

Report

Subject: **Marton Water Supply Strategy Update**

To: Council Meeting

From: Arno Benadie, Principal Advisor - Infrastructure

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1. Purpose of the report

The purpose of this report is to update Council on the progress with the Marton Water Supply Strategy as approved by the Asset and Infrastructure Committee on 14 February 2019.

2. Background

The Assets/Infrastructure Committee endorsed the proposed Marton Water Supply Strategy and indicative development process and timelines in February 2019. The purpose of the Water Supply Strategy is to consistently deliver good quality, affordable, safe drinking water at volumes for today and the future.

The strategy considers all possible solutions covering the following aspects:

- Raw water source
- Treatment
- Storage
- Delivery network

3. Progress to date

A Problem/Opportunity statement was created in March 2019 and followed by a review of all existing information/reports and recent works covering the Marton water supply scheme. Over the previous 80 years as many as 32 reports covering different aspects of the Marton Water Supply was commissioned and produced. All these reports were reviewed to identify any obvious omissions in the information collected to date.

The review of all existing information/reports identified further information required to inform the development of the Strategy. The following additional work was identified:

Raw Water Source:

- A large number of previous reports recommended making use of groundwater as an alternative raw water source. The Calico Line and Tutaenui production bores collectively supplies 5700m³/day (Calico Line – 2200 m³/day and Tutaenui Rd bore - 3500 m³/day) which is substantially more than the 3300 m³/day from the existing WTP and Tutaenui impoundment dams.
- No additional capital investment will be required to create production bores for the Marton water supply. There will be some capital cost in installing the required infrastructure to deliver the Calico Line water to the current reservoir site for treatment and storage. A more detailed look at the costs involved should be undertaken.
- The current production bores have the capability of supplying sufficient water for the current demand of 5 MLD, and it will be feasible to add additional bores in the future if growth drives the demand up.

Treatment:

- In all the previous reports reviewed, this is the only portion of investigation work that has not been completed to date. RDC should engage the services of water treatment process engineers to determine the costs and complexity of treating the existing groundwater sources to a high quality potable water.

Treated Water Storage:

- No further work required. The existing new reservoir will have sufficient capacity to allow for existing use as well as allowing for future growth.

Distribution Network

- The Marton water distribution network will be included in the new RDC Asset Management Strategy work, in which asset performance and asset condition assessments will be undertaken for all of the distribution network over the next three years. This will identify all current problems with network performance, and will identify opportunities for improvements and determine all future replacements and upgrades.

An update report was presented to the Asset & Infrastructure Committee of 11 April 2019, and this report proposed the following recommendations:

1. To engage the services of consultants to advise RDC on the costs to deliver the Calico Line water to the reservoir site for treatment and storage.
2. To engage the services of water treatment process engineers to advise RDC on the costs and complexity of treating the existing groundwater sources.

The work identified above was commissioned and completed by the end of February 2020. The water quality parameters that needed treatment to achieve potable water requirements in accordance with the Drinking Water Standards NZ are hardness, iron, manganese, turbidity and microbiological risk. To improve potable water supply to Marton, four treatment options have been investigated for their feasibility. These are focussed on hardness removal but also address the range of other water quality issues. The options that have been assessed are:

Option 1 – Iron and Manganese Oxidation, Lime Softening and Filtration (\$8.6M Capex).

Option 2 – Iron and Manganese Oxidation, Filtration and Ion Exchange (\$7.3M Capex).

Option 3 – Iron and Manganese Oxidation, Filtration and Nano filtration (\$8.4M Capex)

Option 4 – Iron and Manganese Oxidation, Pellet Softening and Filtration (\$6.7M Capex).

Of these options, Option 2 and Option 4 was recommended for further development. The main consideration with Option 2 – Ion Exchange is that ion exchange resin requires regular regeneration with salt brine. A successful disposal route for brine disposal would need to be found to ensure long-term technical and operational cost feasibility. Alternatively a ‘cleaner’ ion-exchange technology may be able to be sourced from a specialist supplier.

The main consideration with Option 4 - Pellet Softening is that pellet softening removes only calcium carbonate hardness. Further technical assessment with the assistance of the suppliers of this process was required to determine whether this hardness technology alone is sufficient for Marton.

It is noted that for all options there will be a cost for combining the water from the Tutaenui bore and the Calico Line bore into a single supply. An investigation was needed to assess the possible supply configurations based on these two existing bores and/or whether additional alternative bores should be drilled.

Completion of Phase 1 investigations identified further work to be completed to allow for more informed decisions. The following additional investigations were identified and commissioned:

1. Operating Costs to be developed of all four options in the Marton Water Supply report to better inform the preferred option.
2. Investigate the cost of utilising Calico Line Bore and compare that to drilling additional bores in the vicinity of the Marton treatment plant site.
3. Investigate the applicability of pellet softening technology for total hardness removal in the Marton water supply

Phase 2 investigations produced the following results:

1. Operating costs – Cardno Consulting Engineers assessed the operating cost of the four water treatment options proposed in the previous study. It was found that Ion Exchange had the lowest OPEX (\$322k/annum), followed by Pellet Softening and Lime Softening (\$470k/annum). In terms of the whole of life costs, the most cost effective is Ion Exchange at \$12.5M, followed by Pellet Softening at \$14.2M
2. Using Calico Line bore versus a new bore - Cardno Consulting Engineers estimated the costs of reticulating the Calico Line Bore to the existing Marton WTP versus drilling a new bore. It was found that it would cost:
 - \$5.5M to reticulate the Calico Line Bore to the existing Marton WTP.
 - \$1.6M to drill a new bore in the vicinity of the existing Marton WTP.
 - \$2.5M to rehabilitate the Totara Rd bore and/or drill a new bore in the vicinity of the Calico Line Bore where the new WTP may be located. The disposal of wastewaters generated by the WTP were not considered. However, it is noted that if the new WTP is located at the site of the existing WTP the waste waters

would need to be dealt with onsite. On site disposal of treatment waste products also applies to the current treatment process, where pumping the waste products from the treatment plant to storage dams adjacent to B Dam will not be a consented activity going forwards.

3. Investigate the applicability of pellet softening technology - Cardno Consulting Engineers investigated the application of pellet softening for water treatment at Marton. It was found that the pellet softening technology can reduce the calcium hardness by 65% if lime is used and by 75% if caustic soda is used. This results in a total hardness of 150 mg/L in the final softened water at Marton, which is below the Drinking Water Standards NZ guideline value of 200 mg/L.

To confirm the applicability of the full-scale plant, two suppliers indicated that they could supply a pilot plant for \$75,000 NZD which includes transportation, running and training of the pilot plant. However, one of the suppliers is confident that a full scale plant can be designed without the trial.

4. Conclusion

All work identified in the strategy development process has now been completed. The purpose of the Marton Water Supply Strategy is to consistently deliver good quality, affordable, safe drinking water at volumes for today and the future. This process included a review of a large number of existing reports and information about the existing water supply, and was consistently clear about considering alternative water supplies as the most appropriate solution for resolving the colour, odour and taste problems with the current Marton water supply.

Treatment process specialists were engaged to consider all possible treatment options available for the treatment of the Marton ground water, to determine if it would be feasible to make use of the available groundwater as an alternative raw water source. Four possible treatment processes were identified, as well as additional areas of investigation such as the operational costs of the four treatment options and the comparative costs of pumping the Calico Line bore water to the existing treatment plant site or establishing a new production bore in the vicinity of the existing plant.

The work completed to date shows that it would be possible to consider making use of ground water as an alternative raw water source, and that this will produce a high quality drinking water to Marton. There is also a strong business case for supporting the change of raw water source from the impoundment dams to groundwater. The operating costs of the existing plant is similar to the operating costs of the proposed new treatment processes, but the current treatment plant assets are old and coming to the end of its useful life. Over recent years the maintenance costs of the plant has increased substantially to keep the plant running and producing water that will comply with the DWSNZ.

The recent defects and damage identified at the C Dam spillway triggered a comprehensive study of the repairs needed at the dams, and the risks posed by the failure of these structures. The dam water level was managed to a much lower level during the previous winter to avoid further damage to the spillway during rain events, but this created a challenge in water supply

during the last summer. The water level in C Dam was augmented by pumping water from the Tutaenui bore into the dam. This continued for at least 3 months and added considerable costs to the operating costs of current treatment process. The dam engineers also found that the spillway of B Dam is undersized and will have to be enlarged to comply with New Zealand Society on Large Dams (NZSOLD) Dam Safety Guidelines. The costs of this enlargement is unknown but expected to be material. The current temporary repairs made to the spillways at the impoundment dams could be developed into a permanent solution if the water levels in both dams can be managed to a much lower level. If this is not possible on a permanent basis, additional costs will be required to design and construct a permanent solution for both spillways.

It is clear that substantial capital investment will be required in the near future to continue using the current raw water source and treatment facilities to supply drinking water to Marton that will have the same colour, odour and taste problems experienced currently.

5. Recommendations

The investigation work completed to date shows alternative treatment options that will be suitable for treatment of groundwater. The groundwater source and applicable treatment process will consistently deliver good quality, affordable, safe drinking water at volumes for today and the future. The work to date also shows that there would be value in pursuing these options in more detail to determine more accurate costs and a more detailed business case comparisons to allow Council to make an informed decisions on the future of the Marton Water Supply Strategy. In light of the information reported above, the following recommendations are proposed:

1. That the report 'Marton Water Supply Strategy Update' to Council Meeting of 28 May 2020 be received.
2. That a more detailed business case be developed to consider the financial implications of changing the raw water source and treatment process for the production of drinking water for Marton.
3. That work starts on a developed design of the new treatment process for Marton to allow for more accurate estimation of Capital and operating costs.
4. That a more detailed investigation of new potential bore sites in the vicinity of the existing Marton treatment plant be commissioned.

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