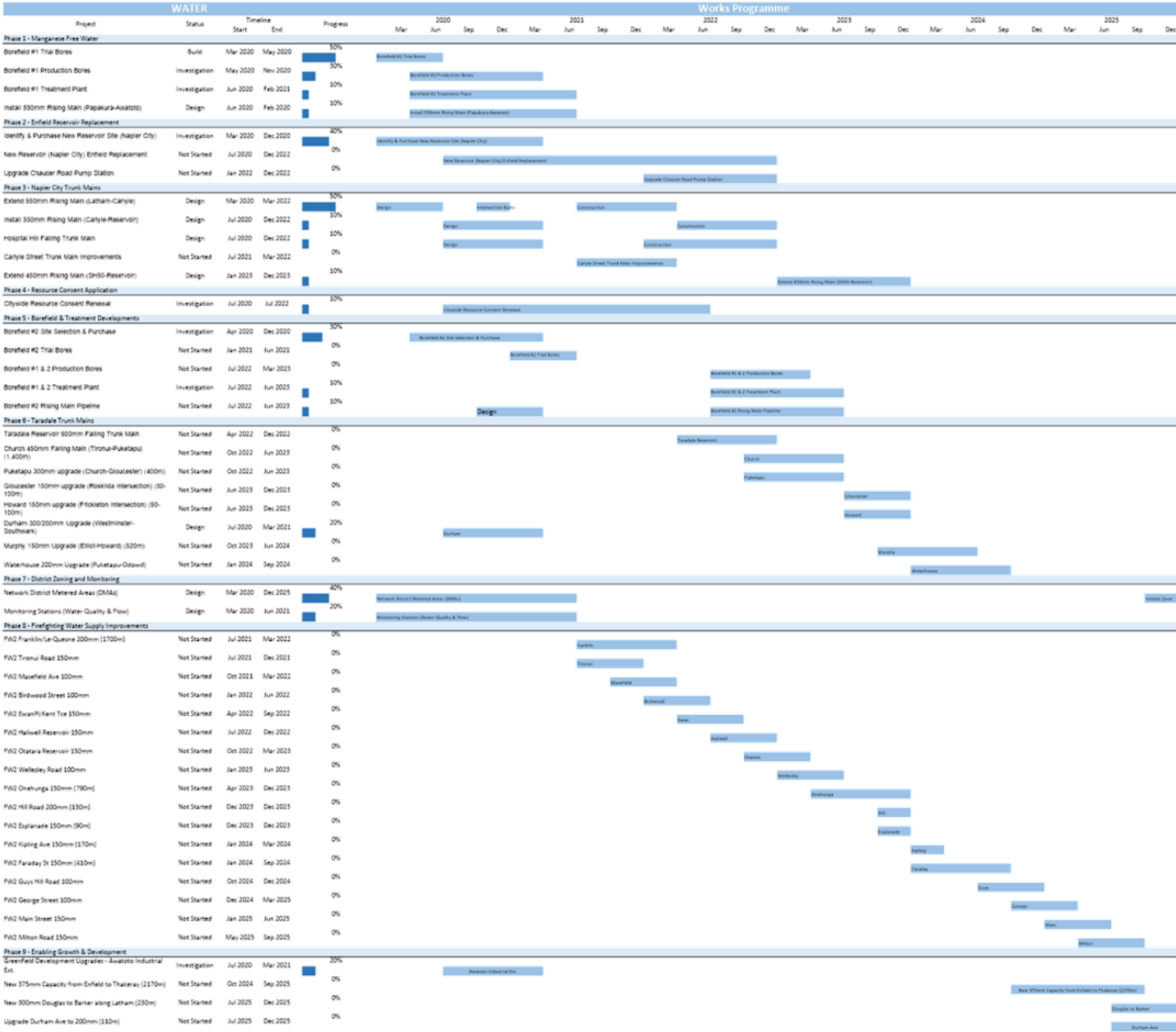
		P	9-2: Construct a new 375mmØ outlet main from Enfield Reservoir up to Thakeray Street (380m in length). Additionally, upgrade the existing 100mmØ main along SH51 to 300/375mmØ outlet pipe from Thakeray Street up to Te Awa Avenue (2,170m in length).	\$3,040,000	May not be required, depends on 4-1 and 5-1	The exact time when this is required is not clear. Depends on growth and other activities.
		P	9-3: Construct a new 300mmØ main along Latham Street from Douglas McLean Avenue to Barker Road (230m in length).	\$ 250,000	May not be required, depends on 4-1 and 5-2	The exact time when this is required is not clear. Depends on growth and other activities.
			9-4: Upgrade existing 150mmØ 1970 AC pipe along Durham Avenue to 200mmØ, from Southwark Avenue to York Avenue (110m in length).	\$ 210,000		Requires 3-3

Wellington

Level 13, 80 The Terrace
Wellington 6011
PO Box 13-052, Armagh
Christchurch 8141
Tel +64 4 381 6700
Fax +64 4 473 1982

Please visit www.stantec.com to learn more about how
Stantec design with community in mind.





2. REVIEW OF NAPIER CITY MOBILE SIGN BYLAW

<i>Type of Report:</i>	Operational and Procedural
<i>Legal Reference:</i>	Local Government Act 2002
<i>Document ID:</i>	918631
<i>Reporting Officer/s & Unit:</i>	Yvonne Legarth, Policy Planner Rachael Horton, Manager Regulatory Solutions

2.1 Purpose of Report

To seek Council approval of the unamended Mobile Sign Bylaw and to commence consultation pursuant to the Local Government Act sections 82 and 82A, and legal advice.

Officer's Recommendation

That Council:

- a. Confirm, in accordance with Section 155 of the Local Government Act 2002, that a Mobile Sign Bylaw is the most appropriate way of addressing the problems that mobile signs can have on:
 - i. public and traffic safety
 - ii. maintenance of aesthetic standards
 - iii. control of offensive material on mobile signs
- b. Confirm that the Mobile Sign Bylaw is currently the most appropriate form of bylaw.
- c. Agree that the Mobile Sign Bylaw is not inconsistent with, or have any implications under the New Zealand Bill of Rights Act 1990.
- d. Adopt the reviewed and unamended Napier City Council Mobile Sign Bylaw for consultation.
- e. Confirm that a further review of the Mobile Sign Bylaw 2013 will be undertaken as part of the process to include the Mobile Sign Bylaw in the yet to be prepared consolidated Napier City Council Urban Environment Bylaw.
- f. Authorise Officers to consult in accordance with the principles in LGA ss 82 and 82A in a manner that is consistent with legal advice.

Mayor's Recommendation

That the Council resolve that the officer's recommendation be adopted.

2.2 Summary

The purpose of the Mobile Sign Bylaw is to ensure that signs or visual messages and notices displayed for information or advertising purposes are not a danger to public safety, and do not compromise aesthetic or community standards. The mobile sign Bylaw only applies to signage that is on or attached to a vehicle, trailer or other means of transportation. The Bylaw includes general and specific requirements, and has provision for Council to authorise exemptions.

The Bylaw is intended to be consolidated with other similar effect bylaws into an Urban Environment Bylaw. This work was put on hold due to the district plan review taking precedent. Work on Council's Urban Environment Bylaw will take place after work on the district plan review is completed.

In the interim, Council must make a determination in respect of a review of the Mobile Sign Bylaw with some urgency if the powers under the Bylaw are to continue.

The Mobile Sign Bylaw 2013 ('Bylaw') is to be reviewed within 5 years, or it is revoked two years after the date of review under section 160A of the Local Government Act.

A review of the Bylaw has been undertaken and it is recommended that the existing Bylaw be kept without amendments.

A decision of Council is needed to adopt the review to retain the existing Bylaw and to consult with interested parties in accordance with the requirements of the Local Government Act.

It is also recommended that an additional review and consultation is undertaken as part of the preparation of the Council's Urban Environment Bylaw.

Following consultation, a final decision will be brought to Council to adopt the Bylaw and any proposed amendments arising from public feedback.

2.3 Issues

The Local Government Act requires a number of specific decisions to be made by Council in respect of a review of the Mobile Signs Bylaw. The review process must be complete by 15 May 2020 in order to prevent the existing Bylaw from being revoked. Each of the decision points Council is required to make are included as separate recommendations in this report, and are:

- iv. Whether the bylaw is still the most appropriate way of addressing the perceived problem; and if the answer is yes, whether the Bylaw:
- v. Is the most appropriate form of bylaw; and
- vi. Gives rise to any implications under the New Zealand Bill of Rights Act 1990

A search of the Council's records was undertaken and there are no complaints or compliance issues or concerns raised as a consequence of the Bylaw, and the Bylaw appears to be effective in managing the issues of public safety and visual amenity.

The Mobile Sign Bylaw falls into low significance under the Council's Engagement Policy and unlikely to affect individual rights under the New Zealand Bill of Rights Act 1990.

2.4 Significance and Engagement

If the Council considers the Mobile Signs Bylaw should continue without amendment, it must consult with the public in accordance with the principles of sections 82 and 82A of the Local Government Act.

This will be done following Council's decision to adopt the reviewed and unamended Napier City Council Mobile Sign Bylaw for consultation, if that is the decision made.

Note that in this instance the council is not required to utilise the special consultative procedure under s83 of the Local Government Act. The Bylaw does not concern a matter that is identified or addressed in the Council's Engagement Policy, and the subject matter would likely fall in the "low" significance category when considered against the significance criteria in Schedule 3 of that Policy.

Further we are not aware of any issues with the existing Bylaw that would mean the continuation in its current form would have, or likely have, any significant impact on the public.

2.5 Implications

Financial

N/A

Social & Policy

N/A

Risk

If the Bylaw is not continued the Council would be unable to control mobile signs, and the associated risks for public safety and amenity.

2.6 Options

The options available to Council are as follows:

- a. To adopt the review of the Mobile Signs Bylaw without making changes; followed by consultation with the public in accordance with the principles of sections 82 and 82A of the Local Government Act; or
- b. To allow the Mobile Sign Bylaw to be revoked in accordance with section 160A of the Local Government Act.

2.7 Development of Preferred Option

Continue the Bylaw without modification

It is recommended that Council adopts the review of the Mobile Signs Bylaw that continues the Bylaw without changes, and undertakes consultation on that basis. Further, consultation on this Bylaw should also be repeated as part of the development of Council's intention to consolidate its Bylaws into an Urban Environment Bylaw.

Review of the Bylaw

The Local Government Act includes requirements for decision-making. A local authority must, seek to identify all reasonably practicable options for the achievement of the objective of a decision; and assess the options in terms of their advantages and disadvantages. The table below summarises the advantages and disadvantages.

	Options	Advantages	Disadvantages
1	Adopt the review of the Mobile Signs Bylaw without change	Can proceed with limited consultation before the Bylaw expires	Comprehensive consultation may identify issues that

		Retains the Bylaw so mobile signs can be controlled	could be addressed by amending the Bylaw
2	Take no action and allow the Mobile Signs Bylaw to be revoked	No advantages have been identified	Mobile signs cannot be controlled and there is potential for risks to public safety and concerns about of effects on visual amenity

2.8 Attachments

A 2013 Mobile Sign Bylaw [↓](#)



NAPIER CITY

Mobile Sign Bylaw 2013

Napier City Council Mobile Sign Bylaw 2013

This page is intentionally blank

Mobile Sign Draft Bylaw 2013

Contents

1.0	Scope	4
2.0	Definitions and Interpretations	4
3.0	General Requirements for Mobile Signs.....	4
4.0	Mobile Signs Left On or Over Roads, Footpaths and Public Places.....	5
5.0	Mobile Signs Affecting Traffic Safety	5
6.0	General Requirements for Construction and Maintenance of Mobile Signs.....	5
7.0	Mobile Signs On Vehicles.....	5
8.0	Exemptions	5
9.0	Repair or Removal of Mobile Signs	5

Napier City Council Mobile Sign Bylaw 2013

Napier City Council Mobile Sign Bylaw**1.0 Scope**

The purpose of this bylaw is to ensure that vehicle and trailer advertising signs are erected, maintained, positioned and displayed in such a manner that they do not present a hazard or a danger to public safety. The bylaw also seeks to maintain aesthetic standards.

1.2 Authority

This bylaw is made pursuant to Part 8 of the Local Government Act 2002.

2.0 Definitions and Interpretations**2.1 Definition of Mobile Sign**

For the purposes of this bylaw MOBILE SIGN means a visual message or notice conveyed to the public and visible from a public place painted on, affixed to, resting on, or in any way attached to or incorporated with, a vehicle, trailer or other means of transportation:

- (a) that is displayed to advertise or identify a product, business, or service, or to inform or warn the public; and
- (b) includes any frame, supporting device and associated ancillary equipment.

2.2 Interpretation

For the purposes of this Part of this bylaw the word "shall" refers to practices that are mandatory for compliance with this Bylaw, while the word "should" refers to practices which are advised or recommended.

2.3 Exclusions

This bylaw does not apply to:

- (a) traffic, direction, information and naming signs erected by or with the approval of the Council or any other relevant road controlling authority;
- (b) signs indicating hazardous substances used at a hazardous facility or being transported;
- (c) signs erected pursuant to any statute or regulation;
- (d) signs painted on or affixed to a vehicle where the vehicle is not being used primarily for the purpose of exhibiting the sign; or
- (e) signs authorized by a resource consent or specified as a permitted activity in the operative District Plan.

3.0 General Requirements for Mobile Signs**3.1 General Restrictions**

No person shall:

- (a) Display or erect any mobile sign which does not comply with this Part of this bylaw, except where:
 - (i) An exemption to the requirements of this Part of this bylaw has been granted by the Council or an authorized officer, or
 - (ii) The mobile sign is exempted by 2.3 of this Part of this bylaw.
- (b) Place or allow to remain in place any mobile sign which explicitly or implicitly:
 - (i) Is discriminatory or advocates discrimination based on one or more of the prohibited grounds of discrimination set out in the Human Rights Act 1993;
 - (ii) Is objectionable within the meaning of the Films, Videos and Publications Classification Act 1993;
 - (iii) Is offensive, threatening or insulting; or
 - (iv) Incites or counsels any persons to commit any offence.

Napier City Council Mobile Sign Bylaw 2013

3.2 Fees

The Council may prescribe fees for the assessment of any application for a dispensation for any mobile sign that is otherwise required to, but does not comply with this Part of this bylaw.

4.0 Mobile Signs Left On or Over Roads, Footpaths and Public Places

Except as otherwise provided by this bylaw no person shall place or leave any mobile sign in such a position as to be on, or project over any road, private street, or public place unless the prior permission of the Council or an authorized officer has been obtained.

5.0 Mobile Signs Affecting Traffic Safety

No mobile sign shall be placed or be allowed to remain where in the opinion of the Council or an authorized officer that sign would:

- (a) Obstruct or be likely to obstruct the view of any corner, bend, intersection, vehicle crossing, traffic sign or traffic signal;
- (b) Distract unduly or be likely to distract unduly the attention of road users;
- (c) Resemble or likely to be confused with any traffic sign or signal;
- (d) Give rise to excessive levels of glare, use flashing or revolving lights or use reflective materials that may interfere with a road user's vision;
- (e) Invite drivers to turn so close to a turning point that there is no time to signal and turn safely;
- (f) Constitute or be likely to constitute in any way a danger to road users.

6.0 General Requirements for Construction and Maintenance of Mobile Signs

Mobile signs (including those covered by a dispensation under 8.2 or excluded 2.3(1)(d)) and their supporting structures shall be constructed, fixed, placed and maintained in a manner so they do not pose a danger to property or the public. This shall be the responsibility of the mobile sign owner and the owner of the land, building, or thing on which the mobile sign is placed.

7.0 Mobile Signs On Vehicles

No person shall display any mobile sign on a vehicle, whether stationary or moving, on a road, where the vehicle is being used primarily for the purpose of exhibiting the mobile sign.

8.0 Exemptions**8.1 Non-Compliant Mobile Signs**

A mobile sign that does not comply with the requirements of this bylaw shall be removed or otherwise made to comply within 1 month of adoption of this Part of this bylaw.

8.2 Dispensations

Where the Council, or the Regulatory Services Manager, is satisfied that compliance with any requirements of this Part of this bylaw would be unreasonable or impracticable, having regards to the circumstances of the case, a dispensation may be granted in whole or in part, with such modifications or conditions as are appropriate in the circumstances. In circumstances where there is contention over a decision with regard to a mobile sign the matter may be referred to the Hearings Committee.

9.0 Repair or Removal of Mobile Signs**9.1 Notice to Repair or Remove**

The Council may, by notice in writing, require the owner, of any vehicle, trailer or other means of transportation on which any unsightly, non-complying, unsafe or unauthorized mobile sign is located, to repair or remove such mobile sign within a period stated in such notice.

Napier City Council Mobile Sign Bylaw 2013

9.2 Compliance With Notice

Where the owner or user of a mobile sign, or the owner of the vehicle, trailer or other means of transportation on which a mobile sign is located, receives a notice given under 9.1, that person shall comply with the requirements of the notice within the time specified in the notice. Where any person has been requested to pull down, alter or remove any non-complying, unsafe, or unauthorized mobile sign, that mobile sign shall not be altered or replaced unless the altered or replacement mobile sign complies with this bylaw.

9.3 Removal By Council

Where any person fails to comply with any requirement to pull down, alter or remove any mobile sign, the Council may have the mobile sign pulled down, altered or removed. The cost incurred in pulling down, altering or removing the mobile sign shall be recoverable as a debt against the owner of the mobile sign.

9.4 Return of Signage


Any mobile sign removed by the Council shall be released to the owner upon payment of the costs incurred in its removal and storage.

9.5 Unclaimed Signage


Any mobile sign that remains unclaimed for a period exceeding one month or is not released for a period exceeding one month may be sold or otherwise disposed of by the Council. Where such a mobile sign is sold, the proceeds of the sale shall be applied first towards the payment of the costs referred to above. Any balance shall be paid to the owner on application.

This bylaw was adopted by the Napier City Council at a meeting of the Council on 15 May 2013

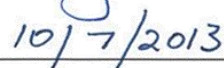
Sealed with the Common Seal
Of the Napier City Council
In the presence of:



Mayor



Chief Executive



Date

