

Three Waters Infrastructure and Environment Committee AGENDA

Notice of Meeting:

An ordinary meeting of the Three Waters Infrastructure and Environment Committee will be held on:

Date: **Wednesday 6 April 2022**

Time: **9.30am**

Venue: **via audio/visual link**

Under the current provisions of the Covid-19 Protection Framework (traffic lights) the meeting is open to the public through access to the live broadcasting of the meeting: <http://councillive.ccc.govt.nz/live-stream>

Membership

Chairperson	Councillor Pauline Cotter
Deputy Chairperson	Councillor Phil Mauger
Members	Mayor Lianne Dalziel
	Deputy Mayor Andrew Turner
	Councillor Jimmy Chen
	Councillor Catherine Chu
	Councillor Melanie Coker
	Councillor Mike Davidson
	Councillor Celeste Donovan
	Councillor Anne Galloway
	Councillor James Gough
	Councillor Yani Johanson
	Councillor Aaron Keown
	Councillor Sam MacDonald
	Councillor Jake McLellan
	Councillor Tim Scandrett
	Councillor Sara Templeton

1 April 2022

Principal Advisor

Jane Davis
General Manager Infrastructure,
Planning & Regulatory Services
Tel: 941 8884

Andrew Campbell
Committee & Hearings Advisor
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Note: The reports contained within this agenda are for consideration and should not be construed as Council policy unless and until adopted. If you require further information relating to any reports, please contact the person named on the report.

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Ōtautahi-Christchurch is a city of opportunity for all

Open to new ideas, new people and new ways of doing things – a city where anything is possible

Principles

Being open, transparent and democratically accountable	Promoting equity, valuing diversity and fostering inclusion	Taking an inter-generational approach to sustainable development, prioritising the social, economic and cultural wellbeing of people and communities and the quality of the environment, now and into the future	Building on the relationship with Te Rūnanga o Ngāi Tahu and the Te Hononga-Council Papatipu Rūnanga partnership, reflecting mutual understanding and respect	Ensuring the diversity and interests of our communities across the city and the district are reflected in decision-making	Actively collaborating and co-operating with other local, regional and national organisations
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Community Outcomes

Resilient communities Strong sense of community Active participation in civic life Safe and healthy communities Celebration of our identity through arts, culture, heritage, sport and recreation Valuing the voices of all cultures and ages (including children)	Liveable city Vibrant and thriving city centre Sustainable suburban and rural centres A well connected and accessible city promoting active and public transport Sufficient supply of, and access to, a range of housing 21st century garden city we are proud to live in	Healthy environment Healthy water bodies High quality drinking water Unique landscapes and indigenous biodiversity are valued and stewardship exercised Sustainable use of resources and minimising waste	Prosperous economy Great place for people, business and investment An inclusive, equitable economy with broad-based prosperity for all A productive, adaptive and resilient economic base Modern and robust city infrastructure and community facilities
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Strategic Priorities

Enabling active and connected communities to own their future	Meeting the challenge of climate change through every means available	Ensuring a high quality drinking water supply that is safe and sustainable	Accelerating the momentum the city needs	Ensuring rates are affordable and sustainable
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Ensuring we get core business done while delivering on our Strategic Priorities and achieving our Community Outcomes

Engagement with the community and partners	Strategies, Plans and Partnerships	Long Term Plan and Annual Plan	Our service delivery approach	Monitoring and reporting on our progress
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THREE WATERS INFRASTRUCTURE AND ENVIRONMENT COMMITTEE OF THE WHOLE - TERMS OF REFERENCE NGĀ ĀRAHINA MAHINGA

Chair	Councillor Cotter
Deputy Chair	Councillor Mauger
Membership	The Mayor and All Councillors
Quorum	Half of the members if the number of members (including vacancies) is even, or a majority of members if the number of members (including vacancies) is odd.
Meeting Cycle	Monthly
Reports To	Council

Delegations

The Council delegates to the Three Waters Infrastructure and Environment Committee authority to monitor and make decisions on:

- Water supply, conservation and quality (*for the avoidance of doubt the Council retains its authority on matters relating to the Governments Water Reform*).
- Receive regular updates from the Water Management Zone Committees.
- Stormwater drainage including the Land Drainage Recovery Programme.
- Natural environment, including the waterways, aquifers, ecology and conservation of resources.
- Natural hazards protection, including flood protection and river control.
- Solid waste collection, processing and disposal including landfills.
- Sewage collection, treatment and disposal.
- Applications to the Biodiversity Fund.

Bylaws

The Council delegates to the Committee authority to:

- Oversee the development of new bylaws within the Committee's terms of reference, up to and including adopting draft bylaws for consultation.
- Oversee the review of the following bylaws, up to and including adopting draft bylaws for consultation.
 - Trade Waste Bylaw 2015
 - Waste Management Bylaw 2009
 - Water Supply, Wastewater and Stormwater Bylaw 2014

Submissions

- The Council delegates to the Committee authority:
- To consider and approve draft submissions on behalf of the Council on topics within its terms of reference. Where the timing of a consultation does not allow for consideration of a draft submission by the Council or relevant Committee, that the draft submission can be considered and approved on behalf of the Council.

Limitations

- This Committee does not have the authority to set project budgets, identify preferred suppliers or award contracts. These powers remain with the Finance and Performance Committee.
- The general delegations to this Committee exclude any specific decision-making powers that are delegated to a Community Board, another Committee of Council or Joint Committee. Delegations to staff are set out in the delegations register.
- The Council retains the authority to adopt policies, strategies and bylaws.
- The Council retains its authority on matters relating to the Government's Water Reform.
- The following matters are prohibited from being subdelegated in accordance with LGA 2002 Schedule 7 Clause 32(1) :
 - the power to make a rate; or
 - the power to make a bylaw; or
 - the power to borrow money, or purchase or dispose of assets, other than in accordance with the long-term plan; or
 - the power to adopt a long-term plan, annual plan, or annual report; or
 - the power to appoint a chief executive; or
 - the power to adopt policies required to be adopted and consulted on under this Act in association with the long-term plan or developed for the purpose of the local governance statement; or
 - the power to adopt a remuneration and employment policy.

Chairperson may refer urgent matters to the Council

As may be necessary from time to time, the Committee Chairperson is authorised to refer urgent matters to the Council for decision, where this Committee would ordinarily have considered the matter. In order to exercise this authority:

- The Committee Advisor must inform the Chairperson in writing the reasons why the referral is necessary.
- The Chairperson must then respond to the Committee Advisor in writing with their decision.
- If the Chairperson agrees to refer the report to the Council, the Council may then assume decision-making authority for that specific report.

Part A	Matters Requiring a Council Decision
Part B	Reports for Information
Part C	Decisions Under Delegation

TABLE OF CONTENTS

Karakia Tīmatanga	7
C 1. Apologies Ngā Whakapāha	7
B 2. Declarations of Interest Ngā Whakapuaki Aronga	7
C 3. Confirmation of Previous Minutes Te Whakaāe o te hui o mua	7
B 4. Public Forum Te Huinga Whānui	7
B 5. Deputations by Appointment Ngā Huinga Whakaritenga.....	7
B 6. Presentation of Petitions Ngā Pākikitanga	7

MINUTES REPORTS

B 7. Christchurch West Melton Water Management Zone Committee Minutes - 24 February 2022.....	13
B 8. Waimakariri Water Management Zone Committee Minutes - 1 November 2021	21

STAFF REPORTS

C 9. Duvauchelle Wastewater - Options for Public Consultation	23
B 10. Resource Recovery Bi-monthly Report January/February 2022	33
B 11. Implications of the Health (Fluoridation of Drinking Water) Amendment Act 2021 for Christchurch water supplies	53

Karakia Whakamutunga

Karakia Tīmatanga

1. Apologies Ngā Whakapāha

At the close of the agenda no apologies had been received.

2. Declarations of Interest Ngā Whakapuaki Aronga

Members are reminded of the need to be vigilant and to stand aside from decision making when a conflict arises between their role as an elected representative and any private or other external interest they might have.

3. Confirmation of Previous Minutes Te Whakaāe o te hui o mua

That the minutes of the Three Waters Infrastructure and Environment Committee meeting held on [Wednesday, 9 March 2022](#) be confirmed (refer page 8).

4. Public Forum Te Huinga Whānui

A period of up to 30 minutes will be available for people to speak for up to five minutes on any issue that is not the subject of a separate hearings process.

There were no public forum requests received at the time the agenda was prepared

5. Deputations by Appointment Ngā Huinga Whakaritenga

Deputations may be heard on a matter or matters covered by a report on this agenda and approved by the Chairperson.

There were no deputations by appointment at the time the agenda was prepared.

6. Presentation of Petitions Ngā Pākikitanga

There were no petitions received at the time the agenda was prepared.

Three Waters Infrastructure and Environment Committee OPEN MINUTES

Date: Wednesday 9 March 2022
Time: 9.35am
Venue: via audio/visual link

Present

Chairperson
Deputy Chairperson
Members

Councillor Pauline Cotter
Councillor Phil Mauger
Mayor Lianne Dalziel
Deputy Mayor Andrew Turner
Councillor Jimmy Chen
Councillor Catherine Chu
Councillor Melanie Coker
Councillor Mike Davidson
Councillor Celeste Donovan
Councillor Anne Galloway
Councillor James Gough
Councillor Yani Johanson
Councillor Aaron Keown
Councillor Sam MacDonald
Councillor Jake McLellan
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Part A Matters Requiring a Council Decision

Part B Reports for Information

Part C Decisions Under Delegation

Karakia Tīmatanga: Given by Councillor Cotter.

The agenda was dealt with in the following order.

1. Apologies Ngā Whakapāha

Part C

Committee Resolved TWIA/2022/00005

That the apologies received from Councillors Galloway, MacDonald and Templeton for lateness be accepted.

Councillor Cotter/Councillor Chen

Carried

2. Declarations of Interest Ngā Whakapuaki Aronga

Part B

There were no declarations of interest recorded.

3. Confirmation of Previous Minutes Te Whakaāe o te hui o mua

Part C

Committee Resolved TWIA/2022/00006

That the minutes of the Three Waters Infrastructure and Environment Committee meeting held on Wednesday, 9 February 2022 be confirmed.

Councillor Mauger/Councillor Davidson

Carried

4. Public Forum Te Huinga Whānui

Part B

There were no public forum presentations.

5. Deputations by Appointment Ngā Huinga Whakaritenga

Part B

There were no deputations by appointment.

6. Presentation of Petitions Ngā Pākikitanga

Part B

There was no presentation of petitions.

7. Three Waters Bi-monthly Report December 2021/January 2022

Committee Comment

1. As part of the Three Waters Reform section of the Three Waters Bi-monthly Report, Mayor Dalziel provided a summary of the report of the Working Group for Representation, Governance and Accountability of new Water Service Entities, including the process followed, ownership model suggested and the issues covered. Mayor Dalziel also acknowledged Doug Martin's role as Chair of the Working Group. The full report can be viewed online on the Department of Internal Affairs website: <https://www.dia.govt.nz/diawebsite.nsf/Files/Three-waters-reform-programme-2022/%24file/Governance-Working-Group-Report.pdf>
2. The Committee requested that Staff provide memos on the following matters:
 - a. the state of the Water Safety Plans;
 - b. the timeframe for when Water Safety Plan Volume C: Source Water Risk Management Plan for Christchurch/ Lyttelton is due to be started and finished;
 - c. when a response is expected from Environment Canterbury regarding the Council's Stormwater Catchment Plans that were submitted to it; and
 - d. the status of work on exemptions from excess water use charges for large families.
 - e. public access to online water meter readings and volume data, including the extent of reporting issues beyond multi-unit dwellings.
 - f. completion date for repairs on the Denton Pump Station, including the final work on the reservoir and the upgrade to the electrical controls of the pump station.
 - g. whether the work being done on the Hayton's Road wastewater renewal will have an impact on Hayton's Stream.
3. The Committee requested that Staff arrange a site visit for Council and Halswell-Hornby-Riccarton Community Board members to the Eastmans, Sutherlands and Hoon Hay Basins.
4. The Committee requested that Staff prepare a plan to communicate to the public on a regular basis the steps that are being taken to work towards dechlorination of water systems.

Committee Resolved TWIA/2022/00007

Part B

That the Three Waters Infrastructure and Environment Committee:

1. Receive the information in the Three Waters Bi-monthly Report December 2021/January 2022 Report

Councillor Cotter/Councillor Mauger

Carried

Councillor MacDonald joined the meeting at 9.37am during the presentation of the Three Waters Bi-monthly Report.

Councillor Templeton joined the meeting at 10.05am during the presentation of the Three Waters Bi-monthly Report.

Councillor Galloway joined the meeting at 10.38am during the presentation of the Three Waters Bi-monthly Report.

Karakia Whakamutunga: Given by Councillor Cotter.

Meeting concluded at 10.48am.

CONFIRMED THIS 6th DAY OF APRIL 2022

COUNCILLOR PAULINE COTTER
CHAIRPERSON

Unconfirmed

7. Christchurch West Melton Water Management Zone Committee Minutes - 24 February 2022

Reference Te Tohutoro: 22/289988

Report of Te Pou Matua: Liz Ryley, Committee & Hearings Advisor – liz.ryley@ccc.govt.nz

General Manager Jane Davis, GM Infrastructure, Planning & Regulatory Services –

Pouwhakarae: jane.davis@ccc.govt.nz


1. Purpose of Report Te Pūtake Pūrongo

The Christchurch West Melton Water Management Zone Committee held a meeting on 24 February 2022 and is circulating the Minutes recorded to the Three Waters Infrastructure and Environment Committee for its information.

2. Recommendation to Three Waters Infrastructure and Environment Committee

That the Three Waters Infrastructure and Environment Committee receives the Minutes from the Christchurch West Melton Water Management Zone Committee meeting held 24 February 2022.

Attachments Ngā Tāpirihanga

No.	Title	Page
A1 	Minutes Christchurch West Melton Water Management Zone Committee - 24 February 2022	14

Signatories Ngā Kaiwaitohu

Author	Liz Ryley - Committee and Hearings Advisor
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Christchurch West Melton Water Management Zone Committee OPEN MINUTES

Date:	Thursday 24 February 2022
Time:	6.04pm
Venue:	West Melton Community Centre, 1163 West Coast Road, West Melton and via audio/video link

Present

Chairperson	Kevin Brown - Community Representative
Deputy Chairperson	Annabelle Hasselman - Community Representative
Members	Mike Patchett - Community Representative
	Brynlea Stocks - Community Representative
	Councillor Phil Clearwater - Councillor Environment Canterbury
	Councillor Sophie McInnes - Selwyn District Council
	Arapata Reuben - Te Ngāi Tūāhuriri Rūnanga
	Les Wanhalla - Te Taumutu Rūnanga

Zone Facilitator
Shelley Washington
Tel: 027 294 5219
Environment Canterbury

Principal Advisor
Diane Shelander
Senior Policy Analyst
Tel: 941 8304
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Committee Advisor
Liz Ryley
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www.ecan.govt.nz/news-and-notice/minutes/Pages/Default.aspx

Christchurch West Melton Water
Management Zone Committee
24 February 2022



Arapata Reuben opened the meeting with a Karakia/Timatanga.

A minute's silence was observed for Peter Ramsden, Te Rūnanga o Kōkourarata, who passed away recently. Peter was passionate about the environment, and was involved in the beginning of the Canterbury Water Management Strategy.

The agenda was dealt with in the following order.

1. Apologies

Committee Resolved CWZC/2022/00001

That the apologies received from Helen Rutter, Emma Norrish and Oscar Bloom be accepted.

Les Wanhalla/Mike Patchett

Carried

2. Declarations of Interest

Annabelle Hasselman declared an interest in Item 11 - Ōpāwaho Heathcote River Network.

Mike Patchett declared an interest in Item 11 - Water and Wildlife Habitat Trust Ōtūkaikino River.

Councillor Clearwater provided a list of his interests.

3. Confirmation of Previous Minutes

Committee Resolved CWZC/2022/00002

That the minutes of the Christchurch West Melton Water Management Zone Committee meeting held on Thursday, 25 November 2021 be confirmed.

Mike Patchett/Phil Clearwater

Carried

4. Matters Arising from the Minutes

It was noted that the funding allocation of \$15,000 referred to at the previous meeting for on-the-ground projects aimed at improving waterway management or biodiversity, relates to Item 11 on today's agenda.

5. Deputations by Appointment

There were no deputations by appointment.

6. Identification of Urgent Items

Nil.

7. Identification of General Public Contributions

Nil.

Item 8 was dealt with prior to the conclusion of the meeting.

Christchurch West Melton Water
Management Zone Committee
24 February 2022



9. Erosion and Sediment Control Responsibilities Update

Committee Comments

A presentation was given by Jess Newlands, Environment Canterbury (ECan) Senior Resource Management Officer and Clive Appleton, Christchurch City Council (CCC) Healthy Waterways Programme Lead – “Christchurch City Council Comprehensive Stormwater Network Discharge Consent” (CSNDC).

See Minutes Attachment for detail of the presentation.

Jess provided detail on the background of the CSNDC, its purpose and location, how stormwater is defined, and a summary about what has changed. Clive referred to matters of erosion and sediment control, that all development sites must have an Erosion and Sediment Control Plan and about the checking and monitoring of these Plans by Council inspectors. He suggested dedicated staff were needed to assist with monitoring and inspections particularly following heavy rainfall events.

Discussion was held about the inclusion of heavy metal traps and greywater tanks; also about education of inspectors and what rules are contained in the District Plan in relation to erosion and sediment control. Clive undertook to investigate these matters.

Committee Resolved CWZC/2022/00003

That the Christchurch West Melton Water Management Zone Committee supports:

1. Building capacity of industry for erosion and sediment control.
2. Education courses being enhanced and continued.
3. The provision of an adequate number of dedicated erosion and sediment control officers.

Mike Patchett/Annabelle Hasselman

Carried

Attachments

- A Erosion and Sediment Control Presentation

10. Ihutai-Estuary and Coastal Catchment Stormwater Management Plan

Committee Comments

Paul Dickson, CCC Drainage Engineer, Stormwater & Waterways, presented about the Ihutai-Estuary and Coastal Catchment Stormwater Management Plan. See Minutes Attachment for detail of the presentation. He talked about:

- 1.1 What shapes the Ihutai-Estuary and Coastal Catchment Stormwater Management Plan (SMP).
- 1.2 Likely matters of interest in the SMP:
 - Contaminants;
 - Flooding.
- 1.3 Mitigations that the Council has and can put in place.

Christchurch West Melton Water
Management Zone Committee
24 February 2022



1.4 Constraints on mitigation actions.

Paul noted the following during his presentation:

- Stormwater Management Plans (SMPs) are a compliance activity under conditions of the CSNDC CRC214226. A strategic plan for surface water is proposed to be developed separately, to develop more aspirational goals for surface water, particularly stormwater quality improvement.
- Key points about contaminant sources and flooding were covered.
- Likely matters of interest relate to flooding was summarised in each of three areas; Parklands, City Centre/Linwood, and hill catchments. In general the flooding risks are low.
- Water quality issues are most significant in the Bromley industrial and central city areas, due to roof types, higher vehicle movements and industrial activities. These areas would be prioritised for treatment. The SMP will propose a stormwater treatment wetland on Linwood Paddocks to treat the Bromley industrial area. Further budget in the LTP may be approved by Council to treat Linwood Canal subject to a report to Council on the performance of the Richardson Terrace Storm Filter and expected benefits and costs of Stormwater treatment city-wide.

Discussion followed the presentation about additional target for nutrients.

Committee Resolved CWZC/2022/00004

That the Christchurch West Melton Water Management Zone Committee:

1. Receive the information in the Ihutai-Estuary and Coastal Catchment Stormwater Management Plan Report.

Kevin Brown/Sophie McInnes

Carried

Attachments

A Ihutai Estuary & Coastal SMP

11. Canterbury Water Management Strategy Plan Action Plan Budget

Port Hills Park Trust

A presentation (**see Minutes Attachment A**) was given by Alan McDonald, Port Hills Park Trust. Alan acknowledged the support of the Zone Committee for the previous Immediate Steps funding provided. He talked about the Trust, its membership and vision. He outlined the Albert Stream project the Trust was seeking funding for, with its goal to increase habitat from the valley floor to Summit Road.

Ōpāwaho Heathcote River Network

Rachel Barker gave a presentation (**see Minutes Attachment B**) about the Ōpāwaho Heathcote River Network's Cashmere Stream Freshwater Springs project, a project to be undertaken in two stages with the aim of protecting the river's freshwater springs.

Christchurch West Melton Water
Management Zone Committee
24 February 2022



Water & Wildlife Habitat Trust – Ōtūkaikino River

Mike Patchett presented to the Committee about a Riparian Restoration project on the Ōtūkaikino River, Clearwater Reach. **(See Minutes Attachment C)**. Mike talked about the project and the degraded catchment due to willows. A map of the River and tributaries provided a summary of the instream ecological health. Mike reported on a partnership with the Department of Corrections for planting work, and a database and imagery for ongoing tools.

Following the presentations discussion was held about the funding allocation available and a decision made on the recommendation to Environment Canterbury.

Committee Resolved CWZC/2022/00005

That the Christchurch West Melton Water Management Zone Committee:

1. Receive information on funding requests from the Port Hills Park Trust Board, Ōpāwaho Heathcote River Network and the Water and Wildlife Habitat Trust Ōtūkaikino River.
2. Recommend to Environment Canterbury the allocation of the available Canterbury Water Management Strategy Action Plan budget:
 - a. Port Hills Park Trust \$5,000
 - b. Ōpāwaho Heathcote River Network \$6,000
 - c. Water and Wildlife Habitat Trust Ōtūkaikino River \$4,000 in this financial year plus \$6,000 top priority for the next financial year

Kevin Brown/Les Wanhalla

Carried

Abstained: Arapata Reuben

Attachments

- A Mt Vernon Zone presentation
- B Ōpāwaho Heathcote River Network Springs Presentation
- C Water & Wildlife Habitat Trust Ōtūkaikino River

12. Canterbury Water Management Strategy Action Plan Progress Updates

Members provided the following Action Plan programme comments.

Mike Patchett reported on engaging community groups, such as:

- Styx Living Laboratory new resource centre, and possibly a brief from them regarding road reserves and about what support the Zone Committee could provide.
- Community Waterways Partnership hub.
- Avon River Group co-governance model.
- Healthy Waterways Report Card developed.

Annabelle Hasselman advised a priority had been understanding from the earlier presentation by Jess Newlands and Clive Appleton on Erosion and Sediment Control that clarified responsibilities.

Christchurch West Melton Water
Management Zone Committee
24 February 2022



Kevin Brown – advocated to the City Council and Environment Canterbury to update and monitor the state of modelling of groundwaters – the report to them was minutes and they see this as a priority.

Brynlea Stocks advised about applications for a Stormwater Superhero Awards, applications are due in April/May with an event to be held around October/November.

Committee Resolved CWZC/2022/00006

That the Christchurch West Melton Water Management Zone Committee:

1. Receive the information in the Action Plan Progress Update Report.

Kevin Brown/Annabelle Hasselman

Carried

8. 2022 Committee Meetings, Working Groups and Election of Chair and Deputy Chair

Resignation

Kevin Brown informed the Committee of his resignation from the Zone Committee, and this was his final meeting.

Nominations were called for the positions of Chair and Deputy Chair for the Christchurch West Melton Water Management Zone Committee.

Chair

Les Wanhalla nominated Annabelle Hasselman to the position of Chair, seconded by Arapata Reuben.

There being no other nominations, Annabelle Hasselman was elected Chair.

Deputy Chair

Annabelle Hasselman nominated Mike Patchett to the position of Deputy Chair, seconded by Cr Clearwater

There being no other nominations, Mike Patchett was elected Deputy Chair.

Kevin was acknowledged and thanked for his commitment, knowledge and expertise, his assistance with the Stormwater Superhero events, and for advocating regarding the nitrates/colorectal cancer issue. He also led the Committee on number of successful field trips.

Arapata Reuben closed the meeting with a Karakia/Whakamutunga.

Meeting concluded at 8.33pm.

CONFIRMED THIS 28TH DAY OF APRIL 2022

**ANNABELLE HASSELMAN
CHAIRPERSON**

8. Waimakariri Water Management Zone Committee Minutes - 1 November 2021

Reference / Te Tohutoro: 22/418568

Report of / Te Pou

Matua:

Liz Ryley, Committee & Hearings Advisor – liz.ryley@ccc.govt.nz

General Manager /

Pouwhakarae:

Jane Davis, GM Infrastructure, Planning & Regulatory Services –
jane.davis@ccc.govt.nz

1. Purpose of Report Te Pūtake Pūrongo

The Waimakariri Water Management Zone Committee held a meeting on 1 November 2021 and is circulating the Minutes recorded to the Council for its information.

2. Recommendation to Three Waters Infrastructure and Environment Committee

That the Three Waters Infrastructure and Environment Committee receives the Minutes from the Waimakariri Water Management Zone Committee meeting held 1 November 2021.

Attachments Ngā Tāpirihanga

There are no attachments to this report.

Signatories / Ngā Kaiwaitohu

Author	Liz Ryley - Committee and Hearings Advisor
Approved By	Liz Ryley - Committee and Hearings Advisor

9. Duvauchelle Wastewater - Options for Public Consultation

Reference / Te Tohutoro: 22/312484

Report of / Te Pou
Matua:

Mike Bourke, Senior Technician, Asset Planning Water and
Wastewater
Barry Hu, Senior Project Manager

General Manager /
Pouwhakarae:

Jane Davis, GM Infrastructure, Planning and Regulatory Services

1. Purpose of the Report Te Pūtake Pūrongo

- 1.1 The purpose of this report is to seek Council approval of the options for the future disposal of Duvauchelle treated wastewater that will be taken to public consultation.
- 1.2 This report has been written following extensive options analysis with a view to reusing the wastewater in solutions that are environmentally sound, culturally appropriate, and socially and financially acceptable. A summary of the options considered is attached to this report (**Attachment A**)
- 1.3 Pursuant to the options analysis and external to the project brief, a request was made for staff to investigate a proposal to dispose of both the Akaroa and Duvauchelle treated wastewater to a terrestrial infiltration gallery at Birdlings Flat, whilst potentially combining this with a pipeline to take drinking water to Akaroa. Staff were requested to consider whether there would be benefits to combine the Duvauchelle and Akaroa water and wastewater schemes.
- 1.4 The decision in this report is of low significance in relation to the Christchurch City Council's Significance and Engagement Policy. The level of significance was determined given that it is to approve two recommended options and add any further listed options the Council may choose on which to base the public consultation.
- 1.5 The current consent for the existing harbour discharge expires in January 2023. A new short term consent will be applied for.

2. Officer Recommendations Ngā Tūtohu

That the Three Waters Infrastructure and Environment Committee:

1. Confirm that the two recommended options: A4 Spray irrigate existing 18 hole golf course with drip irrigation to trees in winter (preferred option), and B3 Drip irrigate planted margins and trees on the golf course be taken forward for public consultation.
2. That a hearings panel be appointed to hear submissions.

3. Reason for Report Recommendations Ngā Take mō te Whakatau

- 3.1 The Duvauchelle Wastewater Treatment Disposal and Renewal project assist with meeting Council's Te Wai Ora Tāne Integrated Water Strategy objectives regarding the disposal of treated wastewater in the Akaroa Harbour catchment.
- 3.2 There are two options that staff recommend be included in the public consultation. There are four options that are not recommended for inclusion in the public consultation for the reasons shown in the table at Attachment A (the highlighted RED options).

4. Alternative Options Considered Ētahi atu Kōwhiringa

- 4.1 Efforts have concentrated on finding solutions to discharge treated wastewater to land. Consenting a further wastewater discharge to Akaroa harbour is not aligned to the objectives of Te Wai Ora o Tāne Integrated Water Strategy.
- 4.2 Sufficient suitable flat land is difficult to find on the peninsula, however the Council Reserve at Duvauchelle that is leased to the Akaroa Golf Club, the Duvauchelle A&P Association and the Banks Peninsula Pony Club has presented the best possibilities. The bulk of the land is leased by the Akaroa Golf Club and the options considered have been based around the use of the golf club area.
- 4.3 The viable options are a trade-off between land area, storage volume and discharge to the environment. The critical period is winter when there will be times when irrigation cannot happen due to soil saturation and storage needs to be provided.
- 4.4 The attachment contains a table setting out the “fit” of each option to the “four well-beings” – cultural, social, economic and environmental. The final column (right hand column) identifies the staff rating and recommendation of each of the options.
- 4.5 The A1 to A4 options include spray irrigation of the treated wastewater. These options will require significant additional treatment (similar to what is proposed for Akaroa). They provide the opportunity for beneficial reuse of the treated wastewater to irrigate the playing surfaces of the golf course, thereby reducing the take from the stream through the golf course in summer when flows are at their lowest. The cheapest of these options, **A4 Spray irrigate 18 hole golf course**, with no discharge to the water environment, is recommended for inclusion in the public consultation.
- 4.6 Options B1 to B3 are drip irrigation options which require a minor treatment plant upgrade. These options provide for disposal of the treated wastewater by way of drip irrigation to trees and planted areas with various combinations of land area and storage. **B3 Drip irrigate planted margins golf course** is recommended to be included in the public consultation as it is the cheapest, but requires some additional land and does not include any direct discharge to the local stream.
- 4.7 Option C1 disestablishes the Golf Course and plants natives over the entire golf course area. This option is not recommended as it would be strongly opposed by the whole community.
- 4.8 Options D1 to D3 drip irrigate to land other than the golf course. D1 is not recommended, even though the land owner is willing, as it entails application of wastewater to culturally sensitive land where an early massacre took place. Option D2 is application to unspecified land on the west of the harbour (location not determined) and is not recommended due to the cost associated with the much longer distance. D3 is to apply the Duvauchelle treated wastewater onto additional land at Robinsons Bay (the main Akaroa wastewater application area). Staff are not recommending this option due to the certain public opposition.
- 4.9 Option E1 has been maintained as the status quo, and represents the current discharge of treated wastewater to the harbour. This option is not recommended by staff due to the cultural concerns and extreme difficulty in consenting, as was found previously with the Akaroa discharge.
- 4.10 The colour coding traffic light system in the attached long list identifies the pros and cons of each option with the final column giving the staff recommendation on each option.
- 4.11 As a separate matter, staff considered the proposals to combine the Akaroa and Duvauchelle water and wastewater systems, and to discharge treated wastewater to Birdlings Flat by performing a 50 year net present value analysis and by completing a high level multi-criteria

assessment. The assessments confirm that the scope of the Akaroa and Duvauchelle wastewater treatment and reuse schemes represent the most favourable and lowest cost solution. Staff therefore do not recommend that the proposals should be further pursued at this time. Details of the assessment is included in the memo “Confirming the scope of the Akaroa and Duvauchelle treated water reuse projects.” (**Attachment B**)

5. Detail Te Whakamahuki

- 5.1 There have been 16 formal meetings with a Community Working Group that included representatives of the Golf Club, A&P Association, Pony Club and members of the community and Community Board. There have been a number of on-site meetings to review different land application options. Representatives of Onuku Runanga have been on the working party from the start and, when not able to be present at meetings, have been kept fully informed as the options have been progressed.
- 5.2 Options have been developed and redeveloped over a long period (10 years) including the option of the Golf Club moving to a 12 hole redevelopment that would release additional land for irrigation. More recently the option most favoured by the Golf Club is beneficial reuse of the treated wastewater across the 18 hole course which would minimise the existing stream take in summer (the club currently takes water for irrigation when stream flows are already low). All groups associated with the working party appear to prefer this option so staff recommend this as the preferred option (A4).
- 5.3 An alternative option (Option B3) recommended by staff is drip irrigation to trees and planted areas only with off-site storage and limited irrigation on neighbouring farm land. This is also considered the lowest cost consentable option.
- 5.4 The decision affects the following wards/Community Board areas:
 - 5.4.1 Banks Peninsula Community Board.

6. Next Steps Nga mahi ka whai ake

Following confirmation by Council of the options to take to public consultation, an appropriate information package will be prepared and public meeting held to seek feedback on the options. Consultation will take place in June with a hearings panel to consider submissions in July with a report and recommendations to Council in August 2022.

7. Policy Framework Implications Ngā Hiraunga ā- Kaupapa here

Strategic Alignment Te Rautaki Tīaroaro

- 7.1 This report supports the [Council's Long Term Plan \(2018 - 2028\)](#):
 - 7.1.1 Activity: Wastewater Collection, Treatment and Disposal
 - Level of Service: 11.1.2.0 Number of abatement notices, infringement notices, enforcement orders and convictions regarding Council resource consents related to discharges from wastewater systems per year - 0
- 7.2 This report supports Te Wai Ora Tāne Integrated Water Strategy:
 - 7.2.1 Objective 8: Sustainable Wastewater Systems
 - Measure 4.5.5 Agree with Ngāi Tahu and the community on long term solution for treated wastewater in Akaroa Harbour

Policy Consistency Te Whai Kaupapa here

- 7.3 The decision is consistent with Council's Plans and Policies to have complying consents for all discharges to the environment.

Impact on Mana Whenua Ngā Whai Take Mana Whenua

- 7.4 The options recommended for consultation do not include a discharge to water or discharge to sensitive lands and are in alignment with the Mahaanui Iwi Management Plan and the Council's Te Wai Ora o Tāne Integrated Water Strategy.
- 7.5 Removing the wastewater discharge from Akaroa harbour would be a significant benefit and is strongly supported by the runanga.
- 7.6 Clearly option E1, a continued discharge to harbour, would be strongly opposed by Ngai Tahu. There is also a strong preference that irrigation to land at the Head of the Harbour Basin (option D1) does not proceed given that this area was the site of a massacre.

Climate Change Impact Considerations Ngā Whai Whakaaro mā te Āhuarangi

- 7.7 All options have been assessed comparatively for climate change impacts. The options involving the most planting of new areas score the highest. Relative climate change impacts are shown in the Net Carbon Emissions column of the attachment.

Accessibility Considerations Ngā Whai Whakaaro mā te Hunga Hauā

- 7.8 No issues are anticipated.

8. Resource Implications Ngā Hīraunga Rauemi

Capex/Opex / Ngā Utu Whakahaere

- 8.1 Cost to Implement – Capital costs of the options are identified in the attachment.
- 8.2 Maintenance/Ongoing costs – Similar for all options.
- 8.3 Funding Source – WBS 522/001375

Other / He mea anō

- 8.4 This project will be delivered by the Wastewater Project Delivery team.

9. Legal Implications Ngā Hīraunga ā-Ture

Statutory power to undertake proposals in the report / Te Manatū Whakahaere Kaupapa

- 9.1 Providing sustainable wastewater management solutions is a key function of a territorial local authority in terms of the Local Government Act 2002.



Other Legal Implications / Ētahi atu Hīraunga-ā-Ture

- 9.2 The legal consideration is the need to have complying consents for all wastewater discharges.

10. Risk Management Implications Ngā Hīraunga Tūraru

- 10.1 Identifying all risks has been an integral part and key driver for assessing all the options in the attachment.

Attachments / Ngā Tāpirihanga

No.	Title	Page
A 	Duvauchelle Wastewater Summary of Disposal and Reuse Options	28
B 	Memo confirming the scope of the Akaroa and Duvuachelle treated wastewater reuse projects	29

In addition to the attached documents, the following background information is available:

Document Name	Location / File Link
Not applicable	Not applicable

Confirmation of Statutory Compliance / Te Whakatūtutanga ā-Ture

Compliance with Statutory Decision-making Requirements (ss 76 - 81 Local Government Act 2002).

(a) This report contains:

- (i) sufficient information about all reasonably practicable options identified and assessed in terms of their advantages and disadvantages; and
- (ii) adequate consideration of the views and preferences of affected and interested persons bearing in mind any proposed or previous community engagement.

(b) The information reflects the level of significance of the matters covered by the report, as determined in accordance with the Council's significance and engagement policy.

Signatories / Ngā Kaiwaitohu

Authors	Mike Bourke - Senior Technician Water and Waste Planning Barry Hu - Senior Project Manager
Approved By	Michele McDonald - Manager Planning & Delivery Helen Beaumont - Head of Three Waters Jane Davis - General Manager Infrastructure, Planning & Regulatory Services

| Longlist Options |

Table 2-3 Duvauchelle Wastewater Scheme Longlist Assessment

Ref.	Option	Plant Upgrade	Irrigation & Storage	CAPEX OPEX 35yr NPV	Net Carbon Emissions (35 years)	Cultural Wellbeing	Social Wellbeing	Economic Wellbeing	Environmental Wellbeing	Staff suggestion for consultation shortlist
A1	Irrigate wastewater onto tees, greens and approaches on a redeveloped 12 hole golf course and add a wetland	Major upgrade to meet spray irrigation standard	3.6 ha plus fairways and surrounds, 1 ha wetland + 5,000 m³ storage	≈\$25M	*	May be acceptable to Ngāi Tahu depending on wetland performance	Favoured by golf club but impacts the A&P Showground which would have to move	Very high costs	Potential impacts on water quality and ecology as regular overflows to stream winter. Difficult to consent	Not recommended due to very high costs, nutrient impacts on stream (NPSFM) and difficult to consent.
A2	Irrigate wastewater onto tees, greens and approaches on a redeveloped 12 hole golf course and also irrigate margin areas	Major upgrade to meet spray irrigation standard	3.6 ha fairways plus 9.6 ha of planted margins + 5,000 m³ storage	≈\$25M ≈\$380K ≈\$30M	✓✓	May have a cultural challenge due to 1 in 5 year overflow of treated storage to harbour	Favoured by golf club but impacts the A&P Showground. Course upgrades may offset the loss on holes.	Very high costs due to need for additional land and golf course upgrades	Likely minimal impacts on water resources + carbon benefits. Has a 1 in 5 year overflow frequency	Not recommended as similar to A1 and even higher costs
A3	Irrigate wastewater onto tees, greens and approaches on a redeveloped 12 hole golf course plus margin areas and neighbouring land	Major upgrade to meet spray irrigation standard	3.6 ha fairways plus 15.6 ha of planted margins plus neighbouring land + 5,000 m³ storage	≈\$26M ≈\$380K ≈\$31M	✓✓✓	Likely favoured by Ngāi Tahu as no discharge to water	Favoured by golf club but impact the A&P Showground. May be concern in community around irrigating neighbouring land.	Very high costs due to need for additional land and golf course upgrades	Minimal impacts on water resources	Not recommended as similar to A1 and even higher costs However - subject to review by Councillors.
A4	Irrigate wastewater onto tees, greens and fairways on existing 18 hole golf course during summer, Irrigate planted course margins including upslope area during Winter	Major upgrade to meet spray irrigation standard	Approx. 8-9 ha of trees plus approx. 3.0 ha golf course + 3,000 m³ storage	≈\$13M ≈\$280K ≈\$17M	✓✓*	Likely favoured by Ngāi Tahu as no discharge to water	No obvious problems but need to select a storage location	Moderate cost due to need for major upgrade to Plant and additional irrigation and drainage infrastructure	Likely minimal impacts on water resources + carbon benefits. Irrigation for golf course reduces stream water take	Recommended due to moderate cost and community stakeholder support for reuse benefits. Recommended by staff
B1	Irrigate planted course margins including upslope area – retain 18 holes with storage on the golf course	Minor upgrade	6.2 ha of trees + 5,000 m³ storage	≈\$9M ≈\$200K ≈\$13M	✓✓	May have a cultural challenge due to limitations in irrigated land and storage causing risk of 1 in 5 year overflow of treated storage to harbour	No obvious problems but need to select a storage location	Comparatively lower cost	Likely minimal impacts on water resources + carbon benefits. Risk of insufficient irrigable land or storage	Not recommended due to risk of Cultural and Environmental effects. However – subject to option improvements through I&I reduction, or increase to land / storage / irrigation rate
B2	Irrigate planted course margins including upslope area – reduce course to 12 holes with storage on the golf course	Minor upgrade	9.4 ha of trees + 3,200 m³ storage	≈\$13.5M ≈\$320K ≈\$19M	✓✓	Likely favoured by Ngāi Tahu as no discharge to water	Golf course reduced to 12 holes, has impact on player experience so Golf Club no longer in favour. Land-sharing to offset with A&P Showground and Pony Club not favoured by parties.	Comparatively lower cost	Likely minimal impacts on water resources + carbon benefits	Not recommended due to community opposition compared to other Golf Club options. However – opportunities could arise if site Master Plan redeveloped
B3	Irrigate planted course margins including upslope area –maintain 18 holes, and irrigate other land with storage on other land	Minor upgrade	9.4 ha of trees + 3,200 m³ storage	≈\$9M ≈\$200K ≈\$13M	✓✓	Likely favoured by Ngāi Tahu as no discharge to water	No obvious problems but need to select a storage location	Comparatively low, but extra cost for additional land. Provides more capacity for growth.	Likely minimal impacts on water resources + carbon benefits	Recommended due to favourable balance of costs and benefits and greater operational flexibility. Recommended by staff. Dependant on land owner negotiations
C1	Dis-establish golf course and irrigate wastewater onto trees on the golf course land	Minor upgrade	19.1 ha of trees + 2,000 m³ storage	≈\$8M ≈\$200K ≈\$12M	✓✓✓	Not favoured by Ngāi Tahu due to social impacts, albeit favoured for no discharge to water	Will be strongly opposed by Golf Club and wider community	Comparatively lower cost	Likely minimal impacts on water resources + carbon benefits	Low cost and positive environmental outcomes. Significant community impact. Alternative recreational use of site would have to be developed given reserve status. Recommendation subject to review by Councillors
D1	Irrigate wastewater onto land at the Head of the Bay	Minor upgrade	8.0 ha of trees + 4,500 m³ storage			Ngāi Tahu have expressed concerns due to Silent File but would discuss further if only land-based option available	Neutral – On private land	While the land is not for sale the owner may consider irrigation of native trees on site	Likely minimal impacts on water resources + carbon benefits	Not recommended as other options available with similar outcome for lower cost and avoid Silent File issue
D2	Irrigate land elsewhere on the western side of Akaroa Harbour Basin	Minor upgrade	Various			Unspecified as no consultation with Ngāi Tahu about this option	Unknown – No further sites of interest identified	Significantly higher cost due to additional conveyance (>distance to irrigation area) and land purchase costs	Likely minimal impacts on water resources + carbon benefits	Not recommended as other options available with similar outcome for lower cost
D3	Irrigate land in Robinsons Bay (Separate to Akaroa scheme land)	Minor upgrade	Approx. 11 ha of trees	≈\$10M ≈\$210K ≈\$13M	✓	Favourable over discharge to harbour	Would receive significant community protest.	Potentially higher costs but further study needed	Likely minimal impacts on water resources + carbon benefits	Not recommended by staff – due to high costs and likely strong opposition by local community. However - subject to review by Councillors
E1	Discharge to harbour	Major upgrade to meet discharge to water standard	N/A	≈\$5M ≈\$130K ≈\$7M	*	Culturally unacceptable to Ngāi Tahu	No stakeholder feedback. Minor risk of public health impacts	Comparatively lower cost	Minor impacts on water quality and ecology	Difficult to consent due to cultural concerns and legal and policy settings However - subject to review by Councillors

*Indicative only; scoping and estimation in progress

Memos



Memo

Date: 31 March 2022
From: Michele McDonald, Team Leader Asset Planning Water & Wastewater
To: Jane Davis, General Manager Infrastructure, Planning and Regulatory Services
Cc: Helen Beaumont, Head of Three Waters
Reference: 22/416306

Confirming the scope of the Akaroa and Duvauchelle treated wastewater reuse projects

1. Purpose of this Memo

- 1.1 The purpose of this report is to confirm the scope of two wastewater projects: the Akaroa Reclaimed Water Treatment & Reuse Scheme (CPMS 596) and the Duvauchelle Treatment and Disposal Renewal (CPMS 2214). The report has been written to respond to a concern raised that opportunities may be missed and that the 'bigger picture' has not been considered.

2. Update

- 2.1 Both projects are in the design phase, with consultation complete for the Akaroa Land Reuse Scheme and consultation for the Duvauchelle project to be embarked upon shortly. The projects were established in the context of the **Te Wai Ona o Tane Integrated Water Strategy** which has a clear objective to discontinue the disposal of treated wastewater into the Akaroa Harbour.
- 2.2 As part of the planning processes pursuant to the establishment of the project briefs, numerous proposals for achieving the above objective were considered, including:
- Pumping treated wastewater to beyond the Akaroa Harbour Heads
 - Pumping treated wastewater to Diamond Harbour, via Port Levy, and into the existing network to the Christchurch Wastewater Treatment Plant
 - Pumping treated wastewater to Halswell and into the existing network to the Christchurch Wastewater Treatment Plant
 - Pumping treated wastewater to Tai Tapu and into the existing network to the Christchurch Wastewater Treatment Plant
 - Pumping treated wastewater to an irrigation field between Tai Tapu and Little River.
- Candidates requiring pumping distances of greater than 15km were much more expensive than more local solutions. The candidates also introduced consenting challenges associated with discharging wastewater from one takiawa into another and discharging into watersheds with significant nutrient problems. Only viable proposals were taken forward for further evaluation as part of the project concept design stages.
- 2.3 The Akaroa Land Reuse Scheme project team was requested to revisit the adopted land irrigation option and to consider additional proposals, including:
- 2.3.1 To develop shared irrigation facilities for both Akaroa and Duvauchelle treated wastewater (already considered in the Duvauchelle options analysis)

Memos



- 2.3.2 To combine Akaroa and Duvauchelle wastewater treatment facilities into a single facility
- 2.3.3 To connect Akaroa and Duvauchelle raw water supplies and to combine drinking water treatment facilities
- 2.3.4 To send treated wastewater from Akaroa and Duvauchelle to Kaitorete Spit to discharge to sea via a terrestrial infiltration gallery
- 2.3.5 To send treated wastewater from Akaroa and Duvauchelle to Kaitorete Spit to discharge to sea via a terrestrial infiltration gallery and to establish a borefield on Kaitorete spit with a pipeline for a raw water supply from Birdlings Flat to Akaroa
- 2.3.6 To re-use treated wastewater at Okains Bay for drinking water purposes (this proposal has not yet been further investigated due to it not enabled in drinking water regulation).
- 2.4 It is believed that concern about the water security in Banks Peninsula has prompted the request to find opportunities to combine treated wastewater reuse with improved raw water security.
- 2.5 Staff responded to the request to consider treated wastewater discharge to the Kaitorete Spit with an internal memo and subsequent discussion, and also committed to evaluate the business case for this and other proposals.
- 2.6 A 50 year net present value analysis was performed to determine the financial feasibility of each proposal. It was determined that:
 - 2.6.1 There is no financial benefit in combining the Akaroa and Duvauchelle irrigation, wastewater treatment or water treatment schemes. The reason being that the additional capital cost, outweighs the operational cost savings if the schemes were combined.
 - 2.6.2 It would cost more to transport treated wastewater to Birdlings Flat for discharge than to irrigate to land as included in the current project scope. The additional capital cost (wastewater only) would be approximately \$30 million, resulting in a 50 year NPV increase of more than \$30 million.
 - 2.6.3 The proposal to augment Akaroa raw water from a Birdlings Flat bore field will increase the capital cost by another \$40 million (\$75 million in total), resulting in a 50 year NPV increase of more than \$80 million.
- 2.7 The proposal to dispose of treated wastewater to Kaitorete Spit instead of pursuing land irrigation in Duvauchelle and Akaroa was evaluated against the four LGA decision making principles. The findings are presented in the table below.

	Financial	Social	Cultural	Environmental
Kaitorete Infiltration	Higher costs, with higher risks around unknown aspects due to the preliminary nature of the option.	Likely to be challenged by new communities involved and undermine work to date to resolve issues with the existing scheme. Likely to be welcomed by a smaller set of residents of the Robinsons Bay area	Likely to be opposed by Ngai Tahu due to discharge from one takiwā into another. Undermines previous decision making and unlikely to receive resource consent	Does not have environmental benefit. Short retention period before discharging to sea.
Akaroa Harbour Irrigation	Lowest cost with a high level of risk understanding	Unsupported by some members of the community, but supported by others	Option is strongly supported by Ngai Tahu as it meets cultural needs.	Has environmental benefits

Memos



3. Conclusion

- 3.1 The current project scope for Akaroa and Duvauchelle treated wastewater reuse meets the objectives of Te Wai Ona o Tana integrated Water Strategy and the Mahaanui Iwi Management Plan. It is strongly supported by Te Rūnanga o Ngāi Tahu, and a change in scope to send treated wastewater to the Waiwera Takiwā is likely to receive significant opposition. The current project briefs also represent the least cost option.
- 3.2 Staff will continue to plan for and develop a Banks Peninsula servicing strategy that will recognise the need for water supply security. This will include the feasibility of establishing both local and regional water and wastewater schemes. The following principles and assumptions concerning water security will be applied:
- Water demand management to be rigorously pursued in the first instance
 - More emphasis to be placed on rain water storage for gardening purposes
 - Non-potable reuse of treated wastewater to be pursued
 - Consider the reuse of treated wastewater as a raw water source for drinking water purposes – likely to be last resort
 - Investigate desalination cost and implications.

Attachments Ngā Tāpirihanga

There are no attachments to this memo.

Signatories / Ngā Kaiwaitohu

Author	Michele McDonald - Manager Planning & Delivery
Approved By	Helen Beaumont - Head of Three Waters Jane Davis - General Manager Infrastructure, Planning & Regulatory Services

10. Resource Recovery Bi-monthly Report January/February 2022

Reference / Te Tohutoro: 22/332912

Report of / Te Pou
Matua:

Lynette Ellis, Head of Transport and Waste Management

General Manager /
Pouwhakarae:

Jane Davis, General Manager Infrastructure, Planning & Regulatory
Services

1. Brief Summary

- 1.1 The purpose of this report is to update the Three Waters Infrastructure and Environment Committee on work occurring in the Resource Recovery portfolio during January 2022 and February 2022 (Attachment A).

- 1.2 Key points in this report:

1.2.1 Kerbside Collections.

Over the period of the report kerbside collection volumes have been stable with higher than expected volumes of organics. This is due to a wetter than average summer season.

The current surge in Covid-19 cases in Canterbury is starting to affect driver availability. Staff are working with the contractor to understand measures that may be required to maintain collections. These measures include:

- Extending collection hours and days.
- Reducing non-essential services.
- Reducing traffic restrictions.

In the interim staff have agreed changes to the traffic restrictions to ease pressure on collection efficiency and driver availability.

1.2.2 Organics Processing Plant.

An options report on the Future of Organics Project has been deferred until 28 April 2022. This allows more time to ensure all options are fully assessed before being presented to Council.

1.2.3 Le Bons Bay Landfill Aftercare.

Works on the removal of the Le Bons Bay landfill material to Kate Valley is continuing. The estimated volume to be removed has increased to 6500 tonnes from the original estimate of 3,600 tonnes.

The work on this and other closed landfill sites is improving planning for possible future projects.

1.2.4 Transform Recycling in Aotearoa Consultation.

The New Zealand Government has launched its consultation and proposals to Transform Recycling in Aotearoa. Consultation is open 13 March – 8 May 2022.

We are preparing a submission on this important consultation.

1.2.5 Burwood Resource Recovery Park.

A blessing ceremony occurred for Site D sensitive materials on 19 February 2022.


Consenting for Site C is continuing with staff engaging with regulatory providers as required.

2. Officer Recommendations Ngā Tūtohu

That the Three Waters Infrastructure and Environment Committee:

1. Receive the information in the Three Waters Bi-monthly Report January/February 2022 Report

Attachments / Ngā Tāpirihanga

No.	Title	Page
A 	Three Waters and Waste Infrastructure and Environment Committee - Resource Recovery - January February 2022	35

In addition to the attached documents, the following background information is available:

Document Name	Location / File Link
Not applicable	Not applicable

Confirmation of Statutory Compliance / Te Whakatūtutanga ā-Ture

Compliance with Statutory Decision-making Requirements (ss 76 - 81 Local Government Act 2002).

(a) This report contains:

- (i) sufficient information about all reasonably practicable options identified and assessed in terms of their advantages and disadvantages; and
- (ii) adequate consideration of the views and preferences of affected and interested persons bearing in mind any proposed or previous community engagement.

(b) The information reflects the level of significance of the matters covered by the report, as determined in accordance with the Council's significance and engagement policy.

Signatories / Ngā Kaiwaitohu

Author	Lynette Ellis - Head of Transport & Waste Management
Approved By	Jane Davis - General Manager Infrastructure, Planning & Regulatory Services



Living Earth Organics Processing Plant Bromley

THREE WATERS INFRASTRUCTURE AND ENVIRONMENT COMMITTEE

RESOURCE RECOVERY

January – February 2022 Report

Christchurch City Council | March 2022

TABLE OF CONTENTS

Planning and Policy	3
TAO Forum Steering Group.....	4
Financial overview	5
The numbers	5
Compliance and Quality assurance	6
Health Safety and Wellbeing	6
Resource Recovery and Solid waste	6
Kerbside recycling education	6
Communications	8
Handheld Battery Recycling	8
Operations	10
Kerbside collections	10
Recycling quality.....	11
Transfer Stations	12
Organics Processing Plant	13
Landfill aftercare.....	15

PLANNING AND POLICY

Service Delivery Review

The Service Delivery Review for Resource Recovery has progressed, with a number of elements underway, including proposals as part of the Annual Plan 2022.

Proposals for the 2022 Annual Plan

- Expanded kerbside service for parts of Banks Peninsula
- Multiple occupancy developments may opt-out of Waste Minimisation Targeted Rate

Future service enhancements

A proposal to increase bin flexibility, including offering residents more choice in their wheelie bins, will be developed further. Work is underway to scope and define the implementation processes required to support these enhancements to service delivery.

In response to the Elected Members request for an update on options for separate glass collection and recycling, staff presented a high level overview on the feasibility of implementing a separate collection. Changes at a national level would significantly impact the incentives for glass recovery and staff recommended that Council await the outcome of the Government work programme, ahead of making any decisions around a separate glass recycling collection.

Bylaw Review

The updated bylaw has been drafted and the project team will now engage with stakeholders before finalising the draft statement of proposal for a replacement bylaw and terms and conditions. We anticipate that a report on the bylaw review will be brought to a Council meeting in May 2022.

The review of the current bylaws and terms and conditions is intended to better align with changes in national regulations (related to waste reporting requirements) support the Council's proposed kerbside service (options for bin size), provide for waste management plans for multi-unit residential developments and include new licensing provisions for waste operations.

Public consultation on the replacement bylaw and terms and conditions would commence in 2022.

National and Regional Liaison

TAO Forum Steering Group

Representation from Christchurch City Council in this group and for the Canterbury Waste Joint Committee, continues. The TAO forum steering group met in February, and discussed the early involvement of stakeholder groups in the Ministry for the Environment work programmes and project for 2022 onwards.

The New Zealand Government has launched its consultation and proposals to Transform Recycling in Aotearoa. Consultation is open 13 March - 8 May 2022.

The government announcement can be found here:

<https://www.beehive.govt.nz/release/government-plans-transform-recycling>

Details on the consultation can be found here:

<https://environment.govt.nz/news/transforming-recycling/>

We are preparing a Council submission on this important consultation.

FINANCIAL OVERVIEW

The numbers

Resource Recovery Operations Breakdown								February 2022			
Year to Date				Activity (\$000's)	Full Year						
Actual	Budget	Variance	%		Forecast	Budget	Variance	%			
5,911	9,887	3,976	40.2%	Recyclable Materials Collection & Processing	9,689	14,629	4,941	33.8%			
3,980	4,513	534	11.8%	Residual Waste Kerbside Collection	6,863	6,771	(92)	-1.4%			
7,524	6,577	(947)	-14.4%	Residual Waste Disposal & Transport	11,249	9,866	(1,383)	-14.0%			
153	209	56	26.8%	Landfill Gas Capture & Treatment	342	314	(28)	-9.1%			
(481)	(247)	233	94.3%	Refuse Transfer Stations	(484)	(740)	(256)	-34.5%			
402	225	(177)	-78.8%	Waste Minimisation	793	588	(205)	-34.8%			
(1,022)	605	1,626	268.9%	Operation & Care of Closed Landfills	(119)	464	583	125.6%			
10,558	11,882	1,325	11.1%	Residual Waste Collection & Disposal	18,643	17,263	(1,381)	-8.0%			
5,600	5,590	(10)	-0.2%	Organics Kerbside Collection	8,317	8,386	69	0.8%			
2,915	2,845	(70)	-2.5%	Organics Processing incl Composting Plant	3,885	3,941	56	1.4%			
8,515	8,435	(80)	-0.9%	Organic Material Collection & Composting	12,203	12,327	124	1.0%			
24,984	30,205	5,221	17.3%	Controllable Net Cost of Service	40,535	44,220	3,685	8.3%			

Figure 1 Resource Recovery unit Financials

Recyclable Materials Collection & Processing costs YTD February 2022 are \$3,976K lower than planned. This is due to lower recycled material processing costs and higher than budgeted price received for recyclable material processed.

Residual Waste Collection & Disposal costs YTD are \$1,325K lower than planned. Residual Waste Kerbside Collection costs are reduced by \$534K due to lower collection costs. Residual Waste Disposal & Transport costs are \$947K unfavourable due to an additional disposal costs and additional costs for diverting contaminated recycled material directly to landfill. Closed Landfills are \$1,626K favourable to plan due to additional revenue and lower maintenance costs. Refuse Transfer stations are \$233K lower than planned YTD due to lower maintenance costs.

COMPLIANCE AND QUALITY ASSURANCE

Health Safety and Wellbeing

Health Safety and Wellbeing Statistics - Month of Feb 2022	Totals	Land Drainage	Water Waste	Resource Recovery	Transport	Intern
Near Misses	70	0	31	27	11	1
First aid injuries (FAI)	5	0	1	4	0	0
Medical Treatment Injuries (MTI)	3	0	0	0	0	3
Lost Time Injuries (LTI)	1	0	0	1	0	0
No. of days lost to LTIs	1	0	0	1	0	0
No. of hours worked	100,940	351	33,324	3,925	37,170	26,170
Health Safety and Wellbeing Statistics - Year to Date - Feb 2022	Totals	Land Drainage	Water Waste	Resource Recovery	Transport	Intern
Near Misses	297	0	135	120	33	9
First aid injuries (FAI)	50	0	5	27	12	6
Medical Treatment Injuries (MTI)	17	0	2	1	5	9
Lost Time Injuries (LTI)	6	0	3	1	1	1
No. of days lost to LTIs	67	0	51	1	5	10
No. of hours worked	708,929	9,866	161,972	101,110	218,046	217,935
LTIFR	8.5	0.0	18.5	9.9	4.6	4.6
MTIFR	32.4	0.0	30.9	19.8	27.5	45.9
TRIFR (LTI + MTI)	40.9	0.0	49.4	29.7	32.1	50.5

Figure 2 Health Safety and Wellbeing Statistics

Year to Date July 2021 - June 2022 (as at 15-3-2022)

Monthly Reporting URL

www.tinyurl.com/ngk32y5

RESOURCE RECOVERY AND SOLID WASTE

Kerbside recycling education

Although there are challenges in the current COVID environment we continue to provide in person education when requested.

While a number of public talks have been postponed, due to Covid-19 related concerns. Education packs are being sent to residents as an alternative, and are in demand from property managers requesting these for groups of tenants.

A recent joint presentation with the Education Programme Team at the Canterbury Schools Property Managers conference was well received and of benefit to all parties in determining further opportunities council could provide tailored education for schools to reduce their recycling contamination.

The bin guide booklet has been translated into Korean at the request of the Korean society of Christchurch, adding to the 12 other languages available on the website.

Kerbside auditing continues, targeted in areas where high rates of contamination have been found, with additional checks on bins that are on a final strike.

Bin removals, for households who have continued contaminating after two warnings and a letter, total 1,933 (up to the 10th of March). In 2021, 2,747 final warning letters were sent out and another 485 have been sent to date in 2022. There were 109 removals in January, and 129 in February 2022. Six properties on the watch list significantly improved in January and this increased to 17 in February.

Of the 5,577 bin checks in January and 5,597 in February, bin contamination dropped from 12% in January to 9% in February. "Gold star" quality presented recycling also dropped from 22% to 18%. Education required, increased from 58% to 64% of all audited bins.

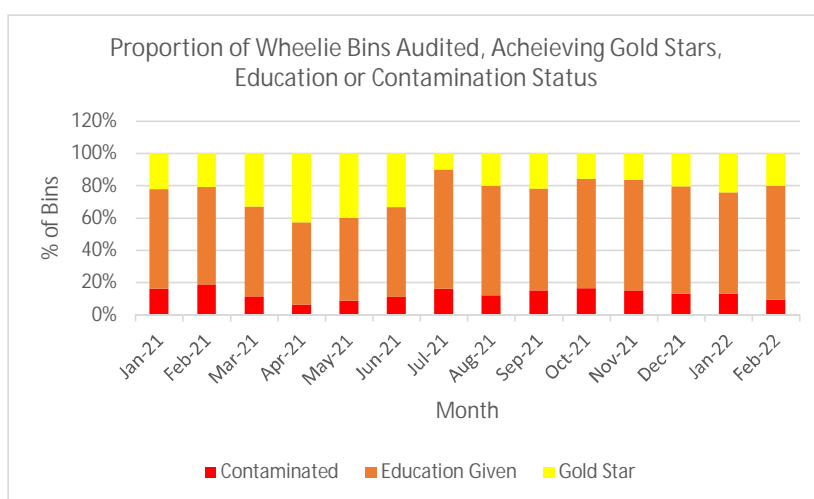


Figure 3 Monthly Recycling Bin results

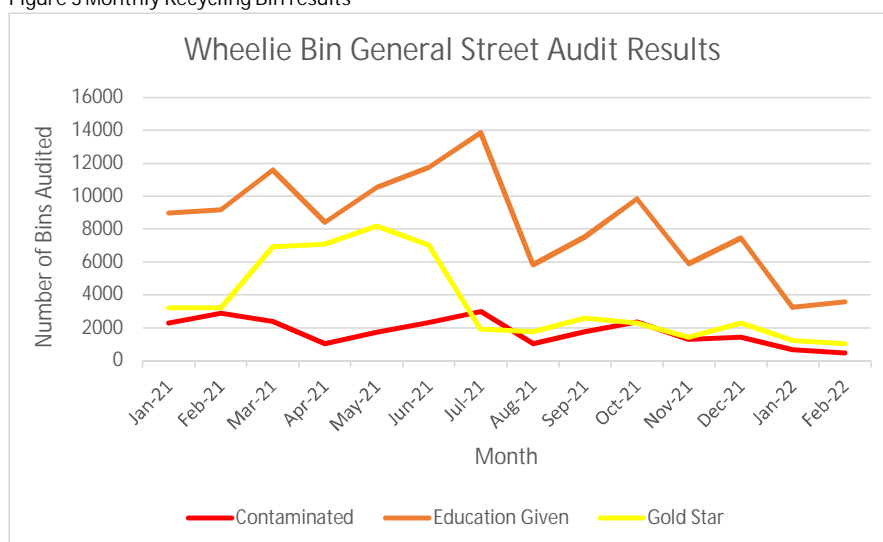


Figure 4 Monthly Recycling Audits

Communications

A document regarding free alternatives to the red bin and landfill was shared with internal staff, community groups, and the schools' newsletter through the Learning Through Action team. This assists residents to utilise recycling schemes available, that they may not be aware of, as well as providing further explanation as to why certain items are not accepted at the recycling plant.

Discussions are being held between staff around using asset sharing technology, to reduce waste from resources not being used, or being landfilled when they could be utilised.

Public communications continue to focus on recycling quality, with distribution of Bin Good Guides and updates to the collection vehicle signage.

In February a Newsline story was published on the topic of used mask disposal: "Red wheelie bin best place for used masks"

Digital Initiatives

- Website - 102,326 page views (1 Jan – 28 Feb). Down by 3.9% on previous period. With an average viewing time of 2.35 mins on page (stable – up 2 seconds from last period).

Top pages viewed:

1. Collections – 26,695
2. Yellow bin – 21,676
3. My bins – 12,399
4. EcoDrops – 11,114
5. Homepage – 7,537
6. Red bin – 7,336
7. Green bin – 4,407
8. Lookup item – 3,336

- The web-based 'item sorting' game for kerbside bins has been played by over 500 individual users between January and February 2022.
- Wheelie Bin App had 29,115 active users between 1 January and 28 February, with 4,773 new users. Top searched items in this period:
 - Plastic
 - Paper
 - Pizza
 - Glass
 - Wood

Handheld Battery Recycling

In total, more than 29 tonnes of household batteries have now been collected via our Christchurch collection sites, over a period of 33 months between May 2019 and the end of February 2022. Of these batteries, 27.4 tonnes have been in recyclable condition. As there are no processing sites in New Zealand, the batteries are amalgamated by our processor with batteries from other sites in New Zealand. One 20 tonne shipment has been sent to the Australian processor. Those that cannot be processed in Australia, are combined with

Page 8 of 18

File name: Three Waters and Waste Infrastructure and Environment Committee - Resource Recovery - January February
30.03.22.DOCX

their collections and then sent on to a more specialised battery recycling plant in South Korea.

The remaining 2.1 tonnes of batteries received, were too rusted or damaged to safely transport for recycling. They will be disposed of at the Kate Valley Regional Landfill.

Regional battery collection receptacles, expanding on the successful Christchurch collection model, are now up and running. The receptacles provide a free way to both, reduce batteries to landfill in Canterbury, and reduce risk of fires from lithium batteries in the waste system.

Funding has been provided through;

- \$35,000 - Ministry for the Environment Waste Minimisation Fund
- \$10,000 - Environment Canterbury
- \$25,000 - Canterbury Waste Joint Committee

Project funding has been used to construct and distribute 12 new receptacles, with ongoing operating costs in the first year also covered. Collection points have been established in the following locations;

- Rangiora, Oxford, Amberley, Ashburton, Timaru and Kaikoura Transfer Stations
- Darfield and Hanmer Libraries & Service Centres
- Rolleston New World, with the remaining perspex receptacles to be placed at indoor public drop-off sites in Kaikoura, Timaru and Ashburton. These councils are currently seeking partners to achieve this.

In addition some councils are also funding their own additional receptacles.

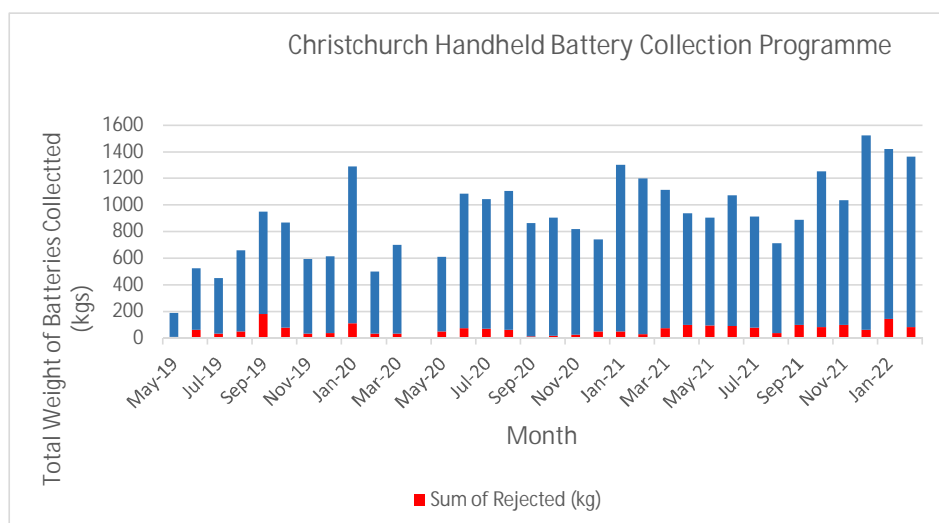


Figure 5 Handheld Battery Collection by Month

OPERATIONS

Kerbside collections

Kerbside collection volumes have been stable, with the exception of higher than usual seasonal volumes in Organics due to a wetter than average summer season.

The current surge in Covid-19 related cases has begun to significantly affect our kerbside collections contractor, with a shortfall in collections drivers and associated staff.

Staff have initiated a number of measures to improve the efficiency of kerbside collections ease the pressure on truck drivers including:

- Extending collection hours
- Saturday collections
- Reducing non –essential services
- Requesting residents hold off presenting bins if less than half full and they can wait until next collection cycle. (without forcing material in)
- Reducing Traffic restrictions where possible

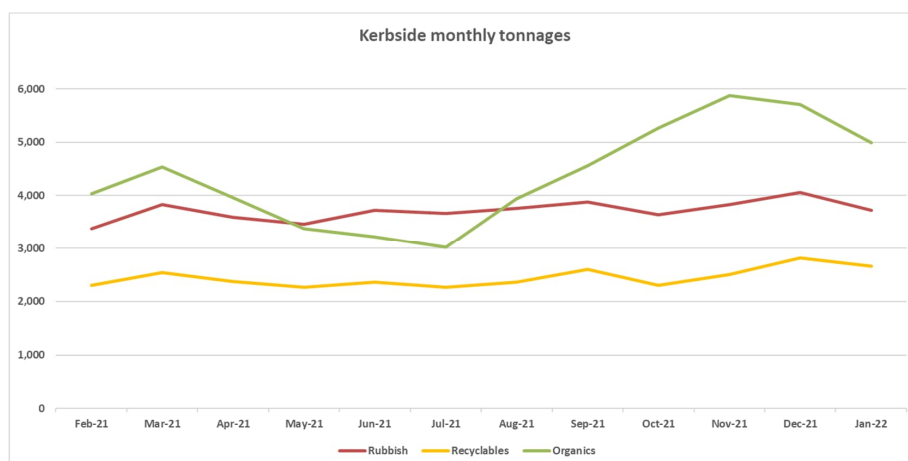


Figure 6 Kerbside Monthly Tonnages

Kerbside contractor performance

Ongoing discussions with the collection contractor continue with the focus on improving service levels to the residents.

Focus has also been preparing for any impact of Omicron and ensuring the collection contractor has robust processes in place to continue servicing throughout the pandemic.

The contractor is currently updating fleet decals with new Council branding on its collection vehicles with five new (replacement) collection vehicles due throughout 2022.

Customer requests – Hybris

Council continue to receive kerbside service requests over 3000 per month, mainly resulting from missed collections and damaged bins.

Staff continue to work with the collections contractor to enable the ability for these to be managed in an effective and proactive manner that reduces the need for the resident to call in to report these service issues.

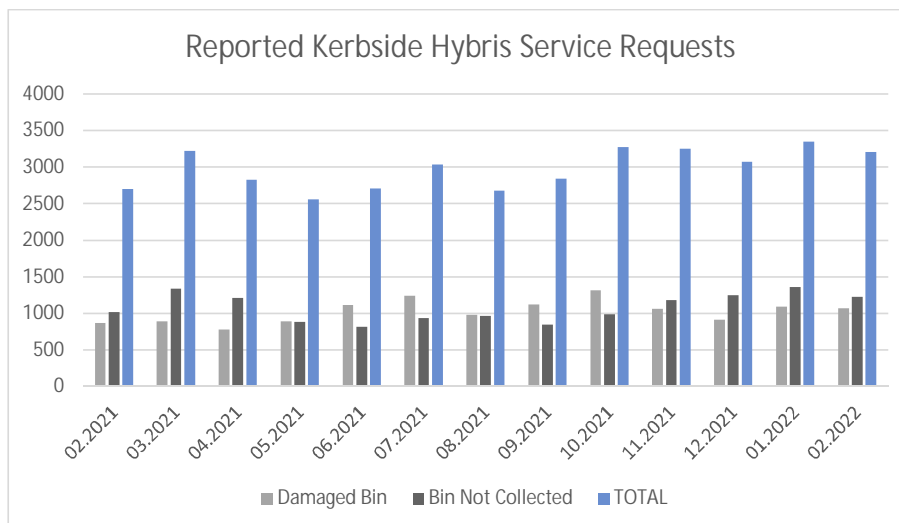


Figure 7 Hybris Kerbside Service Requests

Recycling quality

February saw a slight decline from the improvement in January 2022 in the number of recycling trucks able to be processed at the Ecosort Materials Recovery Facility, with 88 per cent containing 10 percent, or less, contamination.

Council staff are proactively working in areas with high contamination, including a recent collaboration with commercial food businesses in the Riccarton area. This followed a request for support from the property manager after shared recycling bins were found to not be emptied due to high levels of contamination. The onsite education and tailored information and signage have had a positive impact with no further rejected bins to date.

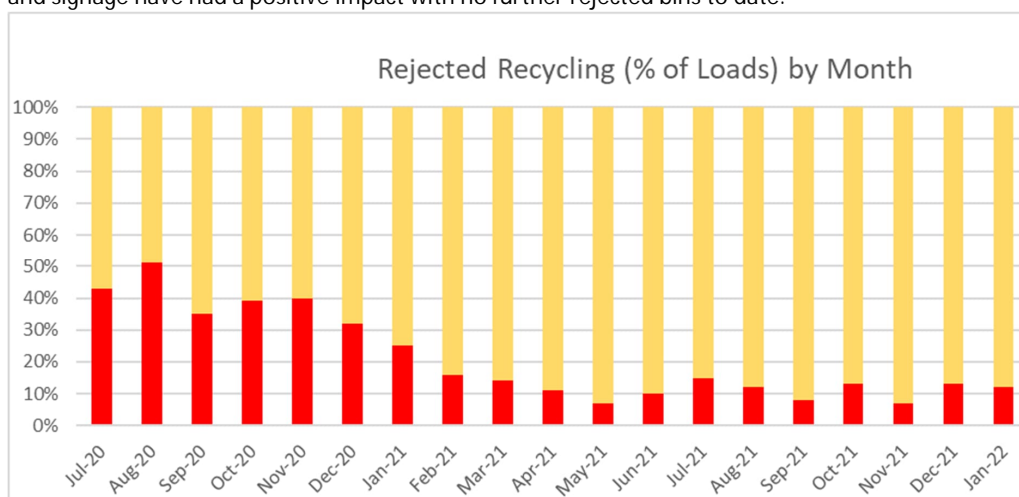


Figure 8 Rejected Contaminated Loads by month

The average contamination rate of the rejected loads (above the 10 per cent threshold) was 16 per cent.

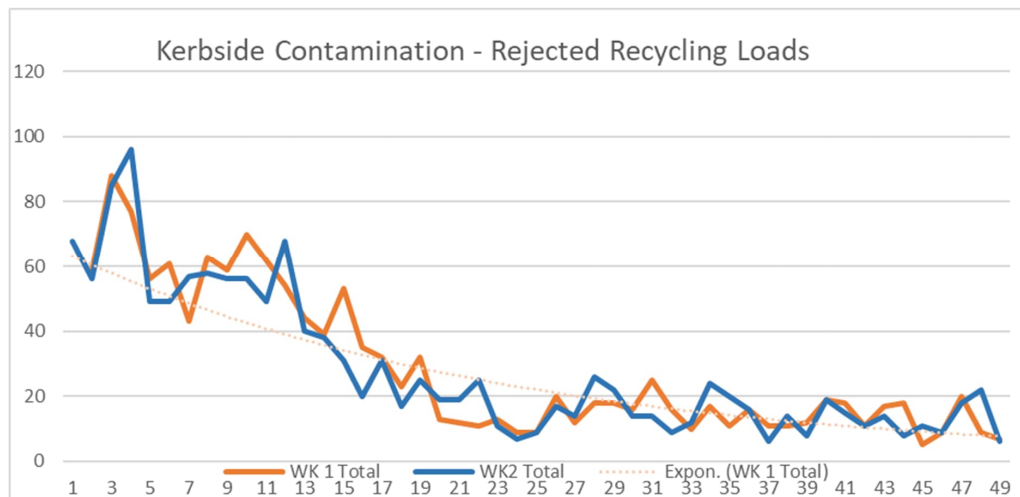


Figure 9 Rejected contaminated loads by week

Materials Recovery Facility plant upgrade

EcoCentral is progressing with the planned facility upgrade, which will improve the facility's ability to sort plastics and fibre, resulting in higher quality outputs and a wider range of plastic commodity grades. The upgrade is scheduled to be underway in April 2022 and completed in January 2023.

Transfer Stations

Barrys Bay Transfer Station

The redevelopment of the Barrys Bay site continues with recommendations to support the planned upgrades including securing water supply, site stormwater and waste water management systems under review.

The next steps will include finalising the detailed design, consent applications, procurement and construction works.

EcoDrop Transfer Stations

All EcoDrop Stations continue to operate a full service under the new Covid Protection Framework.

Projects are underway to improve environmental management controls at three City Transfer Station sites. The work involves stormwater and landscaping, as well as updates to the existing environmental management plans.

As part of the planned asset renewals a new compactor weighbridge and ejector have been completed, while a new compactor body is in construction due to be completed in April ready for install of all new equipment in May 2022.

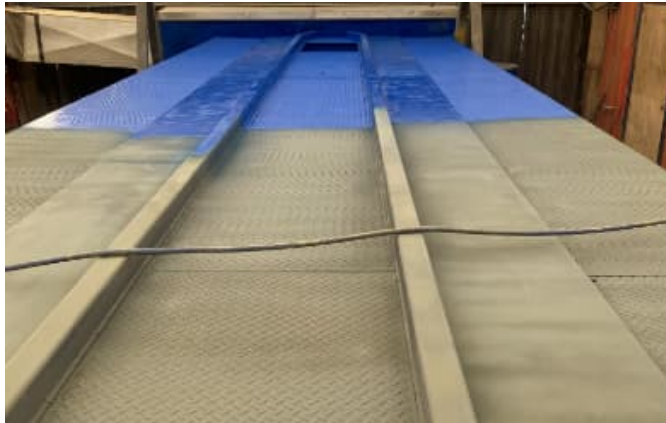


Figure 10 New Compactor weighbridge



Figure 11 New Compactor body in construction

Organics Processing Plant Future of Organics Project

An Options report, due to go to Council on 10 March 2022 has been deferred until 28 April 2022, when it will go before the Finance and Performance Committee. This delay will provide more time to ensure all options are fully assessed before being presented to Council. This decision was communicated to Councillors, Environment Canterbury and the community on 4 March 2022. Independent consultants Jacobs are currently finalising their investigation and feasibility assessment which will inform the report.

Regulatory Compliance

Independent consultants Pattle Delamore Partners have carried out on site odour assessments and concluded that a number of potential odour sources have been eliminated, therefore preventing offensive or objectionable odour beyond the boundary.

In total 31,397m² of maturing compost previously stored on-site in outdoor windrows has been screened and moved off site, with all outdoor processing of material now ceased. This significant change in operations was completed within the Abatement Notice

Page 13 of 18

File name: Three Waters and Waste Infrastructure and Environment Committee - Resource Recovery - January February
30.03.22.DOCX

deadline of 31 January 2022, eliminating the key sources of potential odour from the facility operations.



Figure 12 Organics Processing Plant, site cleared of outdoor windrows

	October 21	November 21	December 21	January 22	February 22	March 22
LE NONC	0	0	2	0	1	0

Notices of Non-Compliance

Figure 13 Living Earth Notices of Non-Compliance

Odour reports

Environment Canterbury's Smelt It app was introduced as part of the Bromley Odour Project in March 2020. When odour is reported through the Smelt It app a selection is required for one or a ranking of Odour Types, with 40 options as per the Ministry for the Environment's Good Practice Guide for Assessing and Managing Odour. Along with other assessment criteria there is also an opportunity to provide comments. Living Earth (LE) related odour reports include where LE or compost is identified in the comments, or where the primary Odour Type selected is compost, which could be perceivably associated with the Organics Processing Plant.

Reported odour related to the Organics Processing Plant has significantly decreased compared to the same time period last year, which averaged 212 complaints per month. We have also seen a progressive decrease in LE related odour reports since November 2021.

	October 21	November 21	December 21	January 22	February 22	March 22
Total odour reports	4	868	287	217	189	Not Available

Page 14 of 18

File name: Three Waters and Waste Infrastructure and Environment Committee - Resource Recovery - January February
30.03.22.DOCX

<i>LE related odour reports</i>	2	71	27	25	23	<i>Not Available</i>
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Figure 14 Bromley area odour reports

Note: The increase in complaints for November may be attributed to the Wastewater Treatment Plant given the increase in odour from this facility since the fire on 1 November 2021

Reports are released publicly at the following webpage: <https://www.ecan.govt.nz/get-involved/news-and-events/2020/smelt-it-bromley-residents-asked-to-report-odours-online-as-part-of-pilot-project>

Operations update

Until a decision is made with regards to the future of Organics project, the new operation comprises of;

1. Processing of incoming material to only occur indoors in the enclosed tunnels.
2. The addition of a probiotic to accelerate the composting process.
3. Screening of material to occur within an enclosed structure.
4. A lower maturity compost is being moved off site within 48 hours.

Currently this lower maturity compost is being applied to the paddocks of the Wastewater Treatment Plant. Independent assessments have not found offensive and objectionable odour in the area surrounding the trial.

Current onsite storage of tailings to continue, following an independent odour assessment of this activity. Tailings are larger fraction materials, separated at the screening process, including pieces of partially broken down sticks and branches. As part of the current operation, they are added to material from the kerbside organics collection and are necessary to create porosity during the enclosed tunnel composting phase.

Community Engagement

We are continuing to communicate with the community regularly via newsletters. The last quarterly public meeting was held on 15 February 2022.

After meeting with Environment Canterbury on 15 December 2021 to discuss the future of the public meetings it was agreed upon after the February 2022 meeting, we will revert to the Community Liaison Group format, focusing on Living Earth rather than the wider Bromley Liaison Group format.

Landfill aftercare

Banks Peninsula Closed Landfill Annual Monitoring

Environment Canterbury have determined the Barrys Bay closed landfill to be non-compliant – action required (seawall repair). An options report is currently being prepared.

The Gollans Bay closed landfill has been monitored in January and is now compliant.

Allandale closed landfill

Following observance of minor foreshore erosion at the Allandale closed landfill an assessment of the site has been completed, including a drone survey of the site and repair design. Cost estimate of the repair is \$330,000.

Page 15 of 18

File name: Three Waters and Waste Infrastructure and Environment Committee - Resource Recovery - January February 30.03.22.DOCX

Barrys Bay Closed Landfill

A report considering the various remediation options for the site is being prepared, to be presented to Council in March 2022.

Bexley Closed Landfill

Foreshore remediation project is progressing well, with works in Zone 1 and Zone 2 completed. The final stage of works, Zone 3 is currently underway.

In addition to the coastal protection works, a condition assessment of the landfill cap has also been completed, with a draft report prepared. This work will inform Council on the available mitigation works should they be required. To support this report, and any future enhancements at the site, an ecological assessment of the estuary drain which runs across the former landfill is to be undertaken in March.

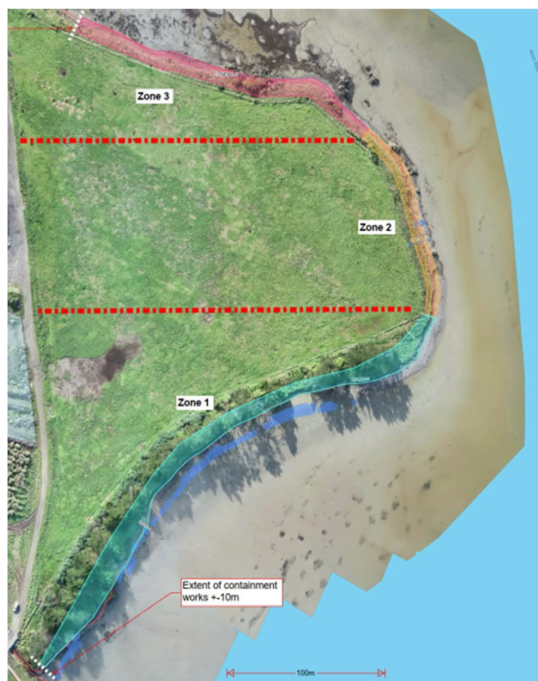


Figure 16 Bexley landfill remediation works

Le Bons Bay Closed landfill

Work on removal of the Le Bons Bay landfill material to Kate Valley Regional Landfill has been progressing well since works started on 26th October 2021. To date, over 5000 tonnes of material has been disposed of at Kate Valley.

Trucking has been steady with between two to five truck and trailer units per day making the journey. Once works commenced, it became apparent there is more waste to remove than was initially estimated, with around 6500 tonnes likely to be excavated.

Page 16 of 18

File name: Three Waters and Waste Infrastructure and Environment Committee - Resource Recovery - January February
30.03.22.DOCX

Due to the recent storm event, the Le Bons Bay Road has been compromised and two trucking incidents occurred in January.

Onuku closed landfill

Acknowledging that the required cap repair will not be completed in time for the current abatement notice (compliance date of 1 February 2022), Environment Canterbury have suggested closing the current abatement notice and filing a new notice once Council has a fixed schedule for repairs.

The current best estimate is that works will be completed by 30 May 2023. The main cause for the delay relates to ecological controls, with the capture and relocation of lizards required before works can commence.

The landfill is currently being used as a site base for works on the adjacent block of land in the Takapuneke Reserve where a Pou is being erected.

Burwood Resource Recovery Park

The Construction and Demolition Waste landfill established in response to the Canterbury earthquake sequence is being progressively closed, with the plan to return it to a recreational area. Final earthworks are planned to be completed across the site by the end of April, with final landscaping to be completed in August. Completion of these works will allow public access to be reinstated in September 2022, with the site managed by the Council's parks unit as part of the Bottle Lake Forest recreational area.

A blessing ceremony occurred for Site D sensitive materials on 19 February 2022, this event marks conclusion of this significant project.

As part of the handover and reinstating public access, a risk assessment of safety for public around the surface ponds is being carried out by Council's Technical Services and Design team.

Low grade contaminated soils continue to be received at site C while resource consents for continued operations are being assessed. Approximately 7,500 tonnes of soil is received each month.

The production of landfill gas has been steady over November and December, with the successful landfill gas treatment plant control system upgrade commissioned 12 November 2021. In February the landfill gas treatment plant had its annual maintenance shutdown, with all works now completed.



Figure 17 Burwood Resource Recovery Park Site B

Closed landfill Supplier Panels

This year two supplier panels are to be established for landfill aftercare design and construction works. The development of these supplier panels will support Council to deliver its landfill aftercare programme, including capacity to proactively identify and address issues associated with former landfill sites.

One panel will be set up for environmental consultants and one panel for physical works contractors.

11. Implications of the Health (Fluoridation of Drinking Water) Amendment Act 2021 for Christchurch water supplies

Reference / Te Tohutoro: 22/336548

Report of / Te Pou Michele McDonald, Team Leader Asset Planning Water and Wastewater (michele.mcdonald@ccc.govt.nz)

General Manager / Pouwhakarae: Jane Davis, General Manager Infrastructure, Planning and Regulatory Services

1. Brief Summary

Background

- 1.1 The purpose of this report is to advise the detail of information submitted to the Director-General of the Ministry of Health in accordance with section 116G of the Health (Fluoridation of Drinking Water) Amendment Act, 2021.
- 1.2 This report follows an item in the last Three Waters Bi-monthly Report to the Three Waters Infrastructure and Environment Committee (09 March 2022) and a subsequent request by the Chair for staff to provide an update on the matter.
- 1.3 The Health (Fluoridation of Drinking Water) Amendment Act 2021 came into force on 13 December 2021 and provides for the Director-General to direct a local authority to add or not to add fluoride to drinking water supplied through its local authority supply.
- 1.4 The Act provides for the Director-General to invite comments from the relevant local authority relating to the financial cost and expected timeframe before making a direction to add fluoride to drinking water.
- 1.5 On 15 December 2021, the Director-General requested information from Christchurch on the cost and timeframe for adding fluoride to the community water supplies that serve more than 500 people. Opportunity was given to respond by 11 March 2022. The Council's response is attached to this report (**Attachment A**).
- 1.6 In response to the Ministry of Health information request, staff procured support from external advisors to review the concept design and costing previously established by Citycare in April 2017 (**Attachment B**).

Estimated cost and time frame to add fluoride to Christchurch drinking water

- 1.7 The fluoridation of the Christchurch community water supplies which serve more than 500 people, means that fluoride must be introduced at 49 high pressure water supply pump stations and at 1 water treatment plant (Akaroa) i.e. 50 locations overall.
- 1.8 The approach for establishing the conceptual cost was based on the categorisation of pump stations by flow rate, rather than developing individual cost estimates for each site. Updated budgetary pricing was obtained from equipment and chemical suppliers.
- 1.9 The capital cost needed to implement fluoridation at 44 operational pump stations and 1 water treatment plant was estimated as \$58 million, or approximately \$1.3 million per water supply facility. An additional \$5 million was estimated for increasing the capital budgets of 5 new water supply pump station projects (Ben Rarere, Moorhouse Ave, Averill, Kerrs, Auburn). The cost estimates include a contingency allowance of 30% and provision for escalation over the proposed implementation period (12% in total).

- 1.10 The ongoing operational cost is estimated as \$1.8 million (excluding depreciation). Additional resources will be required to operate, maintain and manage the fluoridation process. The annualisation of the 20 year renewal estimate of \$14 million amounts to an additional \$1.1 million per annum.
- 1.11 The most prevalent design considerations which impact the cost estimate, include:
 - 1.11.1 The chemical used to add fluoride to water i.e. hexafluorosilicic acid (HFA) is a strong acid and a hazardous substance which relies on certified operators equipped with personal protective equipment, appropriate ventilation, air scrubber facilities, segregation and emergency exposure equipment and facilities. Fluoride storage and dosing must therefore be housed in a separate room. For most facilities a building footprint expansion will be triggered.
 - 1.11.2 Fluorosilicic acid (a common name for HFA) is chemically incompatible with sodium hypochlorite (chemical used for chlorination) and therefore separate dosing locations will be required.
 - 1.11.3 Compliance monitoring as aligned to the 2014 Water New Zealand Code of Practice for Fluoridation of Drinking-Water Supplies will require separate day tanks with online measuring devices, fluoride measuring flow meters on the dosing line and fluoride concentration analysers downstream of the dosing point.
 - 1.11.4 Additional instrumentation and control equipment as well as systems upgrades will be needed to enable the monitoring and control of the fluoridation process at the 50 dosing locations.
 - 1.11.5 Site security and access control will have to be provided to comply with health and safety regulations.
- 1.12 A minimum implementation period of 44 months will be required to implement fluoridation because of the complex scope of work, the limited window available to undertake the required works and due to the network that will not allow multiple upgrades at the same time.
- 1.13 Staff advises that a delay of 24 to 48 months should be factored into the implementation framework to allow for the completion of the several safe drinking water projects, which won't be able to be completed in conjunction with the fluoridation roll-out due limited resources as well as lack of access to facilities.
- 1.14 The Ministry of Health was advised that the Christchurch City Council 2021 - 2031 Long Term Plan does not include funding for fluoridation. The Long Term Plan focuses on delivering a demonstrably safe drinking water supply for all Christchurch communities which reflects Council's priority. It should also be emphasized that the capital budgets for 5 new water supply pump station projects do not make provision for water treatment.

Way Forward

- 1.15 In the letter, dated 15 December 2021, the Director-General requested that local authorities should start with the necessary fluoridation-related preparatory work. It was also advised that a limited amount of capital works funding is available for local authorities that are willing and able to begin the capital works to fluoridate by the end of 2022.
- 1.16 Staff will continue to evolve the fluoridation concept design at 5 water supply facilities, for further implementation planning and costing refinement.
- 1.17 The implementation of fluoridation in Christchurch will be extremely complex and costly. A considerable amount of funding will need to be secured in order to add fluoride to the Christchurch drinking water.



- 1.18 The letter from the Ministry of Health stated that directions to fluoridate will be issued from mid-2022 onwards and that implementing these directions will take a staged approach to align with the significant reforms to the Three Waters infrastructure.
- 1.19 Staff is currently awaiting feedback from the Ministry of Health on the information submitted on the 11th of March 2022.
- 1.20 It should be highlighted that the Health (Fluoridation of Drinking Water) Amendment Act, 2021 states that a local authority that receives a direction under section 116E or an invitation to comment under section 116G is not required to consult on any matter related to the direction or the invitation.

2. Officer Recommendations Ngā Tūtohu

That the Three Waters Infrastructure and Environment Committee:

1. Receive the information in this Report as well as the supporting information in the Technical Memorandum entitled Fluoride Implementation – Preliminary Cost Estimate Update.

Attachments / Ngā Tāpirihanga

No.	Title	Page
A 	Response to Ministry of Health on Community Water Fluoridation Information Request dated 10 March 2022	57
B 	Fluoride Implementation Planning - Preliminary Cost Estimate Update	59

In addition to the attached documents, the following background information is available:

Document Name	Location / File Link
Health (Fluoridation of Drinking Water) Amendment Act 2021	https://www.legislation.govt.nz/act/public/2021/0044/latest/DLM7033733.html

Confirmation of Statutory Compliance / Te Whakatūtutanga ā-Ture

Compliance with Statutory Decision-making Requirements (ss 76 - 81 Local Government Act 2002).
(a) This report contains: <ul style="list-style-type: none"> (i) sufficient information about all reasonably practicable options identified and assessed in terms of their advantages and disadvantages; and (ii) adequate consideration of the views and preferences of affected and interested persons bearing in mind any proposed or previous community engagement.
(b) The information reflects the level of significance of the matters covered by the report, as determined in accordance with the Council's significance and engagement policy.

Signatories / Ngā Kaiwaitohu

Author	Michele McDonald - Manager Planning & Delivery
Approved By	Helen Beaumont - Head of Three Waters Jane Davis - General Manager Infrastructure, Planning & Regulatory Services

10 March 2022

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53 Hereford Street
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Christchurch 8154

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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

Technical Memorandum

Jacobs

Fluoride Implementation – Preliminary Cost Estimate Update

Date:	10 March 2022	Jacobs New Zealand Limited
Project name:	Concept Plan to implement fluoridation of the Christchurch Drinking Water Supplies	Level 2, Wynn Williams Building 47 Hereford Street Christchurch Central 8013 PO Box 1147 Christchurch 8140 New Zealand T +64 3 940 4900 F +64 3 940 4901 www.jacobs.com
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Technical Memorandum

Item 11

Attachment B

Technical Memorandum

Contents

1.	Introduction.....	4
2.	Chemical Considerations.....	5
2.1	Hazard Designations.....	5
2.2	Interactions between Chlorine and Fluoride	5
2.3	Water Quality Review	6
3.	Conceptual Design Scope and Estimating Basis.....	7
3.1	Regulatory Considerations	7
3.2	Process	7
3.3	Building Mechanical.....	9
3.4	Electrical	9
3.5	Instrumentation and Controls	9
3.6	Structural.....	9
3.7	Civil.....	9
3.8	Miscellaneous Items.....	10
4.	Conceptual Costing.....	11
4.1	Costing Approach and Accuracy	11
4.2	Site Categorisation.....	11
4.3	Capital Estimate	11
4.4	Operating and Maintenance Estimate.....	13
4.5	Renewals Estimate	15
5.	Conceptual Implementation Schedule	17
6.	Limitations, Risks and Considerations for Subsequent Phases of Work	20
7.	References	21
	Appendix A – Capital Cost Estimate Breakdown	22

Tables

Table 2-1. Hazardous chemical designations for HFA	5
Table 4-1. Estimate constants.....	11
Table 4-2. Facility size categorization.....	11
Table 4-3. Construction Value Summary.....	12
Table 4-4. Non-Construction Cost Summary	12
Table 4-5. Total Outrun Cost Summary	13
Table 4-6. Chemical Supply, Delivery and Waste Disposal Cost Summary.....	13
Table 4-7. Compliance, operational and maintenance cost estimate.....	13
Table 4-8. Operating and Maintenance Cost Summary by Supply System	14
Table 4-9. Anticipated asset useful lifespans	15
Table 4-10. Renewal Estimate – 20 year horizon.....	15
Table 4-11. Renewal Estimate – Annualized over Asset Useful Life	16
Table 5-1. Implementation schedule overview and considerations	17

Figures

Figure 2-1. Fluctuations in raw water fluoride concentration from 2019 to 2021.....	6
Figure 3-1. HFA system block diagram	7
Figure 5-1. Conceptual implementation schedule	19

Technical Memorandum

Jacobs

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.

Technical Memorandum

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	<p>Hazardous.</p> <ul style="list-style-type: none"> 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	<p>Dangerous good</p> <ul style="list-style-type: none"> 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
 - a) if left unattended, is secured in a way that ensures an unauthorised person cannot gain access to it; and
 - b) 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

Technical Memorandum

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.

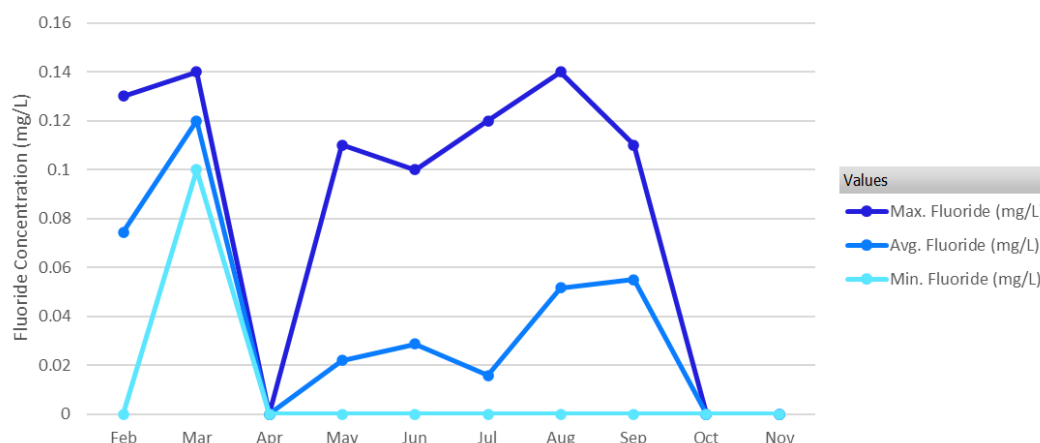


Figure 2-1. Fluctuations in raw water fluoride concentration from 2019 to 2021.

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 CaCO₃ 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).

Technical Memorandum

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.

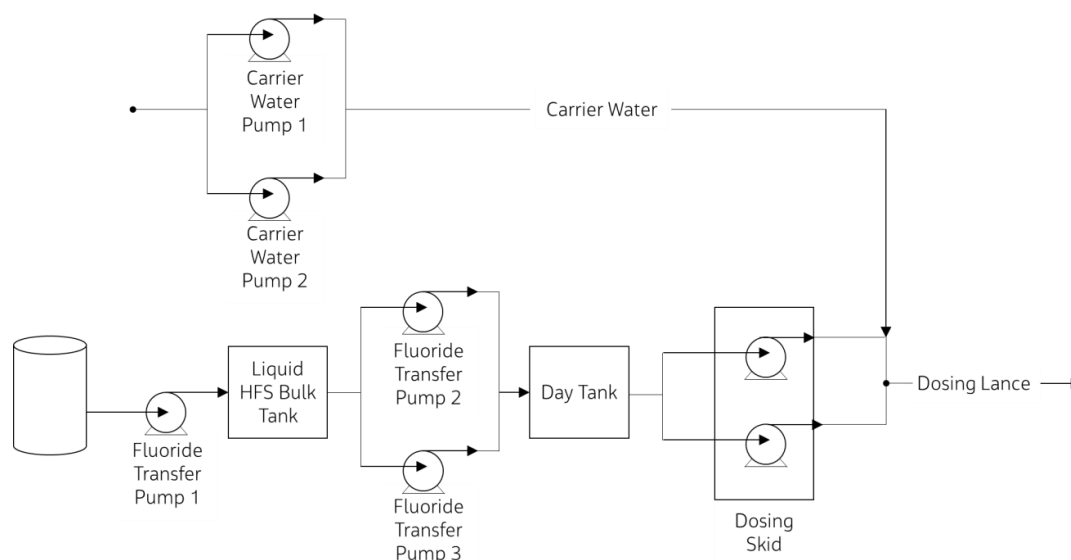


Figure 3-1. HFA system block diagram

Technical Memorandum

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.

Technical Memorandum

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),

Technical Memorandum

- 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.

Technical Memorandum

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.

Technical Memorandum

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

Technical Memorandum

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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Technical Memorandum

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
Analyser 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

Technical Memorandum

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

Technical Memorandum

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

Technical Memorandum

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 pay 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		

Technical Memorandum

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	

Technical Memorandum

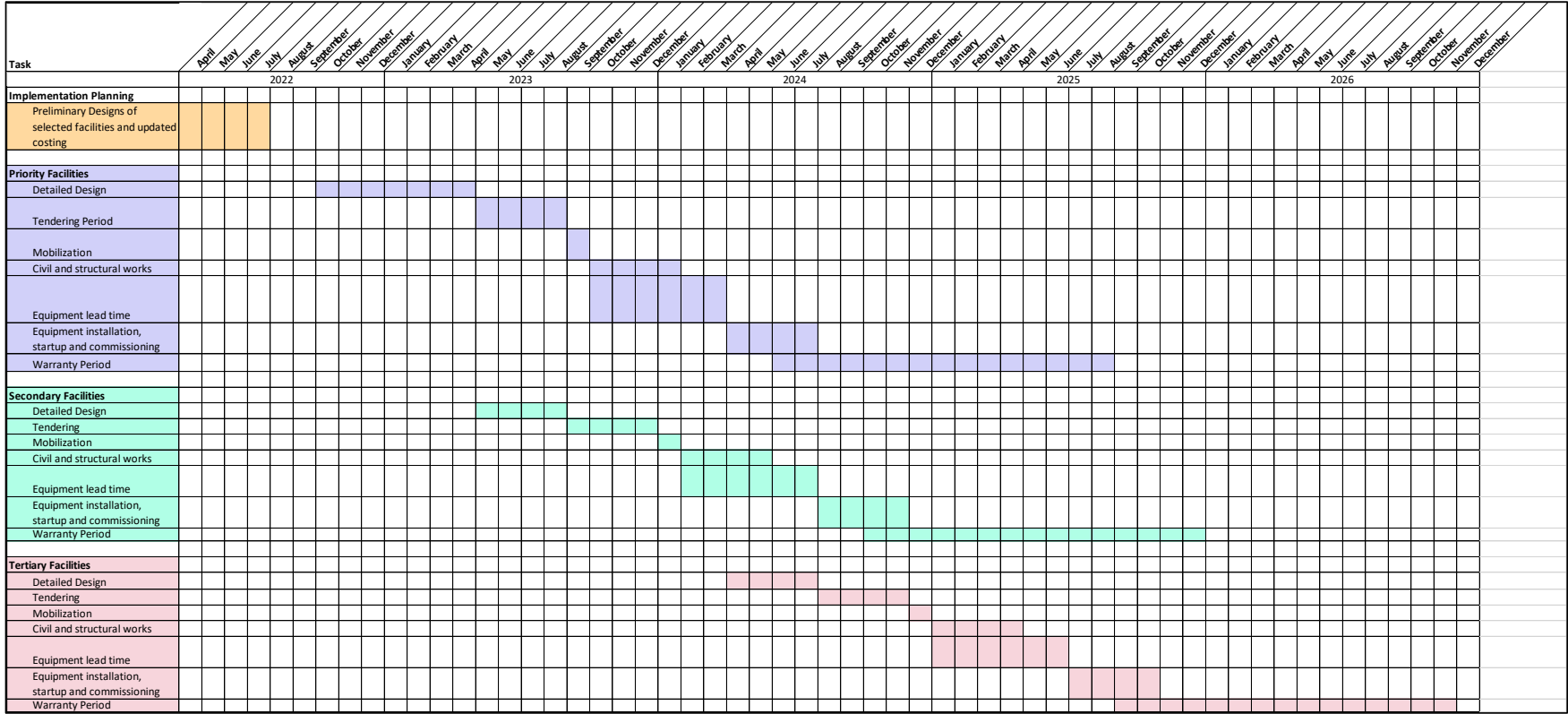


Figure 5-1. Conceptual implementation schedule

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.

[Technical Memorandum](#)

Appendix A – Capital Cost Estimate Breakdown

Item 11

Attachment B

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

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		

Item 11

Attachment B

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

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		

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

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

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

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
Engineering	13%				\$ 3,844,000	reference projects, modified per input from 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					\$ 60,000	@\$5000/week
SCADA communications protocols upgrade (transition to DNP3)					\$ 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 Faci	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	

		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	Medium	None	None	None	None	None	None	Medium
markup - Delivery Constraint		none/minor/medium	None	None	Minor	None	Minor	None	None	Minor	None	None	None	Minor	None	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	\$ 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	\$ 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	\$ 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	\$ 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	\$ 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	\$ 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	\$ 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	\$ 17,500
Mixer		\$ 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	\$ 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	\$ 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	\$ 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	\$ 223,000

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	

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

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	
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	
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	
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	
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	

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

Potential Designations	Facility																
	Thompsons	Avonhead	Belfast	Burnside	Crosbie	Farrington	Grampian	Jeffreys	Redwood	Wrights	Gardiners	Aston	Effingham	Keyes	Lake Terrace		
Non Construction Implementation Costs																	
Permitting & Consents	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000
Engineering	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000
Services During Construction (Inspection, Contract Administration)	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000
CCC Internal Project Management	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000
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)	\$ 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	\$ 15,000
SCADA Template development - CCC internal	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333
SCADA communications protocols upgrade (transition to DNP3)	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000
Chemical/ safety labelling	\$ 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	\$ 1,000
Training	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778
	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000

	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

	Carters	Estuary	Sockburn	Denton	Wilmers	Dunbars	Main Pumps WS	Addington	Aldwins	Blighs	Grassmere	Hillmorton	Hills	Mays	Montreal	Spreydon
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	\$ 15,000	\$ 15,000
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	\$ 15,000	\$ 15,000
Structural																
Building expansion. Excludes designated substance/asbestos abatement	\$ 32,000	\$ 32,000	\$ 40,000	\$ 40,000	\$ -	\$ 40,000	\$ -	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000
Structural Subtotal	\$ 32,000	\$ 32,000	\$ 40,000	\$ 40,000	\$ -	\$ 40,000	\$ -	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 32,000	\$ 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	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000	\$ 60,000
tree removal	\$ 5,000				\$ 5,000			\$ 5,000		\$ 5,000						\$ 5,000
overall site constraints																
minor					\$ 6,000										\$ 6,000	
medium								\$ 15,000			\$ 15,000					
high	\$ 24,000	\$ 24,000										\$ 24,000	\$ 24,000	\$ 24,000		
markup - Delivery Constraint																
minor				\$ 6,000		\$ 6,000		\$ 6,000			\$ 6,000	\$ 6,000		\$ 6,000		
medium	\$ 12,000	\$ 12,000														
markup - WW connection available																
At Road	\$ 6,000	\$ 6,000				\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000		\$ 6,000	\$ 6,000
far			\$ 9,000	\$ 9,000												
none					\$ 15,000											
Civil Subtotal	\$ 107,000	\$ 102,000	\$ 69,000	\$ 75,000	\$ 86,000	\$ 72,000	\$ 66,000	\$ 92,000	\$ 66,000	\$ 71,000	\$ 87,000	\$ 96,000	\$ 90,000	\$ 90,000	\$ 72,000	\$ 71,000
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	\$ 43,000	\$ 43,000	\$ 30,000	\$ 43,000	\$ 43,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000
Electrical Subtotal	\$ 30,000	\$ 30,000	\$ 43,000	\$ 43,000	\$ 30,000	\$ 43,000	\$ 43,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000	\$ 30,000

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

	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

	Carters	Estuary	Sockburn	Denton	Wilmers	Dunbars	Main Pumps WS	Addington	Aldwins	Blighs	Grassmere	Hillmorton	Hills	Mays	Montreal	Spreydon
Non Construction Implementation Costs																
Permitting & Consents	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000
Engineering	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000
Services During Construction (Inspection, Contract Administration)	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000
CCC Internal Project Management	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000
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)	\$ 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
SCADA Template development - CCC internal	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333
SCADA communications protocols upgrade (transition to DNP3)	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000
Chemical/ safety labelling	\$ 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
Training	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778
	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

	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	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	

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

	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				\$ 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

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

	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	

Christchurch Fluoride Implementation - Conceptual Capital Cost Estimate

2022-03-10

	Sydenham	Trafalgar	Worcester	Tanner	Picton	Tara	St Johns	Woolston	Marshlands	Parklands	Prestons	Brooklands	Kainga	Akaroa L'Aube Hill WTP
Non Construction Implementation Costs														
Permitting & Consents	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000
Engineering	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000	\$ 58,000
Services During Construction (Inspection, Contract Administration)	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000	\$ 31,000
CCC Internal Project Management	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000
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)	\$ 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
SCADA Template development - CCC internal	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333	\$ 1,333
SCADA communications protocols upgrade (transition to DNP3)	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000	\$ 40,000
Chemical/ safety labelling	\$ 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
Training	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778	\$ 778
	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000	\$ 180,000