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23 November 2022

s 9(2)(a)

By email: s 9(2)(a)
Ref: H2022013081

Tēnā koe s 9(2)(a)

Response to your request for official information

Thank you for your request under the Official Information Act 1982 (the Act) to Manatū Hauora (Ministry of Health) on 20 September 2022 for information regarding water fluoridation. Please find a response to each part of your request below.

Copies of correspondence from councils requesting access to the \$11.3 million fund for capital projects to fund the fluoridation effort – specifically I am hoping to break down costings from different locations around New Zealand and see how each council made its approach. It seems MoH will be the central point where these applications will go so I am requesting it from yourself

In July 2022, Manatū Hauora issued directions to 14 local authorities to fluoridate some or all of their drinking water supplies. These local authorities have been invited to apply for funding for capital costs of fluoridating, with applications due by November 2022. Manatū Hauora has not yet received any funding applications. Please note that once funding applications are received, they will likely be treated as confidential by Manatū Hauora during the review process.

Any MoH reports which speak to the benefits of fluoridation from a social and/or economic perspective

Manatū Hauora supports community water fluoridation (CWF) as being safe, effective, and affordable. The Office of the Prime Minister's Chief Science Advisor has recently released an evidence update finding that there are no significant health risks with fluoridation at the level used in New Zealand. In addition, in 2015 the Ministry commissioned Sapere Research Group to provide an evaluation of the benefits and costs of community water fluoridation in the New Zealand setting. You can find these reports and further information on the safety and efficacy of CWF on Manatū Hauora website at: www.health.govt.nz/our-work/preventative-health-wellness/fluoride-and-oral-health/water-fluoridation/effective-and-safe.

Latest statistics for the Oral Health Data and Stats – I note the 2020/2021 are online – if this is the latest version please disregard this questions

The latest oral health statistics are from 2020 and are available at: www.health.govt.nz/nz-health-statistics/health-statistics-and-data-sets/oral-health-data-and-stats/age-5-and-year-8-oral-health-data-community-oral-health-service. The statistics for the 2021 calendar year are expected to be published shortly at: www.health.govt.nz/nz-health-statistics/health-statistics-and-data-sets/oral-health-data-and-stats.

All correspondence between Ministry of Health and Christchurch City Council in regards to their fluoridation plan and costings?

Manatū Hauora has identified nine documents within scope of this part of your request. All documents are itemised in Appendix 1 and 2 and are released to you in full.

I trust this information fulfils your request. Under section 28(3) of the Act, you have the right to ask the Ombudsman to review any decisions made under this request. The Ombudsman may be contacted by email at: info@ombudsman.parliament.nz or by calling 0800 802 602.

Please note that this response, with your personal details removed, may be published on the Manatū Hauora website at: www.health.govt.nz/about-ministry/information-releases/responses-official-information-act-requests.

Nāku noa, nā

A handwritten signature in blue ink, appearing to read 'Jane Chambers', is written over a light blue grid background.

Jane Chambers
Group Manager, Public Health Policy and Regulation
Public Health Agency, Ministry of Health | Te Pou Hauora Tūmatanui

Appendix 1: List of documents for release

#	Date	Document details	Decision on release
1	11 November 2021	Letter from the Director- General of Health to local authority Chief Executives (including the CE of Christchurch City Council)	Released in full.
2	15 December 2021	Letter from the Director-General of Health to the Mayor of Christchurch regarding fluoridation in drinking water.	
3		Letter from the Director-General of Health to local authority chief executives (including the chief executive of Christchurch City Council)	
4	10 March 2022 (provided to Manatū Hauora on 11 March 2022)	Letter from the General Manager of Infrastructure, Planning & Regulatory Services at Christchurch City Council to the Director-General of Health about community water fluoridation.	
5		Technical Memorandum: Fluoride Implementation – Preliminary Cost Estimate Update.	
6	10 March 2022	Community Water Fluoridation information – Christchurch City Council entry	Excerpt released under section 16(1)(e) of the Act, with some information being deemed out of scope of your request
7	17 June 2022	Letter from the Director-General of Health to the Chief Executive of Christchurch City Council regarding community water fluoridation.	Released in full
8	7 September 2022	Letter from the Chief Executive of Christchurch City Council to the Director General of Health.	

Appendix 2: List of documents for release

#	Date	Document details	Decision on release
1	10 March 2022 (provided to the Ministry of Health on 11 March)	Christchurch City Council Fluoride Implementation Estimate – Preliminary Estimate Update (spreadsheet version)	Released in full.

11 November 2021

Tēnā koe

This letter is to update you on the Health (Fluoridation of Drinking Water) Amendment Bill (the Bill) and what it means for you.

As you may be aware, on Tuesday 9 November 2021, the Bill passed its final reading and will come into force 28 days after Royal assent. The new legislation amends the Health Act 1956 to give the Director-General of Health the power to issue a direction to local authority water suppliers (including bulk water suppliers) to fluoridate a public drinking water supply. The changes do not apply to private drinking water supplies.

Key content of the new legislation

Under the new legislation, when deciding whether to issue a direction to fluoridate, the Director-General of Health will be required to consider for each individual drinking water supply:

- the scientific evidence on the effectiveness of adding fluoride to drinking water in reducing the prevalence and severity of dental decay
- whether the benefits of adding fluoride to the drinking water outweigh the financial costs, taking into account:
 - the state or likely state of the oral health of the local community or population group associated with the water supply
 - the number of people who are reasonably likely to receive drinking water from the local authority supply
 - the likely financial costs and savings of adding fluoride to the drinking water, including any additional costs of ongoing management and monitoring.

Before issuing any direction to fluoridate, the Director-General of Health must seek written comment from the local authorities on the estimated cost of introducing community water fluoridation, and the date by which the local authority could comply.

The new legislation exempts you from any requirement to consult with your communities on the decision to fluoridate.

Further information on these changes and the obligations for local authorities is in the attached fact sheet.

Implementation

The Ministry of Health (the Ministry) intends to facilitate swift transition to the new fluoridation decision-making process, and anticipates that the Director-General of Health could commence issuing directions from mid-2022 onwards. Implementation will be phased over time and there will be some funding available to support local authorities with the costs of fluoridation-related capital works.

The Ministry is working through implementation details and expects to be able to provide further information to you in the next month.

The Ministry acknowledges the significance of the Government's Three Waters Reform programme on local authorities, including the recent announcement of the creation of the new water service entities. The Ministry of Health is working closely with the Department of Internal Affairs to ensure that implementation planning aligns with the reform programme and factors in current service delivery pressures across the water services sector.

Resources for your communities

You may receive queries from your communities about community water fluoridation now that the new legislation has been passed. We encourage you to refer members of the public or interested groups to the resources below. They reflect the position of the Ministry of Health, World Health Organization, and Centres for Disease Control and Prevention that community water fluoridation is a safe, effective and affordable public health measure to improve the oral health of communities.

<https://www.fluoridefacts.govt.nz/>

<https://www.pmcsa.ac.nz/topics/fluoridation-an-update-on-evidence/>

We look forward to working with you to implement these new changes that will have an important health impact on the communities you serve. We will be in touch again shortly.

Ngā mihi



Deborah Woodley
**Deputy Director-General
Population Health and Prevention**



Riana Clarke
**National Clinical Director, Oral Health
Ministry of Health**

cc: Regional Council Chief Executives

Jon Lamonte, Chief Executive, Watercare

Colin Crampton, Chief Executive, Wellington Water

Bill Bayfield, Chief Executive, Taumata Arowai

District Health Board Chief Executives

Public Health Unit Managers

133 Molesworth Street
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15 December 2021

Lianne Dalziel
Mayor of Christchurch
Christchurch City Council
PO Box 73016
Christchurch 8154

Tēnā koe Lianne

I am writing to let you know that the Health (Fluoridation of Drinking Water) Amendment Act 2021 (the Act) came into force on 13 December 2021, and to encourage you and your colleagues to take positive action in light of this development. The new legislation amends the Health Act 1956 to give the Director-General of Health the power to issue a direction to local authority water suppliers (including bulk water suppliers) to fluoridate a public drinking water supply.

The Ministry of Health's records indicate that the water supply in your local authority is un-fluoridated and serves a large community. Community water fluoridation has been endorsed by the World Health Organization and other international health authorities as the most effective health measure for the prevention of dental decay. Good oral health is essential to achieving and maintaining the overall health and wellbeing of the community you serve.

Community water fluoridation is an effective, safe and affordable public health measure to improve the oral health of all New Zealanders. It is also estimated that introducing community water fluoridation to all public drinking water supplies across the country would result in net savings of more than \$600 million over 20 years for consumers.

I encourage you and your colleagues to act proactively and start the process now to enable fluoridation of your water supply. Please note the local authority can commence this at any time, and this does not require a direction from the Director-General of Health. I have attached a letter addressed to your Chief Executive that also encourages this and seeks information to assist with planning for fluoridation.

The Ministry of Health can provide general advice and support on the evidence for fluoridation, and the steps needed to commence this process. I hope you will support your communities with this important initiative.

Nāku noa, nā

A handwritten signature in black ink, appearing to read 'A Bloomfield', written in a cursive style.

Dr Ashley Bloomfield
Te Tumu Whakarae mō te Hauora
Director-General of Health

RELEASED UNDER THE OFFICIAL INFORMATION ACT 1982

133 Molesworth Street
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New Zealand
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15 December 2021

Tēnā koe

Further to the Ministry of Health's letter of 11 November 2021, I am writing to update you on implementation planning for the Health (Fluoridation of Drinking Water) Amendment Act 2021 (the Act) and seek information from you to assist with this.

Next steps

I expect to consider issuing directions to fluoridate from mid-2022 onwards and implementing these directions will take a staged approach. This will align with the significant reforms to the Three Waters infrastructure announced last month.

I encourage all local authorities with un-fluoridated community water supplies that service over 500 people to start fluoridation-related preparatory work now (a list of these supplies is attached as **Appendix one**), especially in areas with larger populations or that have poor oral health outcomes.

Please note local authorities do not need to wait for a potential direction from me to start fluoridating water supplies in their area. Community water fluoridation will substantially reduce rates of preventable tooth decay and it is widely recognised as one of the most important and proven public health measures to improve oral health

To support early adoption, the Ministry has a limited amount of capital works funding available for local authorities that are willing and able to begin the capital works to fluoridate by the end of 2022. The Ministry will provide more information about funding applications when it has received the information requested below. The Ministry will likely prioritise financial support for communities with poor oral health, or where there are disparities in oral health outcomes.

I recognise that there are some complex council-owned supplies across the country where it may not be feasible to fluoridate in a short timeframe. As part of the Three Waters reforms, new water services entities are due to be established in July 2024. These entities could be responsible for fluoridating these supplies (subject to any directions being issued). The Ministry and the Department of Internal Affairs will work together on how this will be managed as part of the asset management planning processes to establish the new entities. These processes will start next year.

The Ministry requests some information from you now

The Ministry is now seeking information on the fluoridation 'readiness' of local authorities, and any cost and planning pressures they face. This will allow the Ministry to better understand how implementation of fluoridation will be phased¹.

We ask that you provide the following information for each of your council-owned un-fluoridated drinking water supplies that service a population of 500 people or more:

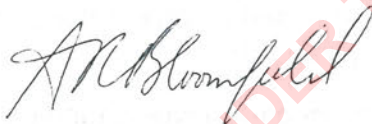
- the status of your fluoridation infrastructure
- whether fluoridation capital works is underway or planned
- the expected date for completion of capital works (if relevant)
- the estimated capital works cost to fluoridate your supplies
- the budgeted capital works costs to fluoridate supplies included in long term plans or budgets
- the number of months required to fluoridate water supplies if a direction is issued
- other information useful for implementation planning.

Please also confirm the list of un-fluoridated supplies controlled by your local authority (see **Appendix one**) and provide the information above for any additional supplies that are not listed.

I request that you provide this information by completing and returning the attached spreadsheet by 11 March 2022 to fluoride@health.govt.nz. You can also use this contact email if you have any questions or would like to discuss matters further.

I look forward to working with you on this initiative to help improve the oral health of the communities you serve.

Nāku noa, nā



Dr Ashley Bloomfield
Te Tumu Whakarae mō te Hauora
Director-General of Health

Cc: Jon Lamonte, Chief Executive, Watercare
Colin Crampton, Chief Executive, Wellington Water
Bill Bayfield, Chief Executive, Taumata Arowai
District Health Board Chief Executives
Public Health Unit Managers

¹ This information is not being sought as part of my requirements under section 116G the Act. I will ask local authorities to formally provide comment on these provisions in advance of issuing directions regarding specific water supplies.

Appendix One: Non-fluoridated community water supplies servicing populations of 500 or more

Water supplier	Water supply	Estimated population size
Ashburton District Council	Ashburton	19,000
Ashburton District Council	Rakaia	1100
Buller District Council	Westport	4974
Buller District Council	Reefton	951
Carterton District Council	Carterton	5230
Central Hawke's Bay District Council	Waipawa	2355
Central Hawke's Bay District Council	Waipukurau	3666
Central Hawke's Bay District Council	Takapau	570
Central Otago District Council	Alexandra	6000
Central Otago District Council	Clyde	2200
Central Otago District Council	Cromwell	8000
Central Otago District Council	Ranfurly	950
Central Otago District Council	Roxburgh	790
Christchurch city Council	Akaroa	820
Christchurch city Council	Brooklands / Kainga	1629
Christchurch city Council	Christchurch	381,816
Christchurch city Council	Lyttelton	5854
Clutha District Council	Richardson Rural	1003
Clutha District Council	Clydevale-Pomahaka Rural	778
Clutha District Council	Glenkenich Rural	705
Clutha District Council	Moa Flat	534
Clutha District Council	North Bruce Rural	928
Clutha District Council	Stirling	737
Clutha District Council	Waitahuna Rural	922
Dunedin City Council	Waikouaiti	1642
Dunedin City Council	Outram	750
Far North District Council	Kaikohe	4200
Far North District Council	Kaitaia	5400
Far North District Council	Kawakawa / Moerewa	3500
Far North District Council	Kerikeri	6700
Far North District Council	Paihia	4000
Far North District Council	Okaihau	800
Far North District Council	Omapere	900
Far North District Council	Rawene	600
Gore District Council	Gore	7480

Gore District Council	Mataura	1790
Grey District Council	Greymouth	8320
Grey District Council	Runanga	1090
Hastings District Council	Haumoana / Te Awanga	1900
Hastings District Council	Clive	560
Hastings District Council	Whirinaki- Hawkes Bay	800
Hastings District Council	Hastings Urban	64,764
Hauraki District Council	Kerepehi	2552
Hauraki District Council	Paeroa	4887
Hauraki District Council	Waihi	4927
Hauraki District Council	Waitakaruru	2076
Horowhenua District Council	Foxton	2700
Horowhenua District Council	Foxton Beach	1900
Horowhenua District Council	Levin	20,000
Horowhenua District Council	Shannon	1436
Horowhenua District Council	Tokomaru	550
Hurunui District Council	Amberley	1921
Hurunui District Council	Ashley Rural	5832
Hurunui District Council	Amuri Plains Rural Water	699
Hurunui District Council	Broomfield	565
Hurunui District Council	Cheviot	888
Hurunui District Council	Hanmer	948
Hurunui District Council	Hawarden	753
Hurunui District Council	Motunau, Greta, Scargill	681
Hurunui District Council	Waitohi Upper	513
Hutt City Council	Petone	7491
Hutt City Council	Korokoro	1482
Kaikoura District Council	Kaikoura	2500
Kaipara District Council	Dargaville	4683
Kaipara District Council	Maungaturoto	980
Kapiti Coast District Council	Otaki	5700
Kapiti Coast District Council	Paekakariki	1665
Kapiti Coast District Council	Hautere	700
Kawerau District Council	Kawerau	7721
Mackenzie District Council	Fairlie	1000
Mackenzie District Council	Twizel	1300
Mackenzie District Council	Tekapo	500
Manawatu District Council	Himatangi Beach	513
Manawatu District Council	Rongotea	639
Manawatu District Council	Sanson	582
Marlborough District Council	Blenheim	24,028
Marlborough District Council	Picton/Waikawa	4185
Marlborough District Council	Renwick	1884
Marlborough District Council	Seddon	535
Marlborough District Council	Havelock	618
Marlborough District Council	Riverlands Industrial	740

Matamata Piako District Council	Matamata	6943
Matamata Piako District Council	Morrinsville	6603
Matamata Piako District Council	Te Aroha	3838
Napier City Council	Napier	59,055
Napier City Council	Bayview	894
Nelson City Council	Nelson	52,400
New Plymouth District Council	Inglewood	3983
New Plymouth District Council	New Plymouth	59,072
New Plymouth District Council	Oakura	1625
New Plymouth District Council	Okato	530
Opotiki District Council	Opotiki	4530
Otorohanga District Council	Otorohanga	3050
Queenstown Lakes District Council	Arrowtown	4366
Queenstown Lakes District Council	Arthurs Point	1631
Queenstown Lakes District Council	Glenorchy	1232
Queenstown Lakes District Council	Hawea	3767
Queenstown Lakes District Council	Lake Hayes	3743
Queenstown Lakes District Council	Queenstown	25,271
Queenstown Lakes District Council	Wanaka	13,633
Queenstown Lakes District Council	Luggate	855
Rangitikei District Council	Bulls	1419
Rangitikei District Council	Marton	4764
Rangitikei District Council	Taihape	1584
Rotorua Lakes Council	Hamurana/Kaharoa	1700
Rotorua Lakes Council	Ngongotaha	4826
Rotorua Lakes Council	Reporoa	1060
Rotorua Lakes Council	Rotorua Central	42,500
Rotorua Lakes Council	Rotorua East	10,330
Rotorua Lakes Council	Mamaku	868
Rotorua Lakes Council	Rotoiti	880
Ruapehu District Council	Ohakune	1500
Ruapehu District Council	Taumarunui	4870
Ruapehu District Council	Raetihi	749
Selwyn District Council	Darfield	3720
Selwyn District Council	Kirwee	1300
Selwyn District Council	Leeston	3000
Selwyn District Council	Lincoln	7200
Selwyn District Council	Malvern Hills RWS	1684
Selwyn District Council	Prebbleton	4500
Selwyn District Council	Rolleston	18,550
Selwyn District Council	Selwyn RWS	1160
Selwyn District Council	West Melton	2270
Selwyn District Council	Sheffield/Waddington	585
Selwyn District Council	Southbridge	990
Selwyn District Council	Springfield	580
Selwyn District Council	Springston	510

Selwyn District Council	Tai Tapu	760
South Taranaki District Council	Eltham	1980
South Taranaki District Council	Opunake	1370
South Taranaki District Council	Patea	1150
South Taranaki District Council	Waimate West	2880
South Taranaki District Council	Waverley	950
South Waikato District Council	Putaruru	4116
South Waikato District Council	Tirau	700
South Wairarapa District Council	Featherston	2599
South Wairarapa District Council	Greytown	2623
South Wairarapa District Council	Martinborough	1776
Southland District Council	Edendale/Wyndham	1152
Southland District Council	Lumsden/Balfour	1061
Southland District Council	Riverton	1506
Southland District Council	Te Anau	2628
Southland District Council	Winton	2436
Southland District Council	Ohai/Nightcaps	667
Southland District Council	Otautau	798
Southland District Council	Tuatapere	561
Taranua District Council	Dannevirke	6000
Taranua District Council	Pahiatua	2700
Taranua District Council	Woodville	1500
Tasman District Council	Hope/Brightwater	2100
Tasman District Council	Motueka	1200
Tasman District Council	Richmond/Waimea Industrial	14,000
Tasman District Council	Waimea Mapua Ruby Bay	2500
Tasman District Council	Wakefield	2100
Taupo District Council	Acacia Bay	2381
Taupo District Council	Kinloch	1696
Taupo District Council	Mangakino	1312
Taupo District Council	Omori/Kuratau/Pukawa	1883
Taupo District Council	Motuoapa	739
Tauranga City Council	Tauranga	146,097
Thames Coromandel District Council	Coromandel	1718
Thames Coromandel District Council	Tairua	1314
Thames Coromandel District Council	Whangamata	3674
Thames Coromandel District Council	Whitianga	4550
Thames Coromandel District Council	Pauanui	750
Timaru District Council	Downlands	4550
Timaru District Council	Geraldine	2121

Timaru District Council	Pleasant Point	1200
Timaru District Council	Te Moana Scheme	1650
Timaru District Council	Temuka	4620
Timaru District Council	Timaru City	26,832
Timaru District Council	Seadown	895
Upper Hutt City Council	Kaitoke	650
Waikato District Council	Raglan	4000
Waimakariri District Council	Kaiapoi	12,630
Waimakariri District Council	Mandeville	2353
Waimakariri District Council	Oxford Urban - Rural No. 2	2993
Waimakariri District Council	Rangiora	17,880
Waimakariri District Council	Waikuku	1150
Waimakariri District Council	Pegasus - Woodend	7325
Waimakariri District Council	Oxford Rural No1	828
Waimakariri District Council	West Eyreton	613
Waimate District Council	Hook/Waituna Rural	1350
Waimate District Council	Waimate	3000
Waimate District Council	Lower Waihao Rural	600
Waipa District Council	Cambridge	20,833
Waipa District Council	Kihikihi	2000
Waipa District Council	Pukerimu Rural	3387
Waipa District Council	Te Awamutu & Pirongia	10,665
Wairoa District Council	Wairoa	4650
Waitaki District Council	Oamaru	15,561
Waitaki District Council	Waihemo	1357
Waitaki District Council	Lower Waitaki, Rural	778
Waitaki District Council	Tokarahi/Livingstone	573
Waitomo District Council	Te Kuiti	4612
Waitomo District Council	Piopio	500
Watercare Services Ltd- Auckland Council	Shakespear Regional Park	1425
Watercare Services Ltd- Auckland Council	Greenlane Hospital	1500
Watercare Services Ltd- Auckland Council	Helensville/Parakai	4579
Watercare Services Ltd- Auckland Council	Snells/Algies	4664
Watercare Services Ltd- Auckland Council	Waiuku	8697
Watercare Services Ltd- Auckland Council	Warkworth	4111
Watercare Services Ltd- Auckland Council	Wellsford/Te Hana	2114
Watercare Services Ltd- Auckland Council	Bombay	609
Watercare Services Ltd- Auckland Council	Broadway Park, Newmarket	1000

Watercare Services Ltd- Auckland Council	Huia Village	597
Watercare Services Ltd- Auckland Council	Muriwai	563
Watercare Services Ltd- Auckland Council	Auckland	25,507
Western Bay of Plenty District Council	Athenree	5125
Western Bay of Plenty District Council	Katikati	5700
Western Bay of Plenty District Council	Omokoroa Minden	6450
Western Bay of Plenty District Council	Pongakawa	4600
Western Bay of Plenty District Council	Te Puke	8460
Westland District Council	Hokitika	3447
Westland District Council	Franz Josef	2611
Whakatane District Council	Murupara	1674
Whakatane District Council	Rangitaiki Plains	2897
Whakatane District Council	Matata	690
Whakatane District Council	Ruatoki	560
Whakatane District Council	Taneatua	790
Whakatane District Council	Otumahi	2841
Whanganui District Council	Whanganui	39,475
Whangarei District Council	Bream Bay	14,800
Whangarei District Council	Whangarei	56,530

Note: In a small number of cases zones are listed rather than supplies, or a supply may be captured where only one or more zones or parts of zones are non-fluoridated.

10 March 2022

03 941 8999

53 Hereford Street
Christchurch 8013PO Box 73013
Christchurch 8154ccc.govt.nz**Director-General of Health**Ministry of Health
PO Box 5013
Wellington 6140

Dear Dr Bloomfield

Response on Community Water Fluoridation Information Request

Your letter of 15 December 2021 requesting information on the fluoridation 'readiness' of the Christchurch City Council has been received. We thank you for the opportunity to inform you about the implementation effects that a pending directive to fluoridate community water supplies will have on the Christchurch City Council and its customers.

Council engaged industry experts and suppliers to develop a generic concept design for fluoridation at 44 high pressure water supply pump stations and the Akaroa water treatment plant in accordance with the Water New Zealand Code of Practice on Fluoridation of Drinking-Water Supplies in New Zealand.

The experts were tasked to inform a capital and operating cost estimate at an accuracy of +/- 30%, and also to advise a potential implementation framework for the installation of fluoride dosing and monitoring facilities throughout the city and at Akaroa. We have completed the questionnaire attached to your request, but can in general respond to your query as follows:

- **the status of your fluoridation infrastructure:** Council does not presently fluoridise its community water supplies and therefore, no fluoridation infrastructure is in place.
- **whether fluoridation capital works is underway or planned:** No fluoridation capital works are presently underway. We are in the process of constructing one new water supply pump station, and will need to vary the designs to enable fluoride dosing, mixing and monitoring. We are in the design phase for another water supply pump station, and will advise that the design should provide for fluoride dosing, mixing and monitoring.
- **the estimated capital works cost to fluoridate your supplies:** The capital cost to implement fluoridation at 44 water supply pump stations and 1 water treatment plant, is **estimated at \$58 million**. This comprises a cost of approximately \$1.3 million per facility and includes a 30% contingency allowance as well as a 12% escalation provision over the implementation period. We have not included in the cost estimate provision for fluoridation facilities at 5 existing water supply pump stations which will be decommissioned or replaced in the next five years. We have also not included the extra-over costs for our two new water supply pump station projects. Allowing for some design and implementation efficiency, the budget impact on our existing capital projects, is estimated at **an additional \$5 million**.
- **the budgeted capital works costs to fluoridate supplies included in long term plans or budgets:** No funding provision has been made in the Christchurch 2021-2031 Long Term Plan, nor in the Draft 2022-23 Annual Plan for fluoridation. The Long Term Plan focuses on delivering a demonstrably safe drinking water supply for all Christchurch communities which reflects Council's priority. Budgets for capital projects targeted at providing 5 new water supply pump stations do not currently make provision for water treatment.
- **the number of months required to fluoridate water supplies if a direction is issued:** We have not provided a response to this line item in the spreadsheet, because no budget is available to implement fluoridation. Assuming the availability of funds, resources (internal and contracted) and supplies we consider that an implementation period of up to 44 months will be required to implement fluoridation at all water supplies serving a population of more than 500 people. The

above timeframe assumes the completion of the existing Council projects to deliver a demonstrably safe drinking water supply. We recommend that a delay of up to 24 - 48 months should be factored into the implementation expectations, in order to provide for the completion of the safe drinking water projects.

- **other information useful for implementation planning:** Please find a copy of the preliminary cost estimate prepared in response to your request for information. We would like to take this opportunity to highlight the following additional issues and risks:
 - Implementation Risks:
 - site constraints for building works to house additional equipment
 - health and safety risks for neighbouring population
 - labour and material supply chain risks caused by Covid as well as sector saturation
 - site constraints for chemical delivery
 - may trigger the need to fast-track SCADA modernisation, for which the cost and time impacts have not been considered
 - An extended implementation timeline is essential as we have limited windows to undertake the required works. Equally the network will not allow multiple upgrades at the same time.
 - Operational Matters/Risks:
 - limited fluoride supplies / suppliers in Christchurch
 - assumptions regarding the disposal of containers after use
 - risks to recruit and retain qualified and certified operators (nationwide issue)
 - an estimated operation and maintenance budget impact of \$1.8 million per annum (excluding depreciation)
 - The 20 year horizon renewal estimate is \$14 million (annualized as \$1.1 million per annum)

Based on the above, it is evident that the Christchurch City Council water supply network is complex and will require a longer implementation timeline as well as significant support to ensure an appropriate level of funding is allocated to ensure implementation of fluoridation for its community water supplies, serving more than 500 people.

We look forward to receive the funding application requirements in due course.

Regards



Jane Davis
General Manager Infrastructure, Planning & Regulatory Services
Christchurch City Council

Fluoride Implementation – Preliminary Cost Estimate Update

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Project name: Concept Plan to implement fluoridation of the Christchurch
Drinking Water Supplies

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1. Introduction

Christchurch City Council (Council) is planning for the implementation of fluoride dosing at 45 water treatment and pumping facilities across the Christchurch/Lyttleton, Brooklands-Kainga and Akaroa systems. A phased implementation planning study is being undertaken by Jacobs, with the current phase (Phase 1) focused on a concept review, confirming key project fundamentals, identifying the extent of integration with the Council's Chlorination Readiness project, and updating previous estimates for implementation costs. Conceptual estimates for capital, operating and maintenance and renewal costs have been developed based on design assumptions as documented in this memorandum alongside a preliminary implementation schedule.

Following the completion of Phase 1, Jacobs will work with Council to identify the next steps required to support fluoride implementation, with the following anticipated scope to be confirmed:

- Phase 2 – reference concept design development. Several sites were considered for further design development; key drivers for site selection were varying size, site constraints, and capturing differences in the pumping sources and configurations. Designs from these representative sites will be further extrapolated to other facilities, allowing for development of a more detailed cost estimate in subsequent phases. Reference concepts for the following facilities will be developed as part of Phase 2:
 - Redwood (submersible pumped into mains)
 - Grassmere (surface pumped into mains)
 - Main Pumps (large capacity)
 - Tara (small capacity)
 - Akaroa (surface water for different water quality)
- Phase 3 – implementation planning and costing refinement. Phase 3 will build upon the 5 reference concepts developed in Phase 2 to extrapolate to a system-wide implementation plan, considering facility prioritization.
- Phase 4 – design customisations. Design customizations for constrained sites will be developed as part of Phase 4, to provide greater confidence in the planning for sites where extrapolation from Phase 2 reference designs may be less representative.

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2. Chemical Considerations

Hexafluorosilicic acid (HFA) is the preferred chemical for fluoride dosing based on an earlier Council alternative review study, and a liquid chemical system was therefore assumed as the system design basis. HFA is a strong acid, typically available in concentrations from 20% to 30% (batch dependent, as a byproduct of fertilizer production), with a standard reference concentration of 23% and available fluoride ion content of 79%.

2.1 Hazard Designations

HFA is considered a hazardous substance with classifications as noted in Table 2-1. Notably, the use of HFA as the fluoride source is accompanied by requirements for personal protective equipment and limits appropriate material selection options as HFA off-gasses hydrofluoric acid, which etches/corrodes glass, metals and electrical equipment.

Table 2-1. Hazardous chemical designations for HFA

Regulation	HFA Classification
HSR002491 Additives, Process Chemicals and Raw Materials (Corrosive) Group Standard	Hazardous. - Subclass 6.1 Category D - Substances which are acutely toxic. - Subclass 8.1 Category A - Substances that are corrosive to metals. - Subclass 8.2 Category C - Substances that are corrosive to dermal tissue. - Subclass 8.3 Category A - Substances that are corrosive to ocular tissue.
NZS 5433:2012 Transport of Dangerous Goods on Land	Dangerous good - Hazard class 8 (corrosive) - Packing group II (medium danger).

The following main conditions for the use of HFA are noted per the Environmental Protection Authority's HSR002491 Group Standard (2020):

- Appropriate labelling and hazard identification
- Safety data sheets available at all times
- Appropriate packaging suitable for chemical properties
- Correct disposal of chemical
- Ensure the chemical
 - if left unattended, is secured in a way that ensures an unauthorised person cannot gain access to it; and
 - is stored or handled in a well-ventilated place only.
- If the chemical is not being used, ensure that it is kept in a sealed package or container.

Allowances for safe handling, ventilation and segregation from incompatible chemicals have been incorporated in the capital, operating and maintenance cost estimates.

2.2 Interactions between Chlorine and Fluoride

While HFA is generally non-reactive with most other chemicals used in water treatment, per the Chlorine Institute, fluorosilicic acid (a common name for HFA) is chemically incompatible with sodium hypochlorite. In

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some instances, chlorine gas and fluorosilicic acid can be dosed through a common injection quill using the chlorinated stream as fluoride carrier water; however, it is not recommended that this approach be taken with a sodium hypochlorite chlorine supply. Separate dosing locations mitigate the risk of the two incompatible chemicals mixing without dilution in the event of a carrier water disruption. Sodium hypochlorite rapidly dissociates into hypochlorous acid and sodium hydroxide in water, and it is anticipated that with an appropriate carrier water for fluoride dilution, the two chemicals may be injected in close succession (under 1 m of separation) in a common pipe of greater than 300 mm diameter. A dilution factor of 1:100 has been assumed for the carrier water system design.

2.3 Water Quality Review

A review of available raw water quality data from 2019 to 2021 indicated that while up to 0.14 mg/L of naturally-occurring fluoride has been observed, this concentration is variable and seasonal, as shown in Figure 2-1. For estimating chemical consumption, it has therefore been assumed that there is no background fluoride, and a target dose of 0.9 mg/L has been assumed.

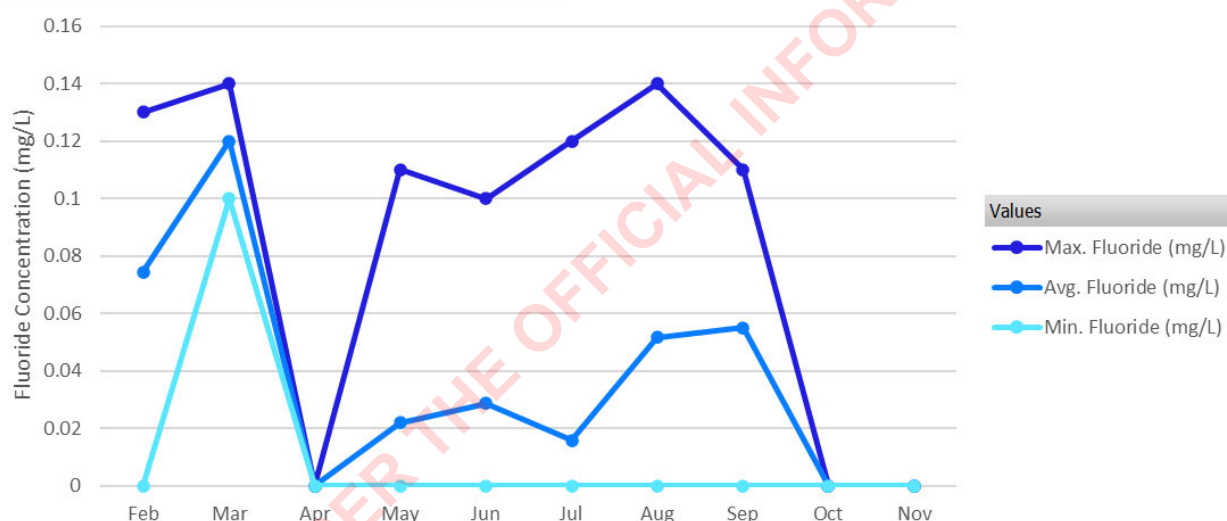


Figure 2-1. Fluctuations in raw water fluoride concentration from 2019 to 2021.

In the same period, alkalinity in the raw water ranged from a minimum of 10 mg/L in the Northwest pressure district (Canterbury Plains aquifer) to a maximum of 340 mg/L at the L'Aube Hill Akaroa Water Treatment Plant (WTP), located on Banks Peninsula (surface water source). It is anticipated that HFA will consume a moderate amount of alkalinity (approximately 2.08 mg/L of CaCO_3 per mg/L of fluoride added), though this reduction in alkalinity will be minor given the small quantity of fluoride to be dosed (target of 0.9 mg/L).

3. Conceptual Design Scope and Estimating Basis

3.1 Regulatory Considerations

The 2021 Draft New Zealand Drinking Water Quality Assurance Rules provide guidance on compliance monitoring and have been reviewed as part of the development of cost estimates for the operating and maintenance level of effort.

Jacobs has confirmed via communication with Taumata Arowai that the 2014 Water New Zealand Code of Practice for Fluoridation of Drinking-Water Supplies (Code of Practice) represents the most current design guidance and requirements, and these requirements have been incorporated in the design assumptions for the estimate update.

3.2 Process

3.2.1 HFA Chemical System, Mixing and Sampling

The HFA system design based on delivery of HFA in 200 L chemical drums. HFA will be transferred from the drums to a bulk storage tank, after which it has been assumed the drums will be disposed of to landfill, given the corrosive nature of any residual chemical. An appropriate daily quantity of HFA will be transferred to a day tank once per 24 hours, from where it will then be dosed into the water supply line via a dosing skid with positive displacement metering pumps in a duty/standby configuration, matched with calibration cylinders. Carrier water will be added after the dosing pumps in a ratio of approximately 100:1, to reduce the mixing time after chemical injection in the water supply and limit the transportation of neat chemical, which is more hazardous. The source of carrier water may differ between different facilities, and it may be necessary to use a reticulated supply. As such it has been assumed that a flow meter will be required to allow for updated reporting of total flows. A simplified process block diagram of the dosing system is presented in Figure 3-1.

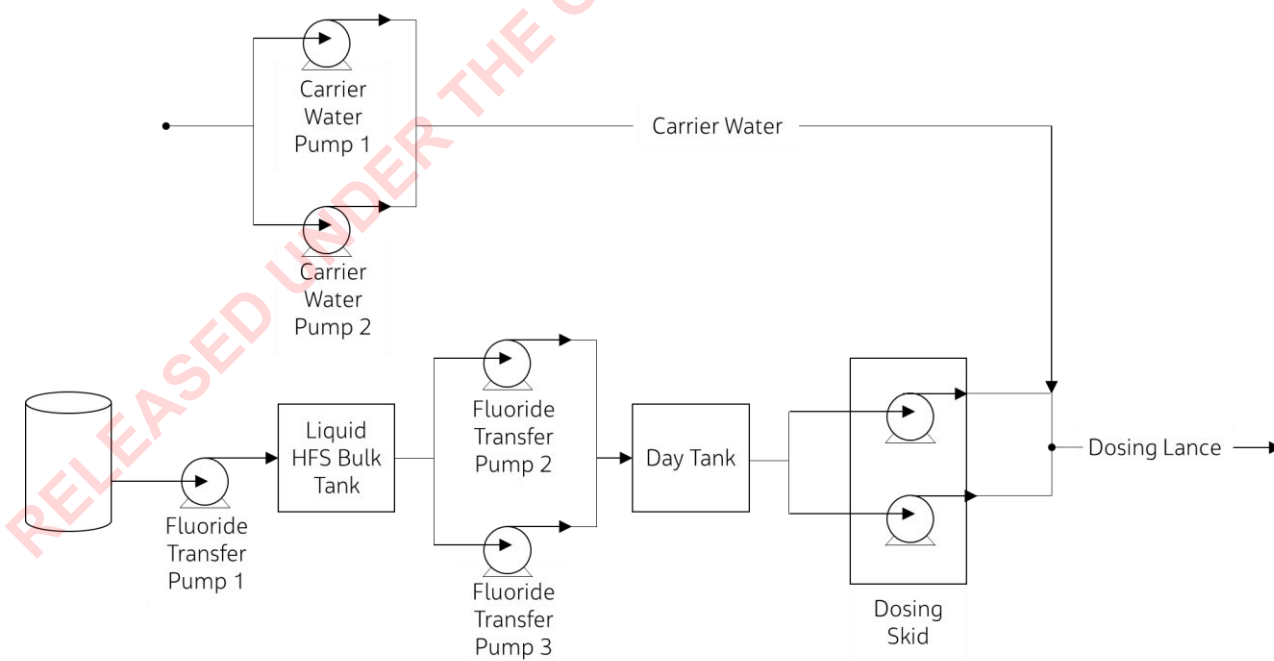


Figure 3-1. HFA system block diagram

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While scale formation at the inject point is reduced by the use of carrier water, an additional approach to reducing the potential for pipe blockages at the point of application is to allow the flexible dosing line to extend beyond the end of the supporting injection lance, thus forming a flexible tail. The continuous movement of the tail in the flow physically dislodges scale as it is formed reducing the likelihood of blockages.

It has been assumed that the fluoride injection point will be in the metering chamber downstream of the pumps at most facilities, with a sampling point upstream of the first diversion. Where there are less than 30 pipe diameters between the dosing location and the sampling location, it is assumed that an inline mixer will be required to provide adequate chemical dispersion between the dosing location and the fluoride analysis sampling point. Additional headloss (and therefore pumping energy consumption) will be incurred if a mixer is installed; while this was not included in the operating cost estimate, this consideration will be further evaluated where pump curves are available.

A target dose of 0.9 mg/L dose assumed, as a conservative dosing concentration. The potential for overfeeds above the maximum allowable value specified in the DWSNZ (1.5 mg/L) requires greater engineering controls in the design. Per the Code of Practice, the maximum physical dosing capacity of the feed equipment will not exceed 110% of the operating target dose at max plant capacity. In addition, for large systems serving more than 10,000 people, two or more of the following independent checks must be used:

1. Day tank, filled once per day and equipped with online measuring device
2. Fluoride measuring flow meter on the dosing line
3. Fluoride concentration analyser downstream of the dosing location

It has been assumed that independent checks 1 and 3 will be employed in the system design.

3.2.2 Flow Rates

Flows for the 45 facilities range from 88 m³/hr (Akaroa L'Aube Hill WTP) to 1320 m³/hr (Sockburn PS) with both current and future capacities considered as per the information provided by Council. For cost estimating purposes, chemical system estimates were considered for three size categories: facilities with flows up to 300 m³/hr, those with flows in the range of 301 to 600 m³/hr and those with flows between 601 and 1320 m³/hr.

3.2.3 Chemical storage

Storage and dosing equipment will be located in a bunded area, with a volume of at least 110% of the volume of the bulk tank, and a waste holding tank from which waste may be discharged, either to sewer or to a disposal tanker. Both the day tank and bulk tank will be vented to the outside atmosphere to reduce corrosion of the equipment in the room, and a water trap will be provided on the tank overflow. The tanks will be equipped with ultrasonic level transmitters, and level switches (high and low level) to enable system automation.

3.2.4 Safe Handling Provisions

Provisions for safe handling of HFA have been integrated in the design concept and cost estimate. It is assumed that fluoride storage and dosing equipment will be housed in a separate room, with a second space housing an Operator Interface Terminal (OIT), a handwashing station, eyewash and emergency shower (assumed to be required each facility). Per workshop discussions with Council, it has been assumed that an activated carbon fluoride scrubber system will be required at all facilities save Akaroa, which is less urban than the other pumping and treatment facilities included in the scope of this implementation study, and a vapour detection system will be included for each facility.

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3.3 Building Mechanical

Allowances have been included in the estimate for extraction fans and a unit heater at each facility, to provide ventilation and prevent fluoride freezing issues at low temperatures (below 0 °C).

3.4 Electrical

Allowances have been included in the estimate for electrical wiring and connections as well as both interior and exterior lighting. Similar to the OIT, it is assumed that any electrical lighting panels for the chemical system will not be located in the fluoride equipment room. The estimate does not include any works to bring existing electrical installations in line with current code requirements, and it has been assumed that there is electrical system capacity to power the new building and equipment at each facility.

3.5 Instrumentation and Controls

Allowances have been included in the estimate for operational control and remote observation integration. Per the Code of Practice, several interlocks are required from the online monitoring system to the dosing system metering pumps, transfer pumps and carrier water pumps. Online monitoring of bulk and day tank levels, flow pacing of chemical dosing and alarms at low- or high-dose set points will all be required along with HFA delivery and transfer controls. Calculations to support confirmation of fluoride dosing (i.e. volume of fluoride used calculation) will be integrated with the system controls.

A further allowance has also been included for installation of new I/O modules at all facilities, based on workshop discussions with Council staff.

3.6 Structural

Based on workshop discussions with Council, it has been noted that previous plans to locate the fluoride dosing systems outdoors present several challenges with respect to longevity of the equipment and security from vandalism. It has been assumed that most facilities, excepting the Main Pumps and Wilmers pumping stations, will require a building footprint expansion to house the chemical system and appurtenances indoors. A 4 m x 4 m footprint has been assumed for small and medium-sized facilities, with a 4 m x 5 m footprint for large facilities, housing the bulk tank, day tank, transfer pumps, dosing equipment, ventilation equipment, PPE storage, eyewash station and control panel.

3.7 Civil

A baseline allowance has been included in the cost estimate for each facilities, encompassing identification of buried services, trenching to install dosing and analyser lines, installation of a delivery pad, and site reinstatement. Pipe-in-pipe construction has been assumed for the dosing lines, for chemical containment.

While some facility sites have ample space for new building footprints and chemical delivery truck access, others are constrained with numerous buildings and trees on site, increasing the complexity of civil construction efforts. Similarly, some facilities already have wastewater sewer connections for waste tank discharge, while the scope of fluoride implementation for other sites would require either establishing a sewer connection, or provision for waste removal by tanker truck. A high-level review of the site layouts was undertaken, to identify sites where markups to the baseline civil allowance were appropriate, for:

- tree removal,
- site constraints (none, minor, medium, high),

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- delivery constraints (none, minor, medium), and
- proximity of a wastewater sewer connection (already on site, near the site at the adjacent road, removed from the site at a significant setback, or no wastewater connection available in the area of the facility).

3.8 Miscellaneous Items

Additional allowances for miscellaneous items including site security and access control to the facility, SCADA critical spares and commissioning have been included in the estimate.

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4. Conceptual Costing

4.1 Costing Approach and Accuracy

Due to the level of development of the overall design, and the time constraints to provide Council with updated estimates, the conceptual cost estimating approach was based on the categorisation of pump stations into three categories by flow rate, rather than developing individual cost estimates for each site. Updated budgetary pricing was obtained from equipment and chemical suppliers, and allowances based on similar reference projects were used to supplement the budgetary quotes. Constants used in the estimate development summarized in Table 4-1.

Table 4-1. Estimate constants

Parameter	Value
Council Staff Labour	\$125/hour
Cost of HFA, delivered	\$2.46/L
HFA delivery container disposal cost ¹	\$100/container
Fluoride target concentration	0.9 mg/L
HFA active chemical concentration	0.22 kg/L

¹ Several disposal sites were contacted; however, none was able to provide a quote for container disposal within the timeline for developing this estimate. A conservative value has been assumed as a placeholder until a quote specific to the Christchurch area can be incorporated.

Several assumptions were made in the development of the estimate, as noted in Section 3. The accuracy of these assumptions will be revisited in subsequent phases of the fluoride implementation planning study, and specifically reviewed for the facilities selected for design development in Phase 2. Based on the conceptual level of design, this estimate is considered a Class 5 estimate (-30% to +50%).

4.2 Site Categorisation

The 45 sites included in this implementation study were categorized based on maximum flow rate, as summarized in Table 4-2.

Table 4-2. Facility size categorization

		System Size		
		Small	Medium	Large
Max Flow (m³/hr)		300	600	1320
No. Facilities	Christchurch/ Lyttleton	8	26	8
	Brookland/ Kainga	2		
	Akaroa	1		

4.3 Capital Estimate

Table 4-3 presents an overview of the capital cost estimate for the different facility size categories; a detailed breakdown of the capital cost estimate, including the determination of civil markups included for each facility, is provided in Appendix A. Construction markups totalling 47% were included based on the anticipated complexity of the construction phase, covering contractor preliminary and general cost, mobilization and demobilization, overhead, profit, risk and warranty requirements. Based on the facility categorisation and the applicable civil markups, the total Construction Value for all facilities is estimated at \$29,560,000.

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Table 4-3. Construction Value Summary

	Multiplier	Small	Medium	Large
Process		\$196,000	\$223,000	\$282,000
Building Mechanical		\$15,000	\$15,000	\$15,000
Structural		\$32,000	\$32,000	\$40,000
Civil		\$60,000 to \$107,000 average of \$77,000		
Electrical		\$30,000	\$30,000	\$43,000
I&C		\$60,000	\$60,000	\$60,000
Miscellaneous		\$33,000	\$33,000	\$33,000
Direct Cost Subtotal		\$443,000	\$470,000	\$550,000
Preliminary & General Cost, Mobilization & Demobilization	30%	\$133,000	\$141,000	\$165,000
Contractor Overhead, Profit and Risk	15%	\$67,000	\$71,000	\$83,000
Warranty (Defects Liability Period)	2%	\$9,000	\$10,000	\$11,000
Construction Value Subtotal		\$660,000	\$700,000	\$810,000

Non-construction costs for Council were estimated as summarized in Table 4-4, with an overview of the total overrun cost estimate, after 30% contingency and 5% escalation based on a review of the Heavy and civil engineering construction index from 2019 to 2021, provided in Table 4-5.

Table 4-4. Non-Construction Cost Summary

	Basis	Total for All Facilities	Average Per facility
Construction Value Subtotal		\$29,570,000	\$657,000
Permitting & Consents	2%	\$592,000	\$14,000
Engineering	13%	\$3,844,000	\$86,000
Services During Construction – inspection, contract administration	7%	\$2,070,000	\$46,000
CCC Internal Program Management	4%	\$1,183,000	\$27,000
Documentation Updates – reports, asset management systems, as built drawings, P&IDs, Operating and Maintenance Manuals, field labelling, GIS updates, OEM manuals, SSRMP plans, SOPs, contractor servicing plans, operational and compliance checklists	1 week per facility	\$675,000	\$15,000
SCADA Template development	12 weeks total	\$60,000	\$1,400
SCADA Upgrade – communications protocol	\$40,000 per site	\$1,800,000	\$40,000
Chemical/ safety labelling	\$1,000 per site	\$45,000	\$1,000
Training	10 days	\$35,000	\$800
Non-Construction Implementation Costs		\$10,300,000	\$232,000

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Table 4-5. Total Outrun Cost Summary

	Multiplier	Total for All Facilities	Average per Facility	Christchurch / Lyttleton	Brooklands / Kainga	Akaroa
Direct Cost Subtotal		\$20,100,000	\$447,000	\$18,900,000	\$800,000	\$400,000
Markups	47%	\$9,460,000	\$211,000	\$8,900,000	\$380,000	\$180,000
Construction Value Subtotal		\$29,560,000	\$657,000	\$27,800,000	\$1,180,000	\$580,000
Non-Construction Implementation Costs	35%	\$10,310,000	\$230,000	\$9,700,000	\$410,000	\$200,000
Base Estimate		\$39,870,000	\$886,000	\$37,500,000	\$1,590,000	\$780,000
Contingency	30%	\$11,960,000	\$266,000	\$11,250,000	\$480,000	\$230,000
Project Estimate		\$51,830,000	\$1,152,000	\$48,750,000	\$2,070,000	\$1,010,000
Escalation	5%	\$6,260,000	\$140,000	\$5,880,000	\$250,000	\$122,000
Total Outrun Cost Estimate		\$58,050,000	\$1,290,000	\$54,600,000	\$2,320,000	\$1,130,000

4.4 Operating and Maintenance Estimate

Chemical consumption estimates were developed based on the total flows in the previous fiscal year, with the regional breakdown as summarized in Table 4-6.

Table 4-6. Chemical Supply, Delivery and Waste Disposal Cost Summary

	Annual Estimate	Christchurch / Lyttleton	Brooklands / Kainga	Akaroa
Total annual flow (m ³ /year)	57,670,000	56,800,000	290,000	580,000
Volume of chemical used per year (L/year)	238,600	235,000	1,200	2,400
Chemical cost, delivered (\$/year)	586,900	\$578,000	\$3,000	\$5,900
Container disposal (\$/year)	\$121,800	\$120,000	\$600	\$1,200
Contract management	\$4,200	\$4,000	\$100	\$100
PO and invoice processing	\$4,200	\$4,000	\$100	\$100
Chemical Supply, Delivery & Waste Disposal Subtotal	\$718,000	\$706,000	\$4,000	\$8,000

Compliance, operating and maintenance effort was estimated on a system basis, as outlined in Table 4-7 and summarized in Table 4-8, and totalled 7207 hours (approximately 3 to 4 full time staff) for weekly, monthly and annual activities, not including travel time to site, or inflation.

Table 4-7. Compliance, operational and maintenance cost estimate

Activity	Annual Frequency	Duration	No. Sites	Total Hours	Annual Cost
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Daily changes in the volume/mass of fluoride chemical consumed in the process must be recorded and used as an additional check of the online measurements	12	1	1	12	\$1,500
Grab samples should be analysed at least weekly to check the calibration of the on-line analyser	52	0.5	45	1170	\$146,250
fluoride level in the treated water leaving the plant is analysed once a week, by a laboratory recognised by the Ministry of Health. To be integrated in the Water Safety Plan	52	0.5	45	1170	\$146,250
additional cost for analysis, estimated at \$100/sample					\$234,000
After-hours response to alarms	24	4	1	96	\$12,000
Investigate and rectify any discrepancies of 0.15 mg/L or more between the monitoring results and the online monitoring and daily chemical volume checks	2	40	1	80	\$10,000
Annual testing of shutdown systems	1	2	45	90	\$11,250
Annual raw water fluoride testing, assumed to be on-going already				0	\$0
Monthly metering pump calibration	12	0.5	45	270	\$33,750
Analyzer calibration (required monthly per Taumata Arowai)	12	0.5	45	270	\$33,750
Receive chemical shipments and transfer to bulk chemical tank	12	2	45	1080	\$135,000
Monthly inspections and preventative maintenance	12	3	45	1620	\$202,500
Reactive Maintenance	1	8	23	184	\$23,000
SCADA Management	12	2	45	1080	\$135,000
Training/review to maintain competencies in the management and operation of the fluoridation systems	1	8	5	40	\$5,000
Recordkeeping (training records, chemical analysis, calibration, alarm testing, surveillance monitoring)	1	1	45	45	\$5,625
Compliance Management, Maintenance and Inspection Subtotal				7207	\$1,135,000

Table 4-8. Operating and Maintenance Cost Summary by Supply System

	Annual Estimate	Christchurch/ Lyttleton	Brooklands / Kainga	Akaroa
Chemical Supply, Delivery & Waste Disposal Subtotal	\$721,000	\$710,000	\$4,000	\$7,000
Compliance Management, Maintenance and Inspection Subtotal	\$1,137,000	\$1,120,000	\$6,000	\$11,000

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Total O&M Cost Estimate - All facilities	\$1,858,000	\$1,830,000	\$10,000	\$18,000
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4.5 Renewals Estimate

Anticipated costs to maintain the new equipment in a state of good repair were estimated based on typical midlife intervention frequencies and anticipated useful lifespans for different asset categories, as summarised in Table 4-9. Renewal estimates for a 20-year horizon are presented in Table 4-10, while Table 4-11 provides an annualized cost for each asset type across their respective useful lives, with a total annualized cost of \$1,068,000, not including inflation.

Table 4-9. Anticipated asset useful lifespans

Asset Type	Midlife intervention frequency (years)	Useful life (years)
Liquid chemical system		10
Chemical system appurtenances (e.g. piping, tanks)		10
Health and safety equipment		10
Scrubber media for a passive scrubber		5
Air handling units and misc. building mechanical	15	25
Analyzers, indicators, analytical instruments and misc. instrumentation		10
Misc. electrical		30
Misc. site works		40
Misc. light structural	10	40
Security		8
Signage		20

Table 4-10. Renewal Estimate – 20 year horizon

Asset Type	Years 1-5	Years 6-10	Years 11-15	Years 16-20
Liquid chemical system		\$3,288,000		\$3,288,000
Chemical system appurtenances (e.g. piping, tanks)		\$4,714,000		\$4,714,000
Health and safety equipment		\$304,000		\$304,000
Scrubber media for a passive scrubber	\$76,000	\$76,000	\$76,000	\$76,000
Air handling units and misc. building mechanical			\$342,000	
Analyzers, indicators, analytical instruments and misc. instrumentation		\$3,834,000		\$3,834,000
Misc. light structural		\$726,000		\$726,000
Security		\$1,140,000		\$1,140,000

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Signage				\$76,000
TOTAL	\$76,000	\$14,082,000	\$418,000	\$14,158,000

Table 4-11. Renewal Estimate – Annualized over Asset Useful Life

Asset Type	Total Annualized Cost
Liquid chemical system	\$195,000
Chemical system appurtenances (e.g. piping, tanks)	\$280,000
Health and safety equipment	\$18,000
Scrubber media for a passive scrubber	\$9,000
Air handling units and misc. building mechanical	\$41,000
Analyzers, indicators, analytical instruments and misc. instrumentation	\$228,000
Misc. electrical	\$49,000
Misc. site works	\$87,000
Misc. light structural	\$91,000
Security	\$85,000
Signage	\$3,000
Renewal Annualized Cost Total	\$1,090,000

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5. Conceptual Implementation Schedule

A conceptual implementation schedule is shown in Figure 5-1 and outlined in Table 5-1, based on a six-month planning period followed by design, tendering, construction and commissioning of 15 facilities in each of three assignments (primary, secondary and tertiary), for a total of 45 facilities commissioned approximately 3 years after the start of implementation. As system capacity requirements are highest in the summer months, activities which include facility downtime (equipment installation, start-up and commissioning) have been scheduled in the period from April to November. This scheduling is predicated on significant design standardization to allow for fast-tracked design of the secondary and tertiary facilities. A six-month equipment lead time is included assuming traditional procurement practices and drives the critical path. Pre-purchasing of key equipment may present an opportunity to expedite the schedule, particularly in the case of the primary facilities.

Table 5-1. Implementation schedule overview and considerations

Task	Duration	Notes
Implementation Planning		
Preliminary Designs of selected facilities and updated costing	4 months	
Priority Facilities		
Detailed Design	7 months	
Tendering Period	4 months	Includes preparation, issue for tender, tender period, evaluation and award
Mobilization	1 month	
Civil and structural works	6 weeks	At each facility. Staggered implementation, based on starting 5 facilities at a time, in 3 waves 1 month apart
Equipment lead time	6 months	from contract award, allowing an additional 4 weeks for the contractor to finalize quotes and place orders.
Equipment installation, startup and commissioning	6 weeks	At each facility. Staggered implementation, based on starting 5 facilities at a time, in 3 waves 1 month apart
Warranty Period	1 year	
Secondary and Tertiary Facilities		

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Detailed Design	4 months	Standardized design, documenting differences
Tendering	4 months	
Mobilization	1 month	
Civil and structural works	6 weeks	At each facility. Staggered implementation, based on starting 5 facilities at a time, in 3 waves 1 month apart
Equipment lead time	6 months	from contract award, allowing an additional 4 weeks for the contractor to finalize quotes and place orders.
Equipment installation, startup and commissioning	6 weeks	At each facility. Staggered implementation, based on starting 5 facilities at a time, in 3 waves 1 month apart
Warranty Period	1 year	

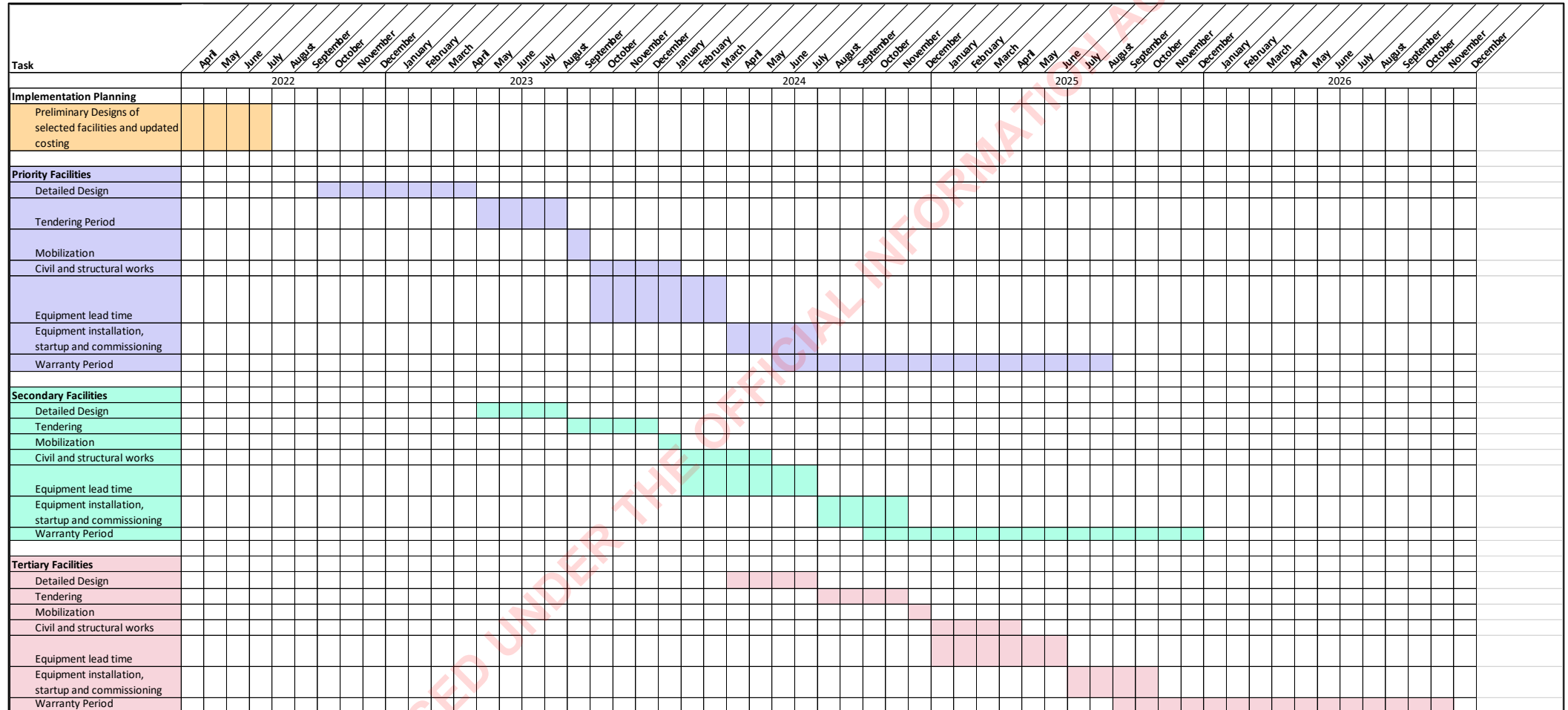


Figure 5-1. Conceptual implementation schedule

6. Limitations, Risks and Considerations for Subsequent Phases of Work

Several limitations of this estimate update are noted, which may carry financial or schedule risk, including:

- The capital cost estimate does not account for potential bulk/program discounts which may be achieved, depending on the procurement approach.
- Capital cost estimate was developed based on a review of the available space on each of the respective sites for the new building footprint. No consideration has been made for setting aside space to integrate future treatment equipment within the site footprints.
- A quote for container disposal specific to the Christchurch-area was not available within the timeframe to develop this estimate. A conservative value has been assumed in the interim.
- Chemical supply cost estimates were based on flows from the previous fiscal year and did not account for increases in flow with population growth
- Only one supplier of HFA was able to provide a quote at the time of the estimate development (Ixom). It is anticipated that other suppliers may begin to carry this chemical as fluoridation becomes more commonplace; however, for the time being a single supplier presents a potential supply chain risk.
- Additional headloss (and therefore pumping energy consumption) will be incurred if a mixer is installed; while this was not included in the operating cost estimate, it is recommended that this consideration be further evaluated where pump curves are available.
- The metering chambers have been identified as a suitable location for fluoride dosing at most sites, as existing infrastructure is present for temporary chlorination. It was noted by Council staff that several metering chambers are themselves constrained with limited space to install appropriate equipment for the fluoridation. It is possible these locations will require civil works to expand the metering chamber, or further investigations to identify an alternative location for fluoride dosing.
- While HFA was assumed to be the preferred fluoridation chemical, it is recommended that the benefits and drawbacks of using a sodium fluoride canister system be considered as part the next phase of the implementation planning process, as these systems have potential benefits in reducing handling of and exposure to a corrosive chemical.

Technical Memorandum

7. References

Environmental Protection Authority, 2020, HSR002491 Additives, Process Chemicals and Raw Materials (Corrosive) Group Standard

Standards New Zealand, 2012, NZS 5433:2012 Transport of Dangerous Goods on Land

Taumata Arowai, 2021, Draft Drinking Water Quality Assurance Rules

Water New Zealand. 2014. Water New Zealand Code of Practice: Fluoridation of Drinking-Water Supplies in New Zealand. First Edition. Wellington: Water New Zealand.

American Water Works Association, 2011, Sodium fluoride standard (ANSI/AWWA B701-11). AWWA, Denver.

American Water Works Association, 2011, Fluorosilicic acid (ANSI/AWWA B703-11). AWWA, Denver.

American Water Works Association, 2004, Water Fluoridation principles and practices, Manual of water supply practices (5th edition). AWWA, Denver.

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Appendix A – Capital Cost Estimate Breakdown

RELEASED UNDER THE OFFICIAL INFORMATION ACT 1982

Document 5

Item	% markups	Small System Cost	Medium System Cost	Large System Cost	All Facilities	Source
Process Equipment						
Bulk Tank		\$ 7,500	\$ 7,500	\$ 10,000		Filtec
Day Tank		\$ 3,000	\$ 5,000	\$ 8,000		Filtec
Dosing skid including pumps		\$ 26,000	\$ 43,000	\$ 68,000		Scaled from vendor quotes
Transfer pump		\$ 7,500	\$ 7,500	\$ 12,500		Filtec
Analyser		\$ 17,500	\$ 17,500	\$ 17,500		Filtec
Ultrasonic level indicator		\$ 2,000	\$ 2,000	\$ 2,000		ChemFeed
Ultrasonic level switch		\$ 2,000	\$ 2,000	\$ 2,000		ChemFeed
Tanker loading station for engineered tanks		\$ 3,000	\$ 3,000	\$ 3,000		ChemFeed
Leak detection switch x2		\$ 600	\$ 600	\$ 600		ChemFeed
Carrier water pumps		\$ 10,000	\$ 10,000	\$ 10,000		Scaled from vendor quotes
Bunding		\$ 8,000	\$ 8,000	\$ 10,000		
waste tank		\$ 2,000	\$ 2,000	\$ 2,000		
Injection quill		\$ 1,000	\$ 1,000	\$ 1,000		
Piping, Fittings and Pipe Tap		\$ 7,800	\$ 7,800	\$ 7,800		reference projects
Safety shower		\$ 7,000	\$ 7,000	\$ 7,000		Filtec
Scrubber		\$ 1,000	\$ 1,000	\$ 1,000		ChemFeed
Vapour detection		\$ 5,000	\$ 5,000	\$ 5,000		ChemFeed
Chemical Delivery Panel		\$ 5,000	\$ 5,000	\$ 5,000		reference project
Flow Meter		\$ 17,500	\$ 17,500	\$ 22,500		Filtec
Mixer	include if required	\$ 3,300	\$ 3,300	\$ 3,300		reference project
Personal Protective Equipment		\$ 4,000	\$ 4,000	\$ 4,000		
Critical Spares	10%	\$ 14,100	\$ 16,000	\$ 20,300		reference project
Installation	30%	\$ 41,100	\$ 46,800	\$ 59,500		reference project
Process Subtotal		\$ 196,000	\$ 223,000	\$ 282,000		

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Item	% markups	Small System Cost	Medium System Cost	Large System Cost	All Facilities	Source
Mechanical						
Mechanical Allowance (ventillation, heating, including installation)		\$ 15,000	\$ 15,000	\$ 15,000		reference project
Mechanical Subtotal		\$ 15,000	\$ 15,000	\$ 15,000		
Structural						
Building expansion. Excludes designated substance/asbestos abatement	include if required	\$ 32,000	\$ 32,000	\$ 40,000		reference project
Structural Subtotal		\$ 32,000	\$ 32,000	\$ 40,000		
Civil						
Civil Allowance (trenching, identification of buried services, site reinstatement)		\$ 60,000	\$ 60,000	\$ 60,000		reference projects
tree removal	include if required	\$ 5,000	\$ 5,000	\$ 5,000		
overall site constraints	include if required					
minor	10%	\$ 6,000	\$ 6,000	\$ 6,000		
medium	25%	\$ 15,000	\$ 15,000	\$ 15,000		
high	40%	\$ 24,000	\$ 24,000	\$ 24,000		
markup - Delivery Constraint	include if required					
minor	10%	\$ 6,000	\$ 6,000	\$ 6,000		
medium	20%	\$ 12,000	\$ 12,000	\$ 12,000		
markup - WW connection available	include if required					
At Road	10%	\$ 6,000	\$ 6,000	\$ 6,000		
far	15%	\$ 9,000	\$ 9,000	\$ 9,000		
none	25%	\$ 15,000	\$ 15,000	\$ 15,000		
Civil Subtotal		\$ 77,000	\$ 77,000	\$ 77,000		
Electrical						
Electrical allowance (lighting, electrical connections & wiring) - not including any works to bring existing electrical installations in line with current code requirements		\$ 30,000	\$ 30,000	\$ 43,000		reference projects
Electrical Subtotal		\$ 30,000	\$ 30,000	\$ 43,000		

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Item	% markups	Small System Cost	Medium System Cost	Large System Cost	All Facilities	Source
I&C						
I&C integration allowance		\$ 50,000	\$ 50,000	\$ 50,000		reference projects estimate per workshop discussion
New I/O modules		\$ 10,000	\$ 10,000	\$ 10,000		
I&C Subtotal		\$ 60,000	\$ 60,000	\$ 60,000		
Misc.						
Commissioning		\$ 12,500	\$ 12,500	\$ 12,500		
SCADA critical spares		\$ 5,000	\$ 5,000	\$ 5,000		updated per CCC feedback
Plant Security Allowance (fencing, access control)		\$ 15,000	\$ 15,000	\$ 15,000		
Misc. Subtotal		\$ 33,000	\$ 33,000	\$ 33,000		
Direct Cost Subtotal - Per Facility		\$ 443,000	\$ 470,000	\$ 550,000		
Direct Cost Estimate - All facilities					\$ 20,065,000	
Markups						
Preliminary & General Cost, Mobilization & Demobilization	30%	\$ 133,000	\$ 141,000	\$ 165,000		reference projects
Contractor Overhead, Profit and Risk	15%	\$ 67,000	\$ 71,000	\$ 83,000		reference projects
Warranty (Defects Liability Period)	2%	\$ 9,000	\$ 10,000	\$ 11,000		
Construction Subtotal - Per Facility	47%	\$ 652,000	\$ 692,000	\$ 809,000		
					\$ 9,498,000	
Construction Estimate - All facilities					\$ 29,563,000	\$ 29,563,000

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Item	% markups	Small System Cost	Medium System Cost	Large System Cost	All Facilities	Source
Non Construction Implementation Costs						
Permitting & Consents	2%				\$ 592,000	reference projects reference projects, modified per input from
Engineering	13%				\$ 3,844,000	CCC estimating engineer
Services During Construction (Inspection, Contract Administration)	7%				\$ 2,070,000	CCC estimating practice
CCC Internal Project Management	4%				\$ 1,183,000	CCC estimating practice
Documentation Updates (reports, asset management systems, as built drawings, P&IDs, Operating and Maintenance Manuals, field labelling, GIS updates, OEM manuals, SSRMP plans, SOPs, contractor servicing plans, operational and compliance checklists)					\$ 675,000	3 weeks per facility @\$125/hr, as noted in CCC feedback estimate per workshop discussion, 12 weeks
SCADA Template development - CCC internal SCADA communications protocols upgrade (transition to DNP3)					\$ 60,000	@\$5000/week
					\$ 1,800,000	estimate per workshop discussion
Chemical/ safety labelling					\$ 45,000	per CCC feedback
						` @\$125/hr, as noted in
Training					\$ 35,000	CCC feedback
Non Construction Implementation Subtotal - All Fac	35%				\$ 10,304,000	
Base Estimate - All facilities					\$ 39,867,000	
Contingency	30%				\$ 11,961,000	consistent with CCC estimating practice
Project Estimate - All facilities	30%				\$ 51,828,000	
Escalation	5%				\$ 6,250,000	28 months @ 5%/year, based on July 2024 midpoint of construction
Total Outrun Cost Estimate - All facilities	5%				\$ 58,078,000	

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Potential Designations		Facility															
		Thompsons	Avonhead	Belfast	Burnside	Crosbie	Farrington	Grampian	Jeffreys	Redwood	Wrights	Gardiners	Aston	Effingham	Keyes	Lake Terrace	
Capacity Future (m3/hr)		350	374	380	845	512	919	450	500	425	356	350	285	321	580	485	
Avg. flow (based on 30% of future capacity) (m3/hr)		105	112	114	254	154	276	135	150	127	107	105	86	96	174	146	
Facility Size designation		Medium	Medium	Medium	Large	Medium	Large	Medium	Medium	Medium	Medium	Medium	Small	Medium	Medium	Medium	
Mixer required	Yes/no	Yes	Yes	No	No	No	Yes	No	No	No	Yes	No	Yes	Yes	No	Yes	
Building expansion required	yes/no	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
tree removal required	Yes/no	No	No	Yes	Yes	No	Yes	No	No	No	Yes	No	No	No	No	No	
overall site constraints	none/minor/medium/high	None	None	Medium	None	None	None	None	None	Medium	None	None	None	None	None	Medium	
markup - Delivery Constraint	none/minor/medium	None	None	Minor	None	Minor	None	None	Minor	None	None	None	None	Minor	None	None	
markup - WW connection	on site, on road, far, none	None	At Road	At Road	Far	Far	At Road	At Road	Far	At Road	At Road	Far	On Site	At Road	At Road	At Road	
Water Supply Area	Christchurch, Brooklands Kainga, Akaroa	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	
Item																	
Bulk Tank		\$ 7,500	\$ 7,500	\$ 7,500	\$ 10,000	\$ 7,500	\$ 10,000	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	
Day Tank		\$ 5,000	\$ 5,000	\$ 5,000	\$ 8,000	\$ 5,000	\$ 8,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 3,000	\$ 5,000	\$ 5,000	
Dosing skid including pumps		\$ 43,000	\$ 43,000	\$ 43,000	\$ 68,000	\$ 43,000	\$ 68,000	\$ 43,000	\$ 43,000	\$ 43,000	\$ 43,000	\$ 43,000	\$ 43,000	\$ 26,000	\$ 43,000	\$ 43,000	
Transfer pump		\$ 7,500	\$ 7,500	\$ 7,500	\$ 12,500	\$ 7,500	\$ 12,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	
Analyser		\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	
Ultrasonic level indicator		\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	
Ultrasonic level switch		\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	
Tanker loading station for engineered tanks		\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	
Leak detection switch x2		\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	
Carrier water pumps		\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	
Bunding		\$ 8,000	\$ 8,000	\$ 8,000	\$ 10,000	\$ 8,000	\$ 10,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	
waste tank		\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	
Injection quill		\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	
Piping, Fittings and Pipe Tap		\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	
Safety shower		\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	
Scrubber		\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	
Vapour detection		\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	
Chemical Delivery Panel		\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	
Flow Meter		\$ 17,500	\$ 17,500	\$ 17,500	\$ 22,500	\$ 17,500	\$ 22,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	
Mixer	include if required	\$ 3,300	\$ 3,300	\$ -	\$ -	\$ -	\$ 3,300	\$ -	\$ 3,300	\$ -	\$ 3,300	\$ -	\$ 3,300	\$ 3,300	\$ -	\$ 3,300	
Personal Protective Equipment		\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	
Critical Spares		\$ 16,000	\$ 16,000	\$ 16,000	\$ 20,300	\$ 16,000	\$ 20,300	\$ 16,000	\$ 16,000	\$ 16,000	\$ 16,000	\$ 16,000	\$ 16,000	\$ 14,100	\$ 16,000	\$ 16,000	
Installation		\$ 46,800	\$ 46,800	\$ 46,800	\$ 59,500	\$ 46,800	\$ 59,500	\$ 46,800	\$ 46,800	\$ 46,800	\$ 46,800	\$ 46,800	\$ 46,800	\$ 41,100	\$ 46,800	\$ 46,800	
Process Subtotal		\$ 223,000	\$ 223,000	\$ 220,000	\$ 279,000	\$ 220,000	\$ 282,000	\$ 220,000	\$ 223,000	\$ 220,000	\$ 223,000	\$ 220,000	\$ 196,000	\$ 223,000	\$ 220,000	\$ 223,000	

Document 5

Potential Designations		Facility																		
		Thompsons	Avonhead	Belfast	Burnside	Crosbie	Farrington	Grampian	Jeffreys	Redwood	Wrights	Gardiners	Aston	Effingham	Keyes	Lake Terrace				
Mechanical																				
Mechanical Allowance (ventillation, heating, including installation)		\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	
Mechanical Subtotal		\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	\$	15,000	
Structural																				
Building expansion. Excludes designated substance/asbestos abatement		include if required	\$	32,000	\$	32,000	\$	32,000	\$	40,000	\$	32,000	\$	40,000	\$	32,000	\$	32,000	\$	32,000
Structural Subtotal			\$	32,000	\$	32,000	\$	32,000	\$	40,000	\$	32,000	\$	40,000	\$	32,000	\$	32,000	\$	32,000
Civil																				
Civil Allowance (trenching, identification of buried services, site reinstatement)			\$	60,000	\$	60,000	\$	60,000	\$	60,000	\$	60,000	\$	60,000	\$	60,000	\$	60,000	\$	60,000
tree removal		include if required				\$	5,000	\$	5,000		\$	5,000		\$	5,000					
overall site constraints		include if required																		
minor		10%																		
medium		25%				\$	15,000						\$	15,000					\$	15,000
high		40%																		
markup - Delivery Constraint		include if required																		
minor		10%				\$	6,000		\$	6,000		\$	6,000				\$	6,000		
medium		20%																		
markup - WW connection available		include if required																		
At Road		10%		\$	6,000	\$	6,000		\$	6,000	\$	6,000		\$	6,000		\$	6,000	\$	6,000
far		15%					\$	9,000	\$	9,000		\$	9,000		\$	9,000				
none		25%	\$	15,000																
Civil Subtotal			\$	75,000	\$	66,000	\$	92,000	\$	74,000	\$	75,000	\$	71,000	\$	66,000	\$	75,000	\$	81,000
Electrical																				
Electrical allowance (lighting, electrial connections & wiring) - not including any works to bring existing electrical installations in line with current code requirements			\$	30,000	\$	30,000	\$	30,000	\$	43,000	\$	30,000	\$	43,000	\$	30,000	\$	30,000	\$	30,000
Electrical Subtotal			\$	30,000	\$	30,000	\$	30,000	\$	43,000	\$	30,000	\$	43,000	\$	30,000	\$	30,000	\$	30,000

Document 5

Potential Designations	Facility															
	Thompsons	Avonhead	Belfast	Burnside	Crosbie	Farrington	Grampian	Jeffreys	Redwood	Wrights	Gardiners	Aston	Effingham	Keyes	Lake Terrace	
I&C																
I&C integration allowance	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000
I&C Subtotal	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000
Misc. Commissioning																
Plant Security Allowance (fencing, access control)	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000
Misc. Subtotal	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000
Direct Cost Subtotal - Per Facility	\$ 440,000	\$ 431,000	\$ 454,000	\$ 516,000	\$ 437,000	\$ 516,000	\$ 428,000	\$ 440,000	\$ 443,000	\$ 436,000	\$ 431,000	\$ 398,000	\$ 437,000	\$ 428,000	\$ 446,000	
Markups																
Preliminary & General Cost, Mobilization & Demobilization	\$ 132,000	\$ 130,000	\$ 137,000	\$ 155,000	\$ 132,000	\$ 155,000	\$ 129,000	\$ 132,000	\$ 133,000	\$ 131,000	\$ 130,000	\$ 120,000	\$ 132,000	\$ 129,000	\$ 134,000	
Contractor Overhead, Profit and Risk	\$ 66,000	\$ 65,000	\$ 69,000	\$ 78,000	\$ 66,000	\$ 78,000	\$ 65,000	\$ 66,000	\$ 67,000	\$ 66,000	\$ 65,000	\$ 60,000	\$ 66,000	\$ 65,000	\$ 67,000	
Warranty (Defects Liability Period)	\$ 9,000	\$ 9,000	\$ 10,000	\$ 11,000	\$ 9,000	\$ 11,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 8,000	\$ 9,000	\$ 9,000	\$ 9,000	
Construction Subtotal - Per Facility	\$ 647,000	\$ 635,000	\$ 670,000	\$ 760,000	\$ 644,000	\$ 760,000	\$ 631,000	\$ 647,000	\$ 652,000	\$ 642,000	\$ 635,000	\$ 586,000	\$ 644,000	\$ 631,000	\$ 656,000	

Document 5

[illegible]

Document 5

	Carters	Estuary	Sockburn	Denton	Wilmers	Dunbars	Main Pumps WS	Addington	Aldwins	Blighs	Grassmere	Hillmorton	Hills	Mays	Montreal	Spreydon
Capacity Future (m3/hr)	551	277	1,320	1,100	470	1,150	1,000	252	280	280	528	300	580	550	449	450
Avg. flow (based on 30% of future capacity) (m3/hr)	165	83	396	330	141	345	300	76	84	84	158	90	174	165	135	135
Facility Size designation	Medium	Small	Large	Large	Medium	Large	Large	Small	Small	Small	Medium	Small	Medium	Medium	Medium	Medium
Mixer required	Yes	No	Yes	No	Yes	No	No	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes
Building expansion required	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
tree removal required	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	No	No	No	No	Yes
overall site constraints	High	High	None	None	Minor	None	N/A	Medium	None	None	Medium	High	High	High	Minor	None
markup - Delivery Constraint	Medium	Medium	None	Minor	None	Minor	None	Minor	None	None	Minor	Minor	None	Minor	None	None
markup - WW connection	At Road	At Road	Far	Far	None	At Road	At Road	At Road	At Road	At Road	At Road	At Road	At Road	On Site	At Road	At Road
Water Supply Area	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch
Item																
Bulk Tank	\$ 7,500	\$ 7,500	\$ 10,000	\$ 10,000	\$ 7,500	\$ 10,000	\$ 10,000	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500
Day Tank	\$ 5,000	\$ 3,000	\$ 8,000	\$ 8,000	\$ 5,000	\$ 8,000	\$ 8,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 5,000	\$ 3,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Dosing skid including pumps	\$ 43,000	\$ 26,000	\$ 68,000	\$ 68,000	\$ 43,000	\$ 68,000	\$ 68,000	\$ 26,000	\$ 26,000	\$ 26,000	\$ 43,000	\$ 26,000	\$ 43,000	\$ 43,000	\$ 43,000	\$ 43,000
Transfer pump	\$ 7,500	\$ 7,500	\$ 12,500	\$ 12,500	\$ 7,500	\$ 12,500	\$ 12,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500
Analyser	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500
Ultrasonic level indicator	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
Ultrasonic level switch	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
Tanker loading station for engineered tanks	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000
Leak detection switch x2	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600
Carrier water pumps	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000
Bunding	\$ 8,000	\$ 8,000	\$ 10,000	\$ 10,000	\$ 8,000	\$ 10,000	\$ 10,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000
waste tank	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
Injection quill	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Piping, Fittings and Pipe Tap	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800
Safety shower	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000
Scrubber	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Vapour detection	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Chemical Delivery Panel	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000
Flow Meter	\$ 17,500	\$ 17,500	\$ 22,500	\$ 22,500	\$ 17,500	\$ 22,500	\$ 22,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500
Mixer	\$ 3,300	\$ -	\$ 3,300	\$ -	\$ 3,300	\$ -	\$ -	\$ 3,300	\$ 3,300	\$ -	\$ -	\$ -	\$ 3,300	\$ 3,300	\$ 3,300	\$ 3,300
Personal Protective Equipment	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000
Critical Spares	\$ 16,000	\$ 14,100	\$ 20,300	\$ 20,300	\$ 16,000	\$ 20,300	\$ 20,300	\$ 14,100	\$ 14,100	\$ 14,100	\$ 16,000	\$ 14,100	\$ 16,000	\$ 16,000	\$ 16,000	\$ 16,000
Installation	\$ 46,800	\$ 41,100	\$ 59,500	\$ 59,500	\$ 46,800	\$ 59,500	\$ 59,500	\$ 41,100	\$ 41,100	\$ 41,100	\$ 46,800	\$ 41,100	\$ 46,800	\$ 46,800	\$ 46,800	\$ 46,800
Process Subtotal	\$ 223,000	\$ 193,000	\$ 282,000	\$ 279,000	\$ 223,000	\$ 279,000	\$ 279,000	\$ 196,000	\$ 196,000	\$ 193,000	\$ 220,000	\$ 193,000	\$ 223,000	\$ 223,000	\$ 223,000	\$ 223,000

Document 5

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Document 5

	Carters	Estuary	Sockburn	Denton	Wilmers	Dunbars	Main Pumps WS	Addington	Aldwins	Blighs	Grassmere	Hillmorton	Hills	Mays	Montreal	Spreydon
I&C																
I&C integration allowance	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000
I&C Subtotal	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000
Misc. Commissioning																
Plant Security Allowance (fencing, access control)	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000
Misc. Subtotal	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000
Direct Cost Subtotal - Per Facility	\$ 472,000	\$ 437,000	\$ 514,000	\$ 517,000	\$ 419,000	\$ 514,000	\$ 468,000	\$ 430,000	\$ 404,000	\$ 406,000	\$ 449,000	\$ 431,000	\$ 455,000	\$ 455,000	\$ 437,000	\$ 436,000
Markups																
Preliminary & General Cost, Mobilization & Demobilization	\$ 142,000	\$ 132,000	\$ 155,000	\$ 156,000	\$ 126,000	\$ 155,000	\$ 141,000	\$ 129,000	\$ 122,000	\$ 122,000	\$ 135,000	\$ 130,000	\$ 137,000	\$ 137,000	\$ 132,000	\$ 131,000
Contractor Overhead, Profit and Risk	\$ 71,000	\$ 66,000	\$ 78,000	\$ 78,000	\$ 63,000	\$ 78,000	\$ 71,000	\$ 65,000	\$ 61,000	\$ 61,000	\$ 68,000	\$ 65,000	\$ 69,000	\$ 69,000	\$ 66,000	\$ 66,000
Warranty (Defects Liability Period)	\$ 10,000	\$ 9,000	\$ 11,000	\$ 11,000	\$ 9,000	\$ 11,000	\$ 10,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 10,000	\$ 10,000	\$ 9,000	\$ 9,000
Construction Subtotal - Per Facility	\$ 695,000	\$ 644,000	\$ 758,000	\$ 762,000	\$ 617,000	\$ 758,000	\$ 690,000	\$ 633,000	\$ 596,000	\$ 598,000	\$ 661,000	\$ 635,000	\$ 671,000	\$ 671,000	\$ 644,000	\$ 642,000

Document 5

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Document 5

	Sydenham	Trafalgar	Worcester	Tanner	Picton	Tara	St Johns	Woolston	Marshlands	Parklands	Prestons	Brooklands	Kainga	Akaroa	L'Aube Hill WTP	
Capacity Future (m3/hr)	450	450	511	137	558	120	667	545	440	500	768	180	108	88		
Avg. flow (based on 30% of future capacity) (m3/hr)	135	135	153	41	167	36	200	164	132	150	230		54	32	26	
Facility Size designation	Medium	Medium	Medium	Small	Medium	Small	Large	Medium	Medium	Medium	Large	Small		Small		
Mixer required	Yes	No	No	No	No	Yes	Yes	Yes	No	No	No	No		No	No	
Building expansion required	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	
tree removal required	No	No	Yes	Yes	No	Yes	Yes	Yes	No	No	No	Yes		No	No	
overall site constraints	None	None	Medium	None	None	None	None	Medium	None	None	None	None		None	No	
markup - Delivery Constraint	None	Medium	Minor	None	Minor	None	None	Medium	Minor	Minor	None	None		None	None	
markup - WW connection	Far	Far	At Road	At Road	Far	At Road	At Road	At Road	Far	Far	At Road	At Road		On Site	On Site	
Water Supply Area	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Christchurch	Brooklands / Kainga	Brooklands / Kainga	Akaroa		
Item																TOTAL - all facilities
Bulk Tank	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 10,000	\$ 7,500	\$ 7,500	\$ 7,500	\$ 10,000	\$ 7,500	\$ 7,500	\$ 7,500	\$ 357,500	
Day Tank	\$ 5,000	\$ 5,000	\$ 5,000	\$ 3,000	\$ 5,000	\$ 3,000	\$ 8,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 8,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 227,000	
Dosing skid including pumps	\$ 43,000	\$ 43,000	\$ 43,000	\$ 26,000	\$ 43,000	\$ 26,000	\$ 68,000	\$ 43,000	\$ 43,000	\$ 43,000	\$ 68,000	\$ 26,000	\$ 26,000	\$ 26,000	\$ 1,948,000	
Transfer pump	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 12,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 12,500	\$ 7,500	\$ 7,500	\$ 7,500	\$ 377,500	
Analyser	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 787,500	
Ultrasonic level indicator	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 90,000	
Ultrasonic level switch	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 90,000	
Tanker loading station for engineered tanks	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000	\$ 135,000	
Leak detection switch x2	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 600	\$ 27,000	
Carrier water pumps	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 450,000	
Bunding	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 10,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 10,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 376,000	
waste tank	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 90,000	
Injection quill	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 45,000	
Piping, Fittings and Pipe Tap	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 7,800	\$ 351,000	
Safety shower	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 315,000	
Scrubber	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 45,000	
Vapour detection	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 225,000	
Chemical Delivery Panel	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 225,000	
Flow Meter	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 22,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 22,500	\$ 17,500	\$ 17,500	\$ 17,500	\$ 827,500	
Mixer	\$ 3,300	\$ -	\$ -	\$ -	\$ -	\$ 3,300	\$ 3,300	\$ 3,300	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 69,300	
Personal Protective Equipment	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 180,000	
Critical Spares	\$ 16,000	\$ 16,000	\$ 16,000	\$ 14,100	\$ 16,000	\$ 14,100	\$ 20,300	\$ 16,000	\$ 16,000	\$ 16,000	\$ 20,300	\$ 14,100	\$ 14,100	\$ 14,100	\$ 733,500	
Installation	\$ 46,800	\$ 46,800	\$ 46,800	\$ 41,100	\$ 46,800	\$ 41,100	\$ 59,500	\$ 46,800	\$ 46,800	\$ 46,800	\$ 59,500	\$ 41,100	\$ 41,100	\$ 41,100	\$ 2,144,900	
Process Subtotal	\$ 223,000	\$ 220,000	\$ 220,000	\$ 193,000	\$ 220,000	\$ 196,000	\$ 282,000	\$ 223,000	\$ 220,000	\$ 220,000	\$ 279,000	\$ 193,000	\$ 193,000	\$ 193,000	\$ 10,138,000	

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	Sydenham	Trafalgar	Worcester	Tanner	Picton	Tara	St Johns	Woolston	Marshlands	Parklands	Prestons	Brooklands	Kainga	Akaroa L’Aube Hill WTP	
Mechanical															
Mechanical Allowance (ventillation, heating, including installation)	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 675,000
Mechanical Subtotal	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 675,000
Structural															
Building expansion. Excludes designated substance/asbestos abatement	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 40,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 40,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 1,432,000
Structural Subtotal	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 40,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 40,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 1,432,000
Civil															
Civil Allowance (trenching, identification of buried services, site reinstatement)	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 2,700,000
tree removal			\$ 5,000	\$ 5,000			\$ 5,000	\$ 5,000				\$ 5,000			\$ 75,000
overall site constraints															\$ -
minor															\$ 12,000
medium			\$ 15,000					\$ 15,000							\$ 105,000
high															\$ 120,000
markup - Delivery Constraint															\$ -
minor			\$ 6,000		\$ 6,000				\$ 6,000	\$ 6,000					\$ 84,000
medium		\$ 12,000						\$ 12,000							\$ 48,000
markup - WW connection available															\$ -
At Road			\$ 6,000	\$ 6,000		\$ 6,000	\$ 6,000	\$ 6,000			\$ 6,000	\$ 6,000			\$ 168,000
far	\$ 9,000	\$ 9,000			\$ 9,000				\$ 9,000	\$ 9,000					\$ 99,000
none															\$ 30,000
Civil Subtotal	\$ 69,000	\$ 81,000	\$ 92,000	\$ 71,000	\$ 75,000	\$ 71,000	\$ 71,000	\$ 98,000	\$ 75,000	\$ 75,000	\$ 66,000	\$ 71,000	\$ 60,000	\$ 60,000	\$ 3,441,000
Electrical															
Electrical allowance (lighting, electrial connections & wiring) - not including any works to bring existing electrical installations in line with current code requirements	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 43,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 43,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 1,454,000
Electrical Subtotal	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 43,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 43,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 1,454,000

Document 5

	Sydenham	Trafalgar	Worcester	Tanner	Picton	Tara	St Johns	Woolston	Marshlands	Parklands	Prestons	Brooklands	Kainga	Akaroa L'Aube Hill WTP	
I&C															
I&C integration allowance	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 2,250,000
I&C Subtotal	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 50,000	\$ 2,250,000
Misc. Commissioning															
Plant Security Allowance (fencing, access control)	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 675,000
Misc. Subtotal	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 15,000	\$ 675,000
Direct Cost Subtotal - Per Facility	\$ 434,000	\$ 443,000	\$ 454,000	\$ 406,000	\$ 437,000	\$ 409,000	\$ 516,000	\$ 463,000	\$ 437,000	\$ 437,000	\$ 508,000	\$ 406,000	\$ 395,000	\$ 395,000	\$ 20,065,000
Markups															
Preliminary & General Cost, Mobilization & Demobilization	\$ 131,000	\$ 133,000	\$ 137,000	\$ 122,000	\$ 132,000	\$ 123,000	\$ 155,000	\$ 139,000	\$ 132,000	\$ 132,000	\$ 153,000	\$ 122,000	\$ 119,000	\$ 119,000	
Contractor Overhead, Profit and Risk	\$ 66,000	\$ 67,000	\$ 69,000	\$ 61,000	\$ 66,000	\$ 62,000	\$ 78,000	\$ 70,000	\$ 66,000	\$ 66,000	\$ 77,000	\$ 61,000	\$ 60,000	\$ 60,000	
Warranty (Defects Liability Period)	\$ 9,000	\$ 9,000	\$ 10,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 11,000	\$ 10,000	\$ 9,000	\$ 9,000	\$ 11,000	\$ 9,000	\$ 8,000	\$ 8,000	
Construction Subtotal - Per Facility	\$ 640,000	\$ 652,000	\$ 670,000	\$ 598,000	\$ 644,000	\$ 603,000	\$ 760,000	\$ 682,000	\$ 644,000	\$ 644,000	\$ 749,000	\$ 598,000	\$ 582,000	\$ 582,000	

Document 5

[illegible]

NOTE: • If a supply is already fully fluoridated, please enter "installed- in use" in Column C and no further information is required for that supply. • If there are additional non-fluoridated supplies servicing a population of 500 or over that are not listed please add these supplies in a new row and enter the required information. • In some cases the water supply referred to may already be partly fluoridated, and therefore the information requested relates only to the zones of that supply that are non-fluoridated. • In other cases zones rather than the parent water supply may be listed. If you require any further assistance with responding to this questionnaire please contact fluoride@health.govt.nz								Name and contact details of key contact for Community Water Fluoridation	Any other comments
Local Authority- Water Supplier	Water supply (servicing population of 500 people or more)	What is the status of fluoridation infrastructure? (select an option)	Are fluoridation capital works underway or planned? (Yes/No)	Expected date for completion of capital works, if relevant (enter date)- ie: respond if answer to Column D was yes	Estimated capital works cost to fluoridate supply if a direction is issued (dollars)	Budgeted capital works costs to fluoridate supply included in long term plans or budgets (dollars and allocation year/s)	Estimated number of months that would be required to fluoridate water supply if a direction is issued		
Out of Scope									
Christchurch city Council	Akaroa	Not Installed	No		\$1,143,398	\$0		Tim Drennan (Manager Service Excellence) - tim.drennan@ccc.govt.nz Michele McDonald (Acting Manager Planning & Delivery) - michele.mcdonald@ccc.govt.nz	timeframe dependent on funding provision
Christchurch city Council	Brooklands / Kainga	Not Installed	No		\$2,318,146	\$0		Tim Drennan (Manager Service Excellence) - tim.drennan@ccc.govt.nz Michele McDonald (Acting Manager Planning & Delivery) - michele.mcdonald@ccc.govt.nz	timeframe dependent on funding provision
Christchurch city Council	Christchurch	Not Installed	No		\$59,615,559	\$0		Tim Drennan (Manager Service Excellence) - tim.drennan@ccc.govt.nz Michele McDonald (Acting Manager Planning & Delivery) - michele.mcdonald@ccc.govt.nz	timeframe dependent on funding provision includes cost increase for 5 water supply PS capital projects, where scope does not currently provide for water treatment
Christchurch city Council	Lyttelton	Not Installed	No		\$0	\$0		n/a	note that Lyttelton is fully supplied from Christchurch
Out of Scope									

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133 Molesworth Street
PO Box 5013
Wellington 6140
New Zealand
T+64 4 496 2000

17 June 2022

Dawn Baxendale
Chief Executive
Christchurch City Council

Tēnā koe Dawn,

Community water fluoridation next steps

Thank you for your response to my letter of 15 December 2021, providing information on the status of the fluoridation infrastructure in your area and the estimated costs and timeframes that would be necessary to fluoridate your drinking water supplies. This information has informed my decisions about which local authorities to consider first, in my decision-making about whether to issue directions to fluoridate.

I note that you have estimated the capital cost of introducing community water fluoridation in Christchurch and Akaroa at \$58 million, and that it would take 44 months. While I acknowledge the complexity of the Christchurch supply, I note this is a more than threefold increase on some previous estimates. I am advised that the engineering report you provided describes this cost as a preliminary estimate and that there is potential to undertake further work to refine the design and get greater certainty on the costs and timeframes. I strongly encourage you to do this.

I have now advised fourteen local authorities that I will soon decide whether to issue directions in relation to some of their drinking water supplies. In deciding which local authorities and water supplies to consider first, I took into account factors including local authority ability to implement fluoridation swiftly, and size and needs of populations served by the relevant water supplies.

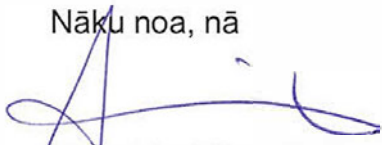
Drinking water supplies controlled by your local authority are not included in the first set of potential directions to fluoridate. However, it is likely your situation will be considered in the coming months, and that a decision on whether to issue a direction to fluoridate your drinking water supplies will be made by the end of 2022. As I noted in my earlier letter, I am also mindful of current service delivery pressures across the water services and broader local government sector. In light of this, if I do issue directions for your water supplies, some of these may have compliance dates set for after July 2024 when the new water service entities are established as part of the Three Waters reforms.

When considering whether to issue any direction to fluoride, and as required under the new legislation, I will seek written comment from you on the estimated costs of fluoridation (including costs of ongoing monitoring and maintenance), and the date by which you could comply with a direction. I will also consider the scientific evidence on the effectiveness of fluoridation, and the oral health status, population size and estimated costs of fluoridation for the area served by each water supply.

Please note too that you do not need to wait for a potential direction from me to start fluoridating water supplies in your area. Community water fluoridation is widely recognised by national and international expert bodies to improve public health by substantially reducing rates of preventable tooth decay. Here in Aotearoa New Zealand we still have high rates of preventable tooth decay, particularly amongst Māori and Pacific people, and people living in deprived communities. Evidence shows that community water fluoridation both improves the oral health of everyone and also has a proportionately larger benefit for these groups.

Thank you for your co-operation as we work together to improve the oral health of the communities we each serve.

Nāku noa, nā



Dr Ashley Bloomfield
Te Tumu Whakarae mō te Hauora
Director-General of Health

7 September

Dr. Diana Sarfati
Ministry of Health
PO Box 5013
Wellington 6140

Tēnā Koe Dr Sarfati

Fluoridation of Christchurch drinking water supplies

In early March 2022, we wrote to then Director-General of Health Dr Ashley Bloomfield to respond to his December 2021 request for information on the 'readiness' of the City Council to plan or undertake fluoridation of its drinking water supplies. As we noted in our letter to Dr. Bloomfield:

- The Council's public drinking water supplies are not currently fluoridated.
- The capital cost to fluoridate Christchurch and Akaroa supplies is estimated to be over \$60 million in 2021/22 dollars, and is expected to incur operational costs upwards of \$3 million a year.
- The time frame to complete fluoridation of the Christchurch and Akaroa public drinking water supplies was estimated to be around 44 months, due to the complexity of the works required and the constraints under which these works can be completed (such as the fact that the network cannot accommodate multiple, simultaneous upgrades).

In early April 2022, our councillors requested that we write to the Director-General of Health to seek information on all alternative options that have been considered for fluoridating children's teeth, before any decision is made to instruct the Council to fluoridate its water supplies. For example, it was noted that in the past fluoride tablets were provided to children, and it was queried whether an approach such as this might be as effective and more affordable, given the complexity of the network and the unique challenges posed by our water supply infrastructure.

In mid-June 2022, Dr. Bloomfield wrote to advise that Christchurch was not among the first local authorities to be included in potential directions to fluoridate, but it was likely that Christchurch would be considered 'in coming months'.

My team and I would welcome the opportunity to meet with you to discuss the matter of fluoridation in detail.

Ngā mihi nui



Dawn Baxendale
Chief Executive

Rec'd 20/9
NMCC
Public Health

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