

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 that 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 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:

- 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