



chatham islands council



*Photo courtesy of Robbie Lanauze*

# AGENDA | 2021

Mayor and Councillors'

Notice is hereby given that an Ordinary Meeting of the 9th triennium (2019-2022) Chatham Islands Council will be held in the Council Chambers, Tuku Road, Waitangi, on **Thursday 16 September 2021**, commencing at **1.30pm**.

**Owen Pickles**  
Chief Executive Officer

RECOMMENDATIONS IN REPORTS ARE NOT TO BE TAKEN AS COUNCIL POLICY UNTIL ADOPTED BY THE COUNCIL



# Karakia

Kia hora te marino  
Kia whakapapa pounamu te moana  
Hei huarahi mā tātou I te rangi nei  
Aroha atu, aroha mai  
Tātou I a tātou katoa  
Hui e! Tāiki e!

*May peace be widespread  
May the sea be like greenstone  
A pathway for us all this day  
Let us show respect for each other  
For one another  
Bind us all together!*

**AGENDA**  
**Meeting Held 16 September 2021**

- |           |   |            |           |
|-----------|---|------------|-----------|
| <b>2.</b> | <b>Democracy</b>  |            |           |
| 2.1       | Minutes from Ordinary Meeting 12 August 2021                                  | (D 2.1d)   | P 1-8     |
| 2.2       | CEO Report  | (D 2.1d)   | P 9-11    |
| <b>3.</b> | <b>Finance</b>  |            |           |
| 3.1       | Council Dues Report to 31 July 2021   | (F 3.5a)   | P 12      |
| 3.2       | Financial Report to 30 June 2021  | (F 3.9b)   | P 13-17   |
| <b>4.</b> | <b>Works &amp; Services</b>   |            |           |
| 4.1       | Stantec Monthly Report  | (WS 4.5b)  | P 18-32   |
| 4.2       | Fulton Hogan Road Maintenance Contract<br>Monthly Report July & August 2021   | (WS 4.1b1) | P 33-61   |
| 4.3       | Fulton Hogan Water & Wastewater Contract<br>Monthly Report July & August 2021 | (WS 4.1b1) | P 62-78   |
| 4.4       | Waste Incineration Option Viability   | (WS 4.8)   | P 79-93   |
| 4.5       | Water & Wastewater Schemes Summary Report<br>January to June 2021             | (WS 4.8)   | P 94-341  |
| 4.6       | National Land Transport Programme – Final Decisions                           | (WS 4.1f)  | P 342-343 |
| 4.7       | Te Matarae Road Realignment   | (WS 4.1u)  | P 344-354 |
| <b>6.</b> | <b>Regulatory</b>   |            |           |
| 6.1       | Activity Report from Environment Canterbury                                   | (R 6.1f1b) | P 356-367 |
| 6.2       | Dog & Stock Control Update  | (R 6.6a)   | P 368-372 |
| 6.3       | Chatham Islands Border Quarantine & Biosecurity                               | (R 6.7)    | P 373-392 |
| 6.4       | Decision – Chatham Islands Airport Ltd Resource<br>Consent CIC/2021/009       | (R 6.1b)   | P 393-421 |
| 6.5       | Application for Subdivision Consent CIC/2021/007                              | (R 6.1d)   | P 422-427 |

**Public Excluded Agenda**

**P 428**

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## 2. Democracy

### 2.1 Minutes of an Ordinary Meeting on 12 August 2021

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<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	2.1
<b>Author/s</b>	Jo Guise – Executive Assistant

#### **Purpose**

For the Council to receive and confirm the minutes of the Ordinary Meeting of Council held on 12 August 2021.

#### **Recommendations**

1. **THAT the minutes from the Ordinary meeting of the Chatham Islands Council held on 12 August 2021 be a true and accurate record.**

## CHATHAM ISLANDS COUNCIL

Minutes of the Ordinary Meeting of the Chatham Islands Council,  
held in the Council Chambers, Tuku Road, Waitangi,  
on Thursday, 12 August 2021, commencing at 1.30pm

- Present:** Deputy Mayor, G Horler (Chair)  
Councillors' J Seymour, RS Joyce, KL Day, G Hoare, C  
Gregory-Hunt, A Seymour and O Nilsson
- Management & Officers:** Chief Executive, Owen Pickles  
Operations Manager, Colette Peni
- In Attendance:** Ms Kerri Moir (ECan Biosecurity)  
Mr Phil Holt (Fulton Hogan, Contracts Manager)
- Apologies:** Her Worship the Mayor, M Croon

**RESOLVED:**  
**THAT the apologies be received.**  
**CARRIED**

### CONFLICTS OF INTEREST

N/a

## **2. DEMOCRACY**

### 2.1 Minutes from Ordinary Meeting 24 June 2021

**RESOLVED:**  
**THAT the Minutes of the Ordinary meeting of the Chatham Islands Council,**  
**held on Thursday 24 June 2021 be adopted as a true and accurate record.**  
**RS JOYCE / G HOARE / CARRIED**

### 2.2 Minutes from Special Meeting 29 June 2021

The purpose of the Special Meeting was to formally adopt the CIC Long Term Plan 2021-2031.

**RESOLVED:**  
**THAT the Minutes of the Special meeting of the Chatham Islands Council,**  
**held on 29 June 2021 be adopted as a true and accurate record.**  
**A SEYMOUR / C GREGORY-HUNT / CARRIED**

### 2.3 CEO Report

A report to Council to provide an update on the Chief Executive's activities.

The following updates were noted –

- CE gave an update on Pitt Island Transport Links
- Request for a breakdown of costs for Waitangi public toilets

**RESOLVED:**

**THAT the Chatham Islands Council receives the report.**

**O NILSSON / J SEYMOUR / CARRIED**

#### 2.4 Mayoral Correspondence – Mins Jan Tinetti & Nanaia Mahuta

The letter received from the Office of Hon Nanaia Mahuta acknowledged the meeting with her held on 9 June 2021 and captured the key points of the meeting.

- Review of Crown Grant to the Council
  - Both of Councils recommendations had been captured in the Terms of Reference for the 2021 review, and Council would be consulted on the terms before appointing a reviewer.
- Governance Review
  - Although the two reviews have been combined to avoid duplication of resources, the governance review and the review of the Crown funding grant would be undertaken in two stages.
- Three Waters Reform Programme
  - Councils concern regarding the timeframe of the Three Waters Reform programme would be considered as part of the review of the Crown grant. Funding for urgent upgrades that could not be deferred would be factored in to the decision-making process on the level of the Crown grant for 2022-23.
- Chatham Islands Investment Strategy
  - Both Ministers supported the work to refresh the Chatham Islands Investment Strategy and appreciated the leadership role Council had taken to ensure the views of the community were reflected in the strategy.
- Meeting of the Four Entities
  - A follow-up meeting would be held with Minister Mahuta following the Four Entities meeting in Wellington.

**RESOLVED:**

**THAT the Chatham Islands Council receives the letter.**

**KL DAY / O NILSSON / CARRIED**

#### 2.5 Mayoral Correspondence – Director-General, Lou Sanson

The letter received from Director-General Lou Sanson was in response to Mayor Croon's letter of 29 June 2021 expressing her disappointment that the 'Jobs for Nature' programme on the Chatham Islands had been withdrawn.

Mr Sanson advised there was already over \$2m approved through Jobs for Nature and that those projects would continue.

**RESOLVED:**

**THAT the Chatham Islands Council receives the letter.**

**RS JOYCE / A SEYMOUR / CARRIED**

### 3. FINANCE

3.1 Council Dues Report to 31 June 2021

**RESOLVED:**

**THAT the Chatham Islands Council receives the report.**

**J SEYMOUR / O NILSSON / CARRIED**

3.2 Financial Report to 31 June 2021

**RESOLVED:**

**THAT the Financial Report to 30 June 2021 be received.**

**KL Day / C GREGORY-HUNT / CARRIED**

3.3 Audit NZ – Final LTP Audit

Within the report were three recommendations identified during the consultation audit -

- Develop and maintain an asset Management Plan for Three Waters assets that provide a good practice basis for asset management planning.
- Develop an Asset Management Policy or Strategic Asset Management Plan for roading and Three Waters assets.
- Disclose the judgements made in choosing its service performance information. This information should be considered when preparing the 2022/23 annual report.

The Asset Management plan for Three Waters would not be Councils responsibility going forward. The Asset Management for roading was undertaken every three years.

**RESOLVED:**

**THAT the report be received.**

**C GREGORY-HUNT / O NILSSON / CARRIED**

3.4 Revision to targeted rate collection estimates, subsequent to adoption of the 2021-31 Long Term Plan

**RESOLVED:**

**THAT the Council:**

1. Note the changes to the expected targeted rates take for the 2021/22 financial year.
2. Provides direction on whether the change should be highlighted to the community through Facebook or other media or rating information packs to minimise question directed at frontline staff.

**J SEYMOUR / O NILSSON / CARRIED**

4. **WORKS & SERVICES**

4.1 Stantec Monthly Report

**RESOLVED:**

**THAT the verbal report be received.**

**O NILSSON / RS JOYCE / CARRIED**

4.2 Fulton Hogan Road Maintenance Contract Monthly Report June 2021

A report from Phil Holt (Fulton Hogan) on the Road Maintenance Contract activities for June 2021 was included in the agenda.

Mr Holt advised road strengthening work scheduled from Te One to Big Bush had been deferred to undertake drainage work. Fulton Hogan were making the most of the crews available on the island.

**RESOLVED:**  
**THAT the reports be received.**  
**A SEYMOUR / O NILSSON / CARRIED**

4.3 Fulton Hogan Road Water & Wastewater Contract Monthly Report June 2021

A report from Phil Holt (Fulton Hogan) on the Water and Wastewater contract activities for June 2021.

**RESOLVED:**  
**THAT the report be received.**  
**O NILSSON / J SEYMOUR / CARRIED**

4.4 Three Waters

The Chief Executive updated Council on Three Waters Reform. At the Local Government Conference the Government offered the Chatham Islands just under \$9m, which must be spent in consultation with Iwi / Imi. It would be paid at the time when all Councils agreed to join the Three Waters programme. Presently 3 Councils were not interested. The Government had given Councils 8 weeks to become familiar with the information they had distributed. Once all the information had been received it would go out to the community.

**RESOLVED:**  
**THAT the report be received.**  
**CARRIED**

4.5 Final Roding AMP and Final RLTP

**RESOLVED:**  
**THAT the Chatham Islands Council Roding Activity Management Plan and Chatham Islands Regional Land Transport Programme be received.**  
**C GREGORY-HUNT / A SEYMOUR / CARRIED**

**6. REGULATORY**

6.1 Activity Report from Environment Canterbury

Reports included in the agenda were from the ECan Steering Group meeting held on 20 July 2021.

Ms Rachel Tutty (ECan) had drafted a submission on the draft changes to the resource management legislation, which asked for some leniency for the Chatham Islands regarding separation of stock from waterways.

Ms Kerri Moir gave a verbal update on biosecurity activities.  
Council supported bringing a Mulcher to the island.

**RESOLVED:**

**THAT Chatham Islands Council:**

- 1. Receives the report;**
- 2. Provides feedback to Environment Canterbury on the Freshwater workshop report; and**
- 3. Receives the Emergency Management Report.**

**O NILSSON / RS JOYCE / CARRIED**

**6.2 Regulatory Report**

The report was to update Council on consents and licenses issued to 30 June 2021.

It was noted that currently MBIE were drafting new rules around 'tiny houses'. If a small home was connected to any services it would need a consent.

**RESOLVED:**

**THAT Chatham Islands Council receives the report.**

**C GREGORY-HUNT / A SEYMOUR / CARRIED**

**8. GOVERNMENT**

**8.1 Report to the Department of Internal Affairs to 30 June 2021**

**RESOLVED:**

**THAT Council receives the 'Report to the Department of Internal Affairs to 30 June 2021'.**

**RS JOYCE / G HOARE / CARRIED**

**8.2 Local Government Members (2021/22) Determination 2021**

**RESOLVED:**

**THAT the report be received.**

**C GREGORY-HYUNT / G HOARE / CARRIED**

**8.3 Reform of New Zealand's Resource Management System**

**RESOLVED:**

**THAT Council receives the report.**

**KL DAY / A SEYMOUR / CARRIED**

**9. CHATHAM ISLANDS**

**9.1 MBIE – TIF Approval Letter**

**RESOLVED:**

**THAT the report be received.**

**J SEYMOUR / C GREGORY-HUNT / CARRIED**

**MEETING CLOSURE**

After consideration of the In-camera Agenda, and there being no further business, the meeting was declared closed at 3.40pm.

**CONFIRMED THIS 16TH DAY OF SEPTEMBER 2021**

**MAYOR**

Meeting Date	Meeting Item #	Task	Owner	Status	Date Updated	Comments
13 May 2021	5.1	Check with Chase Lanauze to see if still pursuing Bike Park	OM	Active	17 May 2021	CL to meet with OM – emailed with no response to date
13 May 2021	6.1	Invite SBS Biosecurity to come to discuss biosecurity issues with Council	CE	Active	31 May 2021	Will visit early in next financial year
24 June 2021	4.1	Shaun Boshier to investigate different lighting for the Te One Transfer station	OM	Active	17 Aug 2021	OM emailed contractor – no response to date
24 June 2021	8.3	1. Council write to the Ministers of Transport and Climate Change about the effect this initiative will have on the Chatham Islands; and 2. Invite the Minister for Climate Change to visit and address Chatham Islands issues.	CE	Active	29 June 2021	Referred to Hon Michael Wood, Min of Transport
12 August 2021	2.3	Breakdown of costs involved in the Waitangi public toilets	CE	Complete	12 Aug 2021	Emailed to Council 12 Aug 2021

## 2. Democracy

### 2.2 – CEO Report

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	2.2
<b>Author/s</b>	Owen Pickles, Chief Executive

#### Purpose

This report is to provide an update on activities the Chief Executive has been involved with since the last Council meeting.

#### Recommendations

**THAT the Chatham Islands Council receives the report.**

#### Report

##### Compliance

**1) National Policy Statements**

Compliance is reliant on Council being resourced and funded. Work has started on achieving this.

**2) Cost of Compliance**

The DIA is looking to complete a review of the Council's costs associated with compliance by October 2021. Recruitment of a consultant to undertake this task is underway.

##### Projects

**1) Council Funding Review**

Assisting DIA with a review of the Council's Crown appropriation. This is carried out every 4 years.

**2) Pitt Island Transport Links**

Working with Waka Kotahi on funding to support transport links to Pitt Island. While early indications were positive it seems that this decision is too hard to make so success is therefore doubtful

### 3) Kaingaroa Wharf

Bryan Peters from Stantec visited 6-9 July to meet with the wharf users and inspect the condition of the wharf. A full report will be provided on his findings however preliminary indications are that a new structure looks to be the best way forward.

### 4) Chatham Islands Airport

- It was good to hear that funding for the project has finally been confirmed and that it will now go ahead.
- An application for RMA consents has been lodged and are being processed with assistance from E.Can.
- The haul road maintenance issue is close to being resolved with agreement being reached to leave the road in a condition as good or better at the end of the project as it was when the project starts. This involves regular maintenance throughout the duration of the project.
- Independent Commissioner Sharron McGarry delivered her consent with conditions on 6<sup>th</sup> September.

### 5) Aoteoroa Peoples Network Kaharoa (apnk)

This is a partnership project between the Council, National Library of New Zealand and 2 Degrees. It will provide a funded internet connection in the library along with computer, scanner and printer. There is also the possibility of a public free to use wifi facility with discussions still on going on this point.

### 6) Chatham Islands Sustainable Growth Strategy

This looks like joining the many reports on the heap of no action reports as still no visit has been confirmed.

### 7) 3 Waters

Chatham Islands has been included within entity 3 which includes the Wellington, Manawatu, Hawkes Bay, Tasman, Nelson and Marlborough Regions.

### 8) Public Toilets

- The Tourism Investment Fund has allocated \$225k for the establishment of a new toilet block in Waitangi
- Working through the location logistics with Jackie Gurden on the 8 rural sites

## Meetings

Paul Eagle	Usually weekly
Ian Cryer re MFE Audit	06 August
Cliff Fuller MBIE new funding opportunities	06 August
3 waters LGNZ Webinar/ zoom calls	frequently
Lou Sanson Director Conservation	10 August
Dena Whaitiri /Gail Amaru/ others	10 August

Ngati Mutunga re 3 waters/housing projects	
Chaired CEG meeting	12 August
Caitlin Metz re connectivity progress	13 August
Patsey Karauria MFE	17 August
Submission to Environment Select Committee – Natural & Built Environment Act Bill – via Zoom	17 August
Stakeholders conference call re COVID -19 response and assistance	20 August
Sharon McGarry /Airport consent engagement	25 August
Monthly catch up with Tony Blakett/ HMT	26 August
National Library /2 Degrees re APNK / Zoom	26 August
MFE re final milestone claim	30 August
E.Can Steering Group Meeting/zoom	31 August
Oliver Richardson 2 Degrees /zoom	31 August

### 3. Finance

#### 3.1 Council Dues Report to 31 July 2021

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	3.1
<b>Author/s</b>	Jakana Lanauze-Phillips, Finance Technical Lead

#### Purpose

Report to Chatham Islands Council on current Council Dues as at 31 July 2021.

#### Recommendations

**THAT the Chatham Islands Council receives the report.**

#### Key points

- Chatham Island Shipping – No Outstanding Manifests
- Air Chathams – No Outstanding Manifests

#### Background

<b>Carrier</b>	<b>Amount Owing</b>	<b>Month/s invoices Outstanding</b>	<b>Details</b>
Air Chathams	\$6,782.24	July 2021	
Chatham Islands Shipping	Nil		

## 3. Finance

### 3.2 Financial Report to 30 June 2021

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<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	3.2
<b>Author/s</b>	Tanya Clifford, Corporate Reporting Accountant, Environment Canterbury

#### **Purpose**

To present to Council the financial report to 30 June 2021.

#### **Recommendations**

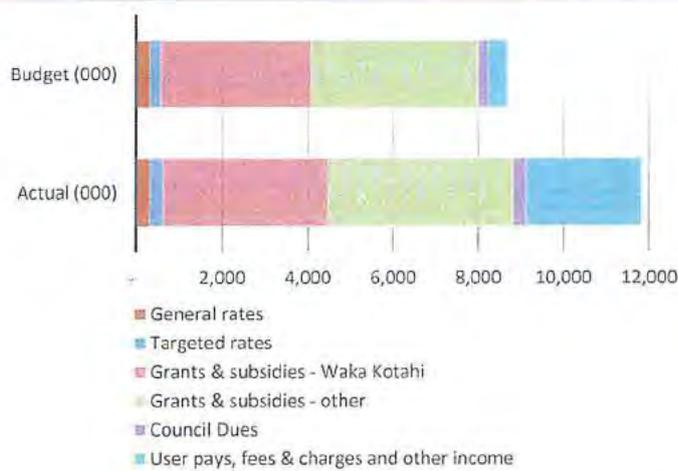
**THAT the Financial Report to 30 June 2021 be received.**

# Graphical Financial Information



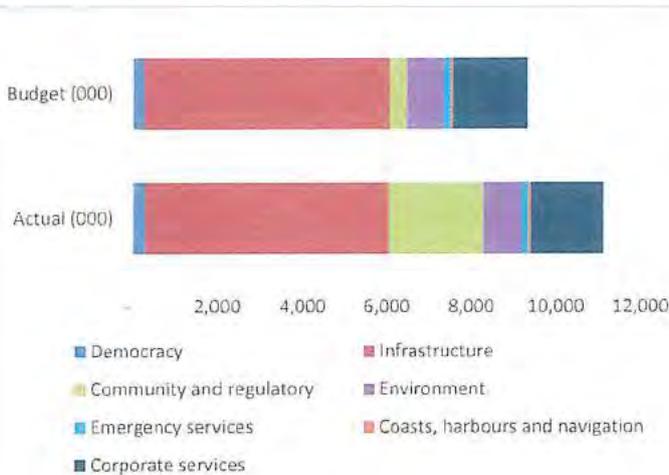
as at 30 June 2021

## Revenue



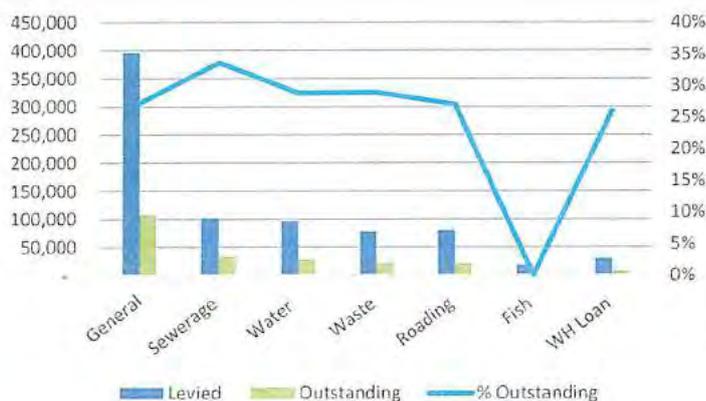
\* Council has received a number of unbudgeted grants to support new initiatives as a result of the Governments COVID-19 support programmed (approximately \$400k) and support to construct the new Council office facility (approximately \$2m).  
 \* DIA annual contribution is \$570k greater than previous levels, this will be sufficient to cover the Waka Kotahi (12%) funding shortfall.

## Operating & Capital Expenditure



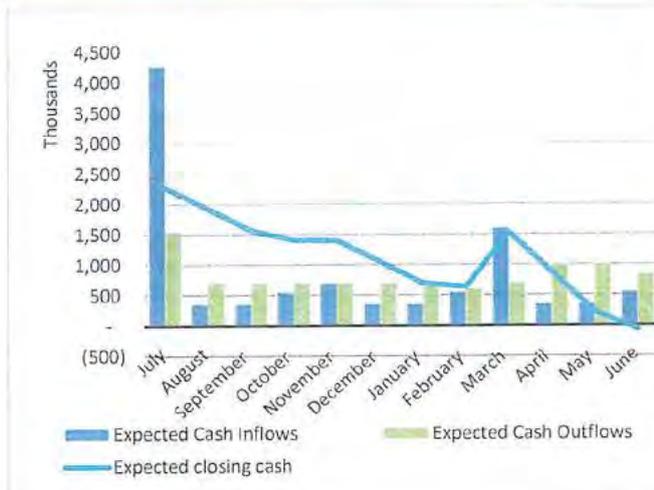
With the exception of the expenditure on the Community Complex, and increased roading, water & wastewater expenditure, there are no significant items of variance related to expenditure.

## Revenue rates collectability



The third (and final) rate instalment was issued on 1 May. The graph indicates 20% of rates for the year remain outstanding or \$120k. In the previous year, a focus on collecting long outstanding rate debtor balances resulting in an outstanding year-end balance of \$80k. Whilst Council has sought legal judgment against long overdue debts, Council may wish to reconsider it's strategy in relation to collecting long outstanding rate debtor balances, including potentially entering into payment arrangements.

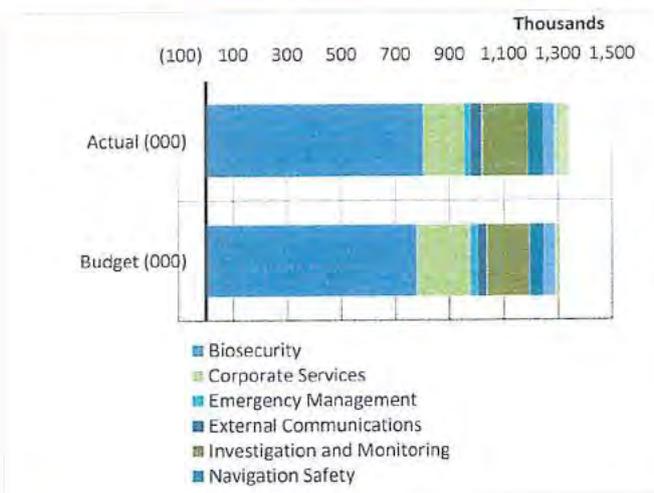
**Cashflow Forecast**



Council's closing balance for June, was an overdraft of \$71k. This is an improved position on the opening cash balance for the year (1 July 2020), which was an overdraft of \$441k, and also better than the budgeted year end position, which was an overdraft of \$667k. This is largely influenced by the number of grants received during the year, some of which may need to be transferred to the next financial year or returned if conditions are not fully met or funds not fully spent.

Funds set aside for the museum construction have now been paid out.

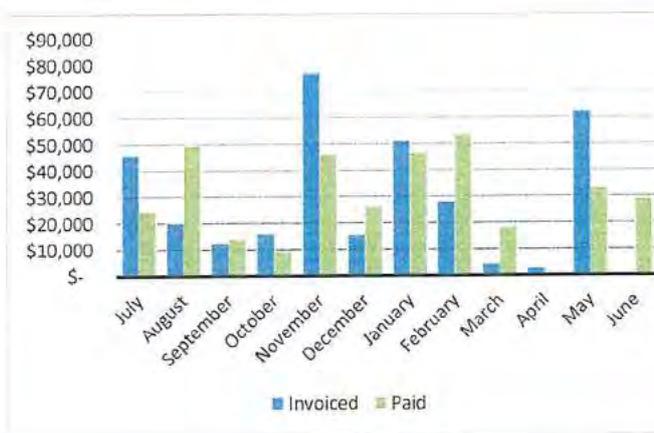
**ECan Operational Expenditure**



Actual expenditure reflects year to date spend, compared with the budgeted contract value allocated for nine months. The later periods of the year is where work programmed increase particularly related to the Long-Term Plan and biosecurity initiatives.

ECan continues to operate within the overall budgetary constraints of the contract.

**Revenue Council dues collectability**



Note: The current outstanding Council Dues balance for June is \$16k.

Current trends are reflective of steady repayments being made. However, amounts have historically not always been repaid within a month of invoicing. Delays in collecting Council Dues, increases the risk of funds not being collected.



	Actual (000) \$000	Budget (000) \$000	Variance	Note Ref
<b>Revenue</b>				
General rates	305	311	(6)	1
Targeted rates	320	266	54	1
Grants & subsidies - Waka Kotahi	3,853	3,490	363	2
Grants & subsidies - other	4,340	3,922	418	2
Council Dues	307	265	42	3
User pays, fees & charges and other income	2,690	432	2,258	4
<b>Total revenue</b>	<b>11,815</b>	<b>8,686</b>	<b>3,129</b>	
<b>Expenditure</b>				
Democracy	309	292	17	7
Roading	1,443	1,487	(44)	5
Solid waste	518	516	2	5
Water	588	191	397	5
Wastewater	137	119	18	5
Community and regulatory	2,240	414	1,826	6
Environment	912	865	47	7
Emergency services	170	172	(2)	7
Coasts, harbours and navigation	59	58	1	7
Corporate services	1,696	1,763	(67)	7
Depreciation	2,549	2,292	257	8
<b>Total expenditure by activity</b>	<b>10,621</b>	<b>8,169</b>	<b>2,452</b>	
<b>Total surplus/(loss)</b>	<b>1,194</b>	<b>517</b>	<b>677</b>	

Minor adjustments/accruals made to this reported financial information to reflected expected year-end results. Audit as part of the Annual Report process is yet to be completed, therefore actual reported results may be different to those reported here.

#### Variance explanations:

- Rates are based on the Council approved rates strike, variance due to recognition of penalties.
- The Waka Kotahi subsidy is based on 88% of actual expenditure, approximately \$480k in unspent approved projects from previous years have been carried over to 2020/21.  
Council also drew down of an unbudgeted grant, including funding from the Ministry of Health for water and wastewater projects (previously earmarked for the sludge lagoon project).
- Council dues are a Council tax on island imports/exports. There is a notable relationship between works on-island and the income received from Dues. Transactions with on-island shipping/freight companies are current.
- Council recognised financial support of \$2 million for the museum component of the new council offices. A grant of \$1 million grant previously received from the Ministry of Culture and Heritage was recognised - previously held as "revenue in advance", and an additional \$1 million was received from Lottery Environment & Heritage NZ.  
The remaining variance relates to a windfall of unbudgeted support payments including: Norman Kirk building & toilet programme (\$190k), youth and regional alliance co-ordinators (\$150k), jobs for nature focused on Pitt Island (\$100k) Predator Free 2050 (\$50k). Where the support payment has not been fully spent in year, the excess has been transferred to the next financial year.
- Infrastructure projects, expenditure primarily relates to the Stantec/Fulton Hogan Roothing and water, wastewater contracts. Additional water & wastewater expenditure for critical repairs has occurred in year, funded by way of reallocated funding previously made available for the sludge lagoon project - now deferred and the three waters 'tranche' funding.
- Expenditure allocated to the construction of the CI Community Complex \$1.6 million. At this point in time, Council has received a greater portion in grants compared to what has been paid out in construction fees, depending on the grant conditions, this may require Council to repay funds to the granting organisation.
- No notable areas of variance.
- Actual depreciation expense run up until February, annual apportionment estimate only, will run final depreciation as part of the Annual Report preparation process, delayed slightly due to COVID-19 restrictions.

Capital expenditure summary	Actual \$000	Budget \$000	Variance	Note Refere
<b>Sources of capital funding</b>				
Subsidies and grants for capital expenditure	2,545	2,239	306	a
Increase / (decrease) in debt	-	(62)	62	
<b>Total sources of capital funding</b>	<b>2,545</b>	<b>2,177</b>	<b>368</b>	
<b>Application of capital funding</b>				
Roading works	2,892	2,544	348	a
Housing*	8	200	(192)	
Waste, including sludge lagoon project*	141	710	(569)	
Water service connections*	-	3,070	(3,070)	
Emergency management*	-	250	(250)	
Critical water & wastewater replacement*	-	552	(552)	
Other	37	-	37	
<b>Total application of capital funding</b>	<b>3,077</b>	<b>7,326</b>	<b>(515)</b>	
<b>Movement in reserves</b>	<b>(532)</b>	<b>(5,149)</b>	<b>883</b>	

\* Desired projects in the 2020/21 budget, removed due to lack of funding support

**Variance explanations:**

- a The grant figure primarily relates to the Waka Kotahi budget, which is reflective of 88% of actual costs incurred. Actual expenditure increased reflective of \$480k in projects deferred from previous years being completed in-year (new cycle begins in 2021/22, with any unused approved funds being 'lost').

## 4. Works & Services

### 4.1 Stantec Engineering Report – July 2021

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<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	4.1
<b>Author/s</b>	Shaun Boshier / Kirsten Norquay - Stantec New Zealand

#### **Purpose**

To update and inform Council about its Engineering Services contract.

#### **Recommendations**

**THAT the report be received.**

#### **Background**

Shaun Boshier and / or Kirsten Norquay will teleconference in to the meeting to give a verbal report on monthly activities.

## CIC Engineering Services Contract: Monthly Report

### Financial update – July 2021

#### Financial Position Roading

The roading budget allocated for the 2021/22 financial year has yet to be fully approved by Waka Kotahi, but the funding request was for \$4.6M. They have approved the Maintenance, Operations and Renewals (MOR) budget of \$3.65M, we are still waiting on the Low Cost, Low Risk (LCLR) funding approval.

The July claim totalled \$231k, meaning we spent approximately 4% of the annual budget vs. 8% of year complete. Expenditure of the core MOR work had 6% of the budget spent and the LCLR projects had 0%, due to funding uncertainty.

The largest construction cost (outside of lump sum) was drainage improvements around the network e.g. watertable creation and culvert replacements. The largest engineering cost was the start of the 2021 Bridge Inspections by Bryan Peters, when he visited about Kaingaroa Wharf.

#### Expenditure Tracking of Waka Kotahi Funding

With budgets for 2021/22 not yet finalised, we will not produce any graphics of the predicted/tracked annual spend until the August report.

#### Financial Position: Water and Wastewater

The operational expenditure for W+WW allocated in the 2021-31 LTP for 2021/22 was \$339,000.

The June claim totalled \$42K. The main construction costs related to remedial works at the Kaingaroa water treatment plant. The main engineering costs related to the planning and consent updates relating to the 3 Water Stimulus package.

#### Expenditure Tracking of Water & Wastewater Funding

Tracking graphs for the W+WW projects will also be presented in August.

## Roading Update – July 2021

<b>Stantec Site Visits</b>	
<p><b>Previous Status:</b></p> <ul style="list-style-type: none"> <li>• Shaun Boshier and Kelly Bombay visited the last week of January. Kelly (Senior Planner) accompanied Shaun to discuss the global consent and Whangamoe consent with Ngāti Mutunga and DOC. Unfortunately Hokotehi were not on Island to meet and discuss matters.</li> <li>• They also attended a Kaingaroa Community meeting and Shaun spoke of plans to improve the sealed road in the settlement.</li> <li>• Nigel Lister visited the 23-26 March. Kelly Bombay visited the 22-25 March.</li> <li>• Nigel and Kelly met with Hokotehi along with Klicky, to discuss the global consent and Whangamoe consent applications.</li> </ul>	<p><b>Updates:</b></p> <ul style="list-style-type: none"> <li>• Shaun and Rebecca visited on the 20-23 July.</li> <li>• Bryan Peters met with the Kaingaroa Wharf community reps and to take another look at the wharf. This will start the process on the future structure at Kaingaroa.</li> <li>• Bryan's biennial bridge inspection visit is set for first week of October.</li> <li>• Nigel and Rebecca will also visit in the first week of October.</li> </ul>
<b>CIC catch-ups in Christchurch</b>	
<p><b>Previous Status:</b></p> <ul style="list-style-type: none"> <li>• Shaun, Nigel, and Kirsten caught up with Owen and Monique in late June 2020 in Christchurch. Manaia met Shaun, Bryan, and Kelly at Stantec Offices in early November.</li> <li>• Shaun and Bryan met with Owen at Stantec to discuss the Kaingaroa Wharf work and other general matters.</li> <li>• Nigel and Shaun met with Owen and Monique on 8 June, ahead of a meeting at Waka Kotahi offices.</li> </ul>	<p><b>Updates:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul>
<b>Waka Kotahi (NZTA) Correspondence</b>	
<p><b>Previous Status:</b></p> <ul style="list-style-type: none"> <li>• Glenn MacGregor visited for a couple of days in February to conduct his procedural audit of Council's expenditure of Waka Kotahi's funding.</li> <li>• Early March will have a meeting on the new Speed Limit Management Tool being produced by Waka Kotahi.</li> <li>• Also have had contact about the new road classification system that Waka Kotahi are going to instigate that replaces the One Network Road Classification (ONRC). The latest one is called the One Network Framework (ONF).</li> <li>• Waka Kotahi has been informed about the large quantity of material that will be hauled over our road network for the 'Longer &amp; Stronger' project.</li> <li>• The stretch of road between Waitaha Quarry and the Port Hutt Road turn-off is likely to suffer poorly from isolated pavement failures that we have not budgeted to repair during the 2021-24 NLTP.</li> <li>• Further discussions are likely needed on this topic and the effect the haulage will have on the road network for everyday users.</li> <li>• Owen, Monique, Shaun and Nigel met with Afi Tusa, Peter Connors and Phil Walker (all Waka Kotahi) on June 8<sup>th</sup> to discuss a few matters and have a general catch-up, as it had been a while since a Council member had met with Waka Kotahi.</li> </ul>	<p><b>Updates:</b></p> <ul style="list-style-type: none"> <li>• Shaun and Rebecca joined Colleen Clearwater to visit David Scarlett about the Road Safety Programme for the next three years.</li> <li>• There was some great ideas put forward by Colleen that were supported by David. Stantec will assist Colleen as required to make these happen.</li> </ul>

### Whangamoe Bridge Replacement

#### Previous Status:

- John Hovell conducted his cultural audit on the 15<sup>th</sup> / 16<sup>th</sup> Sept.
- John has indicated two areas where he has no concerns and one area around the stream where a historical settlement may have existed. A stand-over when excavating in this area will be required in case any koiwi tangata or taonga are found.
- The DVD is understood to outline the wishes of iwi members should items of cultural significance be found. We await the DVD to hear what was said.
- Stantec Planner Kelly Bombay to begin writing the consent application which needs to be lodged with Council (Paul Whyte) by mid-October to allow for appropriate time to review and notify the consent to stakeholders.
- John Hovell's DVD has been received and viewed by Shaun. Notes of important locations within the construction site have been made and appropriately referred to in the consent application.
- The Whangamoe Culvert resource consent application will be submitted in early November. Council to send out copies to key stakeholders.
- Culvert design with manufacturers has been finalised. Awaiting confirmation of a fabrication date. Still hoping that the culvert is manufactured and delivered to the Island prior to Christmas or very early 2021.
- A tight timeframe with the fish-spawning period beginning on the 1<sup>st</sup> March, leaves little time to construct and be out of the streambed before then. There is a risk this project goes on hold until 1 July when the fish spawning ends.
- The decision was made by Shaun & Nigel to delay the construction of Whangamoe Culvert by 6-8 months.
- With the culvert still en-route from Canada and the delays at Auckland Port, the culvert was not going to make landfall on the Chathams until early/mid-February at best. We must be out of the stream by 28 February for fish spawning season from 1 March to 30 June.
- This means we must find other projects to spend the funding. The obvious project for us to complete is the North Road crest job, which has been designed, and was meant to be constructed during this three year funding period anyway.
- Productive discussions on the consent application were had with Ngāti Mutunga and DOC during Shaun and Kelly's visit. Additional discussions with Hokotehi are yet to occur but are an important step in gaining stakeholder support.
- The culvert has landed on Waitangi, so the main piece of the project is safely on the Island. Final hurdle is to work through consent and archaeological issues with stakeholders.
- Nigel and Kelly met with Hokotehi in late March to discuss this consent and archaeological requirements.
- Hokotehi keen to conduct an archaeological assessment of their own that would align more to Heritage NZ procedures. However, this is likely to be conducted only from the road corridor.
- The land agents have been notified by email of this work occurring.

#### Updates:

- Final consultation information has been sent to Iwi and Imi partners to respond to.
- We hope that all concerns have now been addressed and that approval of the consent can then be granted, whilst the Archaeological Authority was being processed.

**Bridge Work****Previous Status:**

- We await feedback from FH on some of the specific items from the bridge inspection report completed earlier in the year.
- Bryan Peters will draw up any necessary design inputs for work that requires Stantec input before FH can get started.
- FH supplied Stantec with an update on the work conducted on the work identified in bridge inspection report.

**Updates:**

- Bryan Peters tried as best he could to conduct some of the biennial bridge inspection work while he was on the Island to visit Kaingaroa Wharf.
- However, his baggage never arrived on the same flight, so he was without a lot of his notes and some equipment to do the tasks. This made it difficult to do productive work

**2021-24 National Land Transport Plan (NLTP) Funding Request and Activity Management Plan (AMP)**
**Previous Status:**

- Due to the deferral of Whangamoe Culvert construction, it caused major headaches in terms of the final funding application submission for our 'Maintenance, Operations and Renewal' (MOR) programme. This is due to the deferral only being decided a week out from the submission date.
- Afi has been very supportive and understanding of the upheaval that has occurred to our 2021-24 programme due to Whangamoe. This has meant the AMP document is now often speaking of projects that are no longer proposed to occur and budgets that are quite different.
- A funding submission of \$13.8M has been submitted for MOR activities. This is higher than the earlier agreed amount of \$13.0M, but Shaun phoned Owen to discuss why this was necessary, to which Owen agreed with the plan.
- Audit NZ had a one hour meeting with Shaun on infrastructure planning, to which Shaun provided them with a draft version of the AMP to show how our planning was occurring.
- Further work to update the application and then complete the supplementary sections is still occurring.
- The draft funding submission is with Waka Kotahi, so we await a response in a couple of months on how successful that has been.
- Shaun to continue updating the AMP and providing copies to Waka Kotahi (in draft format) so that they have the latest information and evidence at hand.
- Updated draft versions of the AMP have been supplied to Waka Kotahi and AuditNZ.
- Waka Kotahi feedback on the AMP has been received. Their assessment is a 'PASS' rating, which is great news as it signals that our AMP successfully outlines the problems and issues on our network, whilst stating the strategies on how we address such issues.
- Shaun sent a draft version to Council for the May meeting to see endorsement (in principal) ahead of a final endorsement in June. There were some missing bits of information that still need to be tidied up.
- This version will be sent to Waka Kotahi by 19<sup>th</sup> May to receive a final assessment. There were a few assessment categories where they wanted more information, namely the financial and commercial information.
- The AMP was finalised and sent to Waka Kotahi on 19 May.
- Since that time, Waka Kotahi has provided the indicative funding Council will receive for their Maintenance, Operations and Renewals (MOR) budget.
- Council has received the allocation that was requested, which is a great outcome.
- Shaun completed a draft version of the Regional Land Transport Plan (RLTP) that Council must consult with the public on. As a unitary authority Council is obliged to undertake this.
- Waka Kotahi have reviewed the RLTP and did not raise any concerns.
- With no public feedback on the RLTP document, Shaun was able to finalise it and submit to Waka Kotahi.

**Updates:**

- We await news on the funding decision for Low Cost Low Risk projects, which won't be known until mid-August.
- Most keenly of that, is whether we get funding for the improvements associated with the sealed rehab in Kaingaroa.

North Road Crest Removal	
<p><b>Previous Status:</b></p> <ul style="list-style-type: none"> <li>• With the Whangamoe Bridge project being delayed into the 2021/22 year, the funding left behind needed to be spent on other projects or otherwise go unspent.</li> <li>• The North Road Crest project that had previously been identified for the 2018-21 NLTP, has been reinvigorated to help spend the funds.</li> <li>• The original cost estimate from Fulton Hogan made the project unviable.</li> <li>• Nigel reduced the scope of work to lower the cost and had some discussions around the percentage of local Island staff involved vs those staff flown in to do the work.</li> <li>• A subsequent cost estimate from Fulton Hogan has meant the project is now financially viable.</li> <li>• Susan Thorpe conducted an archaeological assessment of the site, which identified no issues. We have received her report.</li> <li>• Work has started on site and good progress is being made.</li> </ul>	<p><b>Updates:</b></p> <ul style="list-style-type: none"> <li>• The project is complete and having viewed it during the July visit, it looks much better than it was previously.</li> </ul>
Kaingaroa Settlement Road Improvements	
<p><b>Previous Status:</b></p> <ul style="list-style-type: none"> <li>• The Kaingaroa Settlement sealed rehab is turning into a very big project.</li> <li>• The existing road width is only about 4.2-4.5 m wide, which is not wide enough for two vehicles to pass each other, so it ideally needs to be widened to about 5.5m wide.</li> <li>• This will trigger several processes, namely, retaining walls on the hill side; small retaining walls for the road on coastal side; relocation of water, power, and telecom; some land acquisition, and finally the widening itself.</li> <li>• In all, the job might cost \$1M to rehab 500m of road.</li> <li>• The state of the road out in Kaingaroa is poor, and a resolution has been promised I understand.</li> <li>• With Whangamoe being delayed by a year, this pushes the sealed rehab out by one year also – so it will now occur during late 2022 and early 2023.</li> <li>• Shaun attended a community meeting in Kaingaroa which was a worthwhile exercise, as it enabled us to understand the concerns and desires of the local community for the road in their township.</li> <li>• We learnt they are not interested in a wider road, rather they wish for more road to be sealed near the settlement.</li> <li>• They also desire a footpath to improve safety for their children attending school or tourists wandering around the town.</li> <li>• Shaun promised that the existing road surface could be improved, but no promises on whether any seal extensions could be forthcoming.</li> <li>• The design has been progressed quite a lot this month, with some optioneering needed to try and address a couple of the problems that have arisen.</li> </ul>	<p><b>Updates:</b></p> <ul style="list-style-type: none"> <li>• Work is on pause for a period as we focus on getting other projects finished and expenditure complete before 30 June.</li> <li>• We also need to understand the funding available for the next phase, which is unlikely to be known until August 2021.</li> </ul>

Other Minor Jobs	
<p><b>Previous Status:</b></p> <ul style="list-style-type: none"> <li>• 18 new streetlight locations have been agreed with Ian Sanson. These utilise the best locations to improve coverage where low voltage supply is easily accessed.</li> <li>• The main improvements occur in Te One, with additional lights opposite: te kohanga reo, DoC, Ngati Mutunga offices, Air Chathams, Peni Lane intersection and the 60 km/h threshold sign at northern entrance to town.</li> <li>• In Waitangi the main lighting improvements are at Pages Corner, the garage, Maipito intersection, the morgue and a couple other gaps in main town centre.</li> <li>• The Te One footpath extension has been completed, this will make walking to school or accessing the bus safer for the tamariki who live north of Peni Lane.</li> <li>• The Te One Ped crossing is complete, Stantec will have to meet with the school staff to outline how the crossing operates.</li> </ul>	<p><b>Updates:</b></p> <ul style="list-style-type: none"> <li>• None</li> </ul>

## Network Drainage Improvements

### Previous Status:

- Stantec planner (Kelly Bombay) has discussed with Paul Whyte (CIC Planner – Beca) about whether a global consent for larger maintenance drainage replacements is a good idea.
- There are a growing number of medium sized culverts on the island that need replacement (with a water course diversion), so it makes sense to capture all of these under one consent (global), rather than producing a consent for each culvert replacement.
- Currently we have three out of four locations (where large pipe installations are required), where a major disturbance of the watercourse would occur.
- Kelly has previously written a similar consent for Buller DC, so will use this as the basis of this consent. This will lower costs for Council in terms of writing the application. She will begin this work in April.
- Shaun will start planning where future drainage improvements are to take place next year and then in the three year programme for 2021-24.
- Focus will turn to North Road from the Port Hutt turn off out to Kaingaroa township. Then any necessary work out to Port Hutt and anymore on Tuku Road.
- Stantec asked FH to replace the damaged culvert on Port Hutt Rd with the already purchased multi-plate aluminium culvert.
- We have asked Fulton Hogan to purchase three more medium sized multi-plate culverts to replace other damaged or undersized culverts around the network now that we know it is a successful method.
- The three locations are: immediately outside the Waitaha Basalt quarry, Gillespies Culvert, and another culvert just beyond Gillespies.
- Kelly attended the Ngāti Mutunga February board meeting by phone. This was to explain to the wider board about the consent application and how it would work.
- The global consent process remains in the consultation phase and some good productive outcomes have already arisen from the initial discussions that Shaun and Kelly had with DoC and Ngāti Mutunga.
- Kelly and Nigel discussed the global consent with Tony at Hokotehi. They also briefly chatted to Susan. Discussions with Hokotehi on the consent are on-going as we ensure that both parties points of view are well understood.

### Updates:

- Stantec identified some locations that needed to be addressed around the network, which amounted to some culvert clearing and replacements on Te Matarae Road, high shoulder removal on Target hill (to stop water to accumulating on the edge of the pavement), as we want to ensure that water gets off the pavement as we know there is some weak pavement in the road that will not do well if it gets too much water ingress.
- We are pursuing the three medium sized culverts separate to the Global drainage consent at this stage, as the global consent has some stakeholder issues to deal with which is taking a little longer.
- We are still pursuing the Global consent, but really need to get these three culverts installed this financial year in and around the construction of Whangamoe Culvert.

<b>Stantec Rooding Forward Work Programme – August</b>	
<b>Network &amp; Asset Management</b>	<ul style="list-style-type: none"> <li>National Speed Limit Review work continues</li> <li>One Network Framework classification work continues</li> </ul>
<b>Renewals</b>	<ul style="list-style-type: none"> <li>Work with FH to build up a forward works programme for the year. Especially around targeting unsealed pavement rehabilitations.</li> <li>Pursue a separate consent for three larger culverts that we want to install this year, which cannot wait for the global consent to be finalised.</li> </ul>
<b>Whangamoe Bridge Design</b>	<ul style="list-style-type: none"> <li>Await any feedback from Imi and Iwi partners on the Whangamoe Consent Application.</li> <li>Continue to finalise design for pricing by FH.</li> </ul>
<b>Low Cost / Low Risk Projects</b>	<ul style="list-style-type: none"> <li>Awaiting budget confirmation in mid-August</li> </ul>
<b>Mid-Term Rooding Forward Work Programme (approx. 2-6 months)</b>	
<b>Whangamoe Bridge Design</b>	<ul style="list-style-type: none"> <li>Produce construction drawings and agree cost estimate with FH.</li> <li>Build the replacement structure and conduct construction monitoring visits during key construction milestones. Bryan Peters down as Structural Engineer who will visit during construction.</li> </ul>
<b>Renewals</b>	<ul style="list-style-type: none"> <li>Continue to consult on the 'global consent' application for larger maintenance culvert replacements.</li> </ul>
<b>Low Cost / Low Risk Projects</b>	<ul style="list-style-type: none"> <li>Await news on funding level approved for 2021-24 NLTP and whether Kaingaroa funding has been approved.</li> </ul>
<b>Road Safety Inspection</b>	<ul style="list-style-type: none"> <li>Conduct the biennial road safety inspection. Initial thoughts are to send Mike Smith out, who has not conducted the safety inspection in eight years. Will be good to see his thoughts on how things have changed and how they may have stayed the same (e.g. split camber on bends that are driven on the inside lane in both directions).</li> </ul>
<b>Bridge inspection</b>	<ul style="list-style-type: none"> <li>Bryan Peters to conduct the bridge inspections in November 2021 and try to get over to Pitt Island and review the bridges there, that were not reviewed during 2019.</li> </ul>
<b>Long Term Rooding Forward Work Programme</b>	
<b>Whangamoe Bridge Construction</b>	<ul style="list-style-type: none"> <li>Fence off rooding corridor.</li> <li>Finalise legal boundaries with Māori Land Court and lodge new titles for adjacent parcels and road. Will require a cadastral survey of the road alignment.</li> </ul>
<b>Kaingaroa Improvement Works</b>	<ul style="list-style-type: none"> <li>Once we know what level of funding we have been provided for associated improvement works, we can then begin to design accordingly to our budget.</li> </ul>
<b>Rooding Work Under Action</b>	
	<ul style="list-style-type: none"> <li>Monitoring some isolated failures in the sealed rehabs constructed this year. One of them is getting worse according to Phil.</li> <li>Target Hill is starting to show signs of stress and failure. Needs to be monitored, as the next sealing season is now during 2022/23.</li> </ul>
<b>Miscellaneous</b>	
<b>Kaingaroa Wharf</b>	<ul style="list-style-type: none"> <li>Bryan Peters to complete detailed report on the best outcomes for Kaingaroa Wharf, after his visit in July.</li> </ul>

## Water and Wastewater Update – July 2021

Contract Documentation	
Project:	Current Status:
<b>Water Compliance</b>	<ul style="list-style-type: none"> <li>• Drinking-water Standards for New Zealand 2005 (revised 2018), DWSNZ, came into force on 1 March 2019. Both water supplies are currently non-complying with DWSNZ primarily due to inadequate treatment barriers being in place. Exposure drafts of the new DWSNZ have been released, with public consultation expected later this year.</li> <li>• Stantec, in consultation with FH and CIC, is progressing design/scoping of various upgrade works that are being funded through MoH and 3 Waters Reform.</li> <li>• CIC also needs to carry out a catchment log credit assessment for both supplies and radiological testing for Tikitiki bore water. Depending on actual costs for existing projects, this work may be able to be completed within current 3 Waters Reform funds.</li> <li>• Revised Water Safety Plan (WSP) framework was released in December 2018. The current WSPs, which require reviewing by June 2021, need substantial revision to comply with the new framework. However, new requirements for WSPs as well as for source water management are expected in 2021, along with revised timeframes for implementation. Currently, WSPs are not mandatory as each supply serves less than 500 people (unless CIC elects to comply with DWSNZ via section 10), and so CIC has elected to not review its WSPs at this stage.</li> </ul>
Water Supply	
Project:	Current Status:
<b>All Supplies – Funding and Site Visit</b>	<ul style="list-style-type: none"> <li>• <b>Urgent priority works are progressing, funded via MoH (\$339,900.01).</b> There have been some delays – due to higher than expected costs for bore works, delayed response times from supplier in Dec-Jan, and high workload associated with responding to 3 Waters reform information requests. MoH have confirmed detailed evidence needed to support milestone payment claims (ie invoices from subcontractors, FH and Stantec), <b>funds can be paid on partial completion of milestones</b> (eg completion of design). <b>CIC has received approval for the Contract Variation; an extension of time (30 June 2022) and varied milestone amounts to account for incurred surplus and deficits.</b> Webster Drilling in contract to complete the MPA bore redevelopment (July/August). <b>Waitangi and Kaingaroa WTP upgrades partially complete;</b> electrical work outstanding.</li> <li>• <b>3Waters stimulus works outlined in the approved Delivery Plan are progressing, funded via DIA (\$640k).</b> Council received its first payment (\$320k) in late 2020. <b>Stantec submitted the initial progress report in early February 2021</b> (no additional payment). The balance of funds will be paid in quarterly payments over 2021 calendar year, based on percent complete of work packages. Scope change approved to recoup costs of RFI. Online monitoring scope is being finalised and there is an opportunity to add more monitoring capability across the network.</li> <li>• <b>Site visit required to build relationship with FH's new O&amp;M contract manager to ensure successful delivery of MoH and 3Waters stimulus funding package</b></li> <li>• <b>Request for Information (RFI) for the 3 waters reform</b> (DIA &amp; Canterbury Mayoral Forum) <b>submitted in Jan, subsequent revisions/comments in Feb and Mar. Periodic correspondence since. A second round RFI is anticipated at the end of 2021/early 2022 as per March 2021 DIA webinar.</b></li> </ul>
<b>Kaingaroa – Lake Rangitai</b>	<ul style="list-style-type: none"> <li>• A boil water notice is to be put in place prior to intake trench reinstatement work being undertaken as previous reinstatement saw elevated E.coli in the treated water. <b>Trench reinstatement is ongoing.</b></li> <li>• Pegs to hold down the rising main have arrived on the island. <b>No change.</b> Materials for the extension have been delivered to the island and awaiting installation by FH at end of July pending lake levels.</li> <li>• Stantec have completed design and scope of works for the WTP upgrade (reduce dissolved organic carbon and chlorinate) &amp; confirmed procurement route (MoH</li> </ul>

	<p>funds). Design by Filtec has been reviewed and contract between Filtec and FH is in place. Equipment to depart mainland on June sailing. <b>Kaingaroo WTP upgrades 90% complete. A second visit by FILTEC is required; FILTEC returned on the week of 20 July.</b></p> <ul style="list-style-type: none"> <li>• Shaft on WTP raw water pump failed. FH was able to locate a pump to maintain supply to Kaingaroo as an interim solution. FH placed an order for a replacement pump, and delivery data unknown. A plan is in place to issue a BWN if the interim solution fails and bypassing the WTP is required to maintain supply. BWN was not required.</li> </ul>
<b>Waitangi water supply upgrade</b>	<ul style="list-style-type: none"> <li>• See Jan 2021 monthly report for discussion on MPA bore yield. <b>Stantec has reviewed options and determined best approach for MPA bore investigation (MoH funds). Engagement between FH and Webster in place. MPA bore redevelopment works completed 26 July, but issue with the pump and pumping tests could not be completed. Webster to return on week of 23 August.</b></li> <li>• Stantec have completed design and scope of works for the WTP upgrade (new UV) &amp; confirmed procurement route (MoH funds). Design by Filtec has been reviewed and contract between Filtec and FH is in place. <b>Upgrade works 90% complete and FILTEC to completed 20 July.</b></li> <li>• On-line water monitoring concept discussed with relevant NZ suppliers well progressed, following discussions with various NZ suppliers. <b>ConnectM2M has been identified as the preferred supplier; engagement between ConnectM2M and FH pending.</b></li> <li>• Discussed replacement of the WTP building and possible budget available under the 3Ws Stimulus budget for Water Safety. <b>Reallocation of budget approved by CIC, and construction details to be confirmed with Contractor.</b></li> <li>• CIC to consider introducing rules for enforcing private repairs within a certain timeframe to minimise loss of water and ensure the supply network can be maintained. Ongoing.</li> <li>• CIC to consider whether charges are applied for taking water from the FH yard and/or if water is only able to be taken during hours when the yard is manned (i.e. locked at other times). Ongoing.</li> <li>• CIC to consider procurement options as detailed in the Waitangi water supply upgrade preliminary design report – ON HOLD pending resolution of the above.</li> </ul>
<b>Water Schemes</b>	<ul style="list-style-type: none"> <li>• On-line water monitoring concept discussed with relevant NZ suppliers, options considered and design complete (3Waters funds). <b>ConnectM2M has been identified as the preferred supplier; engagement between ConnectM2M and FH pending.</b></li> </ul>
<b>Reporting/ Monitoring/ Sampling July 2021</b>	<p><b>All water supplies are non-complying with the amended DWSNZ <u>and</u> revised Health Act.</b></p> <ul style="list-style-type: none"> <li>• <b>Waitangi Water Supply</b> <ul style="list-style-type: none"> <li>○ Complies with WSP for bacteria (E.coli not detected in treated or network sample).</li> <li>○ Non-compliance with DWSNZ for protozoa as existing UV disinfection inadequate. <b>Upgrade works 90% complete but not fully commissioned. Due to comply by the end of August 2021.</b></li> <li>○ Total coliforms not detected in raw, treated or network sample for July 2021</li> <li>○ Treated water turbidity was 0.31 NTU and exceeded the operational target of 0.3 NTU. <b>Due to incomplete upgrade works FH to complete manual filter backwashes once every two days until fully automated by the end of July 2021.</b></li> </ul> </li> <li>• <b>Kaingaroo Water Supply</b> <ul style="list-style-type: none"> <li>○ Complies with WSP for bacteria (E.coli not detected in treated or network sample).</li> <li>○ Non-compliance with DWSNZ for protozoa, however consistent with approved WSP. <b>NB: Treatment upgrades due to be completed by end of August 2021 and comply with DWSNZ by August 2021.</b></li> <li>○ No E.coli detected in the treated or network samples.</li> <li>○ E.coli and total coliforms detected in the raw sample only but still in compliance.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Historical total coliforms and E.coli detected in raw water as expected with lake water source. <b>NB: Intake will be extended into deeper part of lake using MoH funding in December 2021 (pending lake levels).</b></li> <li>● <b>MPA Batching Bore (Potential Future Water Supply)</b> <ul style="list-style-type: none"> <li>○ MPA bore no longer in operation (or sampled). See June 2018 monthly update for results and conclusions.</li> </ul> </li> </ul>
<b>Wastewater Treatment</b>	
<b>Project:</b>	<b>Current Status:</b>
<b>WWTP maintenance</b>	<ul style="list-style-type: none"> <li>● Duty WWTP feed pump and check valves at the septic tank site replaced and gearbox leaks addressed late 2020 (MoH funds)</li> <li>● <b>Wastewater improvement projects explored during 2020 site visit (3Waters funds). As-built for existing land application complete. WWTP and land application design to progress with construction of extended land application system planned late 2021/early 2022. Some funds available for urgent WWTP maintenance/repairs (eg corroded balance tanks) - scope to be confirmed once WWTP design complete.</b></li> <li>● <b>Discharge consent review due to begin in July (3Waters funding).</b></li> <li>● Interim planting plan issued and completed by KMP Nurseries June 2021.</li> <li>● Land application extension and planting plan design underway. Correspondence with KMP Nurseries for ultimate planting plan.</li> </ul>
<b>Reporting/ Monitoring/ Sampling July 2021</b>	<ul style="list-style-type: none"> <li>● <b>Waitangi Treated Wastewater Discharge</b> <ul style="list-style-type: none"> <li>○ <b>The treated wastewater complied in July with all parameters except for E.coli. Stantec and FH will continue to monitor treated wastewater quality, particularly with additional tourist numbers and urgent need for WWTP maintenance (to be addressed in part by works planned in 2021).</b> It is noted that the land application system will further reduce TSS, COD, ammonia and E.coli prior to reaching groundwater, particularly now that the sprinklers have been maintained and have been moved further from the property boundary.</li> <li>○ Stantec to review algae treatment options and sludge accumulation issue.</li> </ul> </li> </ul>
<b>General</b>	
	<ul style="list-style-type: none"> <li>● None</li> </ul>
<b>Funding packages summary</b>	
<b>Package:</b>	<b>Task / Objective</b>
<b>Ministry of Health</b>	<p><b>Waitangi WTP Upgrade</b></p> <ul style="list-style-type: none"> <li>● UV reactor</li> <li>● Instrumentation</li> <li>● Filter backwash upgrade</li> <li>● Plant improvements</li> </ul> <p><b>MPA Bore Investigations</b></p> <ul style="list-style-type: none"> <li>● Confirm MPA bore feasibility and aquifer sustainable yield</li> </ul> <p><b>Kaingaroa raw water intake extension at Lake Rangitai</b></p> <p><b>Kaingaroa WTP Upgrade – organics and chlorate removal</b></p> <ul style="list-style-type: none"> <li>● GAC filters</li> <li>● Instrumentation</li> <li>● Chlorination</li> <li>● Plant improvements</li> </ul> <p><b>Waitangi WWTP</b></p> <ul style="list-style-type: none"> <li>● RBC repairs</li> <li>● Inlet feed pump and valve replacement</li> </ul>
<b>3Waters Stimulus Funding</b>	<p><b>Milestone 1 – Wastewater Improvements</b></p> <ul style="list-style-type: none"> <li>● CCTV Inspection</li> <li>● WWTP Upgrade (including balance tanks)</li> <li>● Land Application System Upgrade</li> <li>● Discharge consent update</li> </ul> <p><b>Milestone 2 – Water Safety Improvements</b></p> <ul style="list-style-type: none"> <li>● Online monitoring</li> </ul> <p><b>Milestone 3 – Water Resilience</b></p> <ul style="list-style-type: none"> <li>● Toby boxes (flow meters and valves)</li> <li>● Kaingaroa rainwater collection tanks</li> <li>● Owenga rainwater collection tanks</li> </ul>

## Solid Waste Update – July 2021

Landfill Operation	
<p><b>Current Status:</b></p> <ul style="list-style-type: none"> <li>Stantec has finalised the Waste Management Operations Agreement, to be between CIC and Fulton Hogan, which has been reviewed once by both Fulton Hogan and CIC staff. The agreement is to go before Council in August for approval.</li> <li>CIC is to address several matters at the landfill to properly commission it, as outlined in the Solid Waste Audit Report of October 2019.</li> <li>MfE has issued its Te One Landfill Audit Report.</li> </ul>	<p><b>Actions – Stantec</b></p> <ul style="list-style-type: none"> <li>Provide operational advice as requested from time to time by CIC staff.</li> <li>Stantec to teleconference with Council and MfE regarding the findings of the Audit Report.</li> </ul> <p><b>Actions - Council</b></p> <ul style="list-style-type: none"> <li>Council to approve the Waste Management Operations contract agreement.</li> <li>Council to teleconference with Stantec and MfE regarding the findings of the Audit Report.</li> <li>Placement of waste in the landfill to be undertaken as advised by Stantec.</li> <li>The actions recommended in the Audit Review report for preparing the landfill for disposal are to be undertaken before waste is placed in the landfill.</li> </ul>
Waste Minimisation Project (MfE Waste Minimisation Fund)	
<p><b>Current Status:</b></p> <ul style="list-style-type: none"> <li>Stantec has applied for funding for the installation of a weighbridge to be funded by the MfE through a special grant. \$100,000 has been sought with Council to pay a further \$22,400.</li> <li>Stantec provided advice about the external security lights at Te One.</li> <li>Discussions were had with Stantec, MfE and CIC staff during the May visit about various waste management and minimisation matters.</li> <li>MfE has agreed to extend the completion date for the Phase 1 Sustainable Management Fund project to the end of July.</li> <li>MfE is looking to use any funds left over to help fund initiatives proposed for Phase 2 of the SMF project.</li> <li>Stantec has prepared a draft Project Plan and Project Budget for the Phase 2 of the SMF project for CIC approval.</li> </ul>	<p><b>Actions - Stantec</b></p> <ul style="list-style-type: none"> <li>Stantec to work with CIC and MfE staff to amend the Project Plan and Project Budget for Phase 2 of the SMF project.</li> </ul> <p><b>Actions - Council</b></p> <ul style="list-style-type: none"> <li>CIC to complete actions required to sign off the Phase 1 of the SMF project by end of July.</li> <li>CIC staff to identify how much budget is left over from Phase 1 of the SMF project.</li> </ul>
Sludge Lagoon Project	
<p><b>Current Status – no further progress.</b></p> <ul style="list-style-type: none"> <li>Stantec has provided a short report on the requirements for installing an overflow to the leachate pond.</li> </ul>	<p><b>Actions - Stantec</b></p> <ul style="list-style-type: none"> <li>No outstanding actions.</li> </ul> <p><b>Actions - Council</b></p> <ul style="list-style-type: none"> <li>CIC staff to install the overflow at the leachate pond.</li> <li>Council to work with Stantec to secure funding for the Sludge Facility Project.</li> </ul>

<b>Other Waste Management Matters</b>	
<p><b>Current Status:</b></p> <ul style="list-style-type: none"> <li>• CIC staff have asked Stantec to investigate at a high-level the option of installing and operating a small-scale waste incinerator on the Chatham Islands.</li> <li>• A draft report has been prepared which needs to be supplemented with additional information that is more relevant to the Chatham Islands.</li> <li>• Stantec has received additional information on waste incineration and pyrolysis from companies within New Zealand and is to include that within a report.</li> <li>• Stantec has completed the draft Waste Assessment and sent copies to CIC and MfE.</li> <li>• A letter, with the draft WA, has also been sent to the Canterbury MOH as part of the legislative requirements for reviewing the WMMP. Feedback has not yet been received from the MOH.</li> </ul>	<p><b>Actions - Stantec</b></p> <ul style="list-style-type: none"> <li>• Stantec to complete the report on the options of managing waste by incineration or pyrolysis on the Chatham Islands.</li> <li>• Stantec to finalise the WA and update the WMMP.</li> <li>• Stantec is to follow up with the Canterbury MOH regarding feedback on the draft WA.</li> </ul> <p><b>Actions - Council</b></p> <ul style="list-style-type: none"> <li>• CIC staff to provide information to inform the Waste Assessment and WMMP review process.</li> </ul>

## 4. Works & Services

### 4.2 Fulton Hogan Road Maintenance Report July & August 2021

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<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	4.2
<b>Author/s</b>	Phil Holt – Fulton Hogan Contract Manager

#### **Purpose**

To inform and update the Council on the Chatham Islands Road Maintenance programme.

Attached is the July & August 2021 monthly reports from Fulton Hogan that will be presented by Mr Phil Holt (Fulton Hogan Contract Manager).

#### **Recommendation**

**THAT the reports be received.**



chatham islands council



**Fulton Hogan**



Finished North Road Crest Realignment

CHATHAM ISLANDS  
ROAD MAINTENANCE  
CONTRACT  
MONTHLY REPORT  
July 2021

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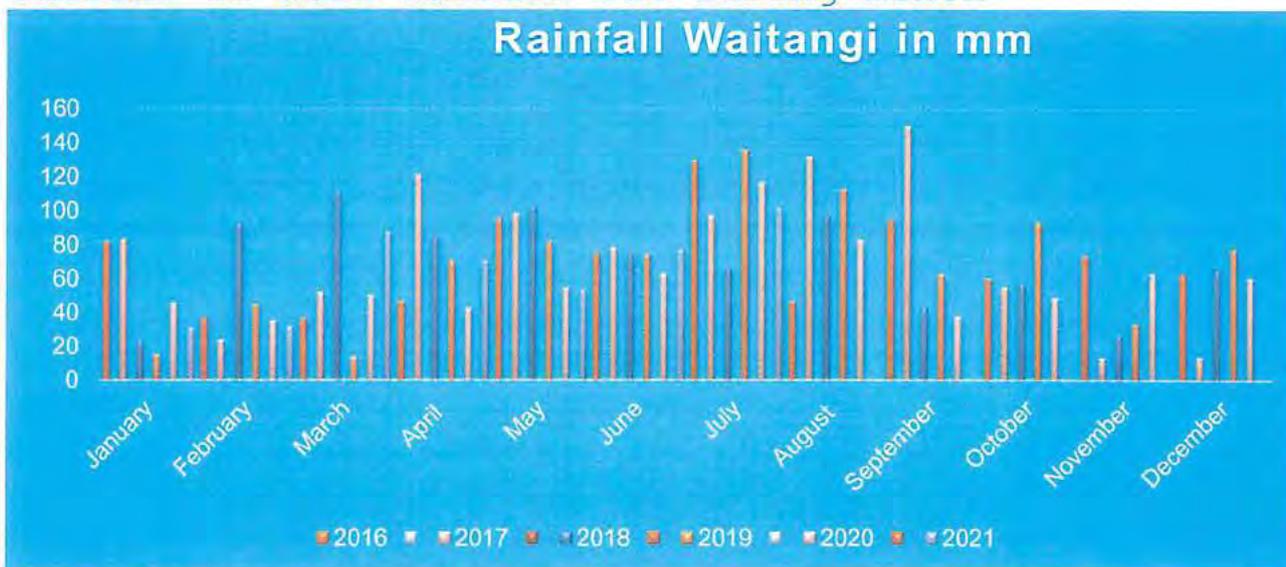
Miscellaneous

1. Traffic Counting
2. Pitt Island
3. Wind Damage

PhotosAppendix A: Minutes

## Work Summary

### Outline of work carried out during month



102mm rainfall recorded for July in the Waitangi yard.

### Routine Maintenance and Operations

Routine maintenance works include mowing and grading, filling potholes in both the sealed and metal networks. Continuing with the spraying of noxious weeds and gorse when weather permitted. Maintenance metal this month was mostly placed on North Road from Wharekauri to the realignment site. This was due to the late programming of this job and heavy rains arriving. Also used quite a bit on WWO Road due to the material road is made from.

### Pavement Renewals

North Road realignment works have been completed now with just the grass seeding to do in the spring.

### Sealed Road Resurfacing

### Drainage Renewals

Have been replacing broken and corroded culvert pipes on Waitangi West and North Roads.

### Bridge and Structure Renewals

### Traffic Services

### Minor Improvements

## Vegetation Control

Mowing continuing when required and weather allows although grass growth has slowed considerably.

## Dayworks

### Programmed Work for following month

Culvert renewals programed for WWO, North and Tuku roads along with removal of high shoulders and clearing watertables and culvert ends.

North Rd strengthening works will continue, weather permitting from where we left off at 8116 back to 6045 at this stage.

## Schedule of Work by Road Name

### 1. Maintenance Grading

- Carried out as required during the month on the following roads:

Road ID	Disp	Road ID	Start RP	End RP	Quantity M
NORTH ROAD	4227	21	25381	31500	6119
NORTH ROAD	4230	21	25381	32000	6619
NORTH ROAD	4233	21	31500	35675	4175
NORTH ROAD	4243	21	19000	25381	6381
NORTH ROAD	4246	21	31500	39235	7735
NORTH ROAD	4247	21	39235	44834	5599
NORTH ROAD	4259	21	24000	31500	7500
NORTH ROAD	4264	21	39235	48508	9273
KAINGAROA ROAD	4267	126	0	5994	5994
NORTH ROAD	4273	21	4589	7400	2811
WWO ROAD	4275	11	4450	7720	3270

WWO ROAD	4282	11	7720	12000	4280
WWO ROAD	4285	11	11728	16694	4966
WWO ROAD	4289	11	15544	21393	5849
				TOTAL	80.571km

## 2. Unsealed Maintenance Metaling

- Carried out on the following roads using Mainly AP32 metal:

Road ID	Disp	Road ID	Start RP	End RP	Quantity	
NORTH ROAD	4219	21	25381	32000	136	
NORTH ROAD	4223	21	17965	25381	32	
NORTH ROAD	4226	21	25381	31500	64	
NORTH ROAD	4231	21	25381	31500	96	
NORTH ROAD	4235	21	31500	44834	112	
NORTH ROAD	4258	21	14670	25381	88	
PORT HUTT ROAD	4265	51	13602	13800	8	
WWO ROAD	4271	11	4450	19155	216	
WWO ROAD	4276	11	19155	21393	88	
WWO ROAD	4280	11	4450	21796	120	
HOSPITAL ROAD NORTH	4281	90	50	350	16	
PORT HUTT ROAD	4287	51	0	10003	48	
		<b>Totals</b>		<b>This Month</b>	<b>1024</b>	<b>m3</b>
				<b>Revised Target</b>	<b>35000</b>	<b>m3</b>
				<b>Contract TD</b>	<b>35618</b>	<b>m3</b>

## Next Month's Target

Currently 618m3 ahead of schedule. Only metal that is absolutely needed is being used and it is intended that this will ease back in the dryer months.

## Crash Damage Report Summary

### Crash Damage Report

Date	Event	Action	Repaired Y/N
24/1/21	Vehicle left the road and rolled on Port Hutt Road	Awaiting police report	One serious injury

19/05/21	Vehicle left road along Terry's Straight		N. Fence post was broken and grass verge torn up
22/05/21	Vehicle ran off the side of Washout Bridge Waitangi West Road	Cones and signs installed	Y. New rails and stays made and installed. All repairs painted

### Network Inspections

Month	Inspection Type	Faults Identified	Inspected By
February 2021	Night	Roads looking good. Some truck damage to North Road between Port Hutt turnoff and Waitaha. Emps and signs ok but some cleaning required in normal places.	
March 2021	Daytime	Roadroid all major roads early in the month. Most roads showing ravages of prolonged dry conditions. There have been improvements with better conditions latter in the month.	Bill
April 2021	Daytime	Road inspection to gauge maintenance needs and priorities. Overall network looking ok with minimal damage caused by recent rains.	Phil
May 2021	Night	North Rd – Wharekauri Rd = a lot of EMP's missing on corners and stock wandering on road. Road surface good at the time.	Phil
June 2021	Daytime	Started 6 monthly audit of the network. As it is my first one it will take a bit longer to get an idea of things going forward.	Phil
July 2021	Daytime	Drive over the network during heavy rain event to gauge where preventative maintenance works are required.	Phil

### Monthly Safety Report and Statistics

Nothing to report.

## 1. Safety Engagements

Date	Near Miss	Incident	Lost Time Injury	Plant Damage	Depot/Worksite Inspections
28/01/21	N	N	N	N	Pavement and drainage repairs on Tuku Road. All going well with no issues.
16/02/21	N	N	N	N	Workshop audit. No problems.
8/03/21	N	N	N	N	Training of new grader operator. All going well.
14/05/21	N	N	N	N	Monthly H&S meeting = workers welfare coming into winter.

## Metal Stockpiles

31/07/2021							
Site	AP40 Schist	AP65	AP32 Basalt	AP100 Schist	AP20	G3 Chip	G5 Chip
Waitaha Schist	1,934	0	0	4,277	0		
Waitaha Basalt	0	2,203	4,417	0	667		
Paritu	3,918	0	0	2,489	0		
Stoney Crossing	0	274	1,420	0	3,190	423	489
Yard	0	0	0	0	0		
Ohinemama	0	0	0	0	0		
Muirsons Schist	801	0	0	827	0		
	6,653	2,477	5,837	7,593	3,857	423	489

CIC Owned Materials  
Signs

Stocktake of Chatham Islands Council Materials					
Item Description	Unit	Purchased	Used July 2021	End Measure	Comments

**Signs**

CS85 North Rd	ea.			1	
CS85 Port Hutt Rd	ea.			1	
RG1	ea.			1	
RG2	ea.			1	
RG6	ea.			0	
RM6 White	ea.			8	
RM6 Yellow	ea.			7	
RM7	ea.			16	
P66X242	ea.			7	
PW11	ea.			1	
PW11.1L	ea.			1	
PW11.1R	ea.			1	
PW12L	ea.			1	900
PW12R	ea.			1	
PW24	ea.			2	
PW25 65KM	ea.			1	
PW28	ea.			1	
PW34.1	ea.			1	900 Y
PW34.2	ea.			2	
PW37	ea.			1	900
PW49 FIRE ENGINE	ea.			2	
PWSX1	ea.			2	
RH-4	ea.			2	
PW54	ea.			2	

**Marker pegs**

EMP	ea.		64	63	
CULVERT MARKERS	ea.		2	13	
WHITE RAPID MARKERS	ea.			19	

**Misc. Items**

ACROW PROPS	ea.			6	
ROAD COUNTER	ea.			1	
ROUGHOMETER	ea.			1	

## Culvert Pipes

ALUFLOW **Stocktake done**  
27/05/21

Item Description	Unit	Used	Purchased	End Measure
375mm	m			5
450mm	m			6
600mm	m			6
750mm	m			6

CivilBOSS **Stocktake done**  
27/05/21

225mm	m			12
300mm	m	30		66
450mm	m	40		64.8
525mm	m			30
800mm	m			30
1000mm	m			12

Builders Mix **Stocktake done**  
27/05/21

CEMENT	T			0
GEOGRID	rolls			7
BIDIM CLOTH	rolls			4

## Environmental Compliance & Feedback

### Environmental Compliance

Date	Site Inspected	Compliant Y/N	Abatement Order Issued	Corrective Action Required	Completed By
27/01/21	Verge mowing WWO Road	Y	N	N	Tomby
15/03/21	Depot and workshop (pre E-Can Audit)	Y	N	N	Bill Lind
21/04/21	Chemical store inspection	Y	N	N	Phil
13/05/21	Te One Footpath Extension	Y	N	N	Phil

### Stakeholder Complaints Register

Month	Council/ Public Complaint	Complaint	Repair Undertaken	Response Time
12/2/21	Public	Slippery Waitangi Wharf Owenga Road	Signs erected and some metal spread.	Same day
15/2/21	Public	Large stones Tuku Road	Graded and metal spread	2 days
26/2/21	Public	Corrugations	Graded	2 days
8/3/21	Public	Windrow left at entranceway	Complaint was made before grading was completed	Same day
16/4/21	Public	Strong effluent smell while driving over Nairn river bridge.	Smell coming from solids tank by bridge. No wind to disperse.	Same Day
21/6/21	Public	Complaint about potholes on Te Matarae Rd	Drove through the road and could not find anything to be concerned about.	Same Day
9/7/21	Public	Complaint about potholes on Te Matarae Rd	Sent the crew through to fill potholes.	Next Day

## Public Relations & Community Involvement

### Innovation

Conditions are too wet to continue with the blended maintenance material when conditions allow. Continuing to monitor areas already done to gauge how they perform in the wet conditions.

## Summary of Monthly Progress Claim by Work Category

Item	July-21	Separable Portion One - Roading			% of Annual Budget
	Work Category	Value for Month	Value YTD	Annual Budget	
1	P&G Other	\$87,437.31	\$87,437.31	\$805,782.09	10.85%
2	Routine Maintenance and Ops	\$58,697.82	\$58,697.82	\$1,273,716.65	4.61%
3	Pavement Renewals	0	0	\$389,340.50	0%
4	Sealed Road Resurfacing	0	\$0.00	\$108,129.00	0%
5	Drainage Renewals	\$20,981.76	\$20,981.76	\$119,480.00	17.56%
6	Bridge Renewals	0	\$0.00	\$60,000.00	0%
7	Traffic Services	\$1,822.92	\$1,822.92	\$13,485.75	13.52%
8	Minor Improvements	\$0.00	0	\$130,000.00	0%
9	Vegetation Control	\$5,408.41	\$5,408.41	\$19,968.75	27.08%
11	Dayworks	\$29,454.54	\$29,454.54	\$242,871.00	12.12%
	<b>Total</b>	<b>\$203,802.76</b>	<b>\$203,802.76</b>	<b>\$3,162,773.74</b>	<b>6.44%</b>

Annual Budget figures are last years and will be updated when 21-22 are finalized.

### 1. Miscellaneous

#### 2. Traffic Counting

This has been delayed till 2022.

#### 3. Pitt Island

Still no word or indication of when we will be able to get an excavator to Pitt.

#### 4. Wind Damage

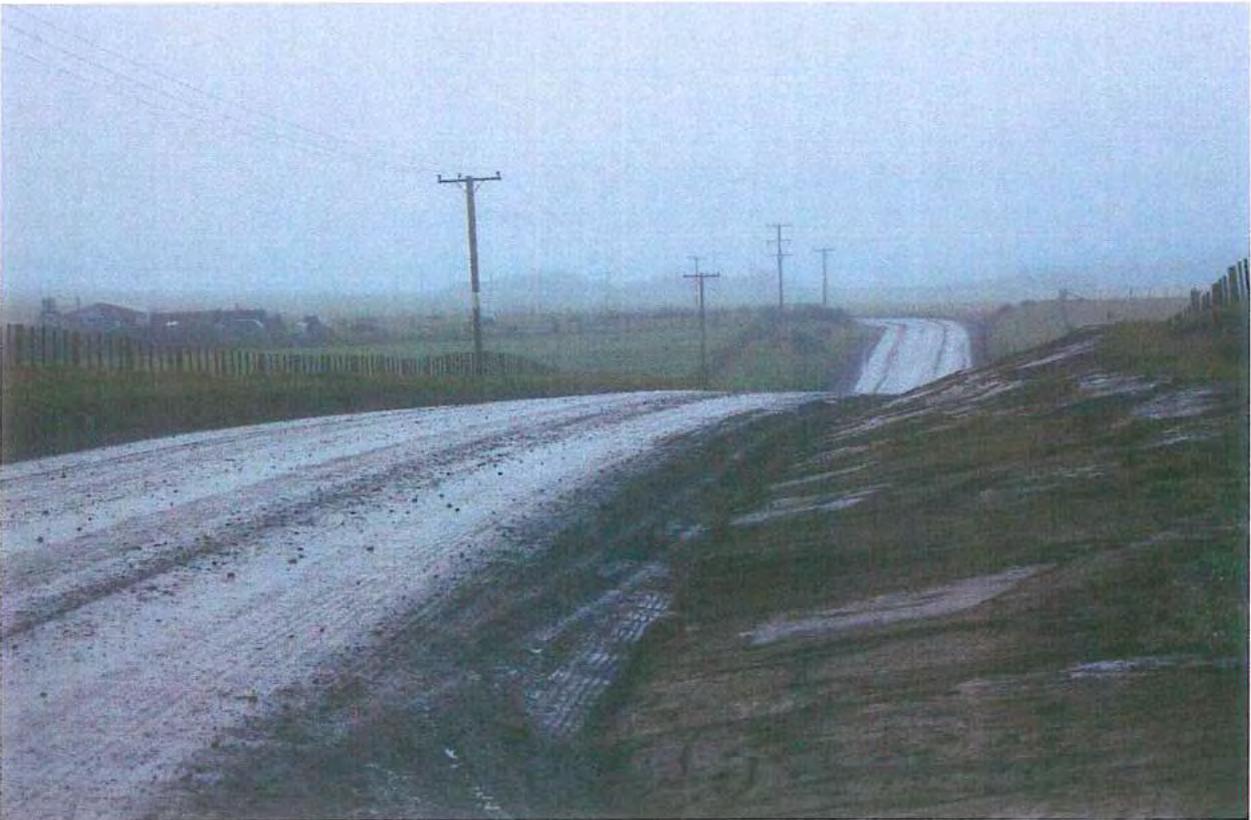
None of note.

## Photos

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Finished North Road Realignment



North Road Sight Benching



chatham islands council



Waitaha Culvert Renewal

CHATHAM ISLANDS  
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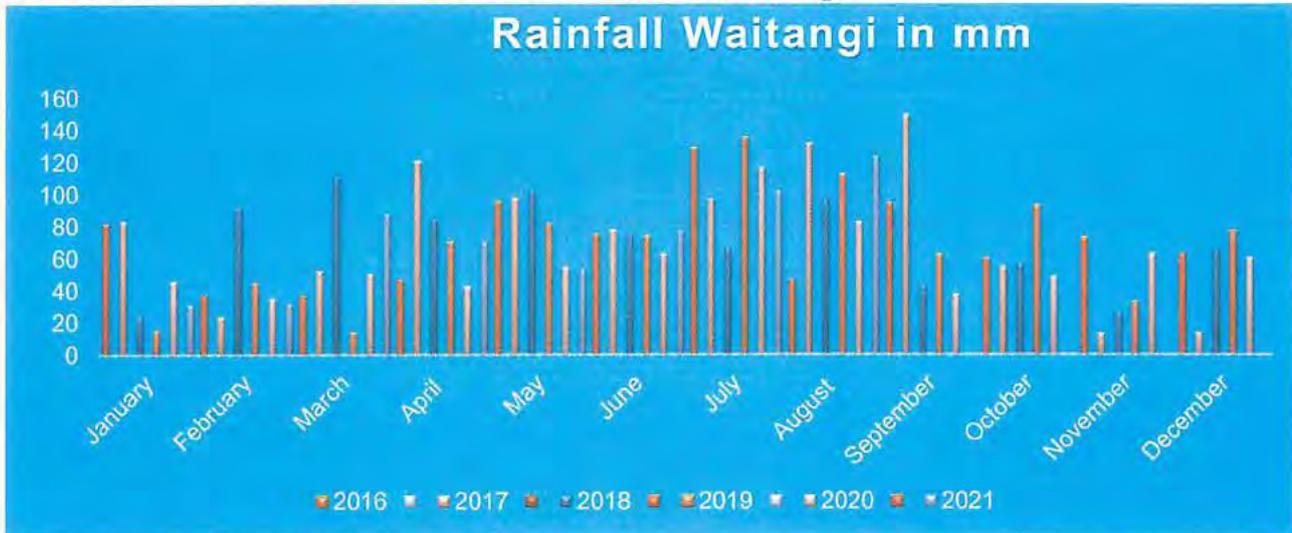
Miscellaneous

1. Traffic Counting
2. Pitt Island
3. Wind Damage

PhotosAppendix A: Minutes

## Work Summary

### Outline of work carried out during month



123.5mm rainfall recorded for August in the Waitangi yard.

### Routine Maintenance and Operations

Routine maintenance works this past month were predominately dictated by the wet weather we experienced. These consisted of filling potholes on both the sealed and metal networks as well as grading to try and keep on top of the potholes. Maintenance metal this month was mostly placed on bare and soft areas right throughout the network wherever required to maintain the pavement integrity. Had a few days of strong winds along with the rain that caused a bit of isolated flooding and sign damage but nothing too drastic.

### Pavement Renewals

Too wet this month to carry on with the strengthening work.

### Sealed Road Resurfacing

### Drainage Renewals

New and replacement culverts were done on Waitangi West, WWO, North and Matarae Roads. Also a new 1800mm dia culvert was placed at Waitaha to replace an old corroded one.

### Bridge and Structure Renewals

### Traffic Services

### Minor Improvements





22/05/21	Vehicle ran off the side of Washout Bridge Waitangi West Road	Cones and signs installed	Y. New rails and stays made and installed. All repairs painted
4/08/21	No official report but we did hear of a Vehicle verse cow incident on North Rd In the Waimahana area.	Had to go and remove beast from the edge of road	N.

## Network Inspections

Month	Inspection Type	Faults Identified	Inspected By
March 2021	Daytime	Roadroid all major roads early in the month. Most roads showing ravages of prolonged dry conditions. There have been improvements with better conditions latter in the month.	Bill
April 2021	Daytime	Road inspection to gauge maintenance needs and priorities. Overall network looking ok with minimal damage caused by recent rains.	Phil
May 2021	Night	North Rd – Wharekauri Rd = a lot of EMP's missing on corners and stock wandering on road. Road surface good at the time.	Phil
June 2021	Daytime	Started 6 monthly audit of the network. As it is my first one it will take a bit longer to get an idea of things going forward.	Phil
July 2021	Daytime	Drive over the network during heavy rain event to gauge where preventative maintenance works are required.	Phil
August 2021	Daytime	Drive over the whole network to inspect and ascertain damage after very heavy rain event.	Mario Tomby

## Monthly Safety Report and Statistics

Nothing to report.

### 1. Safety Engagements

Date	Near Miss	Incident	Lost Time Injury	Plant Damage	Depot/Worksite Inspections
28/01/21	N	N	N	N	Pavement and drainage repairs on Tuku Road. All going well with no issues.

16/02/21	N	N	N	N	Workshop audit. No problems.
8/03/21	N	N	N	N	Training of new grader operator. All going well.
14/05/21	N	N	N	N	Monthly H&S meeting = workers welfare coming into winter.
13/8/21	N	N	N	N	Site visit at Waitaha with crew to work out methodology for replacing culvert.

## Metal Stockpiles

31/08/2021							
Site	AP40 Schist	AP65	AP32 Basalt	AP100 Schist	AP20	G3 Chip	G5 Chip
Waitaha Schist	1,934	0	0	4,277	0		
Waitaha Basalt	0	1,875	3,589	0	667		
Paritu	3,918	0	0	2,489	0		
Stoney Crossing	0	274	1,268	0	3,190	423	489
Yard	0	0	0	0	0		
Ohinemama	0	0	0	0	0		
Muirsons Schist	801	0	0	827	0		
	6,653	2,149	4,851	7,593	3,857	423	489

## CIC Owned Materials

### Signs

Stocktake of Chatham Islands Council Materials					
Item Description	Unit	Purchased	Used Aug 2021	End Measure	Comments

#### Signs

CS85 North Rd	ea.			1	
CS85 Port Hutt Rd	ea.			1	
RG1	ea.			1	
RG2	ea.			1	
RG6	ea.			0	
RM6 White	ea.			8	
RM6 Yellow	ea.			7	
RM7	ea.			16	
P66X242	ea.			7	
PW11	ea.			1	
PW11.1L	ea.			1	
PW11.1R	ea.			1	
PW12L	ea.			1	900
PW12R	ea.			1	
PW24	ea.			2	
PW25 65KM	ea.			1	
PW28	ea.			1	
PW34.1	ea.			1	900 Y
PW34.2	ea.			2	
PW37	ea.			1	900
PW49 FIRE ENGINE	ea.			2	
PWSX1	ea.			2	
RH-4	ea.			2	
PW54	ea.			2	

#### Marker pegs

EMP	ea.		63	0	
CULVERT MARKERS	ea.			13	
WHITE RAPID MARKERS	ea.			19	

#### Misc. Items

ACROW PROPS	ea.			6	
ROAD COUNTER	ea.			1	
ROUGHOMETER	ea.			1	

## Culvert Pipes

ALUFLOW **Stocktake done**  
27/05/21

Item Description	Unit	Used	Purchased	End Measure
375mm	m			5
450mm	m			6
600mm	m	6		0
750mm	m			6

CivilBOSS **Stocktake done**  
27/05/21

225mm	m	6		6
300mm	m	42		24
450mm	m			64.8
525mm	m			30
800mm	m			30
1000mm	m			12

Builders Mix **Stocktake done**  
27/05/21

CEMENT	T			0
GEOGRID	rolls			7
BIDIM CLOTH	rolls			4

## Environmental Compliance & Feedback

### Environmental Compliance

Date	Site Inspected	Compliant Y/N	Abatement Order Issued	Corrective Action Required	Completed By
27/01/21	Verge mowing WWO Road	Y	N	N	Tomby
15/03/21	Depot and workshop (pre E-Can Audit)	Y	N	N	Bill Lind
21/04/21	Chemical store inspection	Y	N	N	Phil
13/05/21	Te One Footpath Extension	Y	N	N	Phil
9/08/21	Target Hill Dumpsite	Y	N	N	Phil

### Stakeholder Complaints Register

Month	Council/ Public Complaint	Complaint	Repair Undertaken	Response Time
12/2/21	Public	Slippery Waitangi Wharf Owenga Road	Signs erected and some metal spread.	Same day
15/2/21	Public	Large stones Tuku Road	Graded and metal spread	2 days
26/2/21	Public	Corrugations	Graded	2 days
8/3/21	Public	Windrow left at entranceway	Complaint was made before grading was completed	Same day
16/4/21	Public	Strong effluent smell while driving over Nairn river bridge.	Smell coming from solids tank by bridge. No wind to disperse.	Same Day
21/6/21	Public	Complaint about potholes on Te Matarae Rd	Drove through the road and could not find anything to be concerned about.	Same Day
9/7/21	Public	Complaint about potholes on Te Matarae Rd	Sent the crew through to fill potholes.	Next Day
16/8/21	Public	Complaint about potholes on the far end of Tuku Rd	Attended to them once farmer had moved his stock from the road verges.	2 Days

### Public Relations & Community Involvement

## Innovation

When conditions allow we will continue with the blended maintenance material and continue to monitor areas already done to gauge how they perform in the wet/dry conditions.

## Summary of Monthly Progress Claim by Work Category

Item	Aug - 21	Separable Portion One - Roading			% of Annual Budget
	Work Category	Value for Month	Value YTD	Annual Budget	
1	P&G Other	\$117,186.45	\$204,623.76	\$805,782.09	25.39%
2	Routine Maintenance and Ops	\$66,573.82	\$125,271.64	\$1,273,716.65	9.84%
3	Pavement Renewals	0	0	\$389,340.50	0%
4	Sealed Road Resurfacing	0	\$0.00	\$108,129.00	0%
5	Drainage Renewals	\$53,607.46	\$74,589.22	\$119,480.00	62.43%
6	Bridge Renewals	0	\$0.00	\$60,000.00	0%
7	Traffic Services	\$2,196.64	\$4,019.56	\$13,485.75	29.8%
8	Minor Improvements	\$0.00	0	\$130,000.00	0%
9	Vegetation Control	\$5,408.41	\$10,816.82	\$19,968.75	54.17%
11	Dayworks	\$37,351.63	\$66,806.17	\$242,871.00	27.5%
	<b>Total</b>	<b>\$282,324.41</b>	<b>\$486,127.17</b>	<b>\$3,162,773.74</b>	<b>15.37%</b>

Annual Budget figures are last years and will be updated when 21-22 are finalized.

### 1. Miscellaneous

#### 2. Traffic Counting

This has been delayed till 2022.

#### 3. Pitt Island

Still no word or indication of when we will be able to get an excavator to Pitt.

#### 4. Wind Damage

A few trees came down and signs damaged but nothing too bad.

## Photos

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Waitaha Culvert Renewal





Waitaha Culvert Renewal





Grass Removed From Shoulders On Target Hill WWO Rd

## 4. Works & Services

### 4.3 Fulton Hogan Water and Wastewater Operation Contract Report July & August 2021

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<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	4.3
<b>Author/s</b>	Phil Holt – Fulton Hogan Contracts Manager

#### **Purpose**

To inform and update the Council on the Chatham Islands Water and Wastewater Operation programme.

Attached is the July & August 2021 report from Fulton Hogan that will be presented by Phil Holt (Fulton Hogan Contract Manager).

#### **Recommendations**

**THAT the reports be received.**



chatham islands council



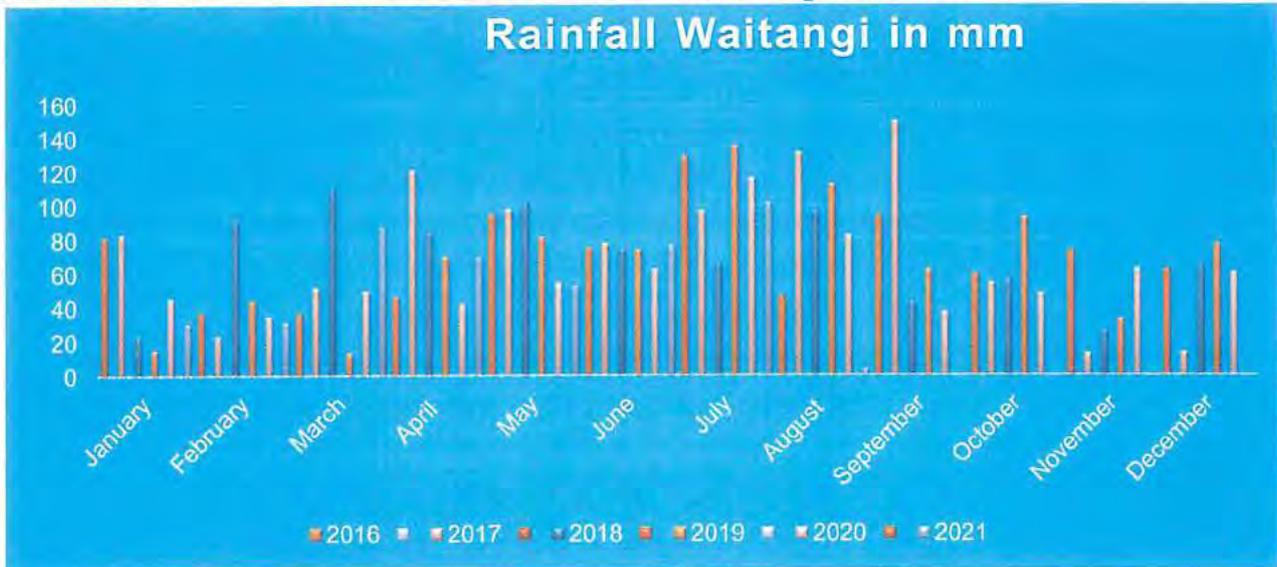
CHATHAM ISLANDS  
WATER AND  
WASTEWATER  
OPERATION CONTRACT  
MONTHLY REPORT  
July 2021

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## Work Summary

### Outline of work carried out during month



102mm rainfall recorded for July in the Waitangi yard.

### Water Supply Operation & Maintenance

Waitangi water supply is at 2/3rds capacity at the moment as we are still trying to catch up after the last round of upgrades. Have had to replace all the fittings from the bore to tank as old ones kept breaking and leaking. Still waiting on some electrical components to finish the upgrades. Test results returned and are all complying.

Kaingaroa Lake is starting to fill up a bit with all the recent rains, with a shallow 100mm depth all around the island. Still a couple of minor things to finish off in the shed at Kaingaroa in regards to the upgrades. New raw water pump seems to be keeping ahead of demand for now with a bit of reserve in the tanks. Had a major break in main feed line this month that took a couple of days to find and repair.

### Water Treatment

Results good at the moment with no issues apparent.

### Wastewater Treatment Plant at Waitangi

All good at present with no apparent issues.

### Dayworks - Water

### Dayworks - Wastewater

### Water and Wastewater Reticulation Network

New water meters and backflow preventers have been ordered and will be installed over the next few months. With the pump problems we have been having we will look at installing the new raw water pump and motor at the lake ASAP. Currently too much water in the lake to install new pipe and intake so will leave this until the summer.

### Water and Wastewater Treatment Plant: Monitoring

Monitoring all going well with no issues being recorded.

Kaingaroa Lake Monitoring Post on the 30<sup>th</sup> July had 100mm of water all around it.

### Summary of Monthly Progress Claim by Work Category

	July-21	Separable Portion Two - Water and Wastewater			
Item	Work Category	Value for Month	Value YTD	Annual Budget	% of Annual Budget
13	Preliminary and General	\$2,793.03	\$2,793.03	\$49,614.04	5.63%
14	Water Supply Ops and Maint	\$922.32	\$922.32	\$20,067.84	4.6%
15	Water Treatment	\$2,947.89	\$2,947.89	\$39,801.86	7.4%
16	WWTP Waitangi	\$922.32	\$922.32	\$35,580.63	2.6%
17	Dayworks - Water	\$9,008.98	\$9,008.98	\$9,519.14	94.64%
18	Dayworks - Wastewater	\$0.00	\$0.00	\$7,090.55	0%
19	Water and Wastewater Reticulation	\$0.00	\$0.00	\$461.16	0%
20	Treatment Plant Monitoring	\$1,188.52	\$1,188.52	\$14,262.24	8.33%
	Total	\$17,783.06	\$17,783.06	\$176,397.46	10.08%

Annual Budget is last years and will be updated once the 21-22 budgets are finalized.

### Programmed Work for Following Month

Install new pump and motor at Kaingaroa supply lake shed.

Finish and refine water plant upgrades.

Start installing new water meters and backflow preventers if parts arrive.

### Schedule of Work

Water Meter Report

See appendix

Irrigation Dosing

Fields changed weekly.

Quality Assurance

No issues

Site Safety Report

Date	Near Miss	Incident	Lost Time Injury	Plant Damage	Depot/Worksite Inspections
15/1/21	N	N	N	N	Suck out of the irrigation tank sludge. No problems.
3/2/21	N	N	N	N	Digging out Kaingaroa intake channel. No issues.
17/3/21	N	N	N	N	Remove roof support.
23/4/21	N	N	N	N	Digging out Kaingaroa intake channel. No issues.
25/05/21	N	N	N	N	Site visit found a cracked pipe fitting that was leaking (repaired)
17/6/21	N	N	N	N	A sprinkler head was found to be blocked = was cleared
21/7/21	N	N	N	N	Ran through the water plant upgrades.

### Environmental Non Compliance

No non-compliances this month

## Monthly Stocktake of Supplies

### General Supplies Stockpile - Month Ending June 2021

	Stock Purchased	Stock End of Previous Month	Stock Used	Stock Remaining End of Month
Salt	0	58 bags	5	53
Chlorine	0	40 L	20	20

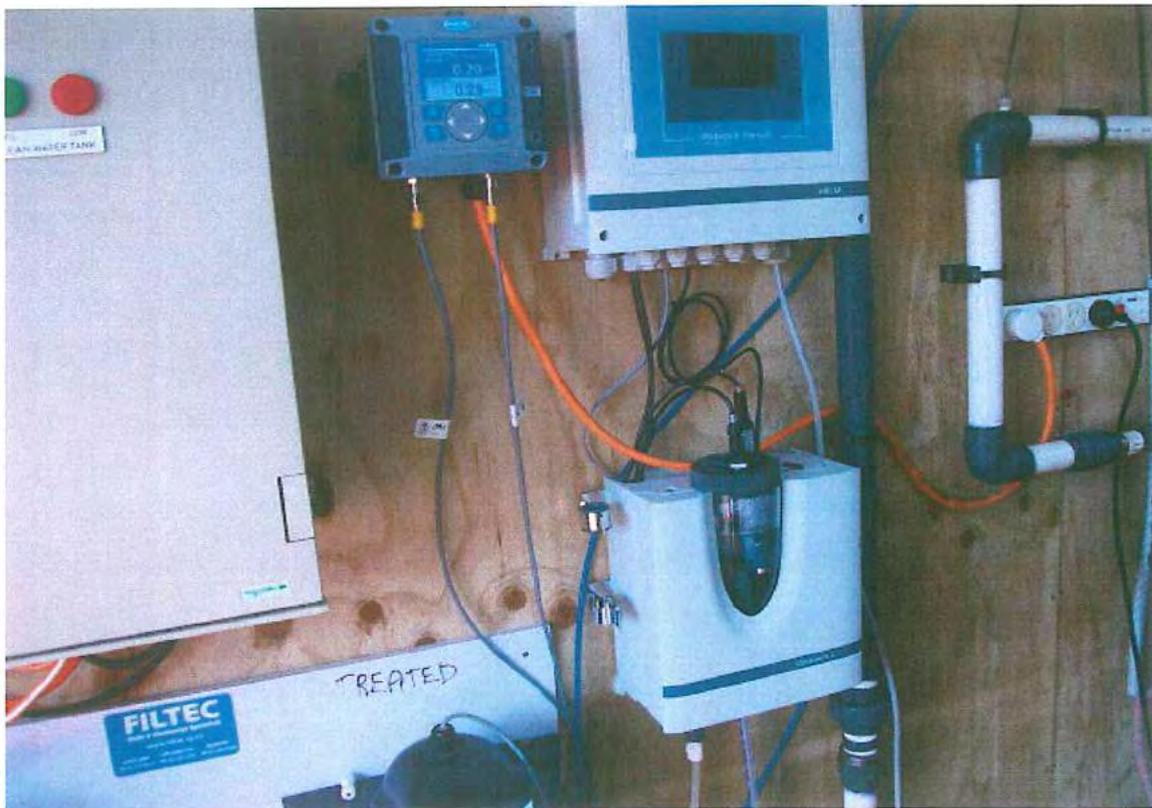
## PHOTOS



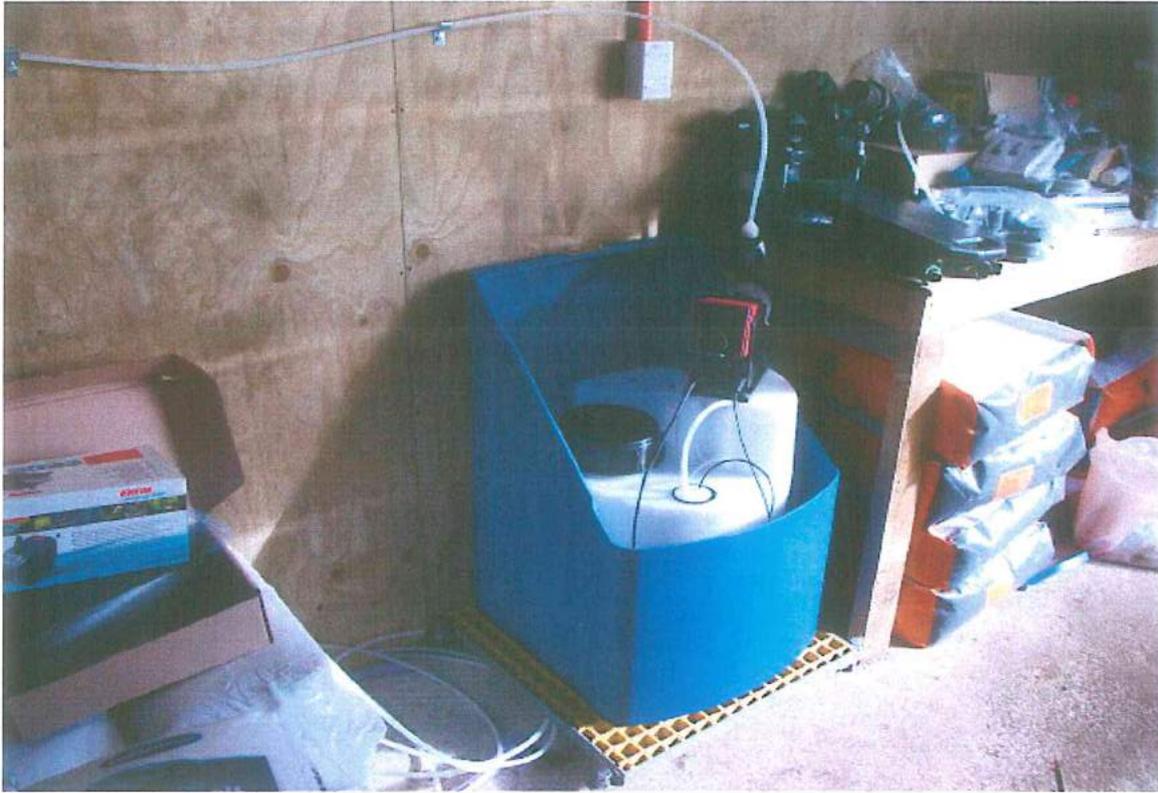
Kaingaroa Water Supply Lake



Kaingaroa Water Treatment Plant



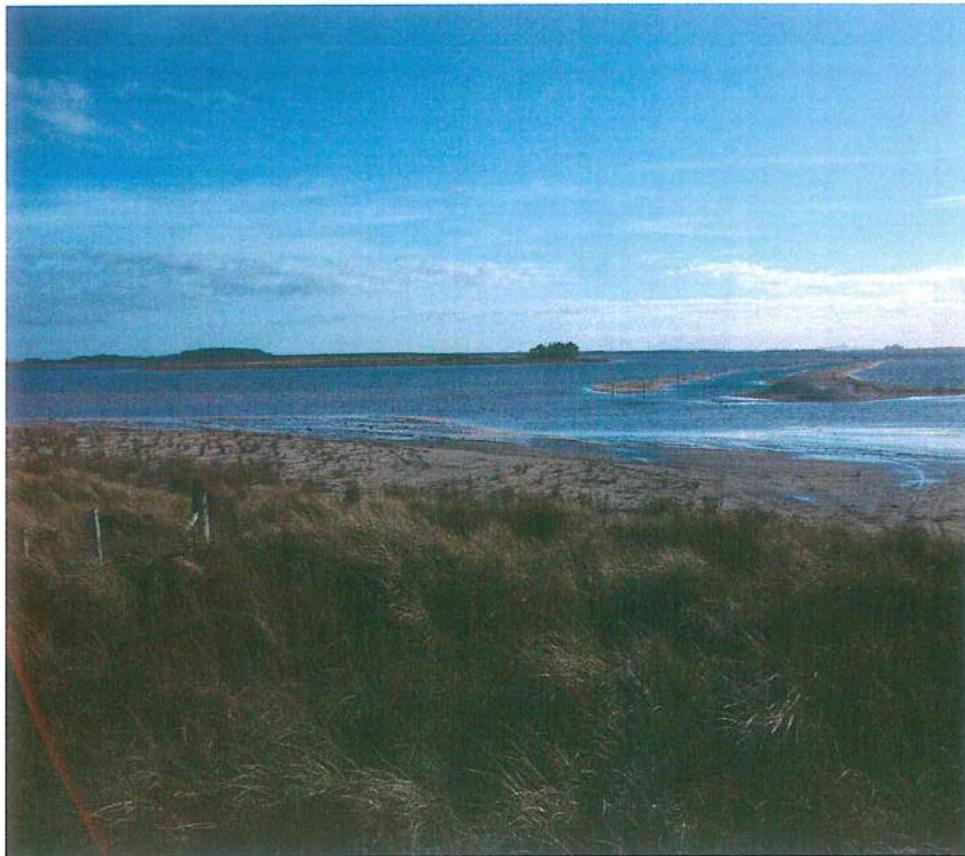
Kaingaroa New Turbidity Meter



Kaingaroa New Chlorine Dosing Pump



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CHATHAM ISLANDS  
WATER AND  
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MONTHLY REPORT  
August 2021

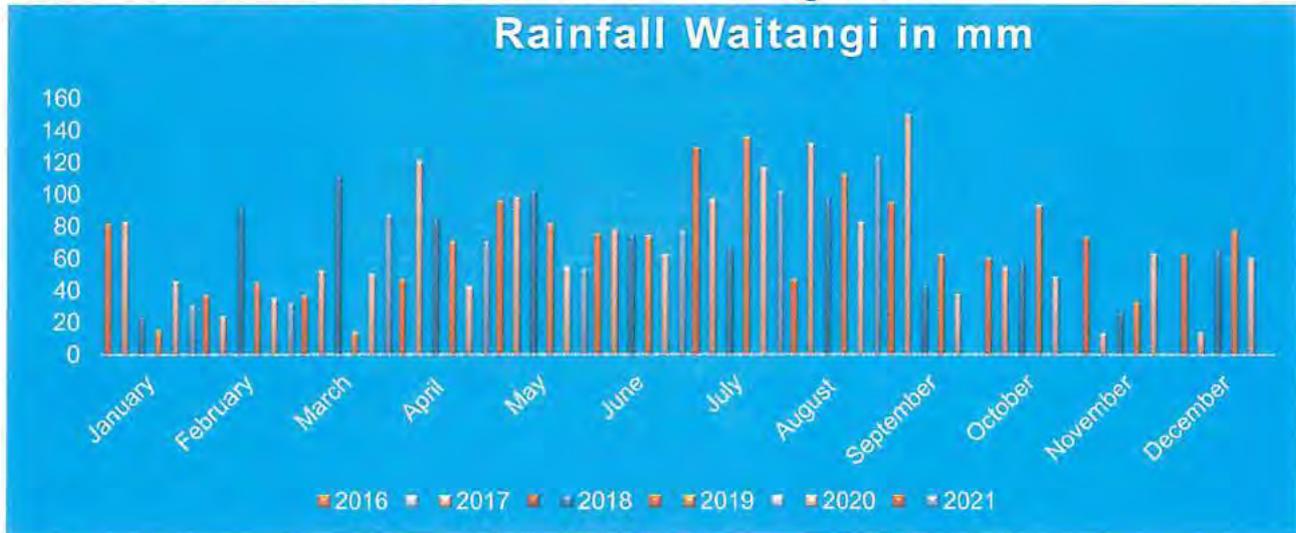
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## Work Summary

### Outline of work carried out during month



123.5 mm rainfall recorded for August in the Waitangi yard.

### Water Supply Operation & Maintenance

Waitangi water supply is at 90% at the moment and holding its own despite a couple of shutdowns to allow minor repairs to be completed. There was a large buildup of sand in the Pressure Relief Valve and the Turbidity meter sprung a leak causing water damage to the instrument. Also had another fitting come apart but was found and repaired pretty quickly. New bore pump is here and has been wired ready to go in as soon as new pipe arrives to minimize amount of joints between bore and treatment shed. Test results returned and are all complying.

Kaingaroa Lake is looking a lot fuller due to all the rain we have had this month. Still a couple of minor things to finish off in the shed at Kaingaroa in regards to the upgrades. Water storage at the moment is approx. 2/3<sup>rd</sup> capacity. Having to turn raw water pump in treatment shed on and off manually at the moment as float switches are not working, waiting for sparky to sort.

### Water Treatment

Results good at the moment with no issues apparent.

### Wastewater Treatment Plant at Waitangi

Sprinkler irrigation pump failed but we had a spare that has been wired in and all working again.

### Dayworks - Water

Repairs to pipework and fittings.

**Dayworks - Wastewater**

Irrigation pump replacement works.

**Water and Wastewater Reticulation Network**

New water meters and backflow preventers have been ordered and will be installed over the next few months.

**Water and Wastewater Treatment Plant: Monitoring**

Monitoring all going well with no issues being recorded.

**Kaingaroa Lake Monitoring Post** on the 24<sup>th</sup> August had 425mm of water all around it.

**Summary of Monthly Progress Claim by Work Category**

	August - 21	Separable Portion Two - Water and Wastewater			
Item	Work Category	Value for Month	Value YTD	Annual Budget	% of Annual Budget
13	Preliminary and General	\$3,390.13	\$6,183.16	\$49,614.04	12.46%
14	Water Supply Ops and Maint	\$922.32	\$1,844.64	\$20,067.84	9.19%
15	Water Treatment	\$2,947.89	\$5,895.78	\$39,801.86	14.81%
16	WWTP Waitangi	\$922.32	\$1,844.64	\$35,580.63	5.18%
17	Dayworks - Water	\$14,219.60	\$23,228.58	\$9,519.14	244%
18	Dayworks - Wastewater	\$6,930.10	\$6,930.10	\$7,090.55	97.74%
19	Water and Wastewater Reticulation	\$0.00	\$0.00	\$461.16	0%
20	Treatment Plant Monitoring	\$1,188.52	\$2,377.04	\$14,262.24	16.66%
	<b>Total</b>	<b>\$30,520.88</b>	<b>\$48,303.94</b>	<b>\$176,397.46</b>	<b>27.38%</b>

Annual Budget is last years and will be updated once the 21-22 budgets are finalized.

**Programmed Work for Following Month**

Install new pump and motor at Kaingaroa supply lake shed.

Finish and refine water plant upgrades.

Start installing new water meters and backflow preventers if parts arrive.

## Schedule of Work

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### Water Meter Report

See appendix

### Irrigation Dosing

Fields changed weekly.

### Quality Assurance

No issues

## Site Safety Report

Date	Near Miss	Incident	Lost Time Injury	Plant Damage	Depot/Worksite Inspections
15/1/21	N	N	N	N	Suck out of the irrigation tank sludge. No problems.
3/2/21	N	N	N	N	Digging out Kaingaroa intake channel. No issues.
17/3/21	N	N	N	N	Remove roof support.
23/4/21	N	N	N	N	Digging out Kaingaroa intake channel. No issues.
25/05/21	N	N	N	N	Site visit found a cracked pipe fitting that was leaking (repaired)
17/6/21	N	N	N	N	A sprinkler head was found to be blocked = was cleared
21/7/21	N	N	N	N	Ran through the water plant upgrades.

### Environmental Non Compliance

No non-compliances this month

## Monthly Stocktake of Supplies

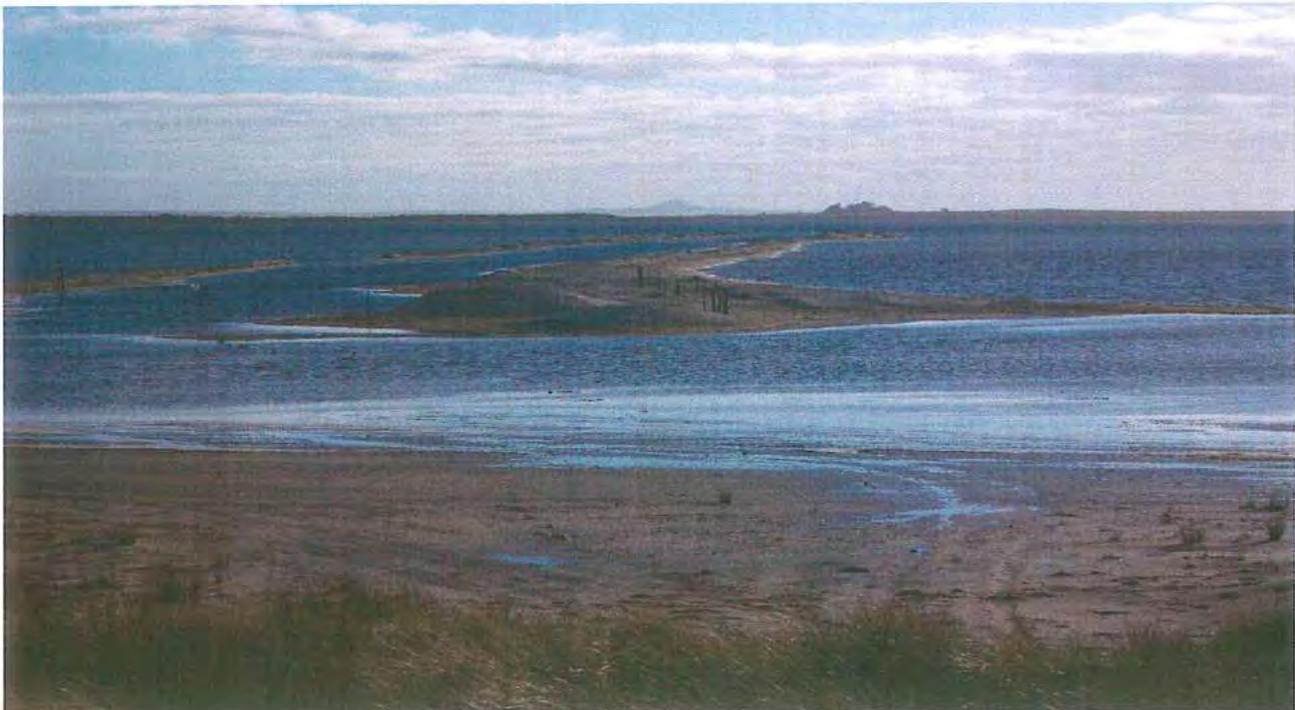
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### General Supplies Stockpile - Month Ending June 2021

	Stock Purchased	Stock End of Previous Month	Stock Used	Stock Remaining End of Month
Salt	0	53 bags	3	50
Chlorine	240lts	20 lts	20lts	240lts

## PHOTOS

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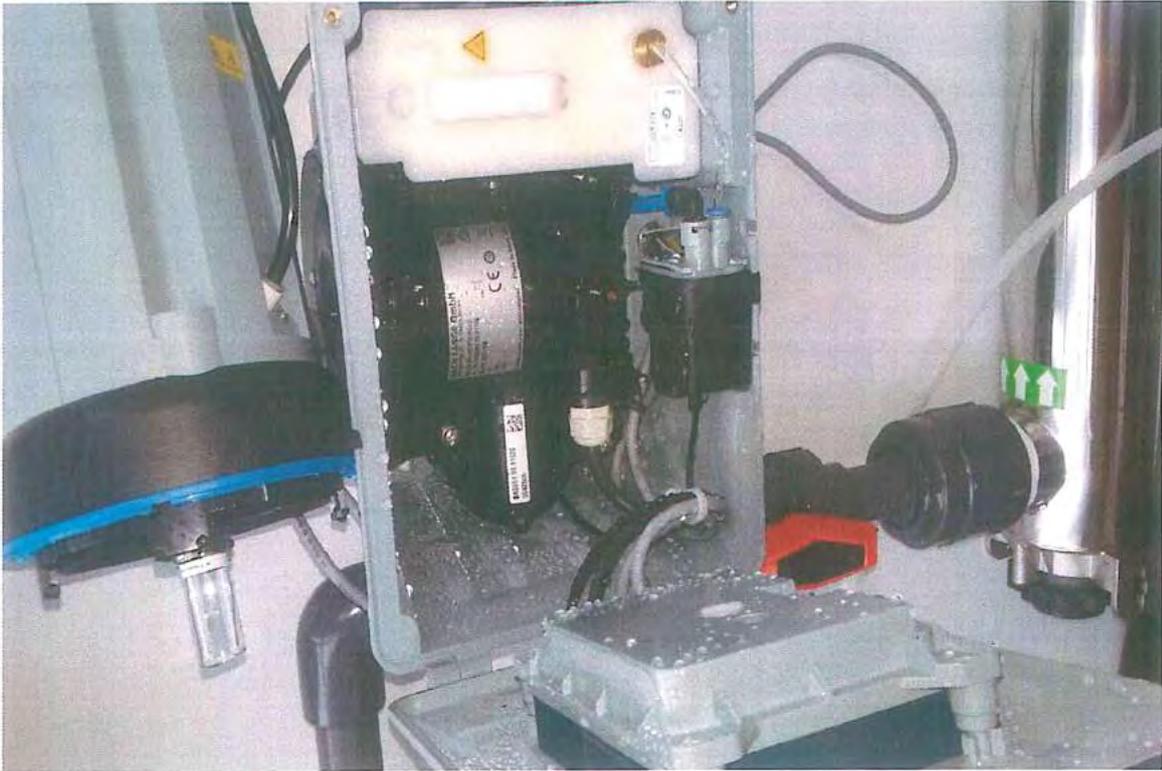
Kaingarooa Water Supply Lake 24/8



Kaingarooa Water Supply Lake 24/8



Sand In The PRV



Failed Turbidity Meter

## 4. Works & Services

### 4.4 Waste Incineration Option Viability

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	4.4
<b>Author/s</b>	Phil Landmark, Stantec

#### Purpose

A memorandum from Stantec Consulting Ltd providing information on the viability of waste incineration on the Chatham Islands.

#### Recommendations

1. THAT the information be received;
2. THAT further investigations into incineration and funding be undertaken.

#### Background

The memorandum is attached to this report and was circulated to Councilor's via email on the 1<sup>st</sup> September 2021.

To:	Owen Pickles	From:	Manoj Singh, Ph.D., P.Eng. Phil Landmark Paul Heveldt
	Chatham Islands Council		Stantec Consulting Ltd.
File:	310101037	Date:	August 25, 2021

Reference: Chatham Islands – Waste Incineration Option Viability

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## INTRODUCTION

Over the past few years, the Chatham Islands Council (CIC) has been pursuing various initiatives to improve the management of solid waste. Through funding received from various agencies of the New Zealand (NZ) Government, the Council has built an engineered landfill, a waste transfer station and a materials recovery facility. As the waste management infrastructure has been built, the need for more specialized operators and plant has become apparent and Council has slowed down on commissioning of these assets. As new Councilors have been elected to the Chatham Island Council, so they have questioned decisions that were made previously about how waste and recyclables should be managed in the Chathams.

In particular, the question has been asked as to whether waste incineration has a role to play for managing waste disposal needs of the Chatham Islands. This memorandum provides information as requested by the Council, including a very high-level assessment of the viability of waste incineration on the Islands. It is believed that the information provided in this memorandum will assist Council in making an informed decision regarding the option of incineration for managing waste at the Chathams.

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Owen Pickles

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Reference: Chatham Islands – Waste Incineration Option Viability

## BACKGROUND

In New Zealand, waste incineration has been practiced only for managing hospital and biosecurity waste. Stantec is not aware of any instances or communities in New Zealand where incineration is being used specifically for managing municipal solid waste<sup>1</sup> (MSW). There are currently three high-temperature hazardous waste incinerators operating within New Zealand, mainly to incinerate medical wastes, quarantine wastes and police-sourced wastes.

Although there are other reasons for incineration not being a preferred option for MSW management, it also does not align with the concepts of the circular economy and/or waste hierarchy which are the major national initiatives in New Zealand. However, factors that favour waste incineration in the Chathams include:

- the remoteness of the Chatham islands and its small population base,
- the cost of shipping transport back to New Zealand,
- the lack of resources for operating waste infrastructure,
- and prohibitively high cost of marketing any recyclable commodity.

All these factors are key considerations that would help understand the current situation and identifying the one preferred waste management option – be it a conventional approach that promotes waste diversion and follows the principles of waste hierarchy or an alternative and much more costly approach of using a thermal technology.

The overall goal should be to achieve efficiencies in managing waste using the resources available on the Chatham Islands, both in terms of protecting the environment and public health as well as costs for managing such waste.

Importantly, as discussed in the next section of this memorandum, waste incineration of MSW is not specifically prohibited by New Zealand legislation.

## REGULATORY CONSIDERATIONS

The following Acts and relevant Regulations are applicable to waste incineration in New Zealand:

- (a) Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NES, 2004)
- (b) Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins, and Other Toxics) Amendment Regulations 2005 (NES, 2005)
- (c) Basal Convention Annex I and II

---

<sup>1</sup> Any non-hazardous, solid waste from household, commercial and/or industrial sources. It includes putrescible waste, garden waste, biosolids, and clinical and related waste sterilised to a standard acceptable to the Ministry of Health (source: WasteMINZ "Land Disposal Guidelines", 2018).

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Reference: Chatham Islands – Waste Incineration Option Viability

MSW is considered to be non-hazardous. NES (2004) does not identify any activity requiring prohibition and restriction on discharge from incineration of domestic waste. However, Schedule 1 of the NES (2004) stipulates threshold concentrations and the allowed number of exceedances for carbon monoxide, nitrogen dioxide, ozone, PM<sub>10</sub> and sulphur dioxide. Except for ozone, all other contaminants can be expected in flue gases generating during waste combustion and would need to be controlled.

Further NES (2005), although does not specific any discharge limit but does speaks about dioxins. These contaminants can be expected during incomplete combustion and therefore strict operational controls will be required when selecting a technology for incineration.

Annex II of the Basel Convention also identifies residue from incineration requiring special considerations:

- Y46: Wastes collected from households
- Y47: Residue arising from the incineration of household wastes

Based on their origin and/or composition and their characteristics, household waste may contain hazardous materials co-mingled with non-hazardous materials. Because of the potential for contamination with hazardous substances, waste collected from households is classified under the Basel Convention as requiring special consideration (Basel Convention, Annex II, Y46)<sup>2</sup>.

Incineration of waste, as proposed as a solution for solid waste disposal at the Chatham Islands, is not specifically prohibited by the requirements of the NES (2004). Incineration is covered in the NES and certain types of incinerators are prohibited, as noted in relevant regulations below.

*Reg 11 Incinerators at schools and healthcare institutions*

*The operation of an incinerator at a school or a healthcare institution is prohibited unless a resource consent has been granted for the discharge produced.*

*Reg 12 High-temperature hazardous waste incinerators*

*(1) The operation of a high-temperature hazardous waste incinerator is prohibited.*

*(2) Subclause (1) does not apply if the incinerator—*

*(a) is a crematorium; or*

*(b) is operating at the following places:*

*(i) 89 Paritutu Road, New Plymouth:*

*(ii) 816 Wairakei Road, Christchurch:*

*(iii) Hape Drive (perimeter road), Auckland International Airport, Auckland.*

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<sup>2</sup> <http://www.basel.int/Implementation/HouseholdWastePartnership/Overview/tabid/5082/Default.aspx> accessed on May 17, 2021

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Reference: Chatham Islands – Waste Incineration Option Viability

A high temperature hazardous waste incinerator is defined as follows:

**high temperature hazardous waste incinerator** means an incinerator that is designed and operated principally for burning hazardous waste at a temperature greater than 850°C as measured—  
(a) near the inner wall of the incinerator; or

(b) at another point in the combustion chamber where the temperature is likely to represent the temperature in the incinerator

Given that an incinerator for the Chathams would not be “designed and operated principally for burning hazardous waste...” but, instead, would burn combustible solid waste only, then there is nothing in the National Environmental Standard that would preclude the use of incineration for waste destruction on the Chatham Islands.

## WASTE CHARACTERISTICS

The accuracy of the data, especially waste quality and quantity and their future trends is crucial to making an informed decision about the waste management approach that would work best for the Chatham Islands community. Given the lack of information about waste composition and quantities in the Chathams, the waste characteristics data used in this memorandum was based on New Zealand's national waste generation data obtained from the Ministry for the Environment<sup>3</sup>, as shown in Figure 1 and Figure 2.

Whilst there is no firm information about waste composition, it is recognized that cardboard is a significant component of the waste stream because supplies and consumables tend to be packaged to the Chatham Islands in cardboard boxes. Anecdotally, several days after the supply ship has visited the waste transfer stations experience a surge in receiving cardboard materials.

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<sup>3</sup> The State of New Zealand's Environment 1997, published by the Ministry for the Environment, ISBN 0-478-09000-5

Reference: Chatham Islands – Waste Incineration Option Viability

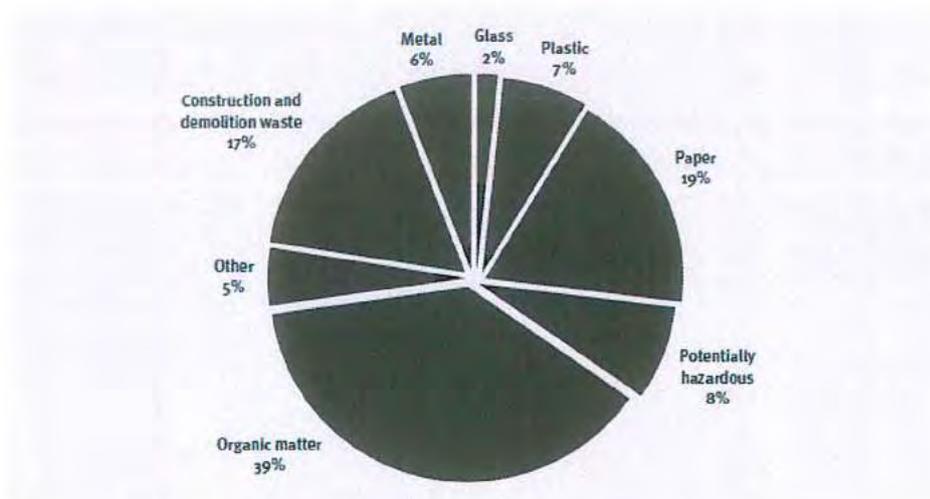


Figure 1 - Estimated composition of New Zealand's landfill waste<sup>3</sup>

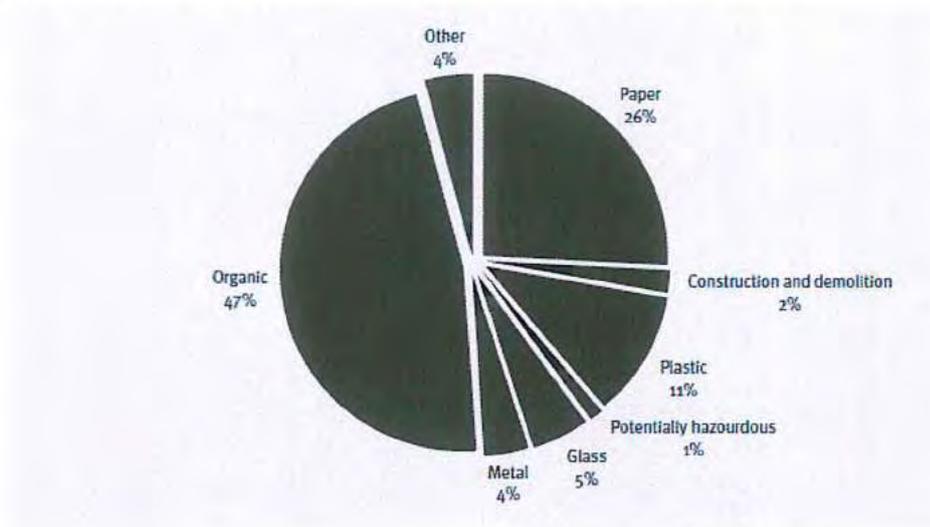


Figure 2 - Estimated composition of household waste in New Zealand<sup>3</sup>

Based on the 2020 waste levy payments, the annual quantity of MSW generated on the Chatham Islands is approximately 570 tonnes. Table 1 shows the combustible and non-combustible portions in the MSW which need to be considered when deciding the viability of an incineration option.

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Reference: Chatham Islands – Waste Incineration Option Viability

**Table 1 Waste Components from an Energy Viewpoint**

<b>MSW Combustible components</b>	<b>MSW Non-combustible components</b>
Plastic, Paper, Cardboard	Ferrous
Fabric/Leather	Non-Ferrous
Wood	Glass
Food	Earth & Stones
Rubber	Other Inorganics
Green waste	
Other organics	

## **WASTE INCINERATION**

### **Overview**

Waste incineration is intended to completely combust waste while maintaining or reducing emission levels below the regulated emission standards

Incineration requires sufficient combustion air, as well as adequate three T's i.e., Temperature, resident Time, and Turbulence for the operation to be efficient and performing as intended. The products of incomplete combustion are major atmospheric pollutants and this is one of the prime concerns with waste incinerators when they are not performing as intended and/or during upset conditions. Such upset conditions usually occur during incinerator startup or shutdown or when the composition of the waste being burned changes suddenly. This can also be caused by malfunctioning equipment, operator error, poor management of the incineration process, or inadequate maintenance.

However, nonetheless, with technological advancements, waste incinerators can be designed as well as operated to produce nearly complete combustion of the combustible portion of waste and to emit low amounts of pollutants of concern under normal operating conditions. One of the key considerations is to ensure that the feed is prepared as homogeneously as possible by mixing and/or blending to facilitate moisture transfer and efficient combustion between readily ignitable plastics/papers on the one hand and wet/moist domestic waste on the other

### **Residuals from Incineration**

MSW combustion residues typically comprises ash (bottom ash and fly ash). The chemical composition of the ash varies depending on the original MSW feedstock and the combustion process. Assuming complete combustion, the residuals are typically in the range of 5-15% (by weight) of the infeed quantity, i.e., almost 85-90% reduction in waste quantity. For the Chathams, this would reduce waste to landfill to between 30 and 90 tonnes per year.

The ash residues from waste combustion may contain toxic residues and therefore ash must be carefully disposed to landfill. So, there will be a need for a landfill, albeit the capacity required would be significantly reduced compared to the option of disposing all wastes to landfill.

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**Reference:** Chatham Islands – Waste Incineration Option Viability

Gases released in the combustion process will also contain toxic components which must be removed by suitable filtration controls.

### **Heating and Energy Value**

Heat recovery is almost always central to waste incineration, but it is unlikely to be economical to recover heat in small operations such as would occur on the Chathams with its limited waste stream, especially because the operation is likely to be on a batch basis, rather than continuous.

### **Waste Diversion and Incineration - Auxiliary Fuel Requirement**

The ability of waste to sustain a combustion process without any supplementary fuel, after ignition, depends on its lower heating value, also known as the lower calorific value. Relative to conventional fossil fuels, MSW is quite heterogenous (i.e., its composition varies) and so its calorific value also varies. This means that auxiliary fuel would be needed to help the incineration process. The type of auxiliary fuel will depend upon the type of furnace and could be electricity or any other fossil fuel such as diesel.

A detailed assessment of the MSW generated in the Chathams would be needed to understand if the MSW could be combusted without the need for any auxiliary fuel. If auxiliary fuel is needed it may lead to significant operating cost to maintain temperature during combustion. Recyclable waste components, specifically plastics and paper/cardboard, have significantly high calorific values relative to food waste/ organics and aids in MSW self-combustion depending upon their overall fraction available as feed stock for the incinerator.

That being said, if waste diversion is also desired by the Council in conjunction with incineration, it will significantly increase the demand for auxiliary fuel for maintaining a desired temperature range in the system and will increase the overall cost of operations.

### **Incineration versus Landfilling**

Incineration is an efficient method for managing MSW by way of up to 90% reduction in waste quantity. However, in general, it is the most expensive solid waste management option. The comparison between landfilling and incineration is best done using a life cycle assessment methodology which is beyond the scope of this project. However, to understand the two concepts of solid waste management, Figure 3 and Table 3 describe the primary differences in terms of few major attributes. Figure 3 assumes that both these operations have a way of harnessing energy of waste. Note that for the Chatham Islands, this is most unlikely to be feasible for both landfilling and waste incineration because of the small scale of operations. Some of the prominent advantages and disadvantages of incineration are also listed in Table 4 for reference.

Reference: Chatham Islands – Waste Incineration Option Viability

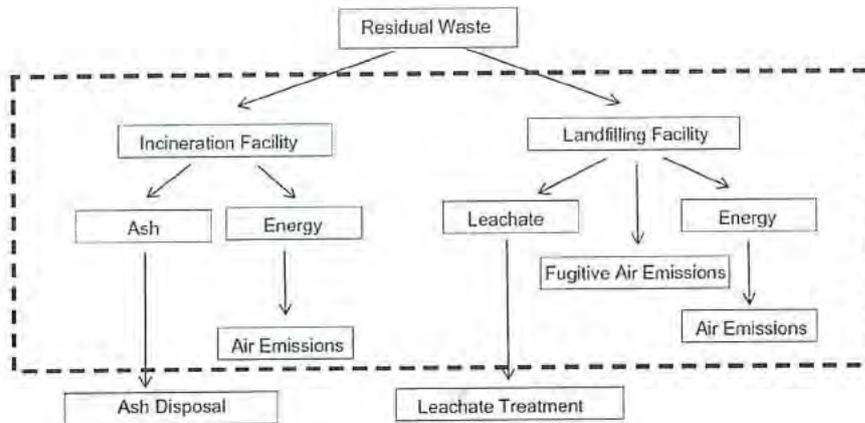


Figure 3 Incineration versus Landfilling<sup>4</sup>

Table 2 Conceptual Difference between Two Technologies

Attribute	Landfilling	Incineration
Air Emissions	Greenhouse gases	Particulate, Dioxins
Residuals	Leachate, subsurface gas migration	Bottom ash and fly ash
Operation	Relatively simple	Complex Operation
Financial	Appears cheaper considering short term but counting for the long-term post-closure care, it is not cheap	Expensive upfront as well as operating cost
Environmental Offset	More carbon offset relative to incineration but larger environmental footprint	Relatively less environmentally friendly but much less environmental footprint

Table 3 Incineration – Advantages and Disadvantages

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Can reduce waste volumes 80-95% - compact and, in general, sterile residue (except fly ash)</li> </ul>	<ul style="list-style-type: none"> <li>Technically a complex process, requires high CAPEX and OPEX as well as good technical skills in maintenance and operation.</li> <li>Requires trained staff for operation.</li> <li>Destroys resources that could otherwise be recycled.</li> </ul>
<ul style="list-style-type: none"> <li>Putrescible matter is sterilized and destroyed. Pathogen count is substantially reduced and</li> </ul>	<ul style="list-style-type: none"> <li>It's crucial to ensure complete burnout of flue gas and residue.</li> </ul>

<sup>4</sup> Assamoi, B. and Lawryshyn, Y. (2012). The environmental comparison of landfilling vs. incineration of MSW accounting for waste diversion. Waste Management, 32, pp 1019-1030.

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Reference: Chatham Islands – Waste Incineration Option Viability

Advantages	Disadvantages
generally negligible except where in the case of incomplete combustion.	
<ul style="list-style-type: none"><li>Plants can be installed closer to the point of waste generation (with proper emission controls) and save in waste transportation costs. This is unlikely to be an issue for Chatham islands.</li></ul>	<ul style="list-style-type: none"><li>System efficiency is dictated by waste composition and feed rate. These are unknown for the Chatham Island's waste.</li></ul>
<ul style="list-style-type: none"><li>Ash resulting from incineration can be beneficially used in construction. A possibility in the Chathams is to blend the ash with roading aggregate.</li></ul>	<ul style="list-style-type: none"><li>With the emission standards in New Zealand potentially getting stringent in the coming years, it will impact OPEX and the cost of managing secondary waste generating pursuant to incineration e.g., scrubbers.</li></ul>
<ul style="list-style-type: none"><li>Waste energy could be recovered for heat or power generation. In the Chathams the small scale of plant is most unlikely to make this feasible.</li></ul>	<ul style="list-style-type: none"><li>Heat recovery is often costly and inefficient since the recovery takes place under adverse conditions (boiler fouling and corrosive environment).</li><li>Residue from flue gas cleaning has the potential to contaminate the environment if not handled appropriately.</li></ul>
<ul style="list-style-type: none"><li>Eliminates the need to manage methane. Greenhouse gas emissions.</li></ul>	<ul style="list-style-type: none"><li>Incomplete combustion can generate amounts of pollutants which may not be easy to control.</li></ul>

### Waste Levy Payments

Section 6 of the Waste Minimisation Act 2008 (WMA) includes "*incineration*" under the meaning of disposal of waste where the intention is to destroy it, but not to recover energy from it. The WMA also imposes a waste levy on waste disposed of at a disposal facility, which includes a waste incinerator.

The present waste levy is \$20 per tonne (from 1 July 2021). It will be increased annually over the next three years so that from 1 July 2024 it will be set at \$60 per tonne.

So, presently, CIC will pay about \$11,400 per year in waste levy payments, increasing to \$34,200 per year by 1 July 2024, if waste quantities remain the same. This would be payable if waste is landfilled and if waste is incinerated without any energy being recovered.

The WMA is silent on how the levy may be applied at waste incineration facilities where energy is recovered. At worst, Council might have to pay the full waste levy but there is a possibility that some of the waste levy would be waived.

### CAPEX and OPEX

The capital cost is a function of capacity of the incinerator to process waste, flue gas cleaning technology and the emission control unit capable of controlling emissions as required by the regulations.

CAPEX information that is readily available from overseas is geared towards larger waste incinerators. With the smaller incinerators typically having a capacity of some 250 tonnes/day, the information is simply not applicable to the Chatham Island situation where waste quantities are estimated to be about 1.5 tonnes/day.

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Reference: Chatham Islands – Waste Incineration Option Viability

Stantec has identified a New Zealand manufacturer of waste incinerators, Stewart & Cavalier Ltd, which is based in Te Awamutu. The company manufactures small scale medical waste incinerators, mainly for export.

Stewart & Cavalier Ltd has provided a budget price for a 300kg/hour medical waste incinerator (see Attachment 1) which is \$4,250,000, excluding civil works such as foundations and a building to house the incinerator.

From discussions with the manufacturer, we understand that medical waste incinerators need to meet particularly high emissions standards in New Zealand. Since there is a possibility that medical wastes from the clinic on the Chatham Islands could be incinerated we have asked that the budget estimate assume this.

If medical wastes were not to be incinerated then we have been advised that the budget price would be reduced by about 20%, i.e., it would be about \$3,400,000.

The operation and maintenance costs typically comprise:

1. Fixed operating costs (salary and wages) – this depends heavily on skill set required for proper operation and maintenance of the facility.
2. Variable operating costs (costs associated with flue gas cleaning, auxiliary fuels, water and wastewater and residual/ ash disposal)
3. Maintenance costs (building and equipment maintenance)

We have not been provided with any OPEX for the Te Awamutu waste incinerator, but information from overseas indicates that OPEX costs/tonne typically increase for smaller waste incinerators. A 250 tonne/day plant would have OPEX costs of about \$140/tonne, so it is likely that it will be much higher per tonne for a much smaller plant.

The sale of energy is a significant element in the economy of waste incineration. In extreme cases, the income from energy sale can cover up to 80 percent to 90 percent of the total costs. However, for Chatham Islands, due to very small waste generation rates, this is not considered to be feasible.

## CONCLUSIONS

Waste incineration is permitted by legislation in New Zealand but the technology used must address all the issues where a variance cannot be obtained under the NES regulations i.e., threshold concentration of pollutants in the emissions. This will need to ensure that necessary performance standards have been agreed to with the vendors supplying the technology so that the operation is environmentally safe, is protective of public health, complies with the Chatham Islands waste management strategy, as well as meeting National goals and initiatives for efficient solid waste management.

However, there are considerable hurdles to implementing waste incineration, not least of which are the high CAPEX and OPEX costs.

A CAPEX budget estimate has been received from a waste incinerator manufacturer in New Zealand with indications being that the incinerator alone, without required civils infrastructure (foundation and building) would cost about \$4,250,000 if medical waste is to be burned, reducing to \$3,400,000 if this is not allowed for.

OPEX costs are likely to well over \$140/tonne.

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**Reference:** Chatham Islands – Waste Incineration Option Viability

Whilst the Chatham Island's waste stream is known to have a high quantity of cardboard that would burn well, there is insufficient information available to indicate whether auxiliary fuel would be needed to assist the incineration process.

Recovery of energy from the waste incineration process is unlikely to be feasible, given that the plant would most likely to located remotely at Te One and the process would be a batch process, rather than continuous.

This means that waste incineration would still incur waste levy payments.

Based on the information obtained and discussed in this memorandum, waste incineration does not appear to be a viable waste management option in the Chatham Islands. However, there are other technologies, such as waste pyrolysis which, although beyond the scope of this memorandum, should be investigated for dealing with fractions of the waste stream.

**Manoj Singh** Ph.D., P.Eng.

Senior Principal

Senior Waste Management Engineer

**Phil Landmark** B.Sc.Eng., CP.Eng.

Senior Civil and Environmental Engineer

Sender's Email **Paul Heveldt** M.Sc.Eng

Principal Environmental Scientist

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ATTACHMENT 1 – HIGH-LEVEL ESTIMATE FOR WASTE INCINERATOR



**STEWART & CAVALIER LTD**  
**ENGINEERS**  
**Te Awamutu**



Re RM 7498-21

Phil Landmark  
Stantec (NZ)  
118 Fitzherberts Avenue  
Palmeston North  
New Zealand

16<sup>th</sup> July 2021

Attention: Phil Landmark

Dear Phil

*RE: Supply One only 300 kg/hr Medical Waste Incinerator*

We have much pleasure in submitting our Budget Price for the above project

**Our Quotation: NZ\$ 4,250,000-00**

SCOPE OF WORK

- Manufacture & Supply One off 300kg/hr Medical Waste Incinerator
- Includes on site installation (Mechanical & Electrical)
- Supply machine c/w air emission Control
- Machine to be a stepped hearth configuration
- Secondary & Tertiary ignition chamber included
- Hydraulic hearth rams included for waste feed through the machine
- Machine to have a manual ash out system
- Secondary, Primary & Tertiary chamber burners included (Light oil fuel)
- Main chambers to be lined with LC1600 refractory
- 6.5 m high s/s process chimney included

NOTES AND CLARIFICATIONS

- Full Air Emission control system allowed for

- No building works (footings and floor slab etc) allowed for
  - Power Supply & Fuel to site your care
  - Because of height of the Baghouse containerization of this item is not possible
  - On site craneage your care
  - As no specification & scope of supply having been issued further clarification will be required to firm up this quotation for supply & installation
- Please also be aware there are pending price increases. Should this take effect prior to award of this Quotation the additional cost will be to your account.

Stewart & Cavalier has an in depth health and safety policy that allows us to meet the requirements of the Health Safety & Employment Act 1992, and the Health & Safety in Employment Regulations 1995. Should our offer be successful we will require a list of hazards that are already on site or may be encountered by our subcontractors or ourselves. This will aid you in complying with sections 16 and 18 of the Health Safety & Employment Act 1992.

VALIDITY

Our quotation is open for acceptance within 30 days from the date of this quotation. Should you have any queries regarding our offer, please do not hesitate to contact us.

TERMS OF PAYMENT

This quotation is subject to standard terms and conditions of trade of Stewart and Cavalier Ltd

Rough Order Payment Terms Subject to Financial Approval by Stewart and Cavalier Ltd and Our Banking Institution. All banking charges and finance has been excluded from the Budget

40% Deposit on Placement of Order  
 20% on completion Design and Start of Manufacture  
 30% on Completion of Manufacture Ready to ship  
 10% on Completion of Commissioning

Yours faithfully  
STEWART & CAVALIER LIMITED



**Roger Myers**  
Engineer

## 4. Works & Services

### 4.5 Water and Wastewater Schemes Summary Report January to June 2021

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<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	4.5
<b>Author/s</b>	Owen Pickles, Chief Executive Officer

#### **Purpose**

The purpose of this report is to summarise the operation of the Kaingaroa and Waitangi Water schemes and the Waitangi Wastewater Scheme for the period 1 January 2021 to 30 June 2021 and to recommend actions to protect public health and minimise adverse environmental effects.

#### **Recommendations**

1. **THAT the Chatham Islands Council receives the report;**
2. **THAT the recommendations within the report be actioned.**

#### **Background**

The report was circulated via email to Councillors on 1 September 2021.

# Water and Wastewater Schemes Summary Report January to June 2021

PREPARED FOR Chatham Island Council | July 2021

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We design with community in mind



## Revision Schedule

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
0	20/07/21	Internal Draft	AW	KN	KN	
1	28/07/21	Final	AW	KN	KN	RB



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<b>PROJECT MANAGER</b> Ali Siddiqui	<b>PROJECT TECHNICAL LEAD</b> Kirsten Norquay
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## Executive Summary

The Kaingaroa and Waitangi Water Schemes and the Waitangi Wastewater Scheme are owned by the Chatham Islands Council (Council) and are operated and maintained under contract by Fulton Hogan.

The purpose of this report is to summarise the operation of the three schemes for the period from 1 January 2021 to 30 June 2021 and recommend actions to protect public health and minimise adverse environmental effects.

Key findings, recommended actions, and progress for this reporting period are summarised below.

Scheme	Key findings	Recommended actions	Progress to Date
Waitangi Water	<ul style="list-style-type: none"> <li>Non-complying with Drinking-water Standards for New Zealand, primarily due to inadequate treatment.</li> <li>Despite this, no E. coli detected in raw, treated or reticulated water.</li> </ul>	<ul style="list-style-type: none"> <li>Urgently replace existing, dysfunctional UV disinfection system.</li> </ul>	<ul style="list-style-type: none"> <li>MoH funding for new UV secured and installed. Final commissioning pending.</li> <li>3 Waters Stimulus funding secured for online monitoring, telemetry, toby valves, and backflow preventers. Design complete.</li> </ul>
Kaingaroa Water	<ul style="list-style-type: none"> <li>Non-complying with Drinking-water Standards for New Zealand, primarily due to poor water intake and inadequate treatment.</li> <li>Despite this, no E. coli was detected in treated or reticulated water.</li> <li>Complaint received due to treated water colour and taste as well as a disruption to supply. Issue has been resolved through planned upgrade works.</li> </ul>	<ul style="list-style-type: none"> <li>Urgently extend water intake into deeper water and upgrade treatment process to include organics removal and chlorination.</li> </ul>	<ul style="list-style-type: none"> <li>MoH funding for intake and WTP upgrade secured.</li> <li>Intake designed and materials delivered to the island. Intake pump replacement scheduled for August 2021. Intake pipe extension scheduled for December 2021, pending low lake levels.</li> <li>WTP upgrade installed and final commissioning pending.</li> <li>3 Waters Stimulus funding secured for online monitoring, telemetry, and rainwater harvesting scheme. Design largely complete.</li> </ul>
Waitangi Wastewater	<ul style="list-style-type: none"> <li>Non-complying with resource consent, primarily due to elevated nitrogen and E. coli.</li> <li>Complying with solids and organics limits.</li> </ul>	<ul style="list-style-type: none"> <li>Urgently carry out various remedial works on wastewater scheme.</li> </ul>	<ul style="list-style-type: none"> <li>MoH funding for critical repairs secured, remedials carried out in Nov-Dec 2020 which should improve compliance.</li> <li>3 Waters Stimulus funding secured for improvement works (planning and construction). Design in progress.</li> </ul>

Overall, the water and wastewater schemes urgently require remedial or upgrade works to address substantial limitations, meet current best practice, and achieve compliance. Central Government Funding to progress these works has been secured through a mixture of Ministry of Health (MoH) and 3 Waters Stimulus Funding (Tranche 1) packages in late 2020, with work in progress and due to be completed in 2022. Some design is being carried out under Tranche One in anticipation of additional funding being available via Tranche Two of the Three Waters Stimulus funding.

## Abbreviations

Acronym	Meaning
Ammonia N	Ammonia Nitrogen
cfu	Coliform Forming Unit
BOD	Biochemical Oxygen Demand
CCP	Critical Control Point
COD	Chemical Oxygen Demand
DWA	Drinking Water Assessor
DWSNZ	Drinking-water Standards for New Zealand 2005 (Revised 2018)
E. coli	<i>Escherichia coliform (E. coli)</i>
FAC	Free Available Chlorine
LTP	Long Term Plan
MPN	Most Probable Number
O&M	Operation and Maintenance
PHRMP	Public Health Risk Management Plan (now called a Water Safety Plan)
RBC	Rotating Biological Contactor
TSS	Total Suspended Solids
UV	Ultraviolet
WSP	Water Safety Plan
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

## 1.0 INTRODUCTION

The Waitangi community on the Chatham Islands is served by a reticulated sewerage system and treatment plant, installed in 2005, and a treated, reticulated water supply, upgraded in the same year. The Kaingaroa community is served by a treated, reticulated water supply, upgraded in 2014.

The water and wastewater schemes are owned by the Chatham Islands Council (the Council) and are operated and maintained under a combined water/wastewater and roading operations and maintenance contract (the O&M Contract). The O&M Contract was awarded to Fulton Hogan in late 2015 and commenced on 1 January 2016. It is a ten-year contract.

The key objectives in the operation and maintenance of the water and wastewater schemes are to protect public health, minimise adverse environmental effects, and ensure the efficient and effective operation of the schemes.

The purpose of this report is to provide a summary of information recorded for the water and wastewater schemes under the O&M Contract for the period from 1 January 2021 to 30 June 2021 (the reporting period) and recommend actions for the Council to consider for the protection of public health and to ensure the efficient and effective operation of these schemes.

### 1.1 LEGISLATIVE CHANGES, REQUIRED UPGRADES AND FUNDING CHALLENGES

***The water and wastewater schemes all currently require significant upgrades to address substantial limitations. This is due to legislative changes as well as aging infrastructure. This section provides a historical account.***

In December 2018, the Government published revised Drinking-water Standards for New Zealand 2005 (revised 2018) which supercede the Drinking-water Standards for New Zealand 2005 (revised 2008) and came into force on 1 March 2019. At that time, the Minister also noted “A comprehensive review of the Standards is also being carried out, led by an independent Drinking-Water Advisory Committee. I expect proposed changes from this review to be released for public consultation by mid-2019.” This review is progressing, with an exposure draft of the revised DWSNZ released in December 2020. Public submissions will be sought once the draft is complete; estimated to be in mid 2021.

The new DWSNZ 2005 (revised 2018) has, and further revisions are likely to have, significant implications for Waitangi and Kaingaroa water supplies. To date these have been largely foreseen by the Council, as they are generally consistent with the findings of the Government Inquiry into Havelock North Drinking Water (the Inquiry), particularly those in the Stage 2 Report released in December 2017<sup>1</sup>.

The Council considered the findings of the Inquiry as well as the current condition of critical assets when it developed its Combined Financial and Infrastructure Strategy (the Strategy) and its 2018-2028 Long Term Plan (LTP) in early 2018. Accordingly, the Strategy and 2019/20 LTP included significant capital upgrades to address the substantial limitations with the existing water and wastewater schemes. Council developed a programme of works to be delivered with Three Water Stimulus Tranche One funding.

For the water supplies it also included upgrades to enable full compliance with the drinking water standards current at that time without relying on ‘secure’ bore water or the caveat of ‘all practicable steps’. For Waitangi water supply, the upgrade also included a new bore source as the current demand exceeds the sustainable yield of the existing aquifer during summer as well as extending the reticulation to Te One, the community where the main primary school for the Island and other facilities are located.

At the time the strategy and 2019/20 LTP was proposed, the Council understood that Central Government funding would be made available for the upgrades as fully funded, or funded from debt with assistance provided through annual Crown contributions. However, various funding applications in 2018 and 2019 to Central Government were unsuccessful.

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<sup>1</sup> Summary provided in Stantec’s 6-monthly report titled “Water and Wastewater – Operation and Maintenance Summary Report: July 2017 – December 2017”

## CHATHAM ISLANDS COUNCIL WATER & WASTEWATER SCHEMES – SUMMARY REPORT JANUARY-JUNE 2021

In late 2019 the Council identified the possibility of reallocating funds totalling \$340,000 for urgent upgrades for the water and wastewater schemes. To support Council's request to Central Government to approve reallocation of this funds, Stantec prepared a memo titled "Chatham Island Water and Wastewater – Priority Infrastructure Needs" dated 11 September 2019<sup>2</sup>. Funding was approved by the Ministry of Health (MoH) on the 28 August 2020 for the following works (see Appendix G):

- New UV unit at Waitangi WTP.
- Confirm feasibility of MPA bore for Waitangi.
- Extend Kaingaroa intake, at Lake Rangitai, into deeper water.
- Add organics and chlorate removal to Kaingaroa WTP treatment system.
- Repairs to Waitangi WWTP RBC shaft.
- WWTP inlet feed pump check valves replacement.

A contract variation request was approved on 23 June 2021 to vary the distribution of amounts for each milestone task and extend the deadline from 30 June 2021 to 30 June 2022. At the time of writing, the MoH funded works are 70% complete with the MPA bore investigations and Kaingaroa intake extension outstanding.

The Council signed the Memorandum of Understanding (MoU) for the three waters reform in August 2020, agreed with the Canterbury Councils to pro-rata the regional allocation of Tranche 1 Three Water Stimulus Funds in September and submitted its Delivery Plan (see Appendix G) and Funding Agreement on 30 September 2020. Funding was approved in October 2020 for the following projects with a total budget of \$640,000:

- **Wastewater improvements** project to mitigate adverse public health and environmental impacts; hence, address consent non-compliance and improve resilience. This will involve extension of the land application system, design of new wastewater treatment plant, and investigation and remedial works to enable the existing system to continue to operate.
- **Water safety improvement** project to enable real-time monitoring and reporting of treated water from Council-owned reticulated water supplies. This will include critical alarms being able to be relayed in real-time. In two projects separate to this expenditure programme, cell phone coverage is being deployed to Chatham Islands and both water treatment plants are being upgraded. Completion of all three projects will substantially improve public safety of the water supply and address current drinking water non-compliances, including those due to weather-related delays in sample transport.
- **Water resilience** project to improve availability of water supply for communities, particularly during peak summer periods. This will involve replacement of aging assets to reduce network losses, provision of additional water storage tanks to reduce the need to tanker potable water from Waitangi, and provision of non-potable water storage to ensure sustainable, reliable supply of potable water for communities.

As required by signing the MoU, the Council is also collating information about the water and wastewater schemes in response to the Department of Internal Affairs (DIA)'s Request for Information for the Three Waters Reform programme. This work has, amongst other things, identified future requirements for water and wastewater services on the Chathams. At the time of writing, the Three Water Stimulus funded works is approximately 25% complete.

Going forward, Three Waters service delivery arrangement in New Zealand will change (see Section 1.2). The Government's intention is to reform local government's Three Waters services into a small number of multi-regional entities with a bottom line of public ownership. Central Government announced its proposed water entity boundaries on 30 June 2021 with the Chatham Islands joining the "Wellington" water entity.

As the outcome of the Three Waters reform programme process is unknown, the Council has assumed a Business as Usual (BAU) approach when developing its 2021-2031 LTP. For funding, this assumes continued assistance from Central Government by way of annual Crown contributions for operational costs, but not for asset depreciation or capital works, and obtaining additional external funding on a case-by-case basis for capital

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<sup>2</sup> Reproduced in Appendix G of Stantec's annual report titled "Water and Wastewater – Operation and Maintenance Summary Report: July 2019 – December 2019"

upgrades or increased level of service. As advised by Audit New Zealand, the 2021/31 LTP indicated a budget of zero for capital upgrades as any such works require the Council to secure funding from Central Government which is not guaranteed, nor provided as a regular sum. Several key upgrades are identified in the LTP (but excluded from financial forecasts), namely the Waitangi Water Treatment Plant upgrade, Kaingaroa water reticulation renewals, and Waitangi Wastewater Treatment Plant Upgrade.

Central Government assistance may not be available if services for the Chathams are provided by a new water entity. In addition, the Council currently sees economies of scale with having a combined roading and Three Waters contract for operations and maintenance (Fulton Hogan) as well as engineering services (Stantec) that may not be realised on the Chathams with a new water entity.

## 1.2 THREE WATERS REFORM

***The Three Waters Reform will result in wide changes in the sector, including service delivery.***

The Department of Internal Affairs webpage for the Three Waters Reform provides the following summary:

*“In July 2020, the Government launched the Three Waters Reform Programme – a three-year programme to reform local government three waters service delivery arrangements.*

*This reform programme builds on the progress made through the Three Waters Review and establishment of Taumata Arowai.*

*Currently 67 different councils own and operate the majority of the drinking water, wastewater and stormwater services across New Zealand. Local government is facing urgent challenges in the provision of these services including: funding infrastructure deficits, complying with safety standards and environmental expectations, building resilience to natural hazards and climate change into three waters networks, and supporting growth.*

*Rather than piecemeal solutions, comprehensive, system-wide reform is needed to achieve lasting benefits for the local government sector, our communities, and the environment.*

*The Government’s starting intention is to reform local government’s three waters services into a small number of multi-regional entities with a bottom line of public ownership. The exact size, shape and design of these entities is still being worked through.*

*The reform programme is being progressed through a voluntary, partnership-based approach with the local government sector, alongside iwi/Māori as the Crown’s Treaty Partner. A Joint Three Waters Steering Committee collaborative provides oversight of the reform programme that brings together central and local government expertise and experience.”*

Whilst the Three Waters Reform may see funding in addition to the Tranche 1 allocation being made available to the Council for water and wastewater, it may not be sufficient to enable full compliance with the DWSNZ and current consents, that will be required by Taumata Arowai. In addition, a different entity (that Council may or may not be a joint owner of) may be responsible for service delivery and alternative funding mechanisms may be introduced which will impact residents.

## 2.0 WATER SUPPLY

### 2.1 WAITANGI WATER SUPPLY

#### 2.1.1 Process Overview

Raw water is drawn from the Tikitiki Bore<sup>3</sup> at Tikitiki Hill. The raw water enters the water treatment plant (WTP) and is pumped through a multimedia filter (sand and anthracite media) to remove particulate matter. The water is softened to reduce scaling in pipes from excessive hardness in the water. Disinfection is supposed to be provided via UV (for protozoa protection<sup>4</sup>) and sodium hypochlorite dosing (Critical Control Point, CCP, and providing residual disinfection in the reticulation). However, the UV disinfection system is no longer functional. The Tikitiki Reservoir provides more than 30 minutes contact time prior to treated water being pumped into the network. The four, interconnected Met Station Reservoirs are within the network for storage. Most properties have a header tank and some also have a booster pump.

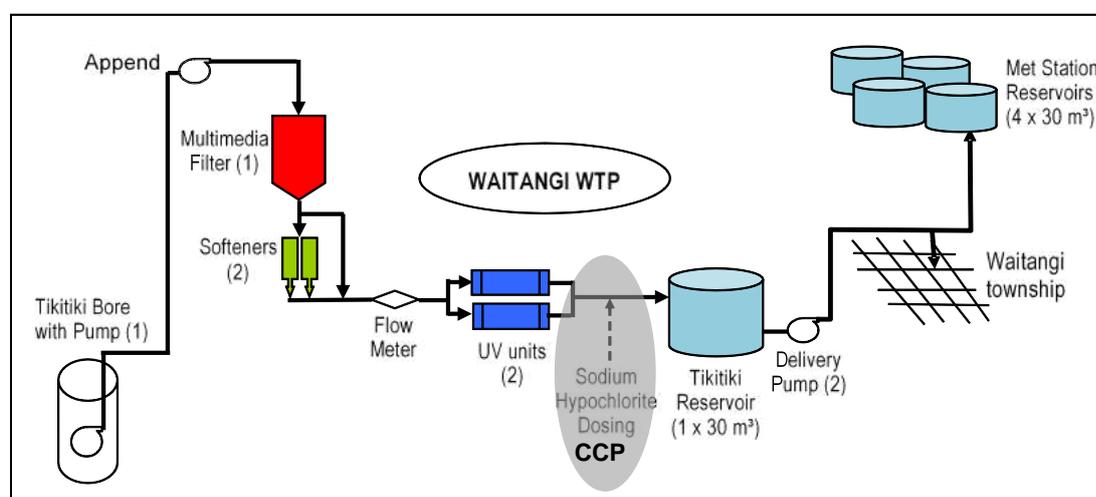


Figure 1: Waitangi Water Supply System Schematic

A proposed upgrade includes a new bore source as the current demand exceeds the sustainable yield of the existing aquifer during summer, a new treatment plant, as well as extending the reticulation to Te One.

The Council secured funding from Ministry of Health on 28 August 2020 to replace the UV disinfection system at the existing WTP at Tikitiki Hill. The new UV disinfection system was installed in June 2021 and is due to be fully commissioned in July 2021. Three Waters Stimulus Tranche One funding was secured for water safety and water resilience (namely to replace toby valves to reduce leakage and install backflow preventers) improvements (planning and construction). A site visit was carried out with the contractor in November 2020. Online monitoring, telemetry, and reporting system upgrades has been designed. New online monitoring instruments were installed in June 2021 and the telemetry system will be installed later in 2021.

#### 2.1.2 DWSNZ Requirements

**The Government has introduced a new regulatory framework for ensuring drinking water safety and improving environmental outcomes for wastewater and stormwater. The new system is to be overseen by the new dedicated water regulator (Taumata Arowai), with a new Water Services Bill and new DWSNZ. An exposure draft of the new DWSNZ was released in late 2020 with intention of being released for public**

<sup>3</sup> The Tikitiki bore does not have secure status. Limited information is available on the bore's construction.

<sup>4</sup> The UV equipment is not validated and does not have any measurement of dose intensity and therefore the Waitangi unit is not considered compliant for protozoa protection under section 5.16 of the DWSNZ. In addition, one of the two parallel UV units has failed and is unable to be repaired.

**consultation in mid-2021. This section reflects the current DWSNZ (2005, revised 2018). It will require updating when the new DWSNZ come into force.**

### 2.1.2.1 Water Supply Classification

The Waitangi Water Supply is classified as a small supply (i.e., less than 500 people) under the Drinking-water Standards for New Zealand 2005 (Revised 2018) (DWSNZ).

The supply does not have appropriate protozoal treatment as per Table 10.1 in Section 10 of the DWSNZ<sup>5</sup>. This means that the supply is required to comply with Sections 4-9 of the DWSNZ.

### 2.1.2.2 Water Safety Plan (WSP) and Implementation

The Council is not required to have a Water Safety Plan (WSP) in place as the water supply serves less than 500 people, however it has elected to do so<sup>6</sup>.

A WSP for the scheme was approved by the DWA on 29 July 2016. It includes monitoring required to be undertaken for ongoing DWSNZ compliance and operation. This report is based on that monitoring regime.

The DWA carried out a WSP implementation audit in 2017/18 year, visiting the site on 6 December 2017 and providing a report on 8 March 2018<sup>7</sup>, and indicated subsequent on-site WSP implementation inspections are likely to be undertaken at 3 yearly intervals to determine implementation progress.

CIC has elected to not review its WSP (due for review in July 2021) due to uncertainty around the new drinking water framework and the new water delivery entities. However, the CCPs will be reviewed and documented as part of any WTP upgrades, with the most recent CCP documentation included in the 6-monthly report.

### 2.1.2.3 Groundwater Security Status (Tikitiki Bore) and Protozoal Treatment

Tikitiki bore was granted secure status by the DWA on 27 July 2016, which meant that no treatment was required to be in place for protozoal compliance under the DWSNZ. Ongoing monitoring of the raw bore water was required to retain secure status.

Tikitiki bore lost secure status on 27 June 2018 following the DWA's WSP implementation audit in December 2017. Fulton Hogan carried out remedial works to return the borehead to a similar condition as at the time of the initial borehead assessment in 2016 and the current DWSNZ only requiring a 5-yearly review of the borehead.

Without secure status, appropriate treatment is required to be in place for protozoal compliance under the DWSNZ. UV disinfection would provide protozoal treatment. The existing UV disinfection system is dysfunctional and does not meet the protozoal compliance requirements under the DWSNZ.

The Council obtained funding from the MoH on 28 August 2020 to install a new UV disinfection system<sup>8</sup> to address existing public health risks and enable DWSNZ compliance. The new UV disinfection system was installed in June 2021 and is due to be fully commissioned in July 2021.

Despite losing secure status, the Council has continued to monitor the raw bore water as per the WSP. E. coli has not been detected in the raw water for the past five years. Low levels of total coliforms have been detected on 10 occasions in the last five years, refer to Appendix B, Table B-1; this needs to be continually monitored.

<sup>5</sup> The Council understood they could demonstrate compliance under section 10 of DWSNZ, which requires a WSP. However, in late 2019, the DWA considered the supply was not currently eligible for compliance under Section 10.

<sup>6</sup> The Council understood they could demonstrate compliance under section 10 of DWSNZ, which requires a WSP. However, in late 2019, the DWA considered the supply was not currently eligible for compliance under Section 10.

<sup>7</sup> Summary and relevant documents provided in Stantec's 6-monthly report titled "Water and Wastewater – Operation and Maintenance Summary Report: January 2018 – June 2018" (see Section 2.2.2 and Appendix G)

<sup>8</sup> A new validated UV disinfection system and online monitoring is proposed as a step towards achieving protozoal compliance.

#### 2.1.2.4 Critical Control Points (CCPs)

**Note: With the completion of the upgrade works at the Waitangi WTP, the current CCPs will change during the next reporting period.**

The Council is required to have Critical Control Points (CCPs) in place for its supplies. A CCP is an active barrier that is essential for protecting consumers from water quality hazards. CCPs need to be monitored regularly, ideally continuously, to ensure the effectiveness of barriers. Properly operated CCPs help ensure safe drinking water.

Stantec and Fulton Hogan discussed potential CCPs and associated documentation for Waitangi with the DWA during the 2017/18 WSP Implementation Audit and subsequently developed CCP documentation for chlorination as discussed. This documentation was reviewed in late 2019 based on the Ministry of Health's revised water safety plan handbook<sup>9</sup>.

Council has secured funding to provide treatment at Waitangi to replace the UV disinfection system. Once this upgrade is complete, the UV disinfection system will be added as a CCP.

The current version of the CCP documentation for chlorination is provided in Appendix H.

#### 2.1.3 Monitoring Regime

Monitoring is undertaken within the water supply for DWSNZ compliance as well as for WTP operation as per the WSP. This monitoring is summarised in Table 1.

**Table 1: Waitangi Water Quality Monitoring Regime**

		Sampling Requirement		DWSNZ Compliance		Operational Requirement	
	Frequency	Location	Parameter	Limit	Parameter	Target	
<b>Source Compliance</b>							
Protozoal	Monthly	Raw water	-	-	Turbidity	-	
					E. coli	<1 MPN/100mL	
					Total coliforms	<1 MPN/100mL	
<b>Treatment Compliance</b>							
Bacterial	Monthly	Treated water	E. coli	<1 MPN/100mL	Turbidity	<0.3 NTU	
			Total coliforms	no limit	Total coliforms	<1 MPN/100mL	
	Weekly		-	-	FAC <sup>10</sup>	0.2-0.6 mg/L <sup>11</sup>	
					pH	6-9 <sup>12</sup>	
<b>Distribution Compliance</b>							
Bacterial	Monthly	Reticulation	E. coli	<1 MPN/100mL			
			Total coliforms	no limit	Total coliforms	<1 MPN/100mL	

<sup>9</sup> Ministry of Health, "Handbook for Preparing a Water Safety Plan", May 2019.

<sup>10</sup> Free Available Chlorine (FAC)

<sup>11</sup> For FAC, DWSNZ has a Guideline Value (GV) of 0.6-1.0 mg/L for taste and odour, a Maximum Acceptable Value (MAV) of 5 mg/L and requirement of >0.2 mg/L in the network (section 4.2.2).

<sup>12</sup> For pH, DWSNZ has a guideline range of 7 – 8.5 for aesthetics and notes less than 8 is preferable for effective disinfection with chlorine. Note that no chemicals are dosed at the WTP to control pH.

FAC<sup>13</sup> and pH of the treated water has been measured with a hand-held meter on-site since the 2005 WTP upgrade. Turbidity of the raw and treated water has been measured by laboratory analysis on the mainland since 26 July 2016.

Chlorination is a CCP, with documentation provided in Appendix H. It is not clear at this time if CCP monitoring will comprise part of DWSNZ compliance monitoring in the future.

### 2.1.4 Monitoring Results

The monitoring results available since 2008 are provided in Appendix B, with the results from this reporting period shaded grey.

Table 2 summarises the monitoring results from the reporting period in the context of DWSNZ compliance and operational requirements as per the WSP.

**Table 2: Waitangi Water Quality Monitoring Results For Reporting Period**

	DWSNZ Compliance	Operational Requirement
<b>Source Compliance</b>		
Bacterial	-	E. coli and total coliforms: All required raw water samples analysed. No E. coli or total coliforms detected. Monitoring is ongoing.
<b>Treatment Compliance</b>		
Bacterial and protozoal	E. coli: All required treated water samples analysed and less than limit. Total coliforms: All required treated water samples analysed. No limit.  <b>Non-compliant</b> as UV not adequate. (Note: weekly sampling of treated water required under section 4; WSP requires monthly sampling)  Note: New UV disinfection system is installed and pending final commissioning.	Total coliform: All required treated water samples analysed. No total coliforms detected.  pH and FAC: All required treated water samples analysed except for two-week period in July and October where pH was not recorded.  pH: All results within expected bounds, stable trend observed.  FAC: All results within target operational range.  Turbidity: All required raw and treated water samples analysed. Elevated levels measured in two treated water samples (20 April, 18 May), possibly due to sample reaction on transport. Continue to monitor.
<b>Distribution Compliance</b>		
Bacterial	E.coli: All required reticulation samples analysed and less than limit. Total coliforms: All required reticulation samples analysed. No limit.  <b>Compliant</b>	Total coliform: All required reticulation samples analysed. No total coliforms detected.

### 2.1.5 Key Maintenance Works

Key maintenance and one-off works undertaken in the reporting period over and above routine works allowed for in the lump sum prices for the O&M Contract are summarised in Appendix A.

<sup>13</sup> Fulton Hogan (Chatham Islands) are authorised by South Island Drinking Water Assessment Unit to perform measurement of FAC by a hand-held meter. The authorisation is based on an assessment of Fulton Hogan staff carried by the Drinking Water Assessment on 6 December 2017 and is valid until January 2021.

## 2.1.6 Water Conservation and Demand Management

The daily bore meter readings are shown in Figure 2. Key observations are as follows.

- The 30-day moving average for this reporting period has varied between 48 - 56 m<sup>3</sup>/day.
- The annual average usage at the end of this reporting period<sup>14</sup> is 53 m<sup>3</sup>/day. Based on a population of 170 people, this equates to an average usage of 312 L/person/day.

A decrease in demand was observed in 2019 following completion of the Wharf Project (i.e., water demand in July 2019 is similar to that seen in July 2015 before the start of the Wharf Project). However, this trend was reversed in late 2020 and can be attributed to Covid-19 – restrictions around international travel saw increased numbers of NZ domestic tourists visiting Chatham Islands, as well as investigation work associated with the “Longer and Stronger” Chatham Islands (Tuuta) Airport runway extension project.

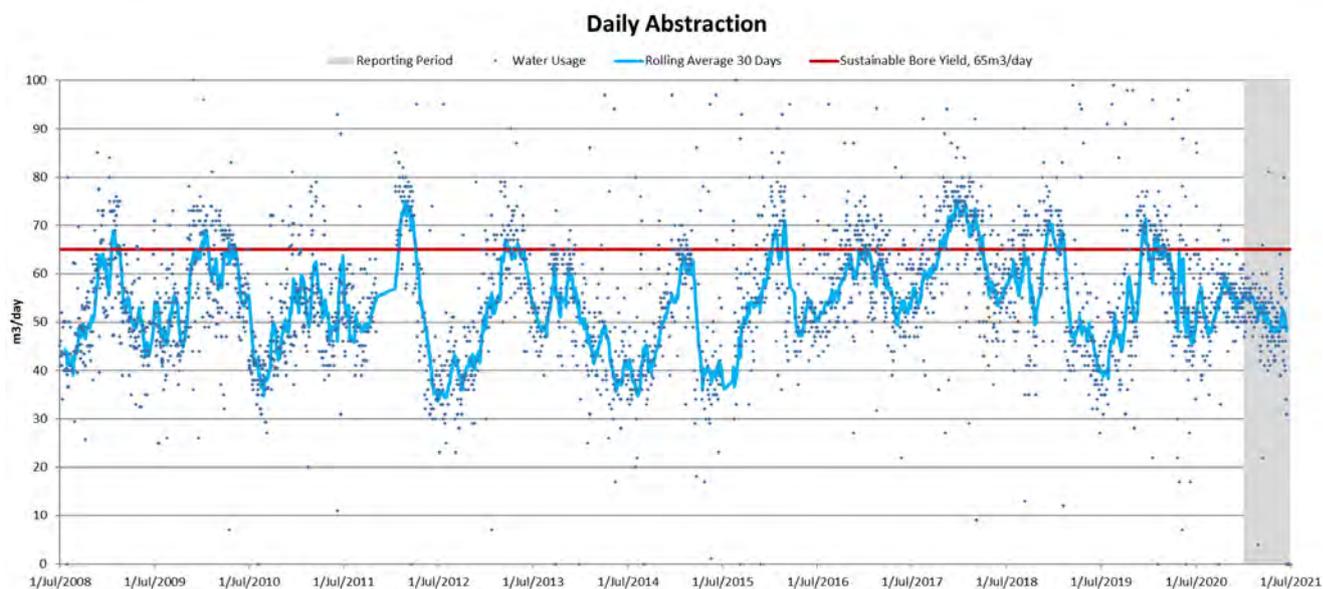
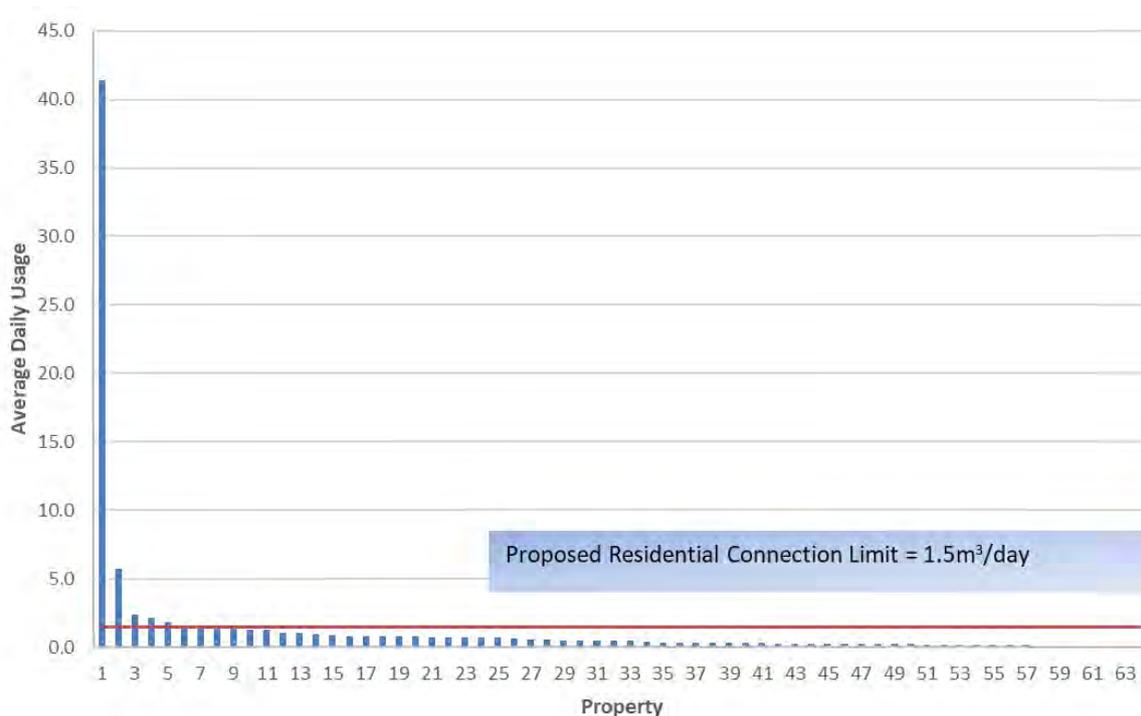


Figure 2: Daily Water Abstraction

Meter readings are required to be taken on a quarterly basis. Fulton Hogan has been carrying out additional readings. The last meter readings were taken at the middle of June 2021 with the next readings programmed for September 2021. Figure 3 provides an overall summary of the average daily water use across the community in this reporting period. There are currently 63 active connections.

<sup>14</sup> Based on the twelve month period from 1 July 2020 to 30 June 2021.



**Figure 3: Ranked Average Daily Water Use in Waitangi**

As shown in Figure 3, the majority of properties used significantly less than 1.5 m<sup>3</sup>/day (i.e., the proposed residential connection limit outlined in the Chatham Island Water Strategy, December 2010) in this reporting period. There were 6 exceptions, largely commercial connections: Morgue, Hotel Chathams, Hotel Motels, Joe & Rae Wills, Beach House, and Robin Page.

## 2.2 KAINGAROA WATER SUPPLY

### 2.2.1 Process Overview

Raw water is drawn from Lake Rangitai via a screened inlet and pumped approximately 8 km to the raw water reservoirs at the water treatment plant (WTP) located in Kaingaroa. There is a rural supply connection off the raw water pumping main and a branch to fill stock water troughs along the shore of Lake Rangitai. The rural supply network and stock water troughs are not actively operated or maintained by Council.

At the WTP, raw water is pumped through a multimedia filter (sand and anthracite media) to remove particulate matter and protect the downstream filter from blinding, and a Macrolite filter (ceramic media) to further remove particulate matter and for protozoa protection<sup>15</sup> (CCP). The water is then softened to reduce scaling in pipes from excessive hardness in the water and then disinfected via UV (for further protozoa protection<sup>16</sup>). Chlorine is not dosed due to the risk of forming disinfection by-products from the dissolved organics present in the raw water.

<sup>15</sup> The Macrolite filter is not currently recognised as providing protozoal protection under Section 5 or 10 of the DWSNZ, however has been verified independently by Massey University as providing 3 log protozoal treatment. The availability of the Macrolite ceramic media is limited in New Zealand. Once the Macrolite media is due for replacement, FILTEC has proposed Aqualite as an alternative, which has been verified independently by Massey University as providing 2-log protozoal removal based on AS/NZS 4348:1995.

<sup>16</sup> The UV disinfection unit is not currently recognised as providing protozoal protection under Section 5 or 10 of the DWSNZ due to extended periods of poor water quality. The extent of protozoal removal is not readily quantifiable as the filtered UV transmittance (UVT) of the lake water can be low (eg 50-60%) for extended periods. To maximise UV dose delivery, the UV disinfection unit was selected to be significantly oversized hydraulically, being validated for 3 log protozoal credits under the USEPA at 75% UVT for flows up to 189 L/min but the flow to the unit at Kaingaroa is restricted to 37 L/min.

The raw and treated water reservoirs provide storage at the WTP site. Most properties also have a header tank and some have a booster pump. There is also a valved, piped connection from the raw water main upstream of the reservoirs to a private bulk storage tank.

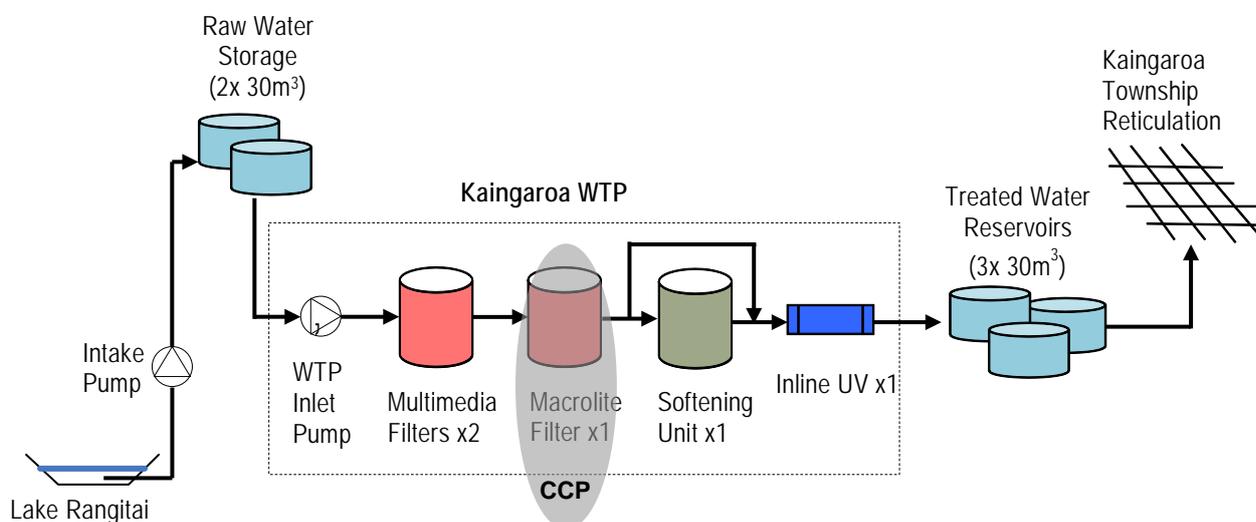


Figure 4: Kaingaroa Water Supply System Schematic

The Council secured funding from the MoH on 28 August 2020 to extend the lake intake structure into deeper water, install a granular activated carbon (GAC) filter and provide chlorine disinfection. At the time of writing, these works are largely complete and pending final commissioning. Three Water Stimulus Tranche One funding was secured for water safety improvements and water resilience (namely new non-potable water supply with community rainwater tanks).

## 2.2.2 DWSNZ Requirements

*The Government has introduced a new regulatory framework for ensuring drinking water safety and improving environmental outcomes for wastewater and stormwater. The new system is to be overseen by new dedicated water regulator (Taumata Arowai), with a new Water Services Bill and new DWSNZ. An exposure draft of the new DWSNZ was released in late 2020 with intention of being released for public consultation in mid-2021. This section reflects the current DWSNZ (2005, revised 2018). It will require updating when the new DWSNZ come into force.*

### 2.2.2.1 Water Supply Classification

The Kaingaroa Water Supply is classified as a neighbourhood supply (i.e., less than 100 people) under the DWSNZ.

The supply does not have appropriate protozoal treatment as per Table 10.1 in Section 10 of the DWSNZ. This means the supply is required to comply with Sections 4-9 of the DWSNZ.

### 2.2.2.2 Water Safety Plan (WSP) and Implementation

The Council is not required to have a Water Safety Plan (WSP) in place as the water supply serves less than 500 people, however it has elected to do so<sup>17</sup>.

A WSP for the scheme was approved by the Drinking Water Assessor on 5 August 2016. It includes the minimum monitoring required to be undertaken for ongoing WSP compliance and operation. This report is based on that monitoring regime.

<sup>17</sup> The Council understood that they could demonstrate compliance for Kaingaroa water supply under section 10 of DWSNZ, which requires a WSP. However, in late 2017, the DWA considered the supply eligible for compliance this was not currently possible under Section 10.

The DWA carried out an WSP implementation audit in 2017/18 year, visiting the site on 6 December 2017 and providing a report on 8 March 2018<sup>18</sup>, and indicated subsequent on-site WSP implementation inspections are likely to be undertaken at 3 yearly intervals to determine implementation progress.

CIC has elected to not review its WSP (due for review in July 2021) due to uncertainty around the new drinking water framework and the potential for new water delivery entities. However, CCPs will be reviewed and documented as part of any WTP upgrades, with the most recent CCP documentation included in the 6-monthly report.

### 2.2.2.3 Protozoal Treatment

Appropriate treatment is required to be in place for protozoal compliance under the DWSNZ. UV disinfection would provide protozoal treatment, however the high level of dissolved organics often present in the lake water means the existing UV disinfection is not effective and also precludes chlorination due to the risk of forming disinfection by-products.

It is noted that whilst the current treatment process at Kaingaroa does not fully comply with the DWSNZ, prior to the upgrade it was agreed with the Ministry of Health that the current treatment process was the best practicable option to address the existing public health risks for Kaingaroa at that time.

The Council subsequently obtained funding from the MoH on 28 August 2020 to extend the lake intake structure into deeper water<sup>19</sup> as well as to install an activated carbon filter<sup>20</sup> and residual chlorination to address existing public health risks and enable DWSNZ compliance. This upgrade work is largely complete and awaiting final commissioning.

### 2.2.2.4 Critical Control Points (CCPs)

**Note: With the completion of the upgrade works at the Kaingaroa WTP, we note that the current CCPs will change during the next reporting period.**

The Council is required to have CCPs in place for its supplies. See Section 2.1.2.4 for additional information on CCPs.

Stantec and Fulton Hogan discussed potential CCPs and associated documentation for Kaingaroa with the DWA during the 2017/18 WSP Implementation Audit and subsequently developed CCP documentation for Macrolite filtration as discussed. This documentation was reviewed in late 2019 based on the MoH revised water safety plan handbook<sup>21</sup>.

The current version of the CCP documentation for Macrolite filtration is provided in Appendix H.

Council has now secured funding to provide treatment at Kaingaroa to remove dissolved organics (and hence improve UV transmittance) as well as provide chlorine disinfection. Once this upgrade is fully implemented, the existing UV disinfection system and the new chlorine disinfection system will become CCPs.

## 2.2.3 Monitoring Regime

Monitoring is undertaken within the water supply for WSP compliance as well as for WTP operation as per the WSP. This monitoring is summarised in Table 3.

<sup>18</sup> Summary and relevant documents provided in Stantec's 6-monthly report titled "Water and Wastewater – Operation and Maintenance Summary Report: January 2018 – June 2018" (see Section 2.2.2 and Appendix G)

<sup>19</sup> Extension into deeper water proposed to ensure certainty of supply for Kaingaroa. It is hoped that this will also improve raw water quality (ie not so impacted by prevailing wind altering lake level and disturbing sediments).

<sup>20</sup> Activated carbon filter proposed to remove organics and hence enable the existing UV disinfection to be effective as well as enable residual chlorination to be installed without the risk of forming disinfection by-products.

<sup>21</sup> Ministry of Health, "Handbook for Preparing a Water Safety Plan", May 2019.

Table 3: Kaingaroa Water Quality Monitoring Regime

	Sampling Requirement		WSP Compliance		Operational Requirement	
	Frequency <sup>22</sup>	Location <sup>23</sup>	Parameter	Limit	Parameter	Target
<b>Source Compliance</b>						
Bacterial	Monthly	Raw water	-	-	E. coli	-
	Weekly		-	-	Total coliforms	-
					Turbidity	-
<b>Treatment Compliance</b>						
Bacterial and Protozoal	Monthly	Treated water	E. coli	<1 MPN/100mL	Total coliforms	<1 MPN/100mL
	Weekly <sup>24</sup>		Total coliforms	no limit		
			-	-	Turbidity	<0.3 NTU
<b>Distribution Compliance</b>						
Bacterial	Monthly	Reticulation	E. coli	<1 MPN/100mL	Total coliforms	<1 MPN/100mL
			Total coliforms	no limit		

Turbidity has been analysed in the raw and treated water by on-line instruments, with values recorded manually during operator WTP visits, since 30 July 2017.

Macrolite filtration is a CCP, with documentation provided in Appendix H. It is not clear at this time if CCP monitoring will comprise part of the new DWSNZ requirements.

## 2.2.4 Monitoring Results

Table 4 summarises the monitoring results from the reporting period in the context of DWSNZ compliance and operational requirements as per the approved WSP.

<sup>22</sup> Maximum interval for parameters monitored monthly is 45 days and weekly is 11 days. Kaingaroa Water Supply is exempt from sampling on a minimum number of days of the week due to logistics of transporting samples to laboratory.

<sup>23</sup> Manual sampling locations are: raw water - at the WTP, before the multimedia filter; treated water - at the WTP after the treated water reservoirs, before entering the reticulation; reticulation - one of two locations within the reticulation (Club, North Whaitiri), with location alternating each month. Turbidity sampling locations at the WTP are prior to multimedia filter (raw water) and after the softener but prior to the UV disinfection

<sup>24</sup> Turbidity analysed continuously in raw and treated water by on-line instruments. Continuous dataset is not able to be downloaded. Displayed value is manually recorded each time the operator visits the site (at least once a week).

Table 4: Kaingaroa Water Monitoring Results For Reporting Period

	DWSNZ Compliance	Operational Requirement
<b>Source</b>		
Bacterial		E.coli and total coliforms: All required raw water samples analysed. E.coli detected in the majority of samples and total coliforms detected in all raw water samples. Typical for surface water source.
<b>Treatment</b>		
Bacterial and protozoal	<p>E. coli: All required treated water samples analysed. No E. coli detected.</p> <p>Total coliforms: All required treated water samples analysed. No limit.</p> <p><b>Non-compliant</b> as inadequate treatment in place. (Note: weekly sampling of treated water required under section 4; WSP requires monthly sampling)</p> <p>Note: MoH funding secured to upgrade treatment process. Upgrade works are pending commissioning.</p>	<p>Total coliforms: All required treated water samples analysed. Reduction seen through treatment process. Two low level detections of total coliforms reported (16 March, 20 April).</p> <p>Turbidity: There were four elevated turbidity events in the treated water during this reporting period following a rain event or intake channel dig out.</p>
<b>Distribution</b>		
Bacterial	<p>E.coli: All required samples analysed. No E. coli detected.</p> <p><b>Compliant</b> with respect to microbiological biological requirements</p> <p><b>Complaint received</b> regarding water quality (taste and colour) as well as water supply disruptions due to upgrade works.</p>	<p>Total Coliforms: All required samples analysed. No total coliforms detected.</p> <p>Note: The change in the taste and colour of the water was attributed to the water softener being taken out of service for maintenance. A failed pump disrupted the supply, but it has been permanently replaced with a shelf-spares available.</p>

To better understand the state of the environment, Environment Canterbury analyse water from Lake Rangitai (i.e. raw water source) four times per year for a range of parameters. The available data from 2005 to the end of this reporting period is provided in Appendix C to augment the raw water quality data obtained as part of the water supply monitoring.

Based on the raw water quality data during this reporting period, the water at Lake Rangitai generally falls within the range observed since 2005, nutrients (nitrogen and phosphorus), conductivity and salinity were typically at the upper end of this range. Ongoing monitoring is required to understand if this reflects the extended period of low lake levels seen during this period or a deterioration in health of Lake Rangitai.

A complaint was received on 29 June 2021 from the Hokotehi Moriori Trust (HMT) regarding “discoloured and foul tasting water”, as well as “interruptions to water delivery” due to a breakdown of a pump. During this time upgrade works at the Kaingaroa WTP were underway and it was discovered that the water softener media was clogged. Replacement media was not available on the island at the time, so it was bypassed affecting the taste and appearance of the treated water. The softener has been partially recharged with new media and returned to service. Additional media will be added in the coming weeks. The disruptions to the supply were due to the breakdown of the filter feed pump at the Kaingaroa WTP. Supply was maintained by installing a temporary pump. As part of the upgrade works, a new pump was installed and a shelf-spares was procured.

### 2.2.5 Key Maintenance Works

Key maintenance and one-off works undertaken in the reporting period over and above routine works allowed for in the lump sum prices for the O&M Contract are summarised in Appendix A.

### 2.2.6 Water Demand Management

There is a flow meter downstream of the UV reactors that records totalised flow. Manual recording of the totalised daily flow by the WTP Operator commenced on 30 July 2016.

The maximum daily flow observed during this reporting period was 42 m<sup>3</sup>/day, with the daily flows typically being between 3 and 20 m<sup>3</sup>/day.

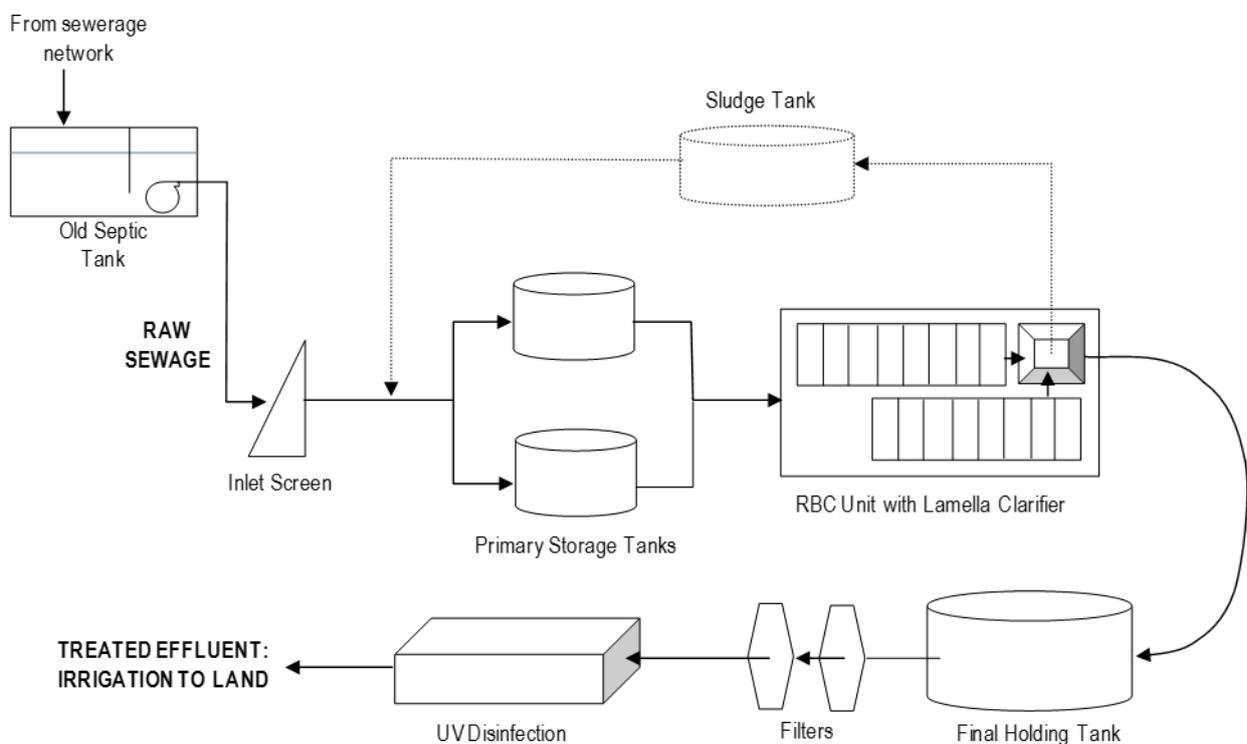
The average daily flow for this reporting period was 11.3 m<sup>3</sup>/day. Based on a population of 60 people, this equates to an average usage of 189 L/person/day. This is similar to the previous reporting period.

## 3.0 WAITANGI WASTEWATER SCHEME

### 3.1 PROCESS OVERVIEW

Raw wastewater is collected from the Waitangi Township via a reticulated sewer network and pumped to the Waitangi Wastewater Treatment Plant (WWTP). At the WWTP (Figure 5), wastewater passes through an inlet screen into one of the two flow balancing tanks, prior to being pumped to the Rotating Biological Contactor (RBC) unit for biological treatment and clarification. In the clarification section of the RBC unit, particles in the wastewater settle to the bottom, while the clarified liquid continues through into the final holding tank. The settled particles from the clarifier are pumped to a waste sludge tank, which is periodically cleaned, and the accumulated sludge is disposed of, either to landfill or buried on site and supernatant is returned to the inlet.

From the final holding tank, the wastewater is pumped via the irrigation pump through two filters to further reduce the suspended solids before entering the UV unit. The UV unit requires low suspended solids to ensure effective transmittance of UV light through the wastewater. The UV disinfects the wastewater, which is then irrigated to land at the WWTP site.



**Figure 5: Waitangi Wastewater Treatment Plant Schematic**

Remedial work is urgently required at the WWTP. Central Government funding to progress these works was secured through a mixture of Ministry of Health (MoH) and Three Water Stimulus Tranche One funding packages in late 2020; urgent remedials on the pump station and RBC were carried out in November-December 2020. Plantings were added to the land application area in June 2021 to help address ponding and surface runoff to the adjacent property. Design currently underway for a WWTP upgrade in anticipation of additional Three Water Stimulus Tranche Two funding. Other works are planned for 2021-2022.

#### 3.1.1 Resource Consent Requirements and Monitoring

There are three resource consents for the Waitangi WWTP: discharge of treated wastewater to land, discharge of contaminants to air, and discharge of contaminants into groundwater from monitoring bores. The first of these

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consents has monitoring and reporting requirements and the second has reporting requirements. All three consents were granted on 25 February 2005 for a period of 35 years (i.e., expire in 2040).

The current monitoring regime, including both resource consent requirements and operational requirements, is summarised in Table 5. As noted in the table, the current monitoring regime departs slightly from that outlined in the resource consent. For the purpose of this report, the WWTP operation is considered to comply with the resource consent if the consent limits given in the fourth column of Table 5 are not exceeded.

**Table 5: Wastewater Monitoring Regime**

Sampling Location	Sampling Frequency <sup>1</sup>	Parameter	Consent Limit <sup>2</sup>	Operational Target	Comment
UV Reactor	Continuous (online)	UV intensity	-	-	Review data weekly
Treated Wastewater, prior to land discharge	Monthly <sup>1</sup>	TSS	25 mg/L	-	
		Ammonia N	25 mg/L	-	Consent limit of 30 mg/L for total nitrogen, assumed ammonia N limit informally adopted post consent award for compliance Consent also requires nitrate monitoring but no consent limit and not done
		Total COD	75 mg/L	-	Consent limit of 25 mg/L for BOD, assumed total COD limit informally adopted post consent award for compliance
		E. coli	500 cfu/100mL	-	
		Total Coliforms	-	-	Monitored but no consent limit or operational target
		pH	-	6-9	
		Electrical conductivity	-	<200 mS/m	
Discharge Meter	Daily	Volume	126 m <sup>3</sup> /d	-	Maximum daily volume
Irrigation Area	Daily	Irrigation depth	5mm	-	Average to individual irrigation area over 5 consecutive days
		Irrigation depth	8mm	-	Maximum depth of single application

**Note**

- 1 Consent requires two monthly sampling but monthly sampling is done for WWTP operation
- 2 All limits and targets are annual medians unless stated otherwise in column titled "comment"

In addition to the monitoring departures given in **Error! Reference source not found.**, the following monitoring is required under the consent but is not currently undertaken.

- Groundwater in bores upstream and downstream of the site twice annually for E. coli and nitrate nitrogen (Condition 15). This has not been carried out to date as groundwater is typically not seen in the bores. Surface water was sampled on some occasions, but it is not an appropriate surrogate due to potential contamination from other sources (e.g., stock).
- Soil layers in the irrigation area once every two years for total phosphorous, major exchangeable ions, pH and conductivity (Condition 17). This has not been carried out. Existing treated wastewater discharge has appeared to enhance growth of vegetation in land application area.

We recommend that:

- Council request that Environment Canterbury review the appropriateness of the existing consent conditions and advise the Council whether an application to amend the consent conditions should be lodged so that the monitoring being carried out is consistent with consent requirements. Part of the Council's 3 Waters Stimulus funding package has been allocated to varying the existing resource consent conditions to address these matters as far as possible.

### **3.1.1.1 UV Performance**

The WWTP Operator monitors the UV intensity and any UV disinfection system alarms as part of the routine WWTP operational inspection carried out at least once a week. The UV lamps are cleaned as required (e.g., on or prior to a low UV intensity alarm). The UV lamps were replaced during the annual service in November 2020.

### **3.1.1.2 Treated Wastewater Quality**

The treated wastewater quality data available since 2008 are provided in Appendix E with the results from this reporting period shaded grey. All required treated water samples were collected and analysed for the required parameters during this reporting period.

Overall, the monitoring of the treated wastewater carried out during the reporting period shows:

- Compliance with the annual TSS and COD consent median limits during the reporting period.
- Non-compliance with the annual nitrogen and E. coli consent limits during the reporting period. Continuing factors include increased influent nitrogen loads from increased domestic tourists, seen due to COVID-19 international travel restrictions and visitors associated with the airport runway extension investigations, large quantity of sludge build-up (removed in November-December 2020), as well as the UV lamps being at or near the end of useful life during the majority of the reporting period (replaced Nov 2020). It is also noted the WWTP was not designed for ammonia reduction and so the operators have no ability to control the reduction achieved at the WWTP.
- It is noted that the land application system will further reduce TSS, COD, ammonia, and E.coli prior to reaching groundwater, particularly now that the sprinklers have been maintained and have been moved further from the property boundary (carried out in November 2020). New plantings have been added to the land application area in June 2021.

MoH funding has been used to carry out urgent remedial work on the pump station and the RBC in November-December 2020. Part of the Council's 3 Waters Stimulus funding package (Tranche 1) will be used to carry out urgent remedial works, extend the land application system, vary existing consent, and design a new WWTP to be located at the same site in 2021/2022. Collectively these works will go some way to addressing consent non-compliance and/or mitigating any adverse environmental effects associated with the treated wastewater discharge. The design is being carried out in anticipation of additional funding being available via Tranche 2 of the 3 Waters Stimulus funding.

### **3.1.1.3 Treated Wastewater Volume and Irrigation Rate**

Appendix E (Figure E-8) shows the daily volume of treated wastewater discharged from the WWTP to the land irrigation area since 2008, with this reporting period shaded grey.

The daily volume did not exceed the consent limit of 126 m<sup>3</sup>/day during this reporting period.

Data required to assess the average and maximum irrigation rates, including size frequency of dosing to individual areas and irrigation volume, was not available for this reporting period. This information would enable a comparison with the consented limits.

### 3.1.1.4 Complaints Received

In the previous reporting period, the Council has received a written public complaint about the operation of the wastewater system in relation to concern about treated wastewater run-off from the land application system into the adjacent property. This follows previous complaints from the same landowner about the same issue.

Stantec and Fulton Hogan have identified options to mitigate surface water ponding and runoff associated with the land application system. The Council included an allowance for this work in its previous LTP, however until recently had been unsuccessful in securing funding for this work.

In this reporting period the Council has secured funding to carry out urgent works to mitigate this issue and the dilapidated boundary fence was replaced in late 2020 – this was required to prevent farm animals in the neighbouring property from eating any new vegetation that will be planted. Council also engaged a local nursery to propagate appropriate vegetation to absorb water. Following a site visit in November 2020 by Stantec wastewater engineers, the irrigation pipework has been repaired and irrigators have been relocated to increase effective area of irrigation (and hence minimise runoff). In June 2021, 250 swamp ake ake and 30 flax were planted in the land application area to help address some of the boggy areas and mitigate wind spray.

The Council has also allocated part of its Three Waters Stimulus funding to design and construct an extended land application system and add more plants, which will go further to mitigating this issue. In November 2020, Stantec wastewater engineers collected information to prepare an accurate as-built plan of the existing land application system and carried out a site and soil investigation to inform the design of the extended land application system. Design is anticipated to be completed in mid-2021 and construction planned for summer 2021/22.

### 3.1.1.5 Summary

Table 6 summarises the monitoring results from the reporting period in the context of consent compliance and operational requirements.

**Table 6: Waitangi Wastewater Monitoring Results for Reporting Period**

Item	Consent Compliance	Operational Requirement
UV intensity	UV intensity and UV alarms reviewed several times a week.	
Treated wastewater Quality	Annual median TSS and COD less than or equal to the limit at end of reporting period. Annual median ammonia and E. coli exceeded limit at end of reporting period.  Note: Council has carried out urgent remedial works at the inlet pumping station and RBCs. 3 Waters Tranche 1 funding secured to carry out further urgent remedial works at WWTP and design a new WWTP for the site in anticipation of additional funding via Tranche 2.	Electrical conductivity and pH within operational targets. No target for total coliforms.
Treated wastewater volume	All daily flows recorded less than the limit.	
Irrigation Rate	Insufficient data to determine irrigation rates for reporting period.	

Item	Consent Compliance	Operational Requirement
Complaints Log	<p>Council received a written public complaint in the previous reporting period in relation to concerns about treated wastewater run-off from the land application system into the adjacent property. Council has taken several steps to address this complaint.</p> <p>No other operational or odour complaints from public.</p> <p>Note: Appropriate plants are being propagated locally; once mature they will be planted to mitigate surface water ponding/runoff from land application system. Three Waters Tranche 1 funding secured to extend land application system to further mitigate issue.</p>	

### 3.1.2 Key Maintenance Works

Key maintenance and one-off works undertaken in the reporting period over and above routine works allowed for in the lump sum prices for the O&M Contract are summarised in Appendix A.

## 4.0 CONCLUSION AND RECOMMENDATIONS

Key findings and recommended actions for this reporting period are summarised below.

**Table 7: Key findings and recommended actions**

Scheme	Key findings	Recommended actions	Progress to Date
Waitangi Water	<ul style="list-style-type: none"> <li>Non-complying with Drinking-water Standards for New Zealand, primarily due to inadequate treatment.</li> <li>Despite this, no E. coli detected in raw, treated or reticulated water.</li> </ul>	<ul style="list-style-type: none"> <li>Urgently replace existing, dysfunctional UV disinfection system.</li> </ul>	<ul style="list-style-type: none"> <li>MoH funding for new UV secured and installed. Final commissioning pending.</li> <li>3 Waters Stimulus funding secured for online monitoring, telemetry, toby valves, and backflow preventers. Design complete.</li> </ul>
Kaingaroa Water	<ul style="list-style-type: none"> <li>Non-complying with Drinking-water Standards for New Zealand, primarily due to poor water intake and inadequate treatment.</li> <li>Despite this, no E. coli was detected in treated or reticulated water.</li> <li>Complaint received due to treated water colour and taste as well as a disruption to supply. Issue has been resolved through planned upgrade works.</li> </ul>	<ul style="list-style-type: none"> <li>Urgently extend water intake into deeper water and upgrade treatment process to include organics removal and chlorination.</li> </ul>	<ul style="list-style-type: none"> <li>MoH funding for intake and WTP upgrade secured.</li> <li>Intake designed and materials delivered to the island. Intake pump replacement scheduled for August 2021. Intake pipe extension scheduled for December 2021, pending low lake levels.</li> <li>WTP upgrade installed and final commissioning pending.</li> <li>3 Waters Stimulus funding secured for online monitoring, telemetry, and rainwater harvesting scheme. Design largely complete.</li> </ul>
Waitangi Wastewater	<ul style="list-style-type: none"> <li>Non-complying with resource consent, primarily due to elevated nitrogen and E. coli.</li> <li>Complying with solids and organics limits.</li> </ul>	<ul style="list-style-type: none"> <li>Urgently carry out various remedial works on wastewater scheme.</li> </ul>	<ul style="list-style-type: none"> <li>MoH funding for critical repairs secured, remedials carried out in Nov-Dec 2020 which should improve compliance.</li> <li>3 Waters Stimulus funding secured for improvement works (planning and construction). Design in progress.</li> </ul>

Overall, the water and wastewater schemes urgently require remedial or upgrade works to address substantial limitations, meet current best practice and achieve compliance. Central Government Funding to progress these works has been secured through a mixture of MoH and Three Water Stimulus Tranche One funding packages in late 2020, with work in progress and due to be completed in 2022. Some design is being carried out under Tranche One in anticipation of additional funding being available via Tranche Two of the Three Waters Stimulus funding.

# Appendices

## Appendix A CONTRACT MEETINGS AND DAYWORKS

### Chatham Islands Water & Wastewater Maintenance Contract Meeting Record

Record of monthly contract meeting for June 2021.

Present: Richard Bennett, Andrew Wong, Phil Holt

Water and Wastewater update – June 2021	
Contract Documentation	
Project:	Current Status:
<b>Water Compliance</b>	<ul style="list-style-type: none"> <li>• Drinking-water Standards for New Zealand 2005 (revised 2018), DWSNZ, came into force on 1 March 2019. Both water supplies are currently non-complying with DWSNZ primarily due to inadequate treatment barriers being in place. Exposure drafts of the new DWSNZ have been released, with public consultation expected later this year.</li> <li>• Stantec, in consultation with FH and CIC, is progressing design/scoping of various upgrade works that are being funded through MoH and 3 Waters Reform.</li> <li>• CIC also needs to carry out a catchment log credit assessment for both supplies and radiological testing for Tikitiki bore water. Depending on actual costs for existing projects, this work may be able to be completed within current 3 Waters Reform funds.</li> <li>• Revised Water Safety Plan (WSP) framework was released in December 2018. The current WSPs, which require reviewing by June 2021, need substantial revision to comply with the new framework. However, new requirements for WSPs as well as for source water management are expected in 2021, along with revised timeframes for implementation. Currently, WSPs are not mandatory as each supply serves less than 500 people (unless CIC elects to comply with DWSNZ via section 10), and so CIC has elected to not review its WSPs at this stage.</li> </ul>
Water Supply	
Project:	Current Status:
<b>All Supplies – Funding and Site Visit</b>	<ul style="list-style-type: none"> <li>• <b>Urgent priority works are progressing, funded via MoH (\$339,900.01). There have been some delays</b> – due to higher than expected costs for bore works, delayed response times from supplier in Dec-Jan, and high workload associated with responding to 3 Waters reform information requests.</li> <li>• MoH have confirmed detailed evidence needed to support milestone payment claims (ie invoices from subcontractors, FH and Stantec), funds can be paid on partial completion of milestones (eg completion of design). <b>CIC has received approval for the Contract Variation; an extension of time (30 June 2022) and varied milestone amounts to account for incurred surplus and deficits.</b> Webster Drilling in contract to complete the MPA bore redevelopment (July/August). Waitangi and Kaingaroa WTP upgrades partially complete.</li> <li>• <b>Three Waters stimulus works outlined in the approved Delivery Plan are progressing, funded via DIA (\$640k).</b> Council received its first payment (\$320k) in late 2020. Stantec submitted the initial progress report in early February 2021 (no additional payment). The balance of funds will be paid in quarterly payments over 2021 calendar year, based on percent complete of work packages. <b>Scope change approved to recoup costs of RFI. Online monitoring scope is being finalised and there is an opportunity to add more monitoring capability across the network.</b></li> <li>• <b>Site visit required to build relationship with FH's new O&amp;M contract manager to ensure successful delivery of MoH and 3Waters stimulus funding package</b></li> <li>• <b>Request for Information (Rfi) for the 3 waters reform (DIA &amp; Canterbury Mayoral Forum) submitted in Jan, subsequent revisions/comments in Feb and Mar. Periodic correspondence since.</b></li> </ul>

Water and Wastewater update – June 2021	
<p><b>Kaingaroa – Lake Rangitai</b></p>	<ul style="list-style-type: none"> <li>• A boil water notice is to be put in place prior to intake trench reinstatement work being undertaken as previous reinstatement saw elevated E.coli in the treated water. <b>Trench reinstatement is ongoing.</b></li> <li>• Pegs to hold down the rising main have arrived on the island. <b>No change.</b> Materials for the extension have been delivered to the island and awaiting installation by FH at end of July pending lake levels.</li> <li>• Stantec have completed design and scope of works for the WTP upgrade (reduce dissolved organic carbon and chlorinate) &amp; confirmed procurement route (MoH funds). Design by Filtec has been reviewed and contract between Filtec and FH is in place. Equipment to depart mainland on June sailing. <b>Kaingaroa WTP upgrades 90% complete. A second visit by FILTEC is required; tentatively scheduled for mid-July.</b></li> <li>• Shaft on WTP raw water pump failed. FH was able to locate a pump to maintain supply to Kaingaroa as an interim solution. FH has placed an order for a replacement pump, and delivery data unknown. A plan is in place to issue a BWN if the interim solution fails and bypassing the WTP is required to maintain supply. BWN was not required, but plan in place.</li> </ul>
<p><b>Waitangi water supply upgrade</b></p>	<ul style="list-style-type: none"> <li>• See Jan 2021 monthly report for discussion on MPA bore yield. <b>Stantec has reviewed options and determined best approach for MPA bore investigation (MoH funds). Engagement between FH and the drilling contractor is in place. MPA bore redevelopment works scheduled for mid/late-July</b></li> <li>• Stantec have completed design and scope of works for the WTP upgrade (new UV) &amp; confirmed procurement route (MoH funds). Design by Filtec has been reviewed and contract between Filtec and FH is in place. <b>Upgrade works 90% complete and FILTEC to complete by mid-July.</b></li> <li>• On-line water monitoring concept discussed with relevant NZ suppliers well progressed, following discussions with various NZ suppliers. <b>ConnectM2M has been identified as the preferred supplier; engagement between ConnectM2M and FH pending.</b></li> <li>• Discussed replacement of the WTP building and possible budget available under the 3Ws Stimulus budget for Water Safety. <b>Reallocation of budget approved by CIC, and construction details to be confirmed with Contractor.</b></li> <li>• CIC to consider introducing rules for enforcing private repairs within a certain timeframe to minimise loss of water and ensure the supply network can be maintained. Ongoing.</li> <li>• CIC to consider whether charges are applied for taking water from the FH yard and/or if water is only able to be taken during hours when the yard is manned (i.e. locked at other times). Ongoing.</li> <li>• CIC to consider procurement options as detailed in the Waitangi water supply upgrade preliminary design report – ON HOLD pending resolution of the above.</li> </ul>
<p><b>Water Schemes</b></p>	<ul style="list-style-type: none"> <li>• On-line water monitoring concept discussed with relevant NZ suppliers, options considered and design complete (3Waters funds). <b>ConnectM2M has been identified as the preferred supplier; engagement between ConnectM2M and FH pending</b></li> </ul>
<p><b>Reporting/ Monitoring/ Sampling November 2020.</b></p> <p><b>December results will be reported on in January.</b></p>	<p><b>All water supplies are non-complying with the amended DWSNZ <u>and</u> revised Health Act.</b></p> <ul style="list-style-type: none"> <li>• <b>Waitangi Water Supply</b> <ul style="list-style-type: none"> <li>○ Complies with WSP for bacteria (E.coli not detected in raw, treated or network sample).</li> <li>○ Non-compliance with DWSNZ for protozoa as existing UV disinfection inadequate. <b>Upgrade works 90% complete but not fully commissioned. Due to comply by the end of July 2021.</b></li> <li>○ Total coliforms not detected in raw, treated or network sample for June 2021</li> <li>○ Treated water turbidity has improved over the last two months to below the operational target of 0.3 NTU. <b>Due to incomplete upgrade works FH to complete manual filter backwashes once every two days until fully automated by the end of July 2021.</b></li> </ul> </li> <li>• <b>Kaingaroa Water Supply</b></li> </ul>

Water and Wastewater update – June 2021	
	<ul style="list-style-type: none"> <li>○ Complies with WSP for bacteria (E.coli not detected in treated or network sample).</li> <li>○ Non-compliance with DWSNZ for protozoa, however consistent with approved WSP. <b>NB: Treatment upgrades due to be completed by end of July 2021 and comply with DWSNZ by July 2021.</b></li> <li>○ No E.coli detected in the raw, treated, or network samples.</li> <li>○ Total coliforms detected in the raw sample only but still in compliance.</li> <li>○ Historical total coliforms and E.coli detected in raw water as expected with lake water source. <b>NB: Intake will be extended into deeper part of lake using MoH funding in July 2021.</b></li> <li>● <b>MPA Batching Bore (Potential Future Water Supply)</b> <ul style="list-style-type: none"> <li>○ MPA bore no longer in operation (or sampled). See June 2018 monthly update for results and conclusions.</li> </ul> </li> </ul>
Wastewater Treatment	
<i>Project:</i>	<i>Current Status:</i>
<b>WWTP maintenance</b>	<ul style="list-style-type: none"> <li>● Duty WWTP feed pump and check valves at the septic tank site replaced and gearbox leaks addressed late 2020 (MoH funds)</li> <li>● <b>Wastewater improvement projects explored during 2020 site visit (3Waters funds). As-built for existing land application complete. WWTP and land application design to progress with construction of extended land application system planned late 2021/early 2022. Some funds available for urgent WWTP maintenance/repairs (eg corroded balance tanks) - scope to be confirmed once WWTP design complete.</b></li> <li>● <b>Discharge consent review due to begin in July (3Waters funding).</b></li> <li>● Interim planting plan issued and completed by KMP Nurseries June 2021.</li> <li>● Land application extension and planting plan design underway. Correspondence with KMP Nurseries for ultimate planting plan.</li> </ul>
<b>Reporting/ Monitoring/ Sampling November 2020</b>  <b>December results will be reported on in January.</b>	<ul style="list-style-type: none"> <li>● <b>Waitangi Treated Wastewater Discharge</b> <ul style="list-style-type: none"> <li>○ The treated wastewater complied in May with all parameters except for E.coli. Stantec and FH will continue to monitor treated wastewater quality, particularly with additional tourist numbers and urgent need for WWTP maintenance (to be addressed in part by works planned in 2021). It is noted that the land application system will further reduce TSS, COD, ammonia and E.coli prior to reaching groundwater, particularly now that the sprinklers have been maintained and have been moved further from the property boundary.</li> <li>○ Stantec to review algae treatment options and sludge accumulation issue.</li> </ul> </li> </ul>
General	
	<ul style="list-style-type: none"> <li>●</li> </ul>

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**Table A-1 Approved Day works Items**

Scheme	Date	Comment
Waitangi WWTP	January 2021	Annual servicing, inlet pump station electrical repairs
Kaingaroa WTP	January 2021	Dig out Kaingaroa intake
Kaingaroa WTP	February 2021	Dig out Kaingaroa intake
Waitangi WWTP	March 2021	Remove rusted balance tank roof support
Kaingaroa WTP	March 2021	Water leak repairs, dig out Kaingaroa intake
Waitangi WTP	May 2021	Repair Tikitiki bore pump
Kaingaroa WTP	May 2021	Install Lake Rangitai water level marker posts, dig out Kaingaroa intake, install temporary raw water pump
Waitangi WWTP	June 2021	Interim land application plantings
Kaingaroa WTP	June 2021	Install replacement raw water pump, intake pump maintenance, upgrade works by FILTEC
Waitangi WTP	June 2021	Leak repairs, upgrade works by FILTEC

Note: These are items over and above those allowed for in lump sum prices in Operation and Maintenance contract.

**Table A-2 Additional Works Carried out by Stantec**

Scheme	Date	Comment
All Schemes	Jan-Mar 2021	Liase with MoH and secure funding. Develop Delivery Plan for 3Waters Stimulus Funding. Co-ordinate and prepare Request for Information Response for 3 waters Reform & Canterbury Mayoral Forum
	Jan-Jun 2021	Design and procurement for MoH and Three Water Stimulus funded works.

Appendix B Waitangi WTP Data

## Appendix B WAITANGI WTP DATA

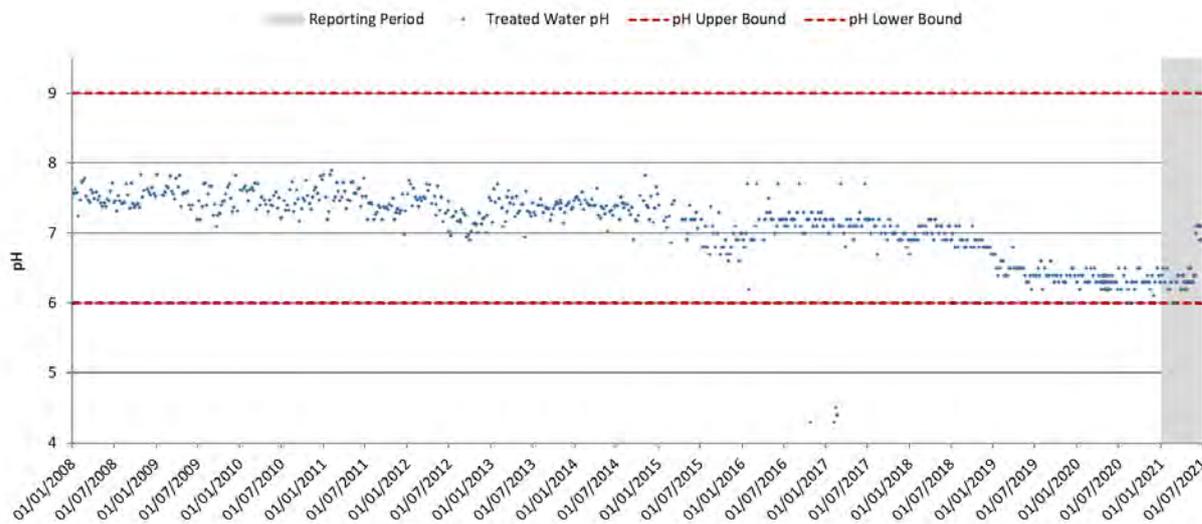


Figure B-1 Waitangi Water pH Data from January 2008

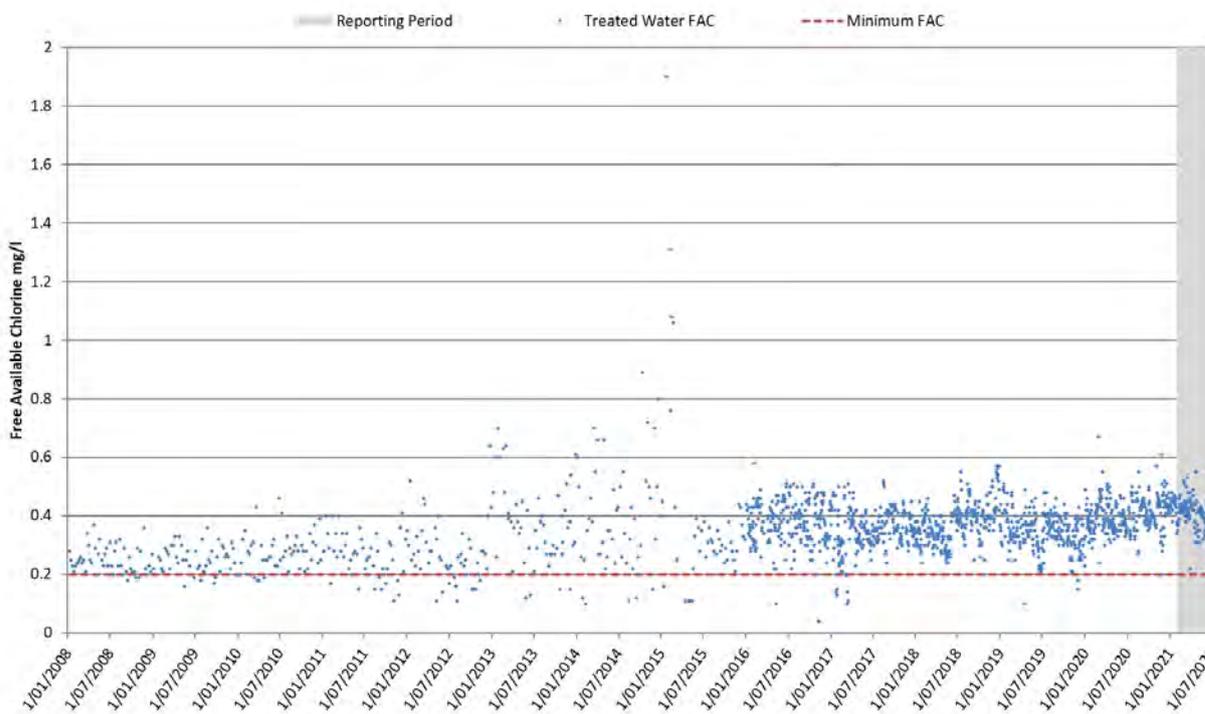
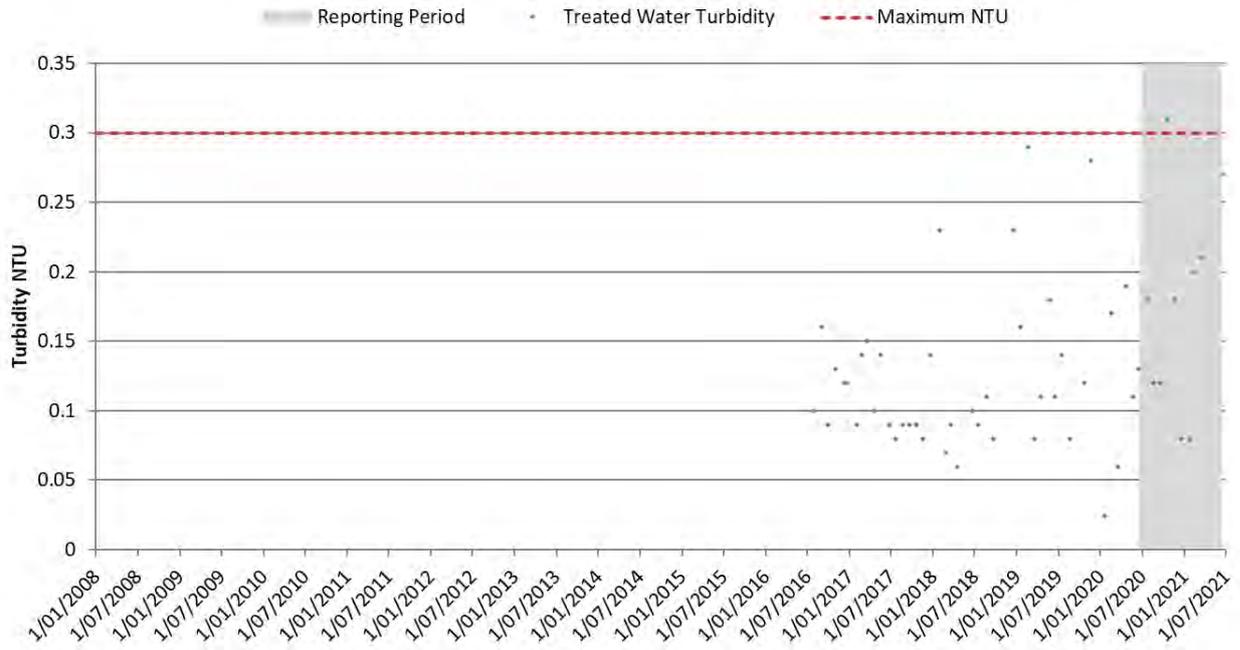


Figure B-2 Waitangi Water FAC Data from January 2008

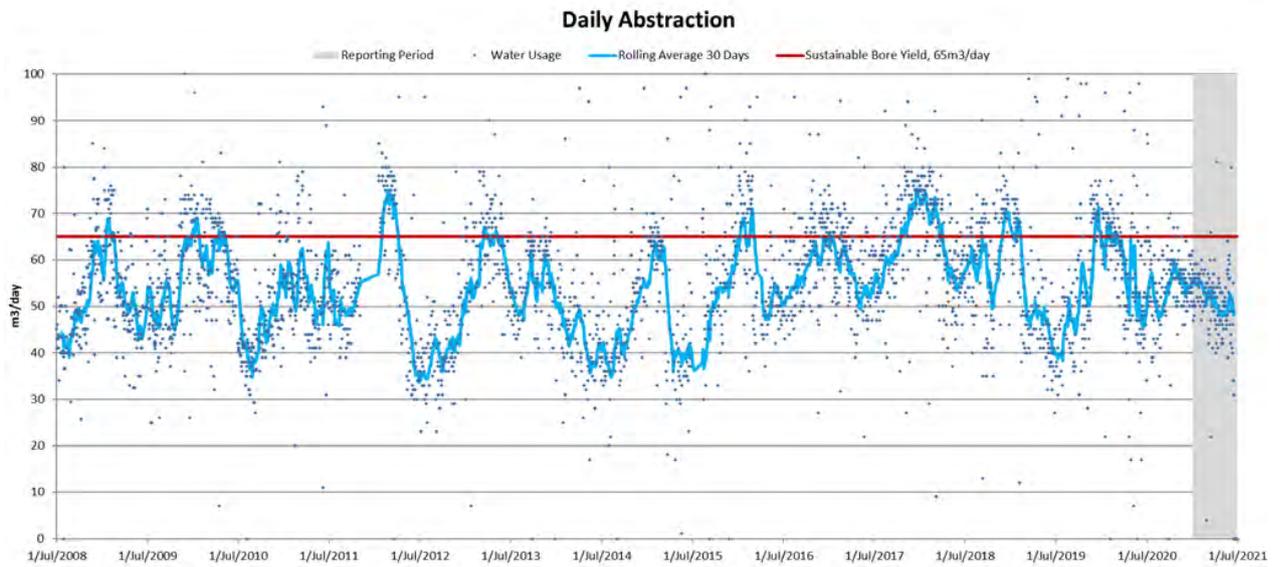
(Note: Result on 3 January 2016 of 6.32 mg/L not shown)

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Appendix B Waitangi WTP Data



**Figure B-3 Waitangi Treated Water Turbidity Data from January 2008**



**Figure B-4 Tikitiki Bore Meter Readings from July 2008**

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Appendix B Waitangi WTP Data

Table B-1 Waitangi WTP Microbiological Data From 2008

Date of Sampling	Days between samples	E.coli (MPN/ 100mL)			Date of Sampling	Days between samples	Total Coliforms (MPN/100mL)		
		Raw	Treated	Reticulation			Raw	Treated	Reticulation
01/02/2008		<1		<1					
26/02/2008	25	<1		<1					
25/03/2008	28	<1		<1					
27/05/2008	63	<1		<1					
01/07/2008	35	<1		<1					
29/09/2008	90	<1		<1					
29/10/2008	30	<1		<1					
25/11/2008	27	<1		<1					
23/12/2008	28	<1		<1					
27/01/2009	35	<1		<1					
24/02/2009	28	<1		<1					
31/03/2009	35	<1		<1					
30/04/2009	30	<1		<1					
29/05/2009	29	<1		<1	29/09/2008			<1	
30/06/2009	32	<1		<1	29/10/2008	30	<1	<1	<1
30/07/2009	30	<1		<1	25/11/2008	27	<1	<1	<1
27/08/2009	28	<1		<1	23/12/2008	28	<1	<1	<1
29/09/2009	33	<1	<1	<1	27/01/2009	35	<1	<1	<1
29/10/2009	30	<1	<1	<1	24/02/2009	28	<1	<1	<1
24/11/2009	26	<1	<1	<1	31/03/2009	35	<1	<1	<1
22/12/2009	28	<1	<1	<1	30/04/2009	30	<1	<1	<1
26/01/2010	35	<1	<1	<1	29/05/2009	29	<1	<1	<1
23/02/2010	28	<1	<1	<1	30/06/2009	32	<1	<1	<1
30/03/2010	35	<1	<1	<1	30/07/2009	30	<1	<1	<1
27/04/2010	28	<1	<1	<1	27/08/2009	28	<1	<1	<1
28/05/2010	31	<1	<1	<1	29/09/2009	33	<1	<1	<1
29/06/2010	32	<1	<1	<1	29/10/2009	30	<1	<1	<1
20/07/2010	21	<1	<1	<1	24/11/2009	26	<1	<1	<1
27/07/2010	7	<1	<1	<1	22/12/2009	28	<1	<1	<1
04/08/2010	8	<1	<1	<1	26/01/2010	35	<1	<1	<1
10/08/2010	6	<1	<1	<1	23/02/2010	28	<1	1	<1
17/08/2010	7	<1	<1	<1	30/03/2010	35	<1	<1	<1
24/08/2010	7	<1	<1	<1	27/04/2010	28	<1	<1	<1
02/09/2010	9	<1	<1	<1	28/05/2010	31	<1	<1	<1
07/09/2010	5	<1	<1	<1	29/06/2010	32	<1	<1	<1
14/09/2010	7	<1	<1	<1					
21/09/2010	7	<1	<1	<1					
28/09/2010	7	<1	<1	<1	27/07/2010			<1	<1
05/10/2010	7	<1	<1	<1	02/09/2010	37	<1	<1	<1
12/10/2010	7	<1	<1	<1	28/09/2010	26	<1	<1	<1
02/11/2010	21	<1	<1	<1	02/11/2010	35	1	<1	<1
30/11/2010	28	<1	<1	<1	30/11/2010	28	<1	<1	<1
29/12/2010	29	<1	<1	<1	29/12/2010	29	<1	<1	<1
02/02/2011	35	<1	<1	<1	02/02/2011	35	<1	<1	<1
01/03/2011	27	<1	<1	<1	01/03/2011	27	<1	<1	<1
26/04/2011	56	<1	<1	<1	26/04/2011	56	<1	<1	<1
31/05/2011	35	<1	<1	<1	31/05/2011	35	38	<1	1
07/06/2011	7	<1	<1	<1	07/06/2011	7	>201	<1	<1
14/06/2011	7	<1	<1	<1	14/06/2011	7	4	<1	<1
28/06/2011	14	<1	<1	<1	28/06/2011	14	1	1	<1
05/07/2011	7	<1	<1	<1	05/07/2011	7	<1	<1	<1
27/07/2011	22	<1	<1	<1	27/07/2011	22	<1	<1	<1
30/08/2011	34	<1	<1	<1	30/08/2011	34	<1	<1	<1
15/09/2011	16	<1	<1	<1	15/09/2011	16	<1	<1	<1
27/09/2011	12	<1	<1	<1	27/09/2011	12	<1	<1	<1

\* Reticulation samples taken from following locations: Works Yard, Wilson Place, Council House

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Appendix B Waitangi WTP Data

Table B-1 Waitangi WTP Microbiological Data (Continued)

Date of Sampling	Days between samples	E.coli (MPN/ 100mL)			Date of Sampling	Days between samples	Total Coliforms (MPN/100mL)		
		Raw	Treated	Reticulation			Raw	Treated	Reticulation
05/10/2011	8	<1	<1		05/10/2011	8	<1	<1	
11/10/2011	6	<1	<1		11/10/2011	6	<1	<1	
25/10/2011	14	<1	<1	<1	25/10/2011	14	<1	<1	<1
29/11/2011	35	<1	<1	1	29/11/2011	35	9	<1	1
06/12/2011	7	<1	<1	<1	06/12/2011	7	<1	<1	<1
20/12/2011	14	<1	<1	<1	20/12/2011	14	2	<1	<1
31/01/2012	42	<1	<1	<1	31/01/2012	42		<1	1
07/02/2012	7	<1	<1	<1	07/02/2012	7	<1	<1	<1
29/02/2012	22	<1	<1	<1	29/02/2012	22	<1	<1	<1
27/03/2012	27	<1	<1	<1	27/03/2012	27	<1	<1	<1
24/04/2012	28	<1	<1	<1	24/04/2012	28	<1	<1	>201
08/05/2012	13	<1	<1	<1	08/05/2012	14	<1	<1	<1
29/05/2012	21	<1	<1	<1	29/05/2012	21	<1	<1	<1
26/06/2012	28	<1	<1	<1	26/06/2012	28	<1	<1	<1
31/07/2012	35	<1	<1	<1	31/07/2012	35	<1	<1	<1
28/08/2012	28	<1			28/08/2012	28	<1		
25/09/2012	28	<1			25/09/2012	28	<1		
30/10/2012	35	<1			30/10/2012	35	<1		
27/11/2012	28	<1			27/11/2012	28	<1		
18/12/2012	21	<1	<1	<1	18/12/2012	21	<1	<1	<1
29/01/2013	42	<1	<1	<1	29/01/2013	42	<1	<1	1
12/02/2013	14			1	12/02/2013	14			2
19/02/2013	7			<1	19/02/2013	7			<1
26/02/2013	7	<1	<1	<1	26/02/2013	7	<1	<1	<1
26/03/2013	28	<1	<1	<1	26/03/2013	28	<1	<1	<1
30/04/2013	35	<1	<1	<1	30/04/2013	35	NT	<1	<1
29/05/2013	29	<1	<1	<1	29/05/2013	29	<1	<1	<1
25/06/2013	27	<1	<1	<1	25/06/2013	27	<1	<1	<1
30/07/2013	35	<1	<1	<1	30/07/2013	35	<1	<1	<1
27/08/2013	28	<1	<1	<1	27/08/2013	28	<1	<1	<1
24/09/2013	28	<1	<1	<1	24/09/2013	28	<1	<1	<1
29/10/2013	35	<1	<1	<1	29/10/2013	35	<1	<1	<1
26/11/2013	28	<1	<1	<1	26/11/2013	28	<1	<1	<1
17/12/2013	21	<1	<1	<1	17/12/2013	21	<1	<1	<1
28/01/2014	42	<1	<1	<1	28/01/2014	42	<1	<1	<1
25/02/2014	28	2	<1	<1	25/02/2014	28	5	<1	<1
04/03/2014	7	<1	<1	NT	04/03/2014	7	4	<1	NT
11/03/2014	7	<1		NT	11/03/2014	7	<1		NT
25/03/2014	14	<1			25/03/2014	14	<1		
29/04/2014	14	>201	<1	<1	29/04/2014	14	<1	<1	<1
06/05/2014	7	<1	<1	NT	06/05/2014	7	<1	<1	NT
28/05/2014	22	<1	<1	<1	28/05/2014	22	<1	<1	<1
24/06/2014	27	<1	<1	<1	24/06/2014	27	<1	<1	<1
29/07/2014	35	<1	<1	<1	29/07/2014	35	<1	<1	<1
26/08/2014	28	<1	<1	<1	26/08/2014	28	<1	<1	<1
30/09/2014	35	<1	<1	<1	30/09/2014	35	<1	<1	<1
28/10/2014	28	<1	<1	<1	28/10/2014	28	<1	<1	<1
02/12/2014	35	<1	<1	<1	02/12/2014	35	<1	<1	<1
23/12/2014	21	<1	<1	<1	23/12/2014	21	<1	<1	<1
27/01/2015	35	<1	<1	<1	27/01/2015	35	<1	<1	<1
24/02/2015	28	<1	<1	<1	24/02/2015	28	<1	<1	<1
31/03/2015	35	<1	<1	<1	31/03/2015	35	<1	<1	<1
28/04/2015	28	<1	<1	<1	28/04/2015	28	<1	<1	<1
26/05/2015	28	<1	<1	<1	26/05/2015	28	<1	<1	<1
7/07/2015	42	<1	<1	<1	7/07/2015	42	<1	<1	<1
28/07/2015	21	<1	<1	<1	28/07/2015	21	<1	<1	<1
25/08/2015	28	<1	<1	<1	25/08/2015	28	<1	<1	<1
29/09/2015	35	<1	<1	<1	29/09/2015	35	<1	<1	<1
27/10/2015	28	<1	<1	<1	27/10/2015	28	<1	<1	<1
24/11/2015	28	<1	<1	<1	24/11/2015	28	<1	<1	<1

\* Reticulation samples taken from following locations: Works Yard, Wilson Place, Council House

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Appendix B Waitangi WTP Data

**Table B-1 Waitangi WTP Microbiological Data (Continued)**

Date of Sampling	Days between samples	E.coli (MPN/ 100mL)			Date of Sampling	Days between samples	Total Coliforms (MPN/100mL)		
		Raw	Treated	Reticulation			Raw	Treated	Reticulation
26/01/2016	35	<1	<1	<1	26/01/2016	35	<1	<1	<1
23/02/2016	28	<1	<1	<1	23/02/2016	28	<1	<1	<1
29/03/2016	35	<1	<1	<1	29/03/2016	35	<1	<1	<1
26/04/2016	28	<1	<1	<1	26/04/2016	28	<1	<1	<1
31/05/2016	35	<1	<1	<1	31/05/2016	35	<1	<1	<1
5/07/2016	35	<1	<1	<1	5/07/2016	35	<1	<1	<1
26/07/2016	21	<1	<1	<1	26/07/2016	21	<1	<1	<1
30/08/2016	35	<1	<1	<1	30/08/2016	35	<1	<1	<1
27/09/2016	28	<1	<1	<1	27/09/2016	28	<1	<1	<1
1/11/2016	35	<1	<1	<1	1/11/2016	35	<1	<1	<1
6/12/2016	35	<1	<1	<1	6/12/2016	35	<1	<1	<1
30/12/2016	24	<1	<1	<1	30/12/2016	24	<1	<1	<1
31/01/2017	32	<1	<1	<1	31/01/2017	32	<1	<1	<1
31/01/2017	0	Na	Na	<1	31/01/2017	0	Na	Na	<1
21/02/2017	21	<1	<1	<1	21/02/2017	21	<1	<1	<1
21/03/2017	28	<1	<1	<1	21/03/2017	28	<1	<1	<1
18/04/2017	28	<1	<1	<1	18/04/2017	28	4	<1	<1
16/05/2017	28	<1	<1	<1	16/05/2017	28	16	<1	<1
20/06/2017	35	<1	<1	<1	20/06/2017	35	3	<1	<1
24/07/2017	34	<1	<1	<1	24/07/2017	34	1	<1	<1
22/08/2017	29	<1	<1	<1	22/08/2017	29	<1	<1	<1
19/09/2017	28	<1	<1	<1	19/09/2017	28	<1	<1	<1
17/10/2017	28	<1	<1	<1	17/10/2017	28	<1	<1	<1
14/11/2017	28	<1	<1	<1	14/11/2017	28	1	<1	<1
19/12/2017	35	<1	<1	<1	19/12/2017	35	<1	<1	<1
30/01/2018	42	<1	<1	<1	30/01/2018	42	<1	<1	<1
20/02/2018	21	<1	<1	<1	20/02/2018	21	<1	<1	<1
20/03/2018	28	<1	<1	<1	20/03/2018	28	<1	<1	<1
17/04/2018	28	<1	<1	<1	17/04/2018	28	<1	<1	<1
15/05/2018	28	<1	<1	<1	15/05/2018	28	<1	<1	<1
20/06/2018	36	<1	<1	<1	20/06/2018	36	<1	<1	<1
17/07/2018	27	<1	<1	<1	17/07/2018	27	<1	<1	<1
21/08/2018	35	<1	<1	<1	21/08/2018	35	<1	<1	<1
18/09/2018	28	<1	<1	<1	18/09/2018	28	<1	<1	<1
16/10/2018	28	<1	<1	<1	16/10/2018	28	<1	<1	<1
20/11/2018	35	<1	<1	<1	20/11/2018	35	<1	<1	<1
18/12/2018	28	<1	<1	<1	18/12/2018	28	<1	<1	<1
15/01/2019	28	<1	<1	<1	15/01/2019	28	<1	<1	<1
19/02/2019	35	<1	<1	<1	19/02/2019	35	<1	<1	<1
19/03/2019	28	<1	<1	<1	19/03/2019	28	<1	<1	<1
16/04/2019	28	<1	<1	<1	16/04/2019	28	<1	<1	<1
21/05/2019	35	<1	<1	<1	21/05/2019	35	6	<1	<1
18/06/2019	28	<1	<1	<1	18/06/2019	28	1	1	<1
16/07/2019	28	<1	<1	<1	16/07/2019	28	2	<1	<1
20/08/2019	35	<1	<1	<1	20/08/2019	35	3	<1	<1
17/09/2019	28	<1	<1	<1	17/09/2019	28	<1	<1	<1
22/10/2019	35	<1	<1	<1	22/10/2019	35	<1	<1	<1
19/11/2019	28	<1	<1	<1	19/11/2019	28	<1	<1	<1
24/12/2019	35	<1	<1	<1	24/12/2019	35	<1	1	<1
21/01/2020	28	<1	<1	<1	21/01/2020	28	<1	<1	34
18/02/2020	28	<1	<1	2	18/02/2020	28	<1	<1	>200
21/02/2020	3	<1	<1	<1	21/02/2020	3	<1	<1	<1
24/02/2020	3	<1	<1	<1	24/02/2020	3	<1	<1	<1
25/02/2020	1	<1	<1	<1	25/02/2020	1	<1	<1	<1
3/03/2020	7	<1	<1	<1	3/03/2020	7	<1	<1	<1
17/03/2020	14	<1	<1	<1	17/03/2020	14	<1	<1	<1
21/04/2020	35	<1	<1	<1	21/04/2020	35	<1	<1	<1
19/05/2020	28	<1	<1	<1	19/05/2020	28	<1	<1	<1
16/06/2020	28	<1	<1	<1	16/06/2020	28	<1	<1	<1
21/07/2020	35	<1	<1	<1	21/07/2020	35	<1	<1	<1
18/08/2020	28	<1	<1	<1	18/08/2020	28	<1	<1	<1
15/09/2020	28	<1	<1	<1	15/09/2020	28	<1	<1	<1
20/10/2020	35	<1	<1	<1	20/10/2020	35	<1	<1	<1
17/11/2020	28	<1	<1	<1	17/11/2020	28	<1	<1	<1
15/12/2020	28	<1	<1	<1	15/12/2020	28	3	<1	<1

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Appendix B Waitangi WTP Data

**Table B-1 Waitangi WTP Microbiological Data (Continued)**

Date of Sampling	Days between samples	E.coli (MPN/ 100mL)			Date of Sampling	Days between samples	Total Coliforms (MPN/100mL)		
		Raw	Treated	Reticulation			Raw	Treated	Reticulation
26/01/2021	42	<1	<1	<1	26/01/2021	42	<1	<1	<1
16/02/2021	21	<1	<1	<1	16/02/2021	21	<1	<1	<1
16/03/2021	28	<1	<1	<1	16/03/2021	28	<1	<1	<1
20/04/2021	35	<1	<1	<1	20/04/2021	35	<1	<1	<1
18/05/2021	28	<1	<1	<1	18/05/2021	28	<1	<1	<1
16/06/2021	29	<1	<1	<1	16/06/2021	29	<1	<1	<1

\* Reticulation samples taken from following locations: Works Yard, Wilson Place, Council House

Appendix C Lake Rangitai Water Quality

## **Appendix C LAKE RANGITAI WATER QUALITY**

*Source: Environment Canterbury*

The approximate sampling location of Lake Rangitai when lake levels allow is illustrated with a teal dot in the figure below. When the lake level is low, the sample is taken from the raw water intake trench for the water supply.



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Appendix C Lake Rangitai Water Quality

Source: Lake Rangitai (Chatham) eastern shore off Taia-Hapupu Rd Site No:SQ34846

Site ID	Date	Time	E coli	Ammonia Nitrogen	Chlorophyll a	Chlorophyll a (plankton)	Dissolved Organic Carbon	Dissolved Organic Carbon (DOC)	Dissolved Reactive Phosphorus	Electrical Conductivity (EC)	Nitrate and Nitrite Nitrogen	pH	Total Nitrogen	Total Phosphorus	Conductivity field	pH field	Rain	Rain Previously	Salinity, Field	Clarity Tube	Chatham's Water Colour	Dissolved Oxygen	Dissolved Oxygen % saturation	Water Clarity	Water Colour	Water Temperature	Wind Direction	Wind Strength
SQ34846	6-Apr-05	1720		0.011			7.6		0.003		0.006	8.2	0.7	0.027	90		not raining	no rain		>100		8.66	91	clear	clear	17.6		
SQ34846	14-Sep-05	1100		0.009	0.5	7.8		<0.001		0.014		0.49	<0.008	93	8.2					100+		9.57	94.6	clear	brown/yellow	14.2		
SQ34846	8-Dec-05	1630		<0.005	0.8	8.6		0.002		0.019		0.57	0.01		8.7	not raining	no rain		100		9.22	96.1	clear	clear	17.6			
SQ34846	30-Mar-06	1305		0.01	1.4	7.7		<0.001		0.008		0.61	0.011		8.6	raining	light rain	0.5	100+		10.1	101.3	clear	clear	15.8			
SQ34846	14-Jun-06	1100		0.009	1.4	9.3		0.002		0.011		0.57	0.015	53.5	8.2	not raining	moderate	0.3	38		7.49	75.3	clear	rose red	7.4			
SQ34846	19-Oct-06	1600	2		0.9	8						0.36	0.012	92	8.5	not raining	light rain				10.99	106.9	clear	clear	13.9			
SQ34846	30-Nov-06	1040	11			6.7						0.47	0.01	92	8.5	not raining	no rain	0.5	81		7.9	102.3	clear	brown/yellow	18			
SQ34846	29-Mar-07	1300	370		0.4	8.8						0.34	<0.008	104	8.8	not raining	no rain	0.5	100+		12	125	clear	clear	17.4			
SQ34846	21-Jun-07	1600	7		0.6	7.3						0.37	<0.008	93.3	9.1	raining	heavy	0.5	100+		11.9	99	clear	clear	8.2			
SQ34846	10-Jul-07	1530	<10		0.3	7.8						0.42	<0.008	87.1	7.3	not raining	light rain	0.4	98		11.5	102	clear	clear	11			
SQ34846	17-Dec-07	1500	43		0.9	7.9						0.71	0.042	102.6	7.4	not raining	no rain	0.5	64				clear	clear	23.8			
SQ34846	30-Mar-08	1630	650		4.6	8.4						0.73	0.21	37.8	8.9	raining	moderate	0.2	100+		10.1	104	clear	green	17			
SQ34846	29-Jun-08	1700			0.7	6.9						0.31	0.008	59.5	8.2	not raining	heavy	0.4	100+		11.4	99.2	clear	clear	9.8			
SQ34846	21-Sep-08	1500	25		1.1	7.5						0.48	0.008	71	8.5	not raining	no rain	0.4	100+		10.78	104	clear	clear	14.1			
SQ34846	18-Dec-08	1330	79		1	7						0.39	0.009	62	8.6	not raining	light rain	0.3			9.7	102	clear	clear	17.6			
SQ34846	23-Mar-09	1800	3		0.4	7.8						0.57	<0.008	96.9	9	not raining	moderate	0.6	100+	clear	10.02	105.9	clear	clear	18			
SQ34846	18-Jun-09	1500	16		0.7	8						0.28	<0.008	103.7	8.4	not raining	moderate	0.5	100	clear	11.7	100.2	clear		8.3			
SQ34846	20-Sep-09	1030	11	0.007	0.9	7.6		<0.001		<0.005	8.3	0.48	<0.008	105.9	N/A	not raining	no rain	0.5	100+	clear	10.1	89.6	clear		10.4			
SQ34846	14-Dec-09	1440	66	<0.005	0.8	9.7		0.002		<0.005		0.75	0.025	101.6	N/A	not raining	no rain	0.4	75	clear	8.64	101.1	clear		23.5			
SQ34846	17-Mar-10	1545	5		6.8	7.9						0.54	0.013	98.9	8.6	not raining	moderate	0.6	100+	clear			clear		12.9			
SQ34846	14-Jun-10	1330		0.013	1.3	6.6		<0.001		0.022		0.51	0.008	82	8.4	not raining	light rain	0.2	<100	clear	11.8	100.2	clear		8.3			
SQ34846	28-Jun-10	1350	8																									
SQ34846	20-Sep-10	1350	11	0.011	2.3	9.8		<0.001		<0.005		0.53	0.015	79.4	7.2	not raining	light rain	0.5	85	clear	11.05	102	clear		12			
SQ34846	13-Dec-10	1440	<1	0.006	0.5	7.8		<0.001		<0.005		0.53	0.011	105.8	8.4	not raining	no rain	0.6	>100		9.14	96.5	clear		18			
SQ34846	24-Feb-11	1206				8.7				0.002		0.54	0.13	118.1	8.5	not raining	no rain	0.7	>100	green/yellow	9.37	99.4	clear		18.4			
SQ34846	13-Jun-11	1330	91	0.008		10		<0.001		0.017		0.61	0.013	72.6	8.1	not raining	light rain	0.5	55	clear	11.28	98.5	turbid		9.6			
SQ34846	12-Sep-11	1415	2	0.007		5.8		<0.001		0.035		0.19	<0.008	74.9	no pH meter	not raining	moderate	0.5	>100	red/brown/yellow	7.6	77.2	clear		14.2			
SQ34846	28-Nov-11	1400	3	0.008		9		<0.001		<0.005		0.41	0.018	75.4	7	not raining	no rain	0.5	62	clear	10.19	101.7	clear		14.7			
SQ34846	15-Mar-12	1500	16	0.009		1.2	8.3	<0.001		<0.005		0.46	0.009	100.8	8.4	not raining	no rain	0.5	100	brown	9.77	99	clear		15.8			
SQ34846	18-Jun-12	1603		0.016	2.2	7.1		0.001		0.007		0.43	<0.008	97.7	8.5	not raining	no rain	0.48	>100	clear	12.54	106.6	clear		7.8			
SQ34846	25-Jun-12	1509	3																									
SQ34846	10-Sep-12	1515	730	0.008		<0.2	7.6	<0.001		<0.005		0.33	0.013	77	8.5	not raining	moderate	0.45	72	clear	101.8	10.51			12.9			
SQ34846	10-Dec-12	1510	9	<0.010	0.0007		8.7	<0.004		<0.002		0.38	0.008	102.5	8.61	not raining	light	0.51	>100		9.7	100.5	clear	no colour				
SQ34846	11-Mar-13	1605	2420	<0.010	0.001		7.6	<0.004		<0.002		0.44	0.018	108.9	8.64	not raining	nil	0.94	75		9.76	163.3	clear	no colour	18			
SQ34846	10-Jun-13	1529	52	<0.010	0.0012		6.7	<0.004		<0.002		0.33	0.005	106	8.37	not raining	nil	0.53	>100		11.08	100	clear	colourless	11.5			
SQ34846	2-Sep-13	1457	<10	0.011	0.0008		5.5	<0.004		<0.002		0.34	0.007	104		not raining	light	0.52	>100				clear	colourless	11.1			
SQ34846	9-Dec-13	1340	9	<0.010	0.0006		7.6	<0.004	105.1	<0.002	8.2	0.39	<0.004	109.3		not raining	nil	0.5	100+	no colour	8.96	106.1	clear		23.5			
SQ34846	4-Mar-14	1010	56	<0.010	0.0004		9.8	<0.004	94.5	<0.002	8.3	0.36	<0.004	90	8.55	not raining	moderate	0.5	>100	red/ brown	8.77	102.3	clear		15.1			
SQ34846	16-Jun-14	1516	2	<0.010	0.0005		4.7	<0.004	50.1	<0.002	8.3	0.23	<0.004	1020	8.66	not raining	nil	0.5	>100	no colour	10.12	103.8	clear		9.7			
SQ34846	8-Sep-14	1540		<0.010	0.0009		7.5	<0.004	81.6	<0.002	8.3	0.36	0.007			not raining	moderate		75	green	11.03	100	turbid		11.1			
SQ34846	10-Dec-14	1020	1	<0.010	0.0004		8.4	<0.004	97.5	<0.002	8.3	0.37	<0.004	103.1		not raining	nil	0.51	100+	green	10.4	102.2	clear		14			
SQ34846	9-Mar-15	1430	4	<0.010	0.0002		8.5	<0.004	114.2	<0.002	8.3	0.38	0.005	118.8		not raining	moderate	0.59	>100	no colour	9.6	98.9	clear		19.6			
SQ34846	12-Jun-15	1342	12	<0.010	0.0003		7.4	<0.004	106.2	0.004	8.2	0.4	<0.004	110.2		not raining	nil	0.55	>100	no colour	10.62	96.4	clear		9.4			
SQ34846	21-Sep-15	1549	<10	<0.010	0.001		8.6	<0.004	105.3	0.036	8.2	0.53	0.01	103.4		not raining	light	0.51	85	no colour	9.52	87.6	clear		11.3			
SQ34846	14-Dec-15	1635	25	0.012	0.0004		6.3	<0.004	74.3	0.013	8.2	0.35	0.009	114.4		not raining	moderate	0.57	100	no colour	8.59	92.5	clear		14.8			
SQ34846	13-Mar-16	1100	7	<0.010	<0.0002		8.2	<0.004	129.8	<0.002	8.1	0.45	<0.004	134		not raining	light	0.67	>100	no colour	10.11	97.6	clear		14.3			
SQ34846	10-Jun-16	1130	30	<0.010	0.0006		6.8	<0.004	121.6	<0.002	8.1	0.38	<0.004	122.5		not raining	light	0.61	>100	no colour	4.62	53.7	clear		12.7	N	strong	
SQ34846	12-Sep-16	1509	56	<0.010	0.0048		8.2	<0.004	117.7	0.007	8.2	2.3	0.156	119.8		not raining	nil	0.6		coffee	10.68	101	turbid		13.1	NW	moderate	
SQ34846	19-Dec-16	1712	28	<0.010	0.0003		11.5	<0.004	139.6	<0.002	8.6	0.54	0.006	134.2		not raining	nil	0.67	100	no colour	7.97	92.5	clear		20.2	W	moderate	
SQ34846	10-Mar-17	1102	23	<0.010	<0.0002		9.1	<0.004	111.9	<0.002	8.3	0.35	0.005	155.9		not raining	nil	0.79	100	no colour	9.69	97.7	clear		16.1	NW	light	
SQ34846	9-Jun-17	1144	6	<0.010	0.0009		4.9	<0.004	103.6	<0.002	8.2	0.39	0.009	131.2		not raining	moderate	0.66		no colour	11.34	99.5	clear		9.6	S	moderate	
SQ34846	11-Sep-17	1520	579		0.0012		9.1	<0.004	118.8	0.003	8.2	0.57	0.009															
SQ34847	11-Dec-17	1356	3	<0.010	0.0003		6	<0.004	126	<0.002	8	0.42	<0.004															

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Appendix C Lake Rangitai Water Quality

Site Name	Date	Time	Sample Parameters							Ammoniacal Nitrogen (mg/L)	Chlorophyll a (planktonic) (ug/L)	Clarity Tube (cm)	Conductivity (mS/m)	Conductivity (Field) (mS/m)	Dissolved Organic Carbon (mg/L)	Dissolved Oxygen (mg/L)	Dissolved Oxygen % Saturation	Dissolved Reactive Phosphorus (mg/L)	E. coli (MPN/100ml)	Nitrate-N + Nitrite-N (g/m3)	Salinity (Field) (ppt)	Total Nitrogen (g/m3)	Total Phosphorus (g/m3)	Water Temperature (Field) (C)	pH	Comments	
			Rain	Rain Previously	Site is dry	Water Clarity	Water Colour	Wind Direction	Wind Strength																		
Site Name: Lake Rangitai (Chathams) east shore off Taia-Hapupu Rd																											
SQ34846	11-Dec-2017	13:56:00	not raining	nil	no	clear	no colour	NW	strong	<0.010	0.30	100.00	126.00	129.80	6.00	8.06	94.90	<0.0040	3.00	<0.002	0.65	0.42	<0.004	23.30	8.00	Lab mistakenly did not test for Enterococci	
SQ34846	12-Mar-2018	13:54:00	not raining	nil	no	clear	no colour	NE	light	<0.010	0.20	100.00	144.20	154.20	7.30	9.29	98.30	<0.0040	4.00	<0.002	0.78	0.47	0.01	18.20	8.20	Lab mistakenly did not test for Enterococci	
SQ34846	07-Jun-2018	10:11:00	not raining	light	no	clear	colourless	SW	light	0.02	0.40	100.00	128.60	90.80		12.08	105.00	<0.0040		<0.002	0.43	0.37	0.01	8.60	8.30	Lab mistakenly did not test for E.coli, Enterococci and DDC	
SQ34846	17-Sep-2018	14:30:00	not raining	light	No	clear	coffee	W	moderate	<0.010	0.80	96.00	122.00	121.50	9.60	9.38	93.80	<0.0040		0.00	0.61	0.43	0.01	15.60	8.10		
SQ34846	17-Sep-2018	14:48:00	not raining	light	No	clear	coffee	N	moderate										7.00								
SQ34846	10-Dec-2018	15:20:00	not raining	light	No	clear	no colour		strong	<0.010	0.50	100.00	163.70		6.10	9.30	104.40	<0.0040	126.00	<0.002		0.45	0.00	20.50	8.10	ProODO used = no EC or Salinity	
SQ34846	18/Mar/2019	16:24:00								0.011	0.3	100	166.6	187.1	10.7	8.32	84	<0.0040	27	0.003	0.96	0.63	<0.004	16.1	8.1		
SQ34846	30/May/2019	15:00:00								0.35	0.5	100	131.2	153.6	13.2	7.67	75.5	<0.0040		0.018	0.78	0.86	0.008	14.2	8.3	E.coli sample frozen- not able to be processed by lab.	
SQ34846	12/Feb/2019	3:16:00 pm	not raining	nil		clear	no colour												291								
SQ34846	18/Mar/2019	4:24:00 pm	not raining	nil		clear	no colour			0.011	0.3	100	166.6		10.7	8.32	84	<0.0040			0.96	0.63	<0.004	16.1	8.1		
SQ34846	18/Mar/2019	4:26:00 pm	Not raining	Nil		Clear	No colour												27								
SQ34846	30/May/2019	3:00:00 pm	not raining	nil		clear	no colour			0.35	0.5	100	131.2		13.2	7.67	75.5	<0.0040			0.78	0.86	0.008	14.2	8.3		
SQ34846	3/Jun/2019	3:54:00 pm	not raining	moderate		clear	no colour																				
SQ34846	16/Sep/2019	2:48:00 pm	not raining	light		clear	no colour			<0.010	3	82	121.5		12.8	7.93	79.5	<0.0040			0.62	0.63	0.015	15.2	8.2		
SQ34846	16/Sep/2019	2:56:00 pm	not raining	light		clear	no colour												63								
SQ34846	21/Dec/2019	3:16:00 pm	not raining	nil		clear	no colour			0.015	1.2	100	96.4		9.2	6.23	70.9	0.006			0.71	0.35	<0.004	21.3	8.4		
SQ34846	16/03/2020	3:03:00 pm	Lake level very low	Not Raining	Nil	Opaque	Green	E	Light	0.121	1	11	121.1	151.7	8.5	11.42	114.9	<0.0040	20	0.007	0.77	0.72	0.022	15.4	8.2		
SQ34846	15/06/2020	2:45:00 pm	Water level low	Not Raining	Nil	Clear	Colourless		Calm	0.105	0.4	100	130.8	155.8	6	11.83	100.2	<0.0040	137	<0.002	0.79	0.54	<0.0040	8.6	8.2		
SQ34846	14/09/2020	2:19:00 pm	Not raining	Light	No	Colourless	Clear			0.01	0.5	100	74.6	152.6	9.91	105.6	105.6	0.004		0.002	0.77	0.34	0.004	18.5	8.6		
SQ34846	14/09/2020	2:45:00 pm	Not raining	Nil	No	Colourless	Clear	NW	Light										10								
SQ34846	11/12/2020	11:17:00 am	Not raining	Moderate	No	Colourless	Clear	N	Light			100		151.6	0.02		86.5		28		0.77			18			
SQ34846	8/03/2021	15:16:00	Not Raining	Heavy		Opaque	Colourless	SW	Strong	0.39	3.6	12		122.9	14.8	7.65	81.7	<0.0040		0.4	0.62	1.65	0.048	17.3	8		
SQ34846	8/03/2021	15:21:00	Not Raining	Heavy		Opaque	Colourless	SW	Strong										>2420								
SQ34846	3/06/2021	15:21:00	Not Raining	Light		Clear	Colourless	SW	Moderate	0.34	0.6	55		177.2	15.8	11.46	102	<0.0040		0.025	0.9	1.04	0.008	10.2	8.1		
SQ34846	7/06/2021	14:46:00	Not Raining	Nil		Clear	Colourless	N	Calm										11								

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Appendix D Kaingaroa WTP Data

## Appendix D KAINGAROA WTP DATA

Table D-1 Kaingaroa WTP Microbiological Data From 2013

Date of Sampling	Days between samples	E.coli (MPN/ 100mL)			Total Coliforms (MPN/100mL)		
		Raw	Treated	Network*	Raw	Treated	Network*
30/07/2013		<1			<1		
27/08/2013	28	<1			<1		
24/09/2013	28	<1			<1		
29/10/2013	35	<1			<1		
26/11/2013	28	<1			<1		
17/12/2013	21	<1			<1		
28/01/2014	42	1			2		
4/02/2014	7	<1			2		
11/02/2014	7	<1			12		
11/02/2014	0	<1			8		
11/02/2014	0	<1			18		
11/02/2014	0	<1			12		
18/02/2014	7	<1			>201		
25/02/2014	7	<1			201		
29/04/2014	63	<1			3		
6/05/2014	7	<1			19		
28/05/2014	22	<1			<1		
24/06/2014	27	<1			<1		
29/07/2014	35	<1	<1	NT	<1	<1	NT
26/08/2014	28	1	<1	NT	5	<1	NT
30/09/2014	35	<1	<1	NT	2	<1	NT
28/10/2014	28	<1	<1	<1	1	<1	NT
2/12/2014	35	<1	<1	<1	<1	<1	NT
23/12/2014	21	2	<1	<1	9	<1	NT
27/01/2015	35	NT	<1	<1	NT	<1	<1
24/02/2015	28	NT	<1	<1	NT	1	<1
31/03/2015	35	2	<1	<1	11	<1	<1
28/04/2015	28	12	<1	<1	41	<1	<1
26/05/2015	28	5	<1	<1	14	<1	<1
7/07/2015	42	<1	<1	<1	24	<1	<1
28/07/2015	21	<1	<1	<1	6	<1	<1
25/08/2015	28	<1	<1	<1	1	<1	1
29/09/2015	35	<1	<1	<1	1	<1	<1
27/10/2015	28	<1	<1	<1	<1	<1	<1
24/11/2015	28	1	<1	<1	2	<1	<1
22/12/2015	28	<1	<1	<1	3	<1	<1
26/01/2016	35	<1	<1	<1	4	<1	15
2/02/2016	7	1	<1	<1	9	<1	4
23/02/2016	21	6	<1	<1	62	1	1
29/03/2016	35	4	<1	<1	6	1	1

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Appendix D Kaingaroa WTP Data

Table D-1 Kaingaroa WTP Microbiological Data From 2013 continued

Date of Sampling	Days between samples	E.coli (MPN/ 100mL)			Total Coliforms (MPN/100mL)		
		Raw	Treated	Network*	Raw	Treated	Network*
26-04-16	28	94	<1	<1	118	18	6
31-05-16	35	56	<1	<1	70	1	3
05-07-16	35	3	<1	<1	17	<1	2
26-07-16	21	9	<1	<1	15	<1	<1
30-08-16	35	1	<1	<1	1	<1	<1
27-09-16	28	<1	<1	<1	11	1	<1
01-11-16	35	8	<1	<1	15	<1	1
06-12-16	35	<1*	1*	<1	<1*	2*	<1
13-12-16	7	<1	<1	<1	<1	<1	1
20-12-16	7	3	<1	<1	10	<1	<1
31-01-17	42	1	<1	<1	8	<1	<1
21-02-17	21	3	<1	<1	43	4	<1
21-03-17	28	21	<1	<1	165	6	50
18-04-17	28	14	<1	<1	62	29	25
16-05-17	28	1	<1	<1	94	19	48
20-06-17	35	<1	<1	<1	15	8	4
24-07-17	34	1	<1	<1	4	<1	2
22-08-17	29	6	<1	<1	21	<1	11
29-08-17	7	2	N/A	N/A	6	N/A	N/A
19-09-17	21	1	<1	<1	5	<1	<1
17-10-17	28	11	<1	<1	53	5	8
14-11-17	28	<1	<1	<1	3	1	<1
19-12-17	35	<1	<1	<1	15	<1	<1
30-01-18	42	14	<1	<1	109	3	2
20-02-18	21	12	<1	<1	>200	1	<1
20-03-18	28	1	<1	<1	16	31	19
27-03-18	7	1	<1	<1	15	16	3
17-04-18	21	8	<1	<1	36	16	12
15-05-18	28	<1	<1	<1	<1	1	<1
20-06-18	36	2	<1	<1	9	9	6
17-07-18	27	3	<1	<1	5	4	9
21-08-18	35	4	<1	>200	14	<1	>200
28-08-18	7	11	2	1	27	2	1
28-08-18	0			3			4
11-09-18	14	3	<1	<1	8	<1	<1
11-09-18	0			<1			1
18-09-18	7	8	<1	<1	9	<1	<1
18-09-18	0			<1			1
16-10-18	28	1	<1	<1	3	<1	<1
20-11-18	35	<1	<1	<1	5	<1	1
18-12-18	28	16	<1	<1	45	<1	200
15-01-19	28	<1	<1	<1	2	2	5
19-02-19	35	18	<1	<1	83	<1	1
19-03-19	28	16	<1	<1	130	<1	6
16-04-19	28	11	<1	<1	130	19	25
23-05-19	37	16	<1	<1	109	4	10
28-05-19	5	10	>200	<1	48	>200	<1
04-06-19	7	2	<1	<1	12	<1	8
11-06-19	7	8	<1	<1	21	<1	<1
18-06-19	7	8	<1	<1	>200	2	5

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Appendix D Kaingaroa WTP Data

Table D-1 Kaingaroa WTP Microbiological Data From 2013 continued

Date of Sampling	Days between samples	E.coli (MPN/ 100mL)			Total Coliforms (MPN/100mL)		
		Raw	Treated	Network*	Raw	Treated	Network*
16/07/2019	28	5	<1	<1	15	2	<1
20/08/2019	35	5	<1	<1	18	<1	<1
17/09/2019	28	5	<1	<1	165	<1	1
22/10/2019	35	6	<1	<1	16	<1	<1
19/11/2019	28	12	<1	<1	29	<1	<1
24/12/2019	35	3	<1	<1	11	3	<1
21/01/2020	28	8	<1	<1	94	<1	<1
18/02/2020	28	<1	<1	<1	43	<1	<1
17/03/2020	28	9	3	<1	74	53	8
23/03/2020	6	1	<1	<1	>200	36	1
24/03/2020	1	4	<1	<1	62	27	6
21/04/2020	28	1	<1	<1	88	3	4
5/05/2020	14	<1	5	<1	<1	70	1
19/05/2020	14	<1	<1	<1	4	<1	1
26/05/2020	7	21	<1	<1	34	11	4
9/06/2020	14	2	<1	<1	6	<1	<1
16/06/2020	7	5	<1	<1	19	2	<1
21/07/2020	35	<1	<1	<1	3	<1	<1
18/08/2020	28	<1	<1	<1	3	<1	<1
15/09/2020	28	1	<1	<1	8	<1	<1
20/10/2020	35	1	<1	<1	3	<1	<1
17/11/2020	28	32	<1	<1	38	<1	<1
15/12/2020	28	1	<1	<1	4	<1	<1
26/01/2021	42	165	<1	<1	165	<1	<1
16/02/2021	21	31	<1	<1	118	<1	<1
16/03/2021	28	2	<1	<1	32	1	3
20/04/2021	35	<1	<1	<1	11	4	<1
18/05/2021	28	1	<1	<1	15	<1	<1
16/06/2021	29	<1	<1	<1	4	<1	<1

NT – sample Not Taken

\* Reticulation samples taken from the following locations: Club and North Whaitiri

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Appendix D Kaingaroa WTP Data

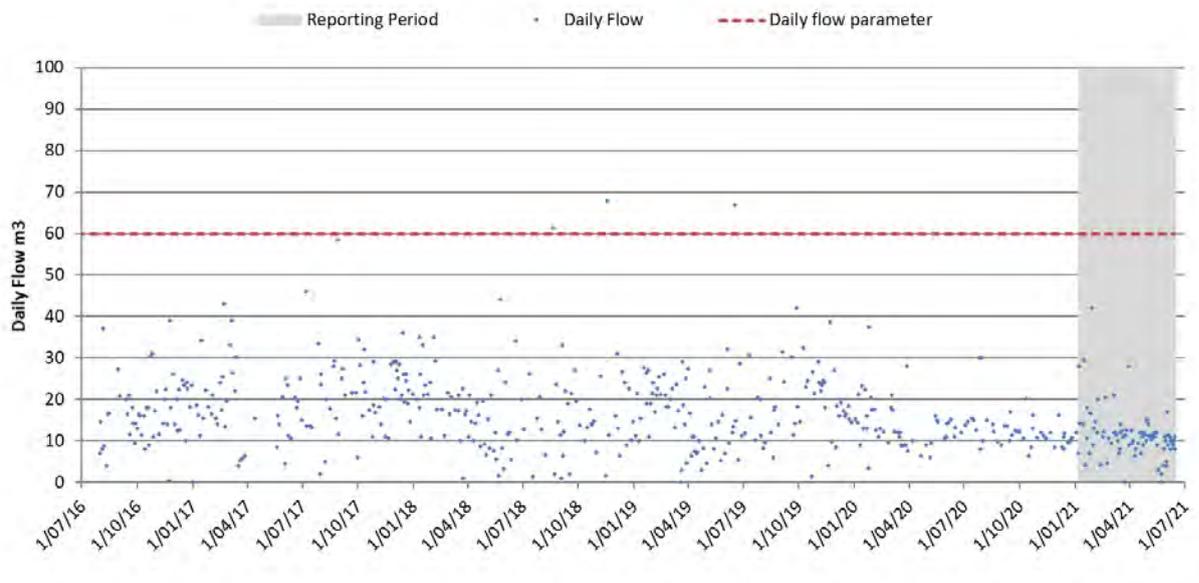


Figure D-1 Kaingaroa Water Daily Flow Data from July 2016

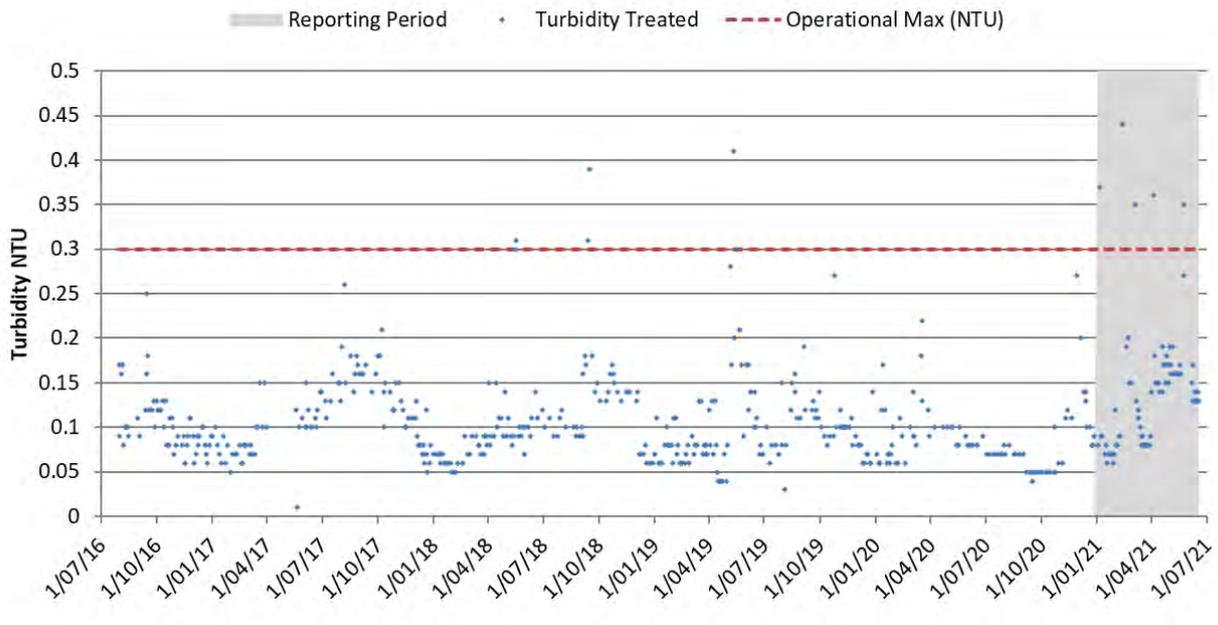


Figure D-2 Kaingaroa Water Treated Turbidity Data from July 2016

## Appendix E WAITANGI WWTP DATA

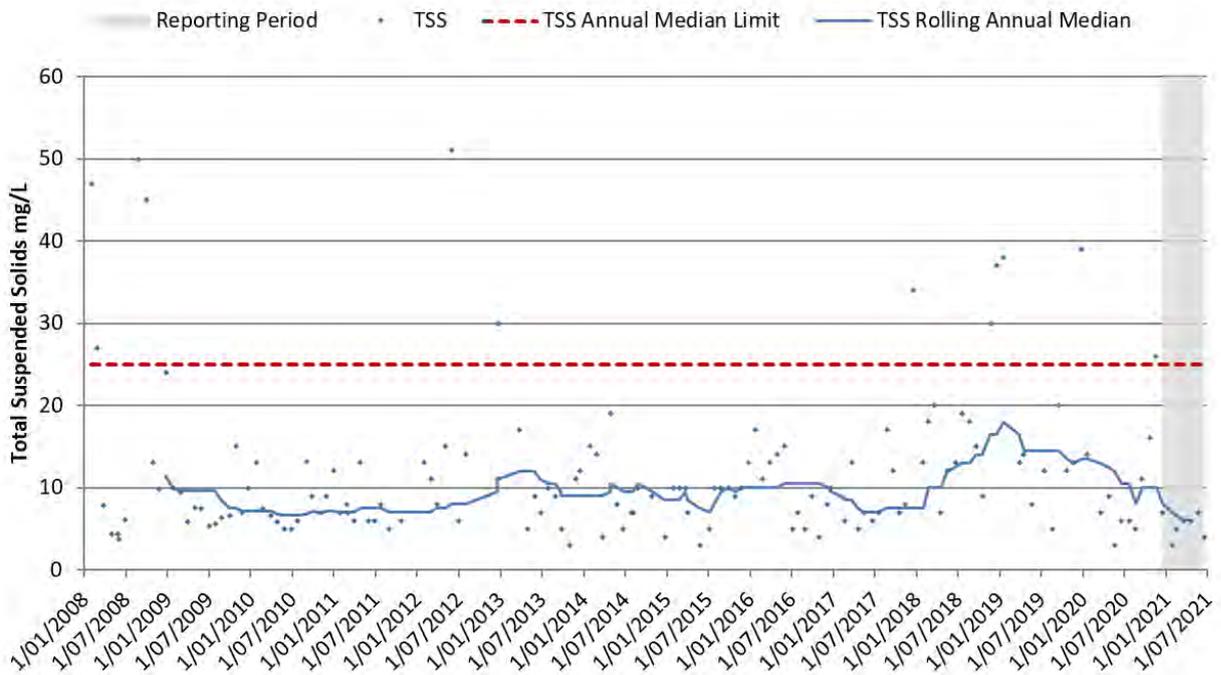


Figure E-1 Total Suspended Solids Concentrations from 2008

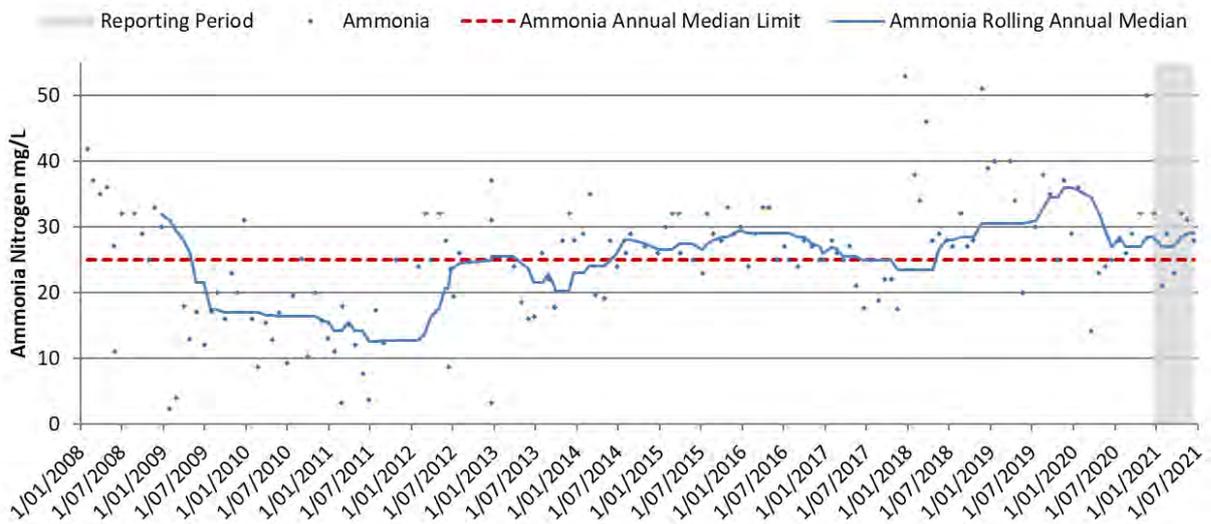


Figure E-2 Ammonia Nitrogen Concentrations from 2008.

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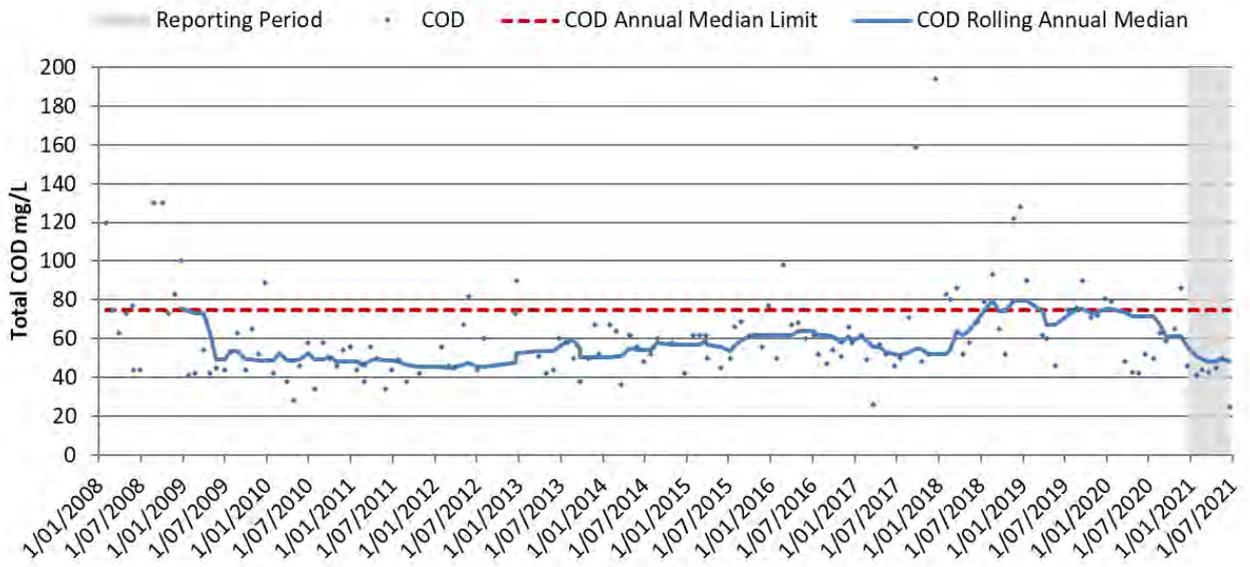


Figure E-3 Treated Wastewater Total Chemical Oxygen Demand Concentrations from 2008

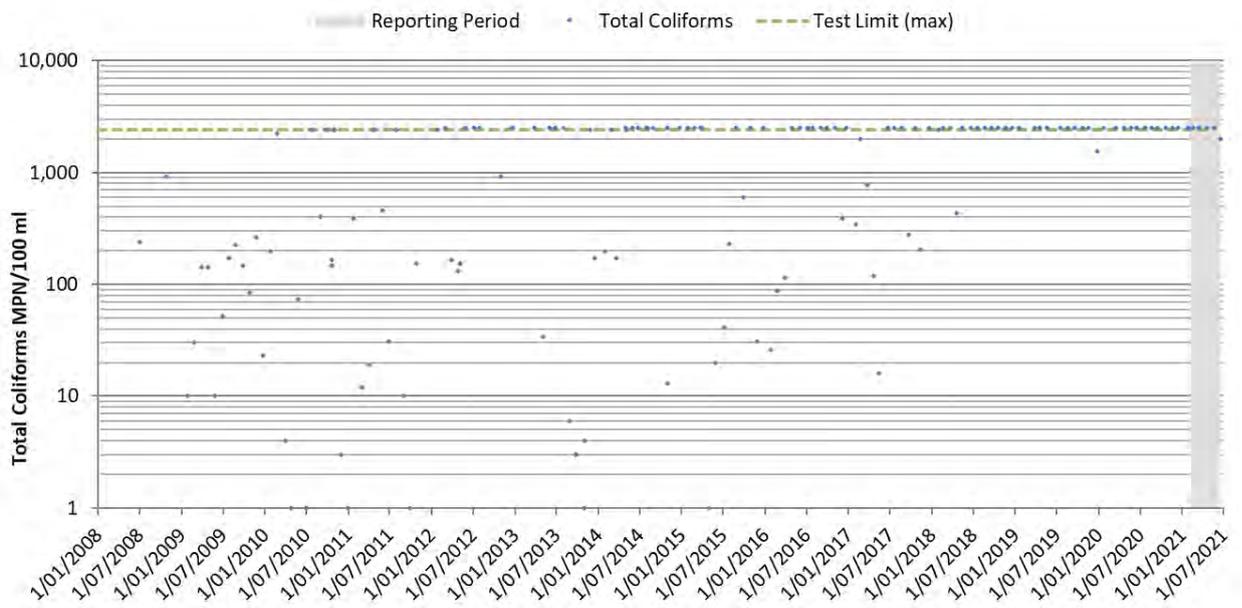


Figure E-4 Total Coliform Concentrations from 2008

**CHATHAM ISLANDS COUNCIL  
WATER & WASTEWATER SCHEMES – SUMMARY REPORT JANUARY-JUNE 2021**

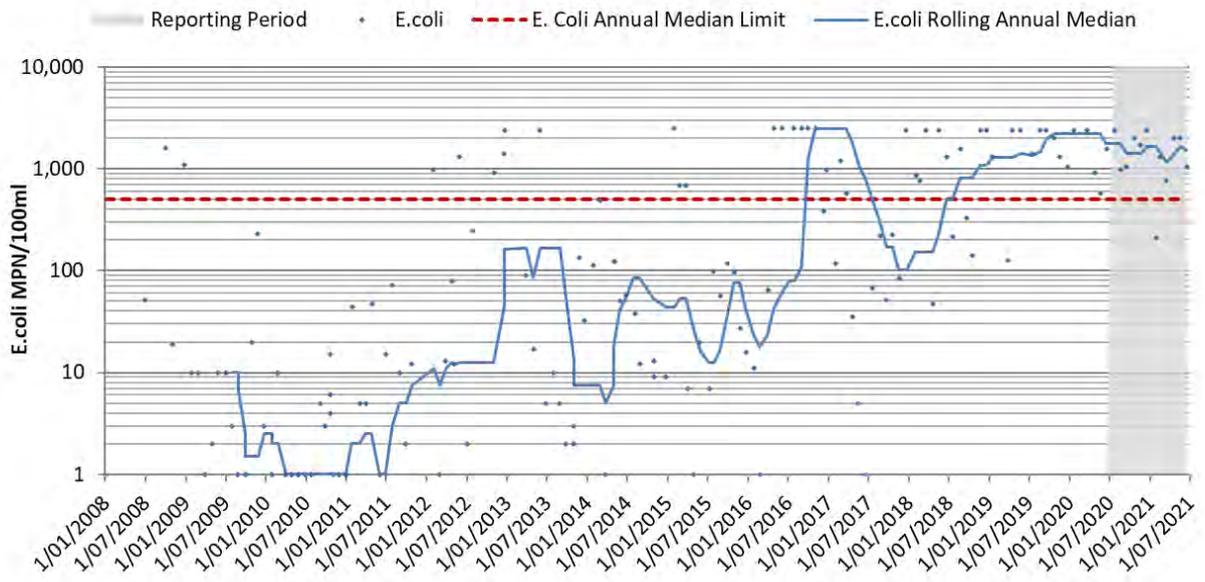


Figure E-5 E. coli Concentrations from 2008

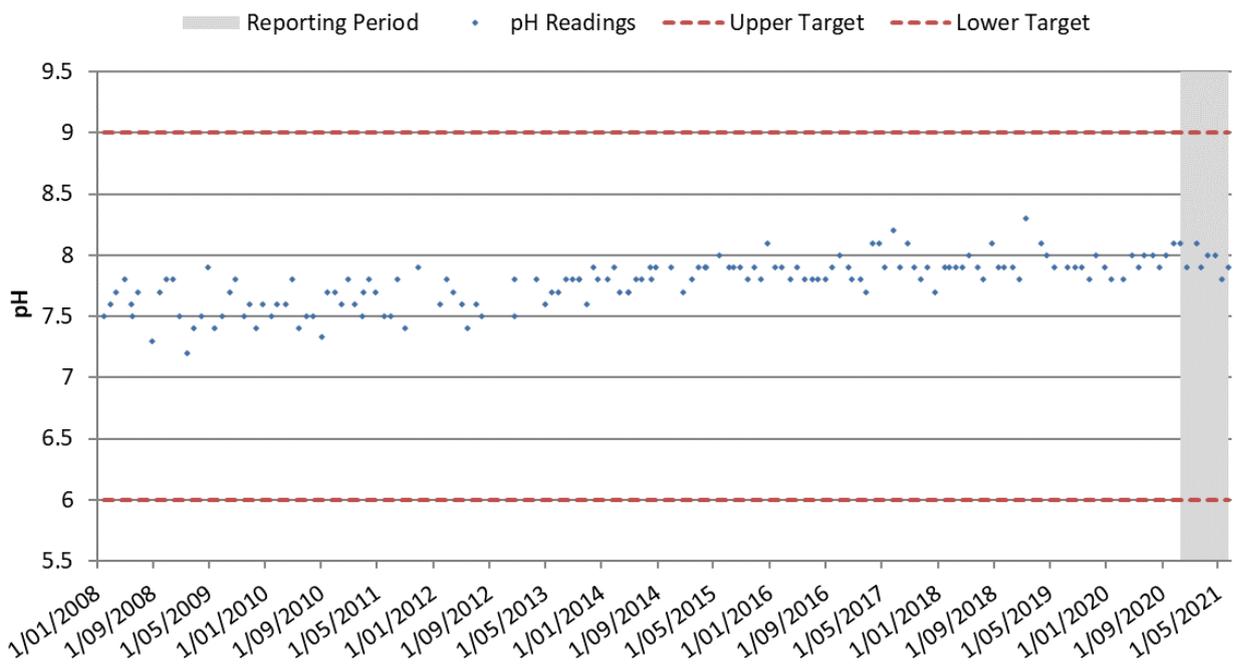


Figure E-6 pH from 2008

**CHATHAM ISLANDS COUNCIL  
WATER & WASTEWATER SCHEMES – SUMMARY REPORT JANUARY-JUNE 2021**

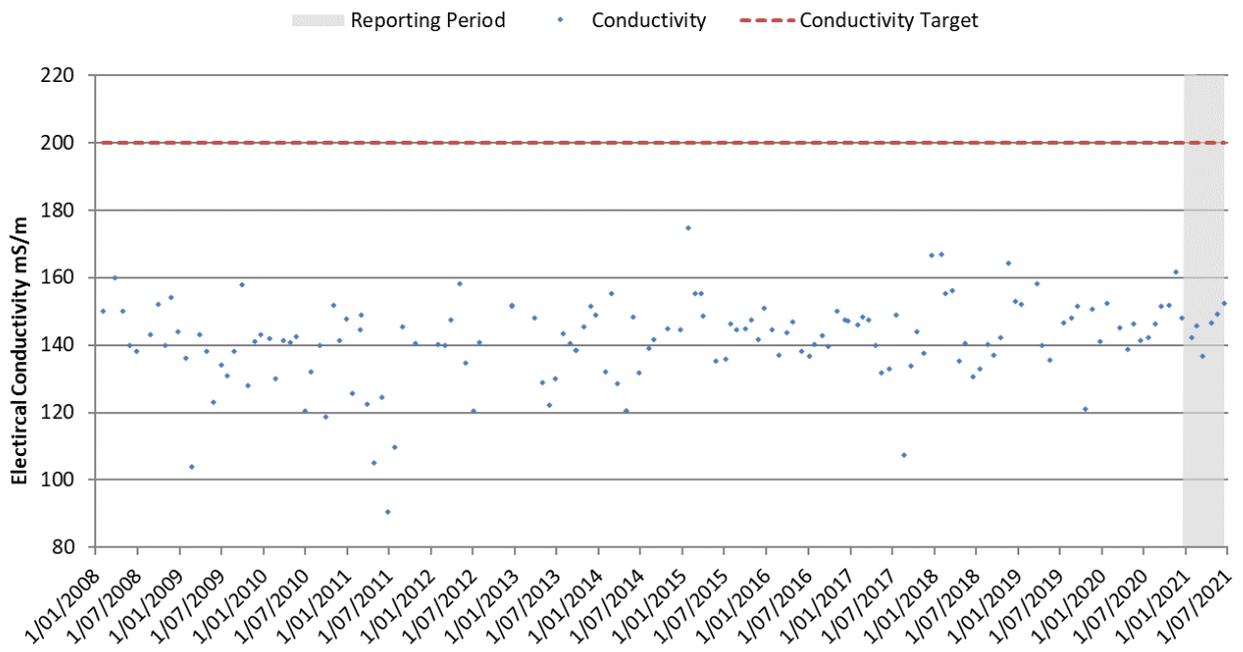


Figure E-7 Electrical Conductivity from 2008

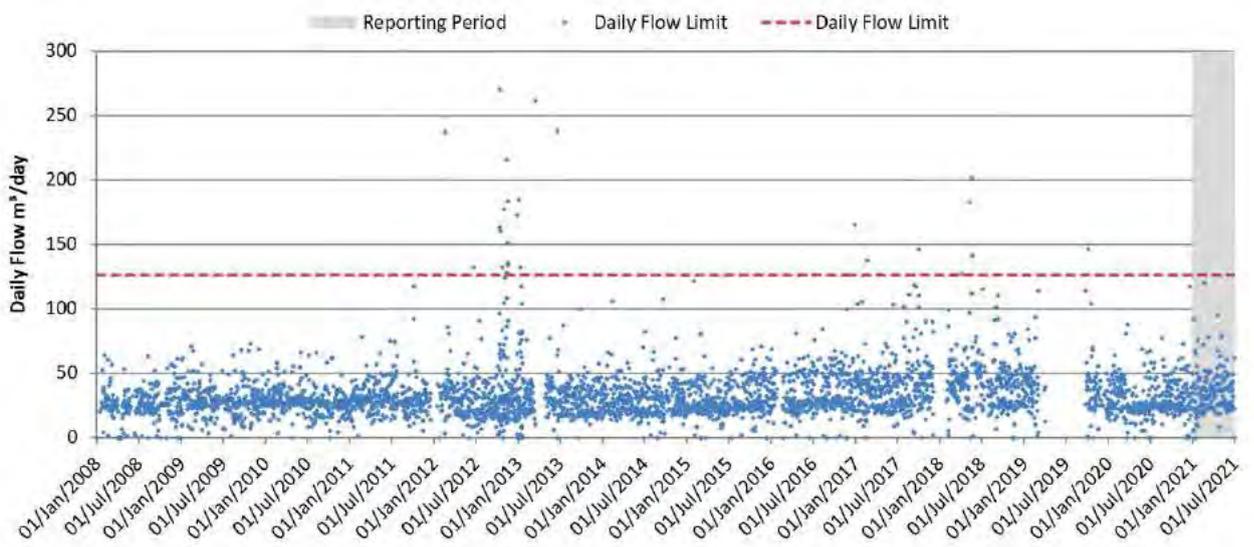


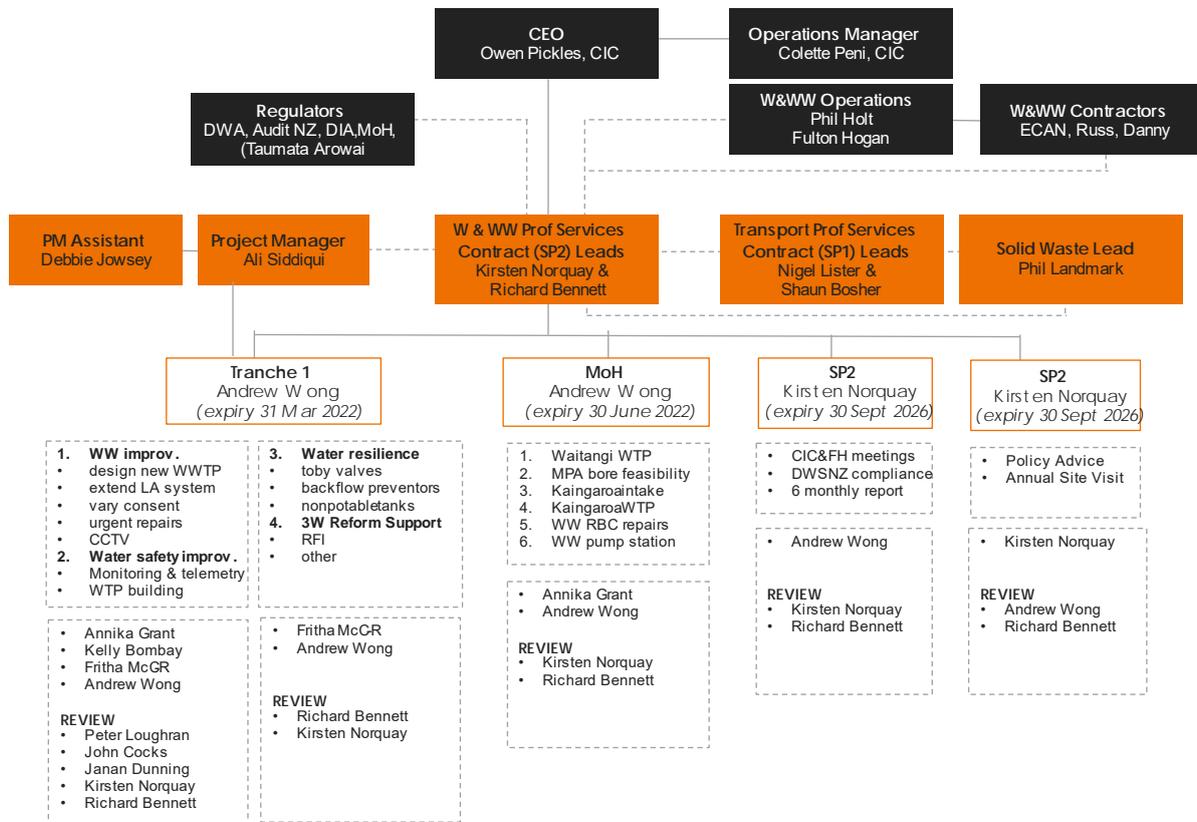
Figure E-8 Irrigation flow from 2008. Note: Irrigation meter not functional March – September 2019

## **Appendix F ORGANISATION INFORMATION**

This Appendix includes the following organisation information:

- Organisation Chart.
- CVs of key staff.
- Training Register of key staff.

## Organisation Chart



## Qualifications/Experience Chart

Photo	Name / Organisation / Role	Qualifications / Experience	Contact Details
	<p><b>Kirsten Norquay</b>  <b>Stantec NZ</b>  <b>Water Engineer</b></p>	<p>Kirsten is a chartered civil and environmental engineer who has been with Stantec for over 15 years, and has over 20 years of experience. Her qualifications include:</p> <ul style="list-style-type: none"> <li>• BSc (Hons), Biochemistry.</li> <li>• BE (Hons), Civil.</li> <li>• Chartered Professional Engineer of Engineering New Zealand (CPEng)</li> <li>• Chartered Member of Engineering New Zealand (CMEngNZ).</li> </ul> <p>Prior to joining Stantec she worked as a Biochemistry Teaching Fellow at the University of Otago. Kirsten is a versatile engineer, whose experience includes water, wastewater and solid waste management. Kirsten has worked on various projects, ranging from investigation, feasibility &amp; consenting to design, tendering, construction &amp; commissioning. Many of these projects have been reconsementing or plant upgrades to meet more stringent resource consent requirements or drinking water standards. Some relevant water projects include:</p> <ul style="list-style-type: none"> <li>• Water and Wastewater Engineer, Chatham Islands Council, 2014 to present</li> <li>• Water Safety Plans, Chatham Islands Council, 2015-16</li> <li>• Water Safety Plans, Dunedin City Council, 2016 to 2018.</li> <li>• Waitangi Water Scheme Upgrade, Chatham Islands Council, 2015-2017</li> <li>• Outram Water Treatment upgrade, Dunedin City Council, 2009 to 2018.</li> <li>• Riverton Water Treatment Plant Upgrade, Southland District Council, 2013 to 2016.</li> <li>• Maitai Alternative Water Source, Nelson City Council, 2014 to 2015.</li> <li>• Kyogle Water Treatment Plant Upgrade, Kyogle Council, 2013</li> <li>• Richmond Water Treatment Plant, Tasman District Council, 2012 to 2013</li> <li>• Rural Water Scheme Upgrades, Waimate District Council, 2012.</li> <li>• Port Chalmers Water Treatment Plant, Dunedin City Council 2007 to 2010.</li> <li>• Rotary Park Distribution Watermain, Dunedin City Council, 2007 to 2008</li> </ul> <p>Kirsten is a founding member of Stantec's Water Safety Group, formed in 2016 to ensure Stantec is proactive in implementing best practice for management of safe drinking water supplied throughout NZ. Kirsten attended the WaterNZ Drinking Water Workshop in September 2017 and the WaterNZ Havelock North Inquiry Outcomes Seminar in February 2018.</p>	<p><b>Email:</b>  Kirsten.Norquay@stantec.com</p> <p><b>Work Phone:</b> +64 3 474 3097</p> <p><b>Mobile Phone:</b> +64 27 582 5171</p>

**CHATHAM ISLANDS COUNCIL  
WATER & WASTEWATER SCHEMES – SUMMARY REPORT JANUARY-JUNE 2021**

Photo	Name / Organisation / Role	Qualifications / Experience	Contact Details
	<p><b>Richard Bennett</b> <b>Stantec NZ</b> <b>Water Engineer</b></p>	<p>Richard has over 25 years' experience as a civil engineer and has worked on complex infrastructure projects throughout his career. He has managed all the stages of water and wastewater projects from conception through to completion of commissioning. His qualifications include:</p> <ul style="list-style-type: none"> <li>• BEng, Civil Engineering, University of Newcastle upon Tyne, 1993</li> <li>• Chartered Engineer, Institution of Civil Engineers (ICE), UK</li> <li>• Member, Institution of Civil Engineers, UK (MICE)</li> <li>• Project Management Professional (PMP), International Management Institute, 2008.</li> </ul> <p>He understands the need to provide robust proven treatment solutions, but through his role as Technical Discipline Leader for Stantec Asia Pacific Civil Water, he is also familiar with new products and industry capabilities.</p> <p>Richard is also a member of Stantec's Water Safety Group and is proactive in implementing best practice for management of safe drinking water supplied throughout NZ. He also attended the WaterNZ Drinking Water Workshop in Hamilton in September 2017.</p> <p>Richard is skilled at focusing on critical problems and finding the best possible outcome. He is proud that all treatment plants that he has had an involvement with recently have been commissioned and operate in accordance with the design expectations.</p> <p>He has extensive experience managing contracts under FIDIC including Design and Build contracts.</p>	<p><b>Email:</b> Richard.Bennett@stantec.com</p> <p><b>Work Phone:</b> +64 3 4743096</p> <p><b>Mobile Phone:</b> +64 27 224 7198</p>
	<p><b>Andrew Wong</b> <b>Stantec NZ</b> <b>Water Engineer</b></p>	<p>Andrew is a Chartered Professional Engineer in water treatment for the Water group in Stantec's Dunedin office. He has technical experience with a wide variety of treatment processes in municipal water treatment. His qualifications include:</p> <ul style="list-style-type: none"> <li>• BSc, Chemical Engineering, Queen's University at Kingston, 2010</li> <li>• MSc, Civil Engineering, University of Waterloo, 2015</li> <li>• Professional Engineer, Professional Engineers Ontario</li> <li>• Professional Engineer, Association of Professional Engineers and Geoscientists of Alberta</li> <li>• Chartered Professional Engineer, Engineering New Zealand</li> </ul> <p>Typical projects have included process design, optioneering, operation, troubleshooting,</p>	<p><b>Email:</b> Andrew.Wong@stantec.com</p> <p><b>Work Phone:</b> +64 3 474 3968</p> <p><b>Mobile Phone:</b> +64 27 248 1427</p>

**CHATHAM ISLANDS COUNCIL  
WATER & WASTEWATER SCHEMES – SUMMARY REPORT JANUARY-JUNE 2021**

Photo	Name / Organisation / Role	Qualifications / Experience	Contact Details
		<p>optimization, construction monitoring, contract management, and peer reviews.</p> <p>Richard is a member of Stantec’s Water Safety Group and is proactive in implementing best practice for management of safe drinking water. He also attended at the Water NZ Drinking Water Workshop and presented at the Annual Conference in Hamilton in September 2019.</p>	
	<p><b>Phil Holt</b> <b>Fulton Hogan</b> <b>Contract Manager</b></p>	<p>To be confirmed</p>	<p><b>Email:</b> <a href="mailto:Philip.Holt@fultonhogan.com">Philip.Holt@fultonhogan.com</a> <b>Work Phone:</b> +64 3 305 0791</p>
	<p><b>Danny Whaitiri</b> <b>Self Employed</b></p> <ul style="list-style-type: none"> <li>• <b>Kaingarooa WTP – Main Operator</b></li> </ul>	<p>Danny has been the Kaingarooa WTP Operator since 2013. He previously operated the Kaingarooa Fish Factory Filtration Water Treatment Plant since 1981. Other relevant experience, qualifications and skills include:</p> <ul style="list-style-type: none"> <li>• Operates and maintains the Kaingarooa Electricity Board and diesel generation plant</li> <li>• Refrigeration technician who manages most of the refrigeration infrastructure on the Chatham Island</li> <li>• Certified Fitter and Turner Engineer</li> <li>• Apprenticeship training and Fitter and Turner at Bluff Engineering and Welding from 1969 to 1976</li> <li>• Served in the NZ Army for 3 months under National Service 31<sup>st</sup> (and last) intake in 1972</li> <li>• Involved in boat maintenance/engineering of various vessel in Chatham Islands</li> <li>• Filtec Training on water treatment plant operation in Nov 2017.</li> </ul>	<p><b>Email:</b> <a href="mailto:dandale@xtra.co.nz">dandale@xtra.co.nz</a> <b>Work Phone:</b> N/a <b>Home phone:</b> 03 305 0251 <b>Mobile Phone:</b> n/a</p>
	<p><b>Russell Phillips</b> <b>Chorus/Downer</b></p> <ul style="list-style-type: none"> <li>• <b>Waitangi WTP - Main Operator &amp; Sampler</b></li> <li>• <b>Kaingarooa WTP – Sampler</b></li> </ul>	<p>Russell has been the WTP and WWTP operator at Waitangi since it was built in 2004. Other relevant experience, qualifications and skills include:</p> <ul style="list-style-type: none"> <li>• Telecommunication technician for all the telecom work on the Chatham Islands including Chorus and Spark, Farmside satellite and their infrastructure</li> <li>• Traineeship at Telecom New Zealand from 1987 to 1990</li> <li>• St Johns First Aid Certificate</li> <li>• National Certificate in Water Reticulation Level (Service Person) Level 3 Wastewater, 2013</li> <li>• National Certificate in Water Reticulation Level (Service Person) Level 3 Water</li> </ul>	<p><b>Email:</b> <a href="mailto:Russell.Phillips@downer.co.nz">Russell.Phillips@downer.co.nz</a> <b>Work Phone:</b> 03 305 0055 <b>Home phone:</b> 03 305 0150 <b>Mobile Phone:</b> n/a</p>

**CHATHAM ISLANDS COUNCIL  
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Photo	Name / Organisation / Role	Qualifications / Experience	Contact Details
		<ul style="list-style-type: none"> <li>National Certificate in Telecommunications (Maintenance and Repair) Level 4, Mechanical, 2013</li> <li>Volunteer Fireman</li> <li>Filtec Training on water treatment plant operation in Nov 2017.</li> </ul>	
	<p><b>Bruce Winter</b> <b>Fulton Hogan</b> <b>Backup WTP Operator</b></p>	<p>Bruce has been the backup operator for the Waitangi WTP and Kaingaroa WTP operator since October 2016. Other relevant experience, qualifications and skills include:</p> <ul style="list-style-type: none"> <li>Factory/Compliance Manager of fish factory at Rekohu/Waitangi Seafood's between 2007 to 2011. Duties included staff coordination, organising and documentation of processing, storage and shipment of product, and also included management of the company's Risk Management Programme (MAF Food Safety)</li> <li>Experience in building and installing pivot irrigation units for PGG Plumbing and Irrigation, NZ between 2003-2004</li> <li>Various other experience as fuel tanker driver, bar manager, fishing boat deckhand and farmhand on dairy farm including skills in building, landscaping, chemical spraying, operating machinery and commercial fishing</li> <li>Qualified fire fighter volunteering at the Chatham Island's Fire Brigade and operating the New Zealand Fire Service electronic certification system. Passed NZFS courses in basic rural firefighting, breathing apparatus recertification, MVA pump rescue tender and Volunteer recruit Pre TMS</li> <li>Filtec Training on water treatment plant operation in Nov 2017.</li> </ul>	<p><b>Email:</b> <a href="mailto:brucewinter@hotmail.co.nz">brucewinter@hotmail.co.nz</a></p> <p><b>Work Phone:</b> 03 305 0682</p> <p><b>Home phone:</b> 03 305 0747</p> <p><b>Mobile Phone:</b> n/a</p>

## Training Activities

Name / Organisation / Role	Training Activity	Trainer	Date	Duration
<b>Kirsten Norquay</b> <b>Stantec NZ</b> <b>Water Engineer</b>	<ul style="list-style-type: none"> <li>IPWEA Conference</li> </ul>	IPWEA	December 2020	3 days
	<ul style="list-style-type: none"> <li>Water NZ Conference</li> </ul>	Water NZ	November 2020	3 days
	<ul style="list-style-type: none"> <li>Water NZ Conference</li> </ul>	Water NZ	19-21 Sept 2018	1 day
	<ul style="list-style-type: none"> <li>Water NZ Drinking Water Workshop</li> </ul>	Water NZ	19 Sept 2017	1 day
	<ul style="list-style-type: none"> <li>Borehead Security Training</li> </ul>	Stu Clarke	8 Sept 2017	4 hours
	<ul style="list-style-type: none"> <li>Site Safe Consultants Passport</li> </ul>	Site Safe	6 April 2016	1 hour
	<ul style="list-style-type: none"> <li>Ethics and Business Conduct for Global Employees</li> </ul>	Stantec	14 Dec 2017	1 hour
	<ul style="list-style-type: none"> <li>Process Control and Instrumentation Modules 1-3</li> <li>Safety in Design Training</li> </ul>	MWH	2015	3 hours
<b>Richard Bennett</b> <b>Stantec NZ</b> <b>Water Engineer</b>	<ul style="list-style-type: none"> <li>Water NZ Conference</li> </ul>	Water NZ	Sept 2015 & Sept 2017	3 days per conference
	<ul style="list-style-type: none"> <li>Water NZ Drinking Water Workshop</li> </ul>	Water NZ	19 Sept 2017	1 day
	<ul style="list-style-type: none"> <li>Borehead Security Training</li> </ul>	Stu Clarke	8 Sept 2017	5 hours
	<ul style="list-style-type: none"> <li>Ethics and Business Conduct for Global Employees</li> </ul>	Stantec	14 Dec 2017	1 hour
	<ul style="list-style-type: none"> <li>Safety in Design Training</li> </ul>	MWH	2015	1 day
<b>Andrew Wong</b> <b>Stantec NZ</b> <b>Water Engineer</b>	<ul style="list-style-type: none"> <li>2021 Ethics and Cybersecurity</li> </ul>	Stantec	14 July 2021	1 hour
	<ul style="list-style-type: none"> <li>Legionella Management and Treatment</li> </ul>	USEPA	28 January 2020	1 hour
	<ul style="list-style-type: none"> <li>Impact of COVID-19 on Water and Wastewater Utilities</li> </ul>	Stantec	7 May 2020	1 hour
	<ul style="list-style-type: none"> <li>Water NZ Drinking Water Workshop</li> </ul>	Water NZ	17 Sept 2019	8 hours
	<ul style="list-style-type: none"> <li>Water NZ Conference</li> </ul>	Water NZ	18-20 Sept 2019	3 days
	<ul style="list-style-type: none"> <li>Engineer's &amp; Contractor's Representative NZS 3910</li> </ul>	IPWEA	7-8 May 2019	2 days

**CHATHAM ISLANDS COUNCIL  
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Name / Organisation / Role	Training Activity	Trainer	Date	Duration
<b>Phil Holt</b> <b>Fulton Hogan</b> <b>Contract Manager</b>	To be confirmed			
<b>Danny Whitiri</b> <b>Self Employed</b>  <b>• Kaingaroa WTP – Main Operator</b>	<ul style="list-style-type: none"> <li>Filtec Onsite Training at Kaingaroa</li> </ul>	Filtec	7 Nov 2017	2 hours
<b>Russell Philips</b> <b>Chorus/Downer</b>  <b>• Waitangi WTP - Main Operator &amp; Sampler</b>  <b>• Kaingaroa WTP – Sampler</b>	<ul style="list-style-type: none"> <li>Filtec Onsite Training at Waitangi and Kaingaroa WTPs</li> <li>NZQA unit 6401 and 6402 – Provide First Aid and Provide Basic Life Support</li> <li>NZQA Unit 5627 Operate as a Traffic Controller (TC) for low volume and Level 1 roads</li> <li>National Certificate in Water Reticulation (Service Person)Level 3 Wastewater and also Level 3 Water</li> </ul>	Filtec  NZQA  NZQA  NZQA	7 & 8 Nov 2017  21 Jan 2017  1 Nov 2015  18 June 2013	2 hours  Not specified  Not specified  Not specified
<b>Bruce Winter</b> <b>Fulton Hogan</b> <b>Backup Operator</b>	<ul style="list-style-type: none"> <li>Filtec Onsite Training at Waitangi and Kaingaroa WTPs</li> <li>Growsafe Introductory Certificate – for Management of Agrichemicals</li> <li>St Johns First Aid Recertification</li> <li>Accelerated Business Growth Programme, NZ Trade and Enterprise</li> <li>NZQA unit 3288 - Load Water and Additives for Aerial Operations and NZQA 20388 – Work Safely with Aircraft at Emergency Incidents</li> <li>Work Safely in the Construction Industry</li> </ul>	Filtec  NZ Agrichemical Education Trust  St John  Aoraki Development Trust  PF Olsen Ltd  Elmo Accredited  NZ Fire	7 & 8 Nov 2017  19 Sep 2017  2 Sept 2017  July 2012  6 Sept 2009  2012  9/5/2009	2 hours  3 hours  8 hours  Not known  6 hours  Not known

**CHATHAM ISLANDS COUNCIL  
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Name / Organisation / Role	Training Activity	Trainer	Date	Duration
	<ul style="list-style-type: none"> <li>• MVA PRT Rev4602 firefighting qualification</li> <li>• TAPs Qualified Firefighter</li> </ul>	Service  NZ Fire Service	7-10 Sept 2007	1 day  3 days

## **Appendix G SUPPORTING REPORTS**

This Appendix includes:

- Schedule 1 of MoH Funding Agreement Variation. CIC has a copy of the full funding agreement
- TM-1 – Kaingaroa Water Intake Extension
- TM-2 – Kaingaroa WTP Upgrade
- TM-3 – Waitangi WTP Upgrade
- TM-4 – MPA Bore Investigations
- TM-5 – Kaingaroa and Waitangi WTP Telemetry and Data Reporting Upgrade
- TM-6 – Waitangi WWTP Drone Survey

## Variation to Agreement

between

**HER MAJESTY THE QUEEN IN RIGHT OF HER  
GOVERNMENT IN NEW ZEALAND  
(acting by and through the Ministry of Health)**



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Dunedin 9058  
Ph: 03-474 8040

Contact:

Sarah Burgess (Wellington)

and

## Chatham Islands Council

**Agreement for Sanitary Works Subsidy for Chatham  
Islands Water and Wastewater Projects**

PO Box 24  
Chatham Islands

Ph: 03-305 0033

Contact:

Owen Pickels

## CONTENTS OF THIS AGREEMENT

<b>A:</b>	<b>SUMMARY</b>	<b>2</b>
<b>B:</b>	<b>PROVIDER SPECIFIC TERMS AND CONDITIONS</b>	<b>3</b>

# A: SUMMARY

**A1 Definitions**

- a. "we", "us", "our" means Her Majesty the Queen in Right of Her Government in New Zealand (acting by and through the Ministry of Health (MoH))
- b. "you", "your" means Chatham Islands Council
- c. "either of us" means either we or you
- d. "both of us" means both we and you

**A2 The Agreement**

In 2020 both of us entered into a Health and Disability Services Agreement (the Agreement). The Agreement commenced on 3 August 2020 and ends on 30 June 2021 and is numbered (923082 / 365995/00).

**A3 Variation**

This is the 01 variation to the Agreement and extends the Agreement term and changes the Agreement price. This variation to the Agreement begins on 01 July 2021 and ends on 30 June 2022.

**A4 Section B**

The attached Section B includes all of the adjustments to this Agreement as a result of this variation.

**A5 Remainder of Agreement**

The remaining terms and conditions of the Agreement are confirmed in all respects except for the variations as set out in this document.

**A6 Signatures**

Please confirm your acceptance of the Agreement by signing where indicated below.

For Her Majesty the Queen:

For Chatham Islands Council:

Sally C (signature)

Owen Pickles (signature)

Name Sally Cullbert

Name Owen Pickles

Position Manager Environmental & Border Health

Position Chief Executive Officer

Date 23 June 2021

Date 23 June 2021

## B: PROVIDER SPECIFIC TERMS AND CONDITIONS

**B1** It is agreed that the following details apply to this Variation

Legal Entity Name	Chatham Islands Council
Legal Entity Number	923082
Contract Number	365995 / 01
Variation Commencement Date	01 July 2021
Variation End Date	30 June 2022

**B2** Details of all purchase units which apply to this Variation

Purchase Unit (PU ID)	GST Rate (%)	Payment Type
MOH8129 Waitangi WTP New UV unit (1 May 2021 to 31 July 2021)	15	CMS
MOH8129 Confirm feasibility of MPA bore for Waitangi (24 December 2020 to 31 January 2021)	15	CMS
MOH8129 Extend Kaingaroa WTP intake into deeper water (1 May 2021 to 30 April 2022)	15	CMS
MOH8129 Organics and chlorate removal for Kaingaroa WTP (1 May 2021 to 31 July 2021)	15	CMS
MOH8129 Repairs to Waitangi WWTP RBC shaft (24 December 2020 to 31 January 2021)	15	CMS
MOH8129 WWTP inlet feed pump check valves (24 December 2020 to 31 January 2021)	15	CMS

<b>Client:</b> Chatham Islands Council	<b>Stantec-TM- 1a</b>		
<b>Project:</b> Kaingaroa WTP Intake	<b>Date issued:</b> 2 March 2021		
<b>Project Task:</b> Extent Intake Pipe into Deeper Water	<b>Prepared by:</b> Annika Grant		
<b>Subject:</b> Specifications for Supply and Installation of Pipework	<b>Reviewed by:</b> Kirsten Norquay		
	<b>Approved by:</b> Richard Bennett		

*This Technical Memo has been prepared for the benefit of Chatham Islands Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.*

*This disclaimer shall apply notwithstanding that the Technical Memo may be made available to Chatham Islands Council and other persons for an application for permission or approval or to fulfil a legal requirement.*

## 1 Introduction & Purpose

The current water intake for Kaingaroa WTP from Lake Rangitai is installed in a shallow, silty part of the lake, approximately 150m from the lake shore. The water level of Lake Rangitai recedes during summer months and times of low rainfall leaving the water intake location dry. Therefore, a trench was dug from deeper water of the lake to the water intake location to ensure year-round water supply. The raw water turbidity is high at times and the trench requires regular deepening using a digger to avoid siltation. To improve water quality, specifically raw water turbidity, and to ensure year-round water supply to the community, it is proposed to relocate the water intake into deeper water by lengthening the water intake pipe.

The purpose of this memo is to specify the equipment and work required to extend the water intake into deeper water of Lake Rangitai to reduce the turbidity in the raw water. The existing suction pipe requires an extension of about 600m through shallow water into the deeper part of Lake Rangitai.

This memo is written on the basis that Fulton Hogan (the maintenance contractor for CIC) is carrying out the physical works.

## 2 Current Intake and Proposed Changes

### 2.1 Current Intake

Currently, the raw water pump station is located on the shore of Lake Rangitai. The pump station has no mains power connection, and the water pump is powered via a diesel generator and a hydraulic system. The water pump sucks raw water from the water intake and pumps the water approximately 8km to Kaingaroa WTP. It is proposed to extend the suction pipe from the current water intake location by approximately 600m into deeper water.

The pump station location is not altered with the proposed works.

The existing suction pipe is a grey DN90 uPVC with an internal diameter of 80mm which is laid above ground and secured to the silty surface using wooden stakes. At the end of the uPVC pipe, a check valve is connected via a flange connection. A black flexible steel reinforced rubber hose is attached to the other side of the check valve via flange connection. A floating intake structure with a submerged stainless-steel pipe is attached to the flexible hose.

### 2.2 Proposed Changes

To extend the intake into deeper water, the exiting uPVC pipe will be extended by joining Iplex Rural Black PE100 DN90 the existing uPVC pipe using Iplex Plasson Line 7 fittings. The additional PE100 pipe length required is approximately 600m and is joined in the deeper water to the relocated existing floating intake structure.

The PE100 pipe will be joint using Iplex Plasson Line 7 fittings to provide strong, durable and water-tight connections that will not dislodge through movement of the pipe. The existing uPVC will be connected to the new PE100 pipe using a solvent cement glued Iplex Novakey threaded socket which can be attached to a threaded Plasson Line 7 fitting. Immediately after this joint, a concrete pipe restraint will be installed to avoid any movement at the joint or along the existing uPVC pipe.

A blank capped stainless-steel ball valve will be installed close to the concrete restraint for filling of the pipe during commissioning. There is an existing venting point at the high point at the pump station location.

At the transition into deeper water on the lake edge, a stainless-steel check valve and a Plasson Line 7 coupling will be installed to allow for disconnection of the floating section of the pipe and the intake structure for maintenance purposes.

A new stainless-steel check valve will be installed directly at the floating intake structure via a flange welded to the existing stainless-steel pipe. The floating section of the PE100 pipe in deeper water will float by itself due to the specific gravity of PE100 pipe being less than water. The intake structure requires an anchor to secure the intake into place.

As part of the pipe extension, an upgrade of the raw water pump, motor and hydraulic oil pump is required. The existing diesel generator and the oil reservoir will remain unchanged. The new pump system will be transferring the same flow as the existing, i.e. 7.2 m<sup>3</sup>/hr. Pump run-hours will be required to increase to meet rising future water demand.

The new pump system will be longer than the existing. The new pump system will fit on the existing concrete plinth but a new steel frame as support will be required. The frame is to be manufactured by Futon Hogan to suit the new pump and motor system.

The aerial photograph in Figure 1 shows the current intake location and the approximate alignment of the intake pipe extension into deeper water.



Figure 1: Intake Pipe Extension (Google Earth)

The photograph in Figure 2 shows the current water intake arrangement within Lake Rangitai.



Figure 2: Current Water Intake Arrangement within Lake Rangitai

### 3 Work Required

Work required includes the supply, installation, pressure testing (where applicable) and commissioning of the pipework and fittings associated with the modifications of the intake location. It also includes the supply installation and commissioning of the new pump system.

The detailed work items are listed in Attachments A to E.

Specifications for the installation are included in Attachment F.

## Attachment A - Work Required

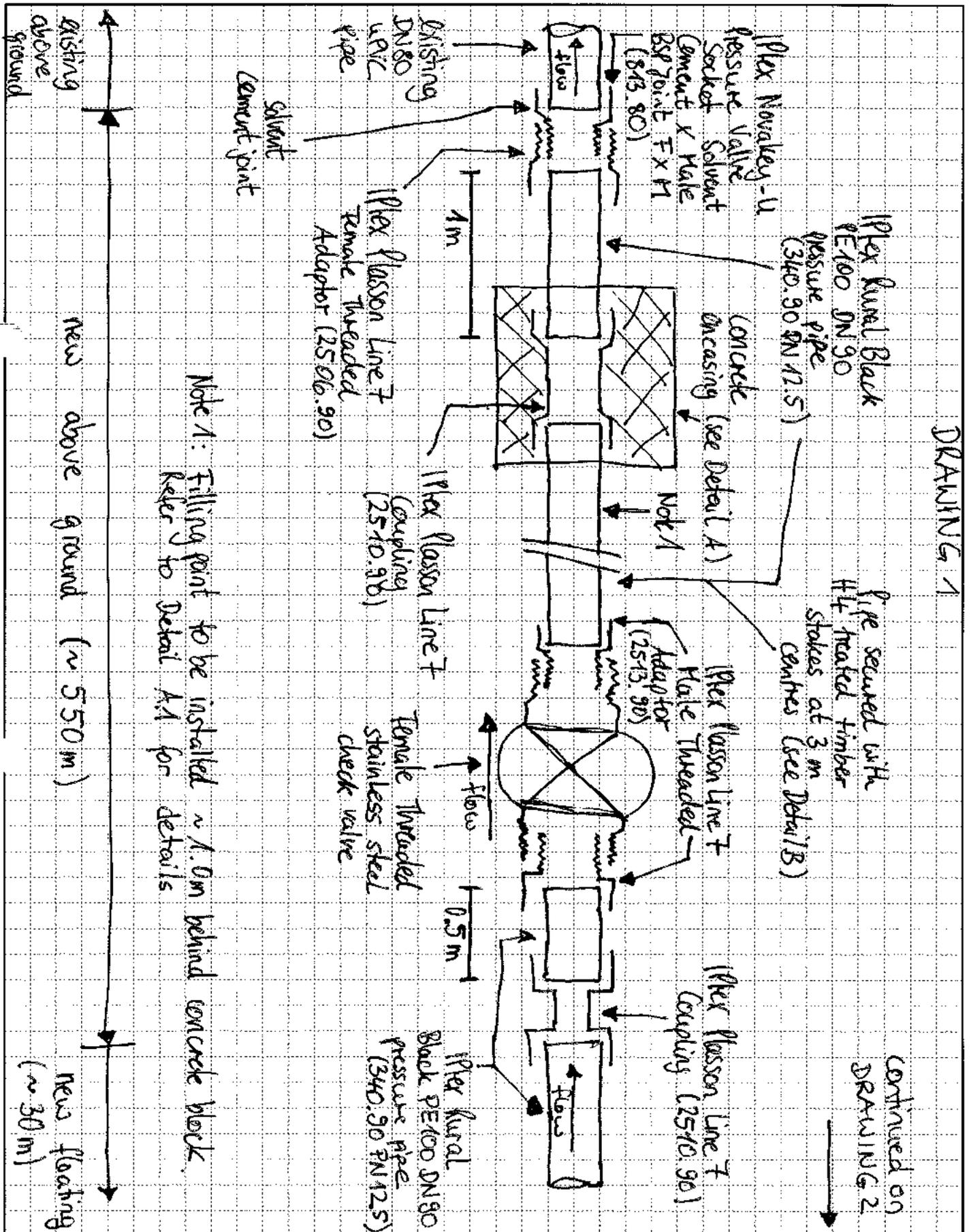
Table A-1 Mechanical Work

	Item	Description
1	Pipe extension	Supply and install ~600m of PE100 pipe above ground using Plasson Line 7 fittings and join onto existing uPVC pipe at the current water intake location
2	Pipe restraint	Fix PE100 pipe to lake floor along shallow parts with crossed H4 treated, pointed wooden stakes at ~3.0m spacing (same as existing pipe was fixed)
3	Concrete pipe restraint	Supply and install 4 x 1.8m pointed 150Ø H5 treated timber posts with 4 x R12 stirrups encased in concrete around coupling in PE100 pipe close to joint with uPVC pipe to protect rubber rings in uPVC from movement
4	Check valves	Supply and install two new female threaded stainless-steel check valve at the joint of PE100 pipe to intake structure and on transition between floating and supported PE100 pipe.
5	Ball valve	Supply and install new ball valve on threaded tee in PE100 pipe for priming of the line prior to commissioning
6	Relocation of existing intake structure	De-attach existing intake structure from uPVC pipe and remove steel wire reinforced hose and check valve. Weld stainless steel flange to stainless-steel pipe at intake structure. Connect flange to threaded flange connected to female threaded stainless-steel check valve on PE100 pipe
7	Anchor intake structure	Anchor intake structure to lake floor in deeper water – allowing for expected water level fluctuations
8	Pump Frame	Manufacture frame for new pump (approximate length of pump and motor system = 1,345mm) (Refer to pump dimensions in Attachment E)
9	Pump, hydraulic motor and oil pump	Supply and install new raw water pump, hydraulic motor and oil pump (supplied by Pump & Valve – refer to Attachment E for details)

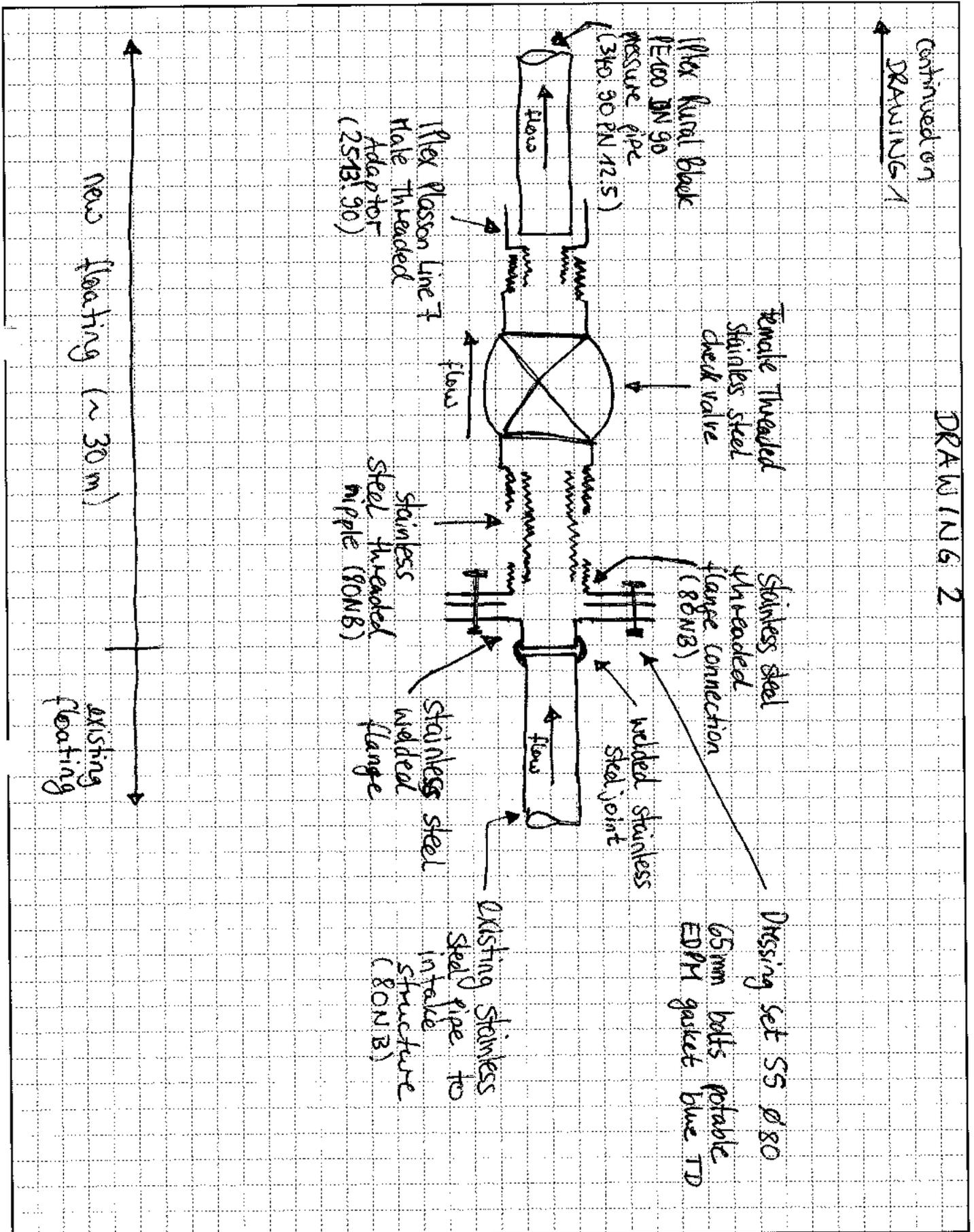
## Attachment B – Parts List

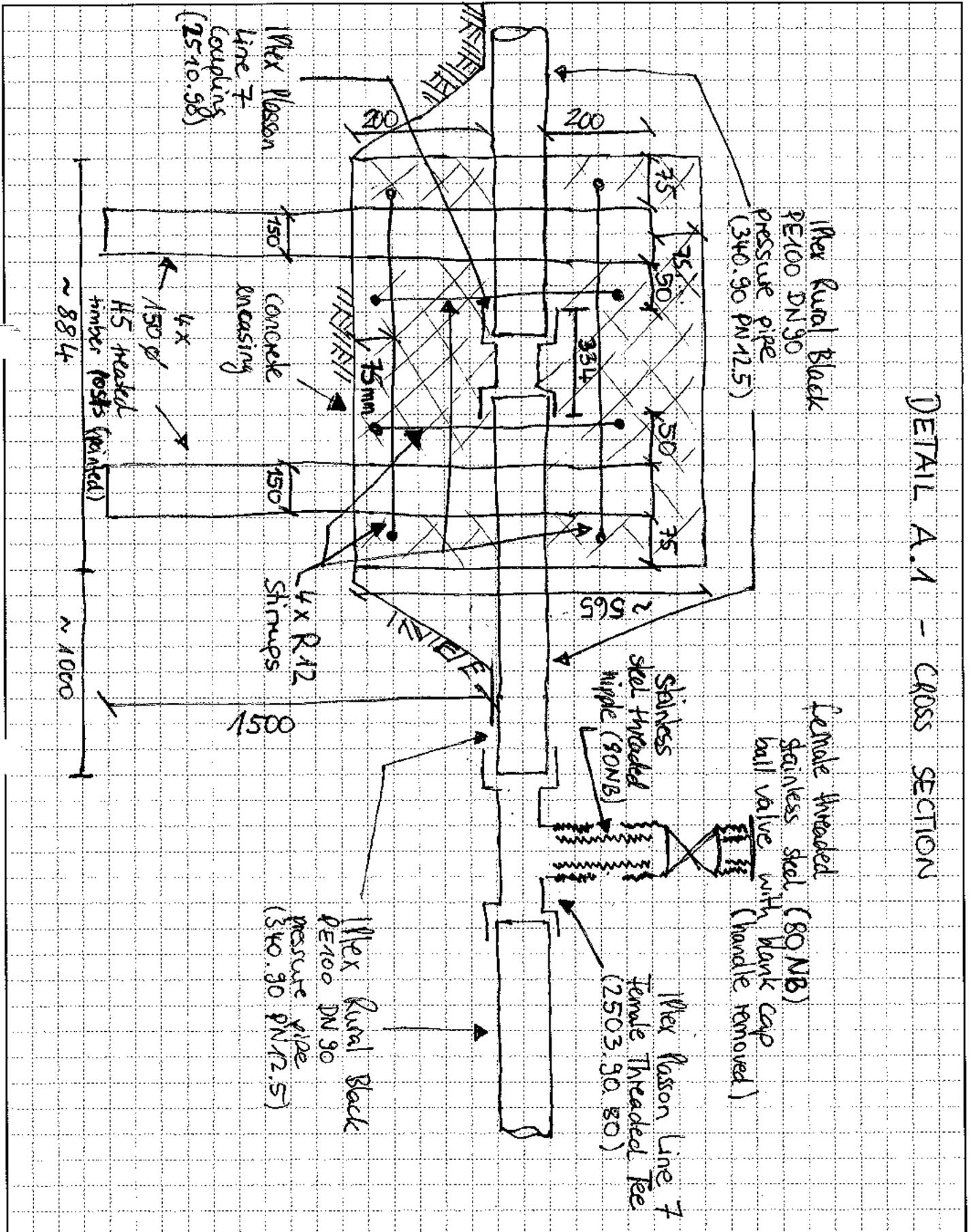
	Order Code	Description	Quantity
1	340.90PN12.5.100	Iplex rural black PE100 pressure pipe (100m coil length)	600m (6 coils @ 100m)
2	ODF2510.90	Iplex Plasson Line 7 coupling	7
3	ODF2513.90	Iplex Plasson Line 7 male threaded adaptor	3
4	ODF2506.90	Iplex Plasson Line 7 female threaded adaptor	1
5	P-ANCP	80NB SS BSP 3pc Spring Check 316	2
6	P-ANCP	80NB SS BSP Flange TD	1
7	P-ANCP	80NB SS BPS Hex Nipple 316	2
8	P-ANCP	80NB x 10 SS Pipe Flange	1
9	2503.90.80	Iplex Plasson Line 7 Female Threaded Tee	1
10		80NB SS BSP 316 Ball Valve with blank cap	1
11	DSSS080P	Dressing Set SS 80Ø 65mm Bolts Potable EDPM Gasket Blue TD	2
12	813.80	Iplex Novakey-U Pressure Valve Socket Solvent Cement x Male BSP Joint (F&M)	1
13		Solvent cement glue	1 kit
14		50 x 50mm pointed wooden stakes H4 tanalised – min.1.0m long	~400 (2 each 3.0m)
15		Anchor for floating intake structure	1
16		M6 x 120 stainless steel bolts	~200
17		150mm diameter pointed H5 treated timber posts – 1.8m long	4
19		RMCB562R2CD1P Roto Pump (to be supplied by Pump & Valve)	1
20	Motor:MSO-101-1700-009 Pump: MSP-1GP10010241	1x H Series Hydraulic Motor and 1SP Oil Pump (4.2cc, 58Nm, 360rpm (to be supplied by Pump & Valve)	1
21		DN80 uPVC pipe to extent existing for connection to new pump	~1m

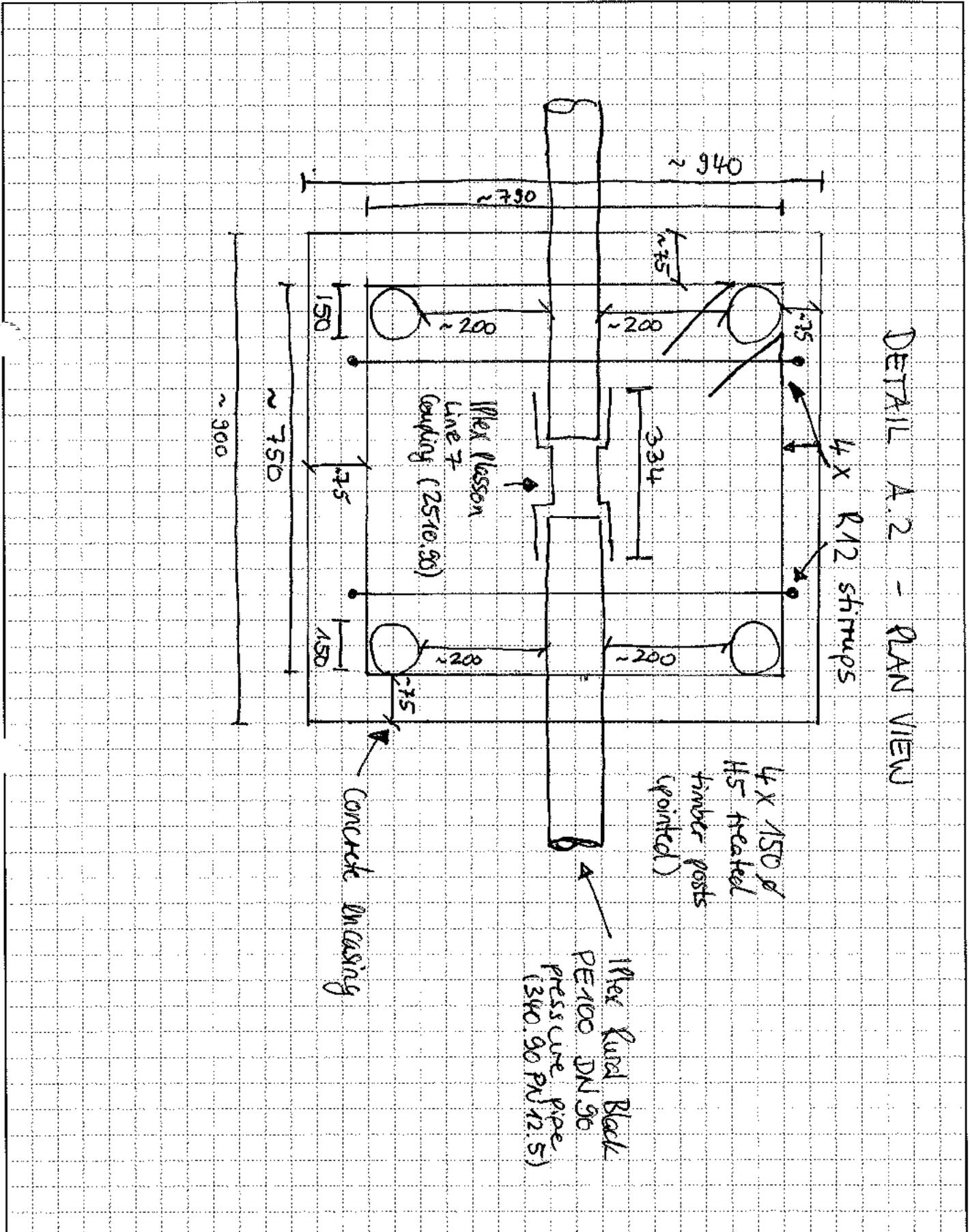
Attachment C – Proposed Works Sketches



Note 1: Filling joint to be installed ~1.0m behind concrete block. Refer to Detail A.1 for details.







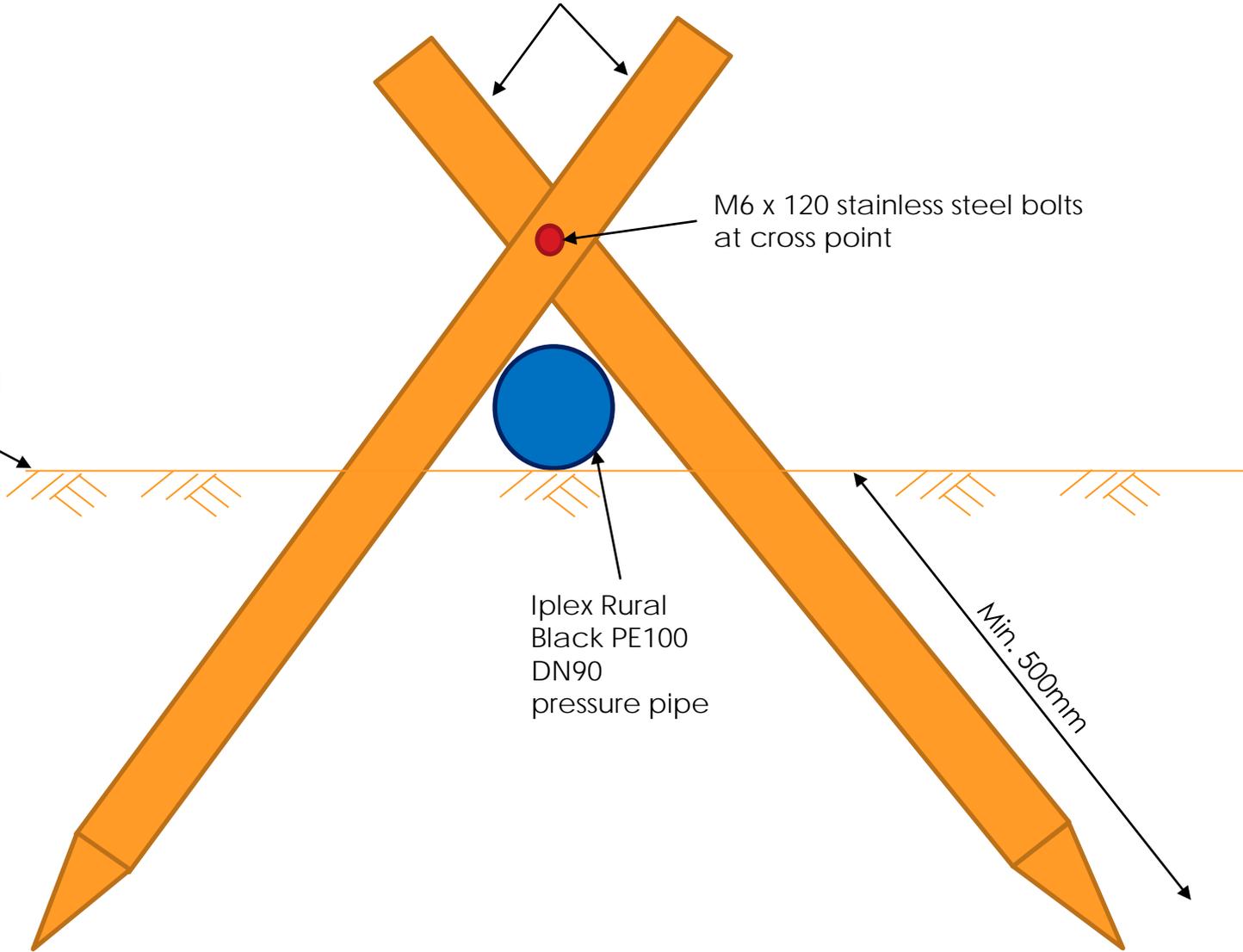
50 x 50mm pointed wooden stakes H4  
tanalised – min.1.0m long

M6 x 120 stainless steel bolts  
at cross point

Ground level

Iplex Rural  
Black PE100  
DN90  
pressure pipe

Min. 500mm



Attachment D – Plasson Line 7 Product Assembly Guide & How I Solvent Cement Joint  
PVC Pipes

## Plasson Line 7 mechanical compression fittings

PLASSON Line 7 fittings are an internationally recognised range of pressure rated compression fittings, for use with Iplex BLUELINE™, GREENLINE™, REDLINE™, RURAL BLACK™, BLACKLINE™ PN16 and Iplex EFFLUENT PIPE. PLASSON Mechanical fittings are rated to PN16 except as listed in the tables below. PLASSON Line 7 fittings can also be used on 20mm or 25mm (Nominal ID size) Iplex ALKATHENE™ low density polyethylene pipe. Plasson fittings offer effective joint security for metric OD polyethylene pipe and form a seal without distorting the pipe or restricting the pipe bore. A large range of threaded fittings and accessories make PLASSON a versatile product range and allow compatibility with other pipe materials.

**See the Iplex Product Catalogue in the Resources section of the Iplex NZ Website for our complete Plasson Fittings Range**



### Plasson "Line 7" Compression Fittings (20 - 110mm)

#### 90 Elbow°



Code	Size mm
2501.20	20
2501.25	25
2501.32	32
2501.40	40
2501.50	50
2501.63	63
2501.90	90
2501.110	110

#### Female Threaded Adapter



90mm: 10 Bar  
110mm: 6 Bar

Code	Size mm x BSP
2506.20	20 x 1/2"
2506.25	25 X 3/4"
2506.32	32 x 1"
2506.40	40 x 1 1/4"
2506.50	50 x 1 1/2"
2506.63	63 x 2"
2506.75.65	75 x 2 1/2"
2506.90	90 x 3"
2506.110	110 x 4"

#### Slip Coupling



Code	Size mm
2511.20	20
2511.25	25
2511.32	32
2511.40	40
2511.50	50
2511.63	63

Designed for retrofit "slip" assembly into an existing pipeline

#### Slip Tee 90°



Code	Size mm
2502.20	20
2502.25	25
2502.32	32
2502.40	40
2502.50	50
2502.63	63

40 - 63mm: 12.5 Bar

#### Male Threaded Elbow 90°



Code	Size mm x BSP
2507.20	20 x 1/2"
2507.25	25 X 3/4"
2507.32	32 x 1"
2507.40	40 x 1 1/4"
2507.50	50 x 1 1/2"
2507.63	63 x 2"

#### Universal Coupling



Code	Size mm
2512.25x15-22	20 x 15 to 22
2512.25x20-27	25 x 20 to 27
2512.25x27-35	25 x 27 to 35
2512.32x27-35	32 x 27 to 35
2512.50x35-50	50 x 35 to 50

50mm: 10 Bar

Adapts "metric OD" PE pipe to PVC, steel, copper and imperial OD LDPE or HDPE, within the OD size ranges above

#### Female Threaded Tee



Code	Size mm x BSP
2503.20.15	20 x 1/2"
2503.25.20	25 X 3/4"
2503.32.25	32 x 1"
2503.40.32	40 x 1 1/4"
2503.50.40	50 x 1 1/2"
2503.63.50	63 x 2"
2503.75.65	75 x 2 1/2"
2503.90.80	90 x 3"
2503.110.100	100 x 4"

90mm: 10 Bar  
110mm: 6 Bar

#### Female Threaded Elbow 90°



Code	Size mm x BSP
2508.20	20 x 1/2"
2508.25	25 X 3/4"
2508.32	32 x 1"
2508.40	40 x 1 1/4"
2508.50	50 x 1 1/2"
2508.63	63 x 2"

#### Wingback Female Adapter



Code	Size mm x BSP
2509.20	20 x 1/2"
2509.25	25 X 3/4"

#### Male Threaded Adapter



Code	Size mm x BSP
2513.20	20 x 1/2"
2513.25.15	25 X 1/2"
2513.25	25 x 3/4"
2513.32	32 x 1"
2513.40	40 x 1 1/4"
2513.50	50 x 1 1/2"
2513.63	63 x 2"
2513.75.65	75 x 2 1/2"
2513.90	90 x 3"
2513.110	110 x 4"

#### Tee 90°



Code	Size mm
2504.20	20
2504.25	25
2504.32	32
2504.40	40
2504.50	50
2504.63	63
2504.90	90
2504.110	110

#### Coupling



Code	Size mm
2510.20	20
2510.25	25
2510.32	32
2510.40	40
2510.50	50
2510.63	63
2510.75	75
2510.90	90
2510.110	110

#### Female Threaded Branch Saddle



25 - 63mm: 12.5 Bar  
75 - 110mm: 10 Bar

Code	Size mm x BSP
2519.25.20	25 x 3/4"
2519.32.25	32 X 1"
2519.40.25	40 x 1"
2519.50.15	50 x 1/2"
2519.50.20	50 x 3/4"
2519.50.25	50 x 1"
2519.50.32	50 x 1 1/4"
2519.63.15	63 x 1/2"
2519.63.20	63 x 3/4"
2519.63.25	63 x 1"
2519.63.32	63 x 1 1/4"
2519.63.40	63 x 1 1/2"
2519.75.25	75 x 1"
2519.75.50	75 x 2"
2519.90.25	90 x 1"
2519.90.50	90 x 2"
2519.110.25	110 x 1"
2519.110.32	110 x 1 1/4"
2519.110.40	110 x 1 1/2"

#### Reducing Tee 90°



Code	Size mm
2505.25.20	25 x 20
2505.32.25	32 x 25
2505.40.32	40 x 32
2505.50.40	50 x 40
2505.63.50	63 x 50
2505.75.63	75 x 63

#### Universal Slip Repair Coupling



Iplex Code	Size mm x mm
3511.24-28	24 x 28mm
3511.31-35	31 x 35mm
3511.40-43	40 x 43mm
3511.48-51	48 x 51mm
3511.60-64	60 x 64mm

### Reducing Coupling



Code	Size mm
2523.25.20	25 x 20
2523.32.25	32 x 25
2523.40.32	40 x 32
2523.50.40	50 x 40
2523.63.50	63 x 50
2523.75.63	75 x 63
2523.90.75	90 x 75
2523.110.90	110 x 90

### Reducing Set



110mm x 75mm: 10 Bar  
110mm x 90mm: 10 Bar

Reduces the size of any Plasson Line 7 mechanical socket

Code	Size mm
2524.25.20	25 x 20
2524.32.20	32 x 25
2524.32.25	40 x 32
2524.40.25	50 x 40
2524.40.32	63 x 50
2524.50.25	75 x 63
2524.50.32	90 x 75
2524.50.40	50 x 40
2524.63.25	63 x 25
2524.63.32	63 x 32
2524.63.40	63 x 40
2524.63.50	63 x 50
2524.75.63	75 x 63
2524.110.63	110 x 63
2524.110.75	110 x 75
2524.110.90	110 x 90

### Shouldered Adapter



Code	Size mm
2525.63	63
2525.110	110

### End Plug



Code	Size mm
2531.20	20
2531.25	25
2531.32	32
2531.40	40
2531.50	50
2531.63	63
2531.75	75
2531.90	90
2531.110	110

### Barrel Union Threaded Male Adapter



75mm: 12 Bar

Code	Size mm x BSP
2572.25.15	25 x 1/2"
2572.25.20	25 X 3/4"
2572.32.15	32 x 1/2"
2572.32.20	32 x 3/4"
2572.32.25	32 x 1"
2572.40.25	40 x 1"
2572.40.32	40 x 1 1/4"
2572.40.40	40 x 1 1/4"
2572.50.25	50 x 1"
2572.50.32	50 x 1 1/4"
2572.50.40	50 x 1 1/4"
2572.50.50	50 x 2"
2572.63.25	63 x 1"
2572.63.32	63 x 1 1/4"
2572.63.40	63 x 1 1/4"
2572.63.50	63 x 2"
2572.63.65	63 x 2 1/2"
2572.75.40	75 x 1 1/4"
2572.75.50	75 x 2"
2572.75.65	75 x 2 1/2"
2572.75.80	75 x 3"

### Plug Adapter



12.5 Bar

Code	Size mm
2530.20	20
2530.25	25
2530.32	32
2530.40	40
2530.50	50
2530.63	63

### Modular Adapter



Code	Size mm
2579.20	20
2579.25	25
2579.32	32
2579.40	40
2579.50	50
2579.63	63

### Wrench



Code	Size mm
2550.40.75	40 to 75
2550.63.125	63 to 125

Designed for use with Plasson Line 7 fittings only

### Chamfering Tool



Code	Size mm
2555.20.63	25 to 63

## Plasson Threaded Fittings

### Threaded Nipple



16 Bar

Code	Size BSP
2516.15	1/2"
2516.20	3/4"
2516.25	1"
2516.32	1 1/4"
2516.40	1 1/2"
2516.50	2"

### Threaded Tee



1/2" - 1": 16 Bar  
1 1/4" - 2": 10 Bar

Code	Size BSP
2514.15	1/2"
2514.20	3/4"
2514.25	1"
2514.32	1 1/4"
2514.40	1 1/2"
2514.50	2"

### Threaded Reducing Nipple



16 Bar

Code	Size mm
2518.20.15	3/4" x 1/2"
2518.25.15	1" x 1/2"
2518.25.20	1" x 3/4"
2518.32.15	1 1/4" x 1/2"
2518.32.20	1 1/4" x 3/4"
2518.32.25	1 1/4" x 1"
2518.40.15	1 1/2" x 1 1/2"
2518.40.20	1 1/2" x 1 1/4"
2518.40.25	1 1/2" x 1"
2518.40.32	1 1/2" x 1 1/4"
2518.50.15	2" x 1 1/2"
2518.50.20	2" x 3/4"
2518.50.25	2" x 1"
2518.50.32	2" x 1 1/4"
2518.50.40	2" x 1 1/2"

### Threaded Reducing Bush



1/2" - 1": 16 Bar  
1 1/4" - 4": 10 Bar

Code	Size mm
2517.20.15	3/4" x 1/2"
2517.25.15	1" x 1/2"
2517.25.20	1" x 3/4"
2517.32.15	1 1/4" x 1/2"
2517.32.20	1 1/4" x 3/4"
2517.32.25	1 1/4" x 1"
2517.40.15	1 1/2" x 1 1/2"
2517.40.20	1 1/2" x 3/4"
2517.40.25	1 1/2" x 1"
2517.40.32	1 1/2" x 1 1/4"
2517.50.15	2" x 1/2"
2517.50.20	2" x 3/4"
2517.50.25	2" x 1"
2517.50.32	2" x 1 1/4"
2517.50.40	2" x 1 1/2"
2517.65.50	2 1/2" x 2"
2517.80.25	3" x 1"
2517.80.32	3" x 1 1/4"
2517.80.40	3" x 1 1/2"
2517.80.50	3" x 2"
2517.80.65	3" x 2 1/2"
2517.100.50	4" x 2"
2517.100.80	4" x 3"

### Threaded Elbow



1/2" - 1": 16 Bar  
1 1/4" - 2": 10 Bar

Code	Size BSP
2515.15	1/2"
2515.20	3/4"
2515.25	1"
2515.32	1 1/4"
2515.40	1 1/2"
2515.50	2"

### Threaded Socket



1/2" - 1": 16 Bar  
1 1/4" - 2": 10 Bar

Code	Size BSP
2521.15	1/2"
2521.20	3/4"
2521.25	1"
2521.32	1 1/4"
2521.40	1 1/2"
2521.50	2"

### Threaded Plug



16 Bar

Code	Size BSP
2530T.15	1/2"
2530T.20	3/4"
2530T.25	1"
2530T.32	1 1/4"
2530T.40	1 1/2"
2530T.50	2"

# Valves

		Order Number	Size (mm)	
<b>Quick Coupling Valve</b> (10 Bar Rating)		2711	20 (¾")	<ul style="list-style-type: none"> <li>instant on/off water supply valve</li> <li>compatible with GREENLINE, REDLINE™ and ALKATHENE™ pipes</li> <li>ideal for wash down areas and filling spray tanks</li> </ul>
		2712	25 (1")	
<b>Valve</b> (10 Bar Rating)		2731	20 (¾")	<ul style="list-style-type: none"> <li>economical BSP female threaded valve</li> <li>small size and rugged polypropylene body make it ideal for use around the farm.</li> </ul>
		2732	25 (1")	
<b>Riser Key</b> (10 Bar Rating)		2713 (Used with 2712)		<ul style="list-style-type: none"> <li>bayonet type fitting used on end of hose to turn on PLASSON quick coupling valves</li> </ul>
<b>Compression Stopcock</b> (16 Bar Rating)		2741.20	20	<ul style="list-style-type: none"> <li>direct connection to GREENLINE, REDLINE™, RURAL BLACK and 20mm and 25mm ALKATHENE™ pipe</li> <li>no more leaking threaded joints</li> <li>cost effective – do away with threaded adapters, to connect valve to the pipe.</li> </ul>
		2741.25	25	
		2741.32	32	
<b>Angle Seat Valve</b> (8 Bar Rating)		2735.32	32 (1¼")	<ul style="list-style-type: none"> <li>economical BSP male threaded valve</li> <li>rugged polypropylene construction to take the knocks</li> <li>full-bore flow performance when the valve is open</li> </ul>
		2735.40	40 (1½")	
		2735.50	50 (2")	
<b>Check Valve Insert</b> (16 Bar Rating)		2720.25	25	<ul style="list-style-type: none"> <li>check valve designed to be inserted into 25mm PLASSON fittings</li> <li>compatible with REDLINE™, RURAL BLACK, BLACKLINE PN16 and 20mm ALKATHENE™ pipes</li> <li>used for backflow protection.</li> </ul>
<b>Valve Box</b>		193*	155 x 200 x 200 high	<ul style="list-style-type: none"> <li>house and protect valves and meters</li> <li>tough polyethylene construction</li> <li>snap on lid for easy access</li> <li>colour coded lids for asset identification</li> </ul> <p><b>Notes:</b> *Valve box only - no lid **Green lid *** lue lid</p>
		193LIDGR**	155 x 200	
		193LIDBL***	155 x 200	

## Technical Specifications

### Fittings

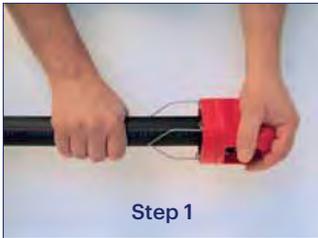
- Body - polypropylene - food grade polymer
- Backing nut - polypropylene - food grade polymer
- Split ring - acetyl
- 'O' ring - nitrile rubber (70 Shore A.NBR)

### Saddles

- Reinforcing ring on BSP threaded outlets - stainless steel
- Nuts - stainless steel
- Bolts - stainless steel
- Threads - B.S.P. standard



## Plasson Line 7 Fittings (20mm - 63mm)- Assembly Instructions



### General Instructions

Follow these assembly Instructions for a secure, leakproof connection to last a lifetime.

- Ensure the pipe end to be inserted into the fitting, and the fitting itself, are both totally free of dirt, grit, scratches and any other damage
- **Do not overtighten the Backing Nut** when closing. NEVER use wrenches with handle lengths longer than 22cm – excessive torque during tightening can spread the Backing Nut cone and result in pullouts.
- If fittings are reused, ensure the Split Grip Ring is sharp and can bite into the pipe to avoid pull outs. Alternatively replace the Split Grip Ring.

**Note:** Use PTFE tape for all threaded connections.

**1.** Cut the pipe square and remove burrs. It is good trade practice to chamfer (with a file or Plasson 2555 chamfering tool) and lubricate the pipe ends. (use Medlube or an approved equivalent). Chamfering and lubrication will ease insertion, particularly for sizes DN 40, DN 50 and DN 63, however these steps are optional.

**2.** Undo the nut up to the last thread. **Do not remove the Backing Nut** from the fitting body.

**3.** Twist the pipe into the fitting through the Backing Nut and through the Split Grip Ring until it meets the first resistance – pushing against the captive O-ring. Then push and twist the pipe **through and past the O-ring** until it stops at the pipe stop inside the fitting – the final stop.

**4.** Firmly hand tighten the Backing Nut. Use a Plasson "C-Ring" wrench for a further half turn past hand tight for final tightening of fittings, for diameters DN40, DN 50 and DN 63. The full hydraulic seal is achieved when the pipe passes through the O-ring. Nut tightening is only to achieve pullout resistance – the hydraulic seal is automatically created when the pipe is pushed past the captive O-ring.

## Technical Specifications

### Fittings

- Body - polypropylene - food grade polymer
- Backing nut - polypropylene - food grade polymer
- Split ring - acetyl
- 'O' ring - nitrile rubber (70 Shore A.NBR)

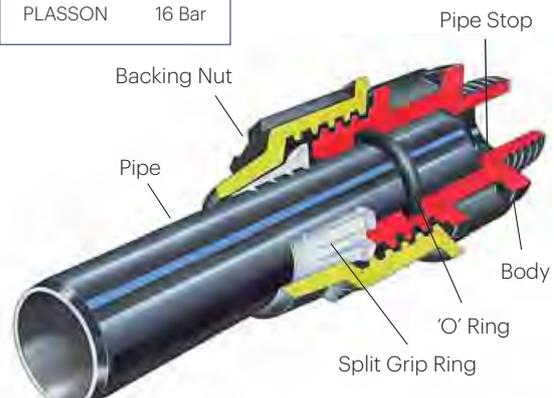
### Saddles

- Reinforcing ring on BSP threaded outlets - stainless steel
- Nuts - stainless steel
- Bolts - stainless steel
- Threads - B.S.P. standard

### 20mm - 63mm

**Maximum operating pressure at 20°C**

PLASSON 16 Bar





## Plasson Line 7 Fittings (75mm - 125mm) - Assembly Instructions



### General Instructions

Cut the pipe, square. Unscrew the Backing Nut and **remove the Split Grip ring**. Reposition Backing Nut, Follower Bush and O ring on the pipe, two diameters back. Lubricate pipe and O ring, with Medlube.



Push the pipe fully into the fitting body, up to the internal stop. Push the O ring and Follower Bush forward until they rest against the fitting (They will not enter the body of the fitting).



Tighten the Backing Nut to drive the Follower Bush and O ring together, right into the fitting until the Follower Bush is flush with fitting mouth. Use a Plasson C ring spanner to assist as needed.



Fully unscrew the Backing Nut, and pull back along the pipe.



Now, open the Split Grip Ring and place directly over and onto the pipe, with the lugs and flat end, **facing and touching** the Follower Bush.



Firmly tighten the Backing Nut with **only** a Plasson "C-ring" spanner. **(Max handle length = 46cm) Do not overtighten.**

## Technical Specifications

### Fittings

- Body - polypropylene - food grade polymer
- Backing nut - polypropylene - food grade polymer
- Split ring - acetyl
- 'O' ring - nitrile rubber (70 Shore A.NBR)

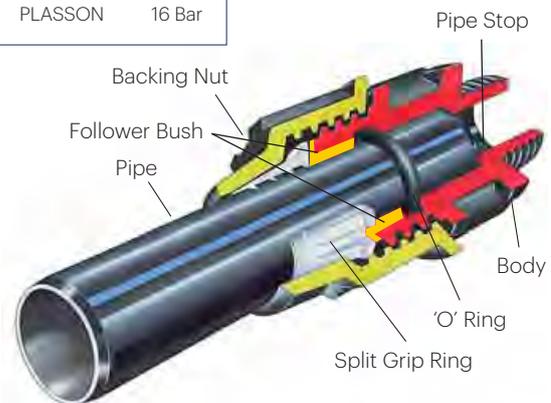
### Saddles

- Reinforcing ring on BSP threaded outlets - stainless steel
- Nuts - stainless steel
- Bolts - stainless steel
- Threads - B.S.P. standard

### 75mm - 125mm

**Maximum operating pressure at 20°C**

PLASSON 16 Bar



# Assembly Instructions

## Modular Adaptor (2579 Series)

1



The modular adaptor may be used with a wide variety of Plasson Series 7 compression fittings. Tee fittings are shown for illustration purposes.

2



Remove nut and split ring and set them aside.

3



Assemble adaptor on fitting body, hand tighten nut then add 1/2 turn with Plasson wrench. The nut need not reach the last thread for an effective seal.

4



Repeat procedure with a second fitting body.

5



The assembly is ready for a third fitting or for nut and split ring.

## Assembly Instructions

### Reducing Set - (2524 Series) 63mm to 20mm and combinations



1. Remove nut from fitting and discard white split ring.
2. Slide nut, grey nut reducer(s) and white split ring from set onto the pipe as shown.
3. Make a mark on the pipe to depth of Reducing Bush.
4. Push pipe into bush up to the mark you have made.
5. Push reducing bush and pipe into body of the fitting until the shoulder of the reducing bush reaches the end of the fitting. Some lubricant at this point would be of help.
6. Draw the split ring and grey nut reducer(s) close to the body of the fitting.
7. Hand tighten and a maximum half turn past hand tight with a Plasson wrench. Maximum handle length 22cm.

### Reducing Set - (2524 Series) 110 mm to 63mm and combinations

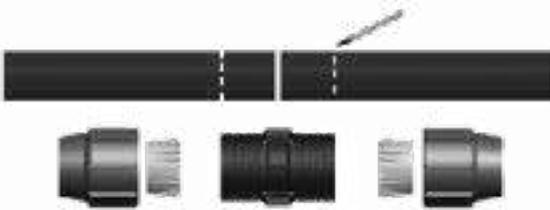


1. Cut pipe square, remove burrs.
2. Remove nut from fitting and discard white split ring.
3. Insert reducing adaptor into fitting body. It will be stopped by the resistance of the internal o-ring.
4. Reposition nut onto fitting body.
5. Tighten nut with a wrench to push the reducing adaptor in through the o-ring until its shoulder abuts fitting bushing.
6. Unscrew nut from fitting.
7. Mount the nut, nut reducer and 63 white split ring (with large end facing the fitting) on the pipe.
8. Twist the pipe into the reducer through the seal to the pipe stop. Lubrication and chamfering of the pipe end will ease insertion of the pipe. Use a silicone lubricant.
9. Slide split ring to abut the reducer.
10. Hand tighten nut firmly and a further 1/2 turn with a Plasson wrench or a wrench with maximum handle length of 22cm.

# Assembly Instructions

## Slip Repair Coupling (2511 Series)

1



Mark insertion depth on pipe ends.  
Lubricate o-rings with inert lubricant.

2



Lift pipe end and slip nut, split ring and body fully onto pipe as shown.

Lift other pipe end and slip remaining nut and split ring onto it.

3



Realign pipe ends, then twist and push coupler body into place, ensuring that the insertion depth lines meet fittings body.

Position split rings adjacent to body.

4



Assemble nuts on fitting body, hand tighten firmly then add 1/2 turn with Plasson wrench or wrench handle with length not exceeding 22cm.

## Assembly Instructions

### Universal Slip Repair Coupling (3511 Series)

1



Mark pipe insertion depth

2



Insert the pipe

3



Tighten the nut

### Universal Coupling (2512 series)



1. Remove any unsound material adhering to the pipe.
2. Select correct fitting using the Plasson gauge to measure the pipe.
3. Cut and de-burr pipe as necessary.
4. Slide the Plasson Universal Adaptor fitting end onto the pipe until the first resistance point.
5. Tighten the nut against the body. Final tightening to be done with a Plasson wrench or similar.
6. Assemble the metric PE joint following the standard fitting instructions.

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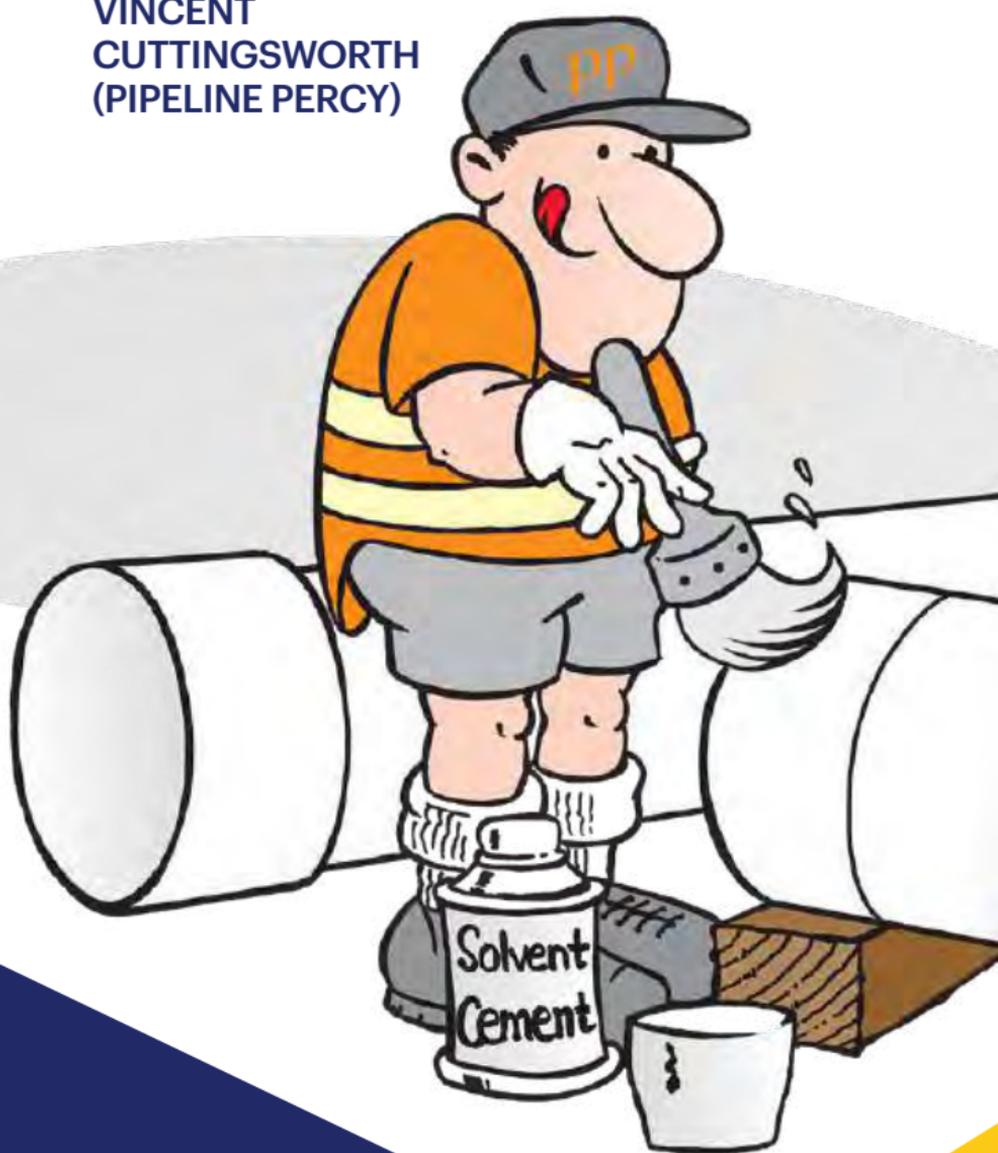
Auckland: Private Bag 92 114, 810 Great South Road, Penrose  
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Christchurch: PO Box 16225, 22 Braeburn Drive, Sockburn

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(Supersedes all previous Issues of this Product Catalogue)

# How I Solvent Cement Joint PVC Pipes

BY PERCIVAL  
VINCENT  
CUTTINGSWORTH  
(PIPELINE PERCY)



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## Introduction

G'day—I'm Percival Vincent Cuttingsworth, but all my friends call me 'Pipeline Percy'!

A few years ago the people at Iplex Pipelines asked me to write a book on 'How I Install PVC Pipes'. They tell me that it went down really well and I have become an overnight star!

They asked me to write another book on 'How I Solvent Cement Joint PVC Pipes', correctly – adding in much more fine detail. Apparently some operators don't know how to do it and they always ask Iplex for help. I have based the procedure on what I know works in the field; I also researched the world to see how others do it too.

If followed, these guidelines will help you to get it right and to help you do it right – first time!

There are other places that you can go to download Standards and Guidelines too. I will mention those along the way.

I hope this helps you.



*Pipeline Percy*

---

## Recommendations for use of NOVAKEY PVC Cleaner Primer and Solvent Cement

These recommendations apply generally to Apollo Series 1 PVC-O pipes, White Rhino (Series 1) PVC-M pipes, Novakey (Series 1) PVC-U pipes, Novadrain PVC-U DWV pipes, Superstorm PVC- U Pipe, and compatible Novakey or Novadrain PVC-U fittings.

The complete “Recommendations for Use”, printed on each container of Novakey Cleaner Primer, and Novakey PVC solvent cement and the recommendations for use contained in these guidelines must be adhered to.

### **INDUSTRY GUIDELINE DOCUMENTS**

I strongly recommend you read other published documents including:

Plastic Industry Pipe Association (PIPA).

– Guidelines for Solvent Cement Jointing of PVC pipe.

Australia New Zealand Standard.

– AS/NZS 2032 Installation of PVC Pipe Systems.

Novakey Cleaner Primer and Solvent Cement must be used together with Iplex PVC pipe, to ensure permanent leak free joints.

### **USE OF CLEANER PRIMER**

Cleaner primer **must be** used to prime and clean all jointing surfaces, prior to application of solvent cement. **NO EXCEPTIONS.** Cleaner primer softens the surface and is essential to a successful jointing process.

**Do not** prepare the surface using sand paper as contamination can occur.

Refer to **Table 1** for recommended use volumes.

---

## **SOLVENT CEMENT**

No additive of any kind should be introduced to the cleaner primer, or to the solvent cement. Ensure that the solvent cement is in good condition and runs freely from the brush. If the cement does not run freely or appears “globular” or “tacky”, discard and use fresh stock of solvent cement. Ensure that the cement is within its recommended “use by” date.

Refer to **Table 1** for recommended use volumes.

## **APPLICATOR SIZE**

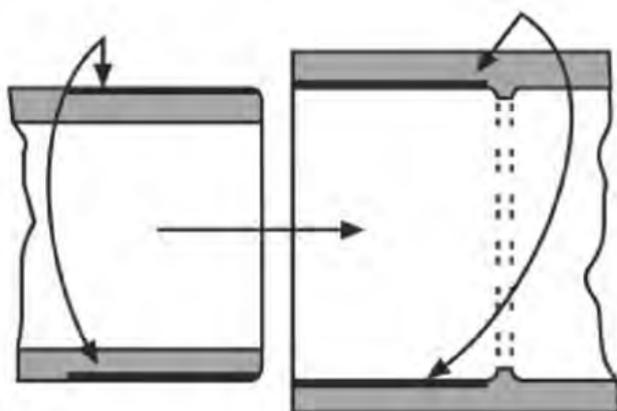
Use a brush or dauber that is properly sized for the pipe or fittings you are joining. The applicator width should be approximately 50% of the pipe diameter. Disposable brushes are recommended for pipe diameters larger than 100mm.

Refer to **Table 2** for recommended brush widths.

## **BASIC PRINCIPLES OF SOLVENT CEMENT WELDING**

**The joint surfaces must be softened and remain wet with solvent cement during joint assembly.**

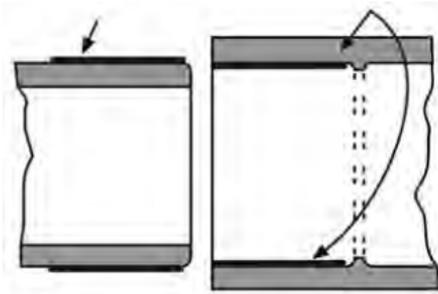
### *Joint Services*



---

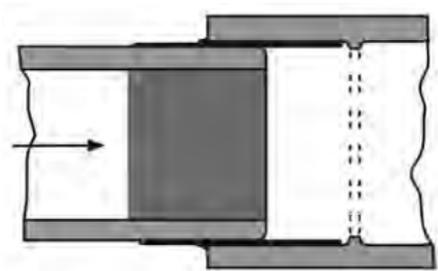
**Sufficient solvent cement must be applied to fill the gap between the pipe and fitting.**

**Sufficient Cement Coating**



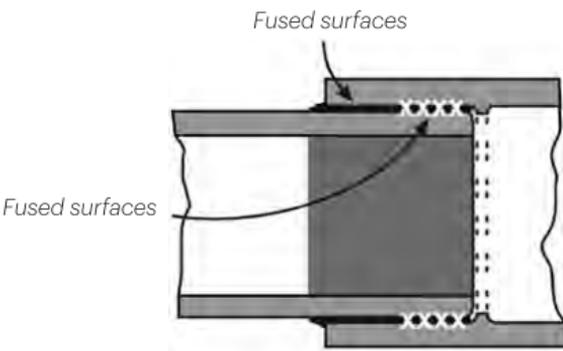
**Assembly must be made while the surfaces are still wet and the solvent cement is still fluid.**

**Surfaces must be assembled while they are still wet and soft**



**Joint strength develops as the solvents evaporate from the joint.**

**Bonded Surface**



Fused and bonded surfaces of joined pipe and fitting

---

## **LOW TEMPERATURE SOLVENT CEMENT JOINTING**

In cold weather conditions, solvents penetrate and soften the PVC surfaces much slower. Therefore, it is more important to pre-soften the jointing surfaces with cleaner primer. Because of slower evaporation of the solvents a longer cure time will be necessary.

## **PERSONAL PROTECTIVE EQUIPMENT (PPE)**

We recommend the use of disposable polyethylene gloves when applying cleaner primer and solvent cement fluids. When joining pipe and fittings, within confined spaces, ensure good ventilation is present or use of suitable breathing equipment.

## **HEALTH AND SAFETY CAUTION**

Solvent cement and cleaner primer are highly inflammable liquids and should be kept away from all sources of ignition. They may be harmful if swallowed or inhaled and may cause skin or eye irritation. Avoid breathing the vapour, use in well ventilated areas.

Seek medical attention immediately, if:

**Swallowed:** Give water to dilute, do not cause vomiting.

**Skin Contact:** Remove contaminated clothing and wash skin thoroughly with soap and water.

**Eye Contact:** Hold open and flood with water for at least 15 minutes.

Do not contaminate any water supply.

Store containers in a cool place, dispose of empty containers safely.

We recommend that you comply with all warning and First Aid notices, displayed on container labels.

**Table 1 – Estimated Usage Guide**

Number of joints for cleaner primer and solvent cement

NOMINAL DIAMETER DN	CLEANER PRIMER (500ML)	SOLVENT CEMENT (500ML)
15	1050	300
20	625	175
25	450	130
32	325	95
40	250	70
50	150	42
65	125	35
80	100	30
100	70	25
125	55	20
150	45	15
200	27	8
225	20	14
300	6	12
375	4	7

**Table 2 – Recommended Brush Widths**

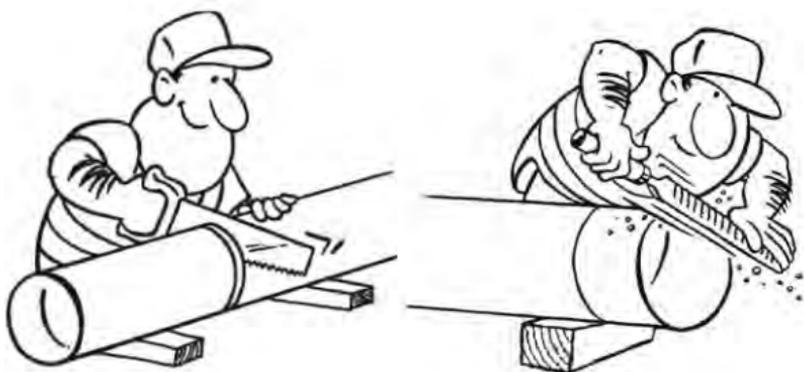
PIPE NOMINAL DIAMETER DN	BRUSH WIDTH (MM)
100	50
125	75
150	80
200	100
225	125
300	150
375	200

---

## PVC Pipe and Fitting Preparation

### **STEP 1. CUT SPIGOT SQUARE AND DEBURR**

Cut pipe square, ensure the pipe spigot and socket are not damaged. Remove any burrs, sharp edges and pipe shavings from the spigot and socket using a file or reaming tool. Correct deburring of the spigot avoids displacement of the cement from the inside of the socket when the spigot is inserted to make the joint. Failure to correctly deburr may prevent full pipe penetration and/or cause the detrimental accumulation of solvent cement at the back of the joint.



### **STEP 2. APPLY WITNESS MARK**

Measure the insertion depth of the socket that you are about to join. On the spigot mark a corresponding witness mark with a pencil or felt pen.



---

### **STEP 3. TEST - DRY FIT THE JOINT**

Check the spigot and socket for an interference fit by dryfitting the joint. An interference fit must be reached between approximately one to two thirds of the socket depth determined by the witness mark position.



### **STEP 4. APPLICATOR SELECTION**

The brush should be large enough to apply the solvent cement within 30 seconds, a disposable brush is recommended for use. For pipes larger than 100mm, it may be necessary to decant solvent cement into a larger container to enable a large brush to be used.

Refer to Table 2 for recommended brush widths.



---

## Solvent Cement Welding Procedure

### **STEP 1. INSPECT CLEAN AND PRIME SURFACES**

Cleaner primer fluid **MUST BE** used to clean and prime all surfaces, it is essential to the jointing process. The primer etches the PVC surface, removes the gloss and softens for the solvent cement's effective bond. Ensure the spigot and socket are clean and dry. Moisture contamination may lead to future joint failure.

Apply cleaner primer to the spigot and socket with a lint-free cloth (natural fibres) dampen the joint with priming fluid. Use the correct personal protective equipment at all times.



### **STEP 2. APPLY SOLVENT CEMENT**

Using a suitably sized brush apply a full even coat of solvent cement (down to the witness mark) to the spigot and an even layer to the socket.

Apply a second full even coat to the spigot **if required**. Excessive solvent cement on the outer OD can easily be wiped away after assembly.

Ensure the **entire surface** is covered and are **“thoroughly wet”** with cement before assembly.

As solvents evaporate faster from the exposed spigot than from the socket a “dry” patch not lubricated by wet solvent cement, may also prevent full insertion.

Ensure that excess solvent cement **does not pond** at the back of the socket as pools of solvent may continue to attack the PVC and weaken the pipe.

We recommend that you comply with all warning and First Aid notices, displayed on container labels. Excess or un-used solvent cement should never be returned to the storage can.



### **STEP 3. ASSEMBLE AND HOLD**

While the cement is still wet quickly (within 1 minute), push spigot into socket up to the witness mark. Make the joint in a single movement, push the assembly home firmly. **Do not stop** as the bond will start to set immediately. The final 10% of spigot penetration **is vital** to the interference fit.

**Hold the joint firmly** without movement for at least 30 seconds.

Mechanical force will be required for larger joints, **be ready in advance**. Pipe pullers, polyester straps or come-alongs may be required, in order to apply a winch or lever hold-force.



---

#### **STEP 4. EXCESS SOLVENT CEMENT**

A consistent bead must be visible at the mouth of the joint. Wipe off the excess solvent cement from the outside, and where possible from the inside of the pipe or fitting.



#### **STEP 5. DO NOT DISTURB JOINT**

**Do not move** the joint for at least **5 minutes**, and handle carefully for at least another hour after jointing.

#### **STEP 10. JOINT CURING**

Allow the cement to fully cure before attempting any site pressure testing.

Joint curing normally takes at least 24 hours @16-20°C. Allow up to 48 hours cure time if the temperature is less than 15°C.

**Do not fill the pipe** with water for at least one hour after making the last joint.

---

## Pressure Testing

Once the joints have completely cured and when they are anchored correctly, you can then fill the pipe with water to complete a system pressure test.

Iplex have asked me to write another book on “How I Pressure Test Pipes” so watch out for that booklet too. In the meantime look for the pressure test procedure from your contract documents, council code of practices or follow the procedure in New Zealand’s NZS 4404 Land Development and Subdivision Infrastructure - Standard.

For Field Testing of Pipelines, go to Appendix C about three-quarters the way through the book.

You need to follow the entire procedure starting at clause C1.

Well that's it. It's easy when you know how! Always do it right the first time—keep on joining 'em pipes!

## *Pipeline Percy*



## More products from Iplex Pipelines



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### **Important Disclaimer**

*The information, opinions, advice and recommendations contained in this publication are put forward with the main objective of providing a better understanding of technical matters associated with pipeline design using Iplex Pipelines. Whilst all reasonable care has been made in ensuring that the information contained in this publication is accurate, this publication should not be used as the only source of information by the reader. Reference should also be made to established textbooks and other published material, and readers should not rely on the information contained in this publication without taking appropriate professional advice for their particular circumstances. Pipes and fittings have been shown as typical configurations, however, in some cases product dimensions may vary or be changed without notice. In all instances, the reader should contact Iplex Pipelines for clarification that the specific product is appropriate for their circumstances.*

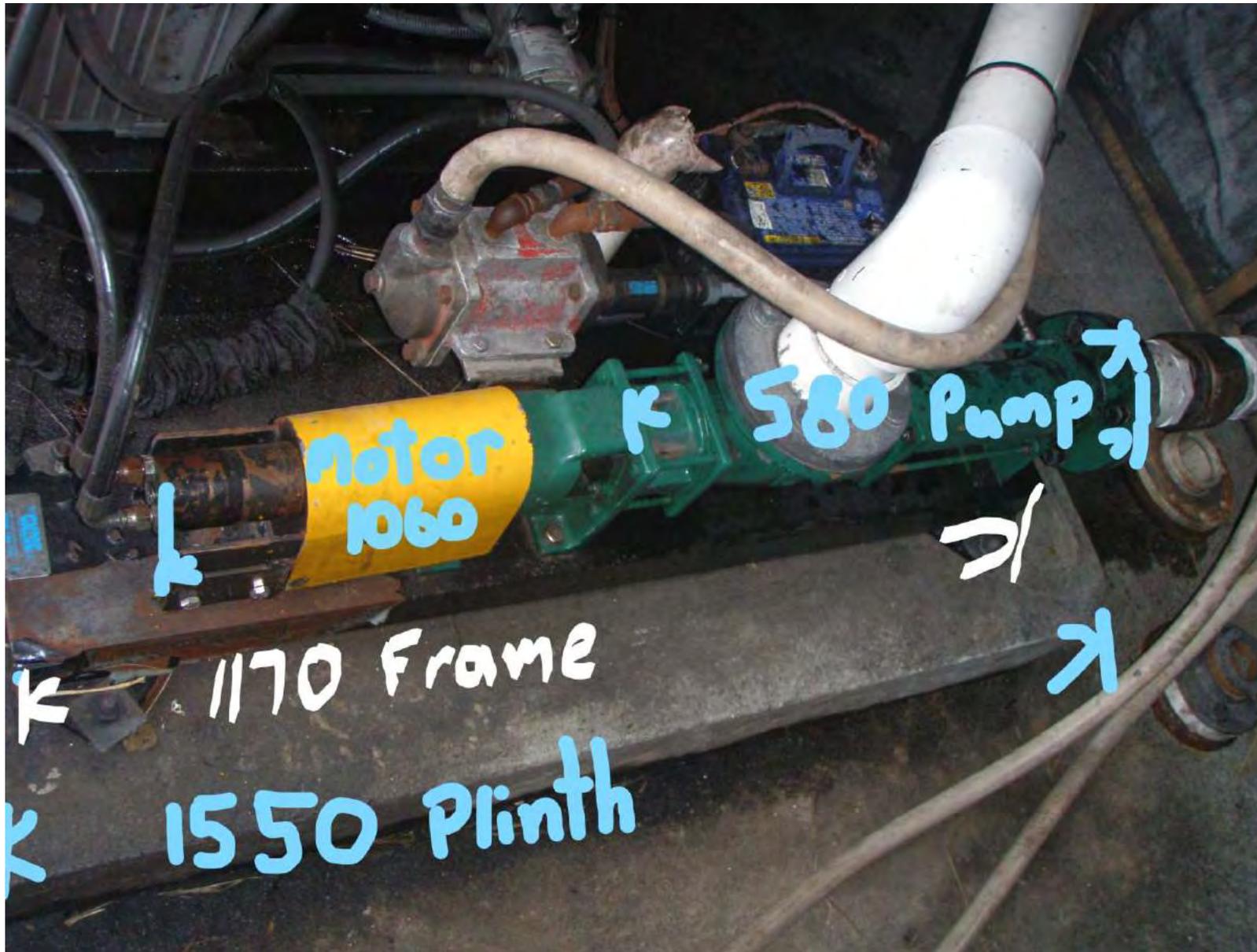
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Attachment E – New Pump System Details

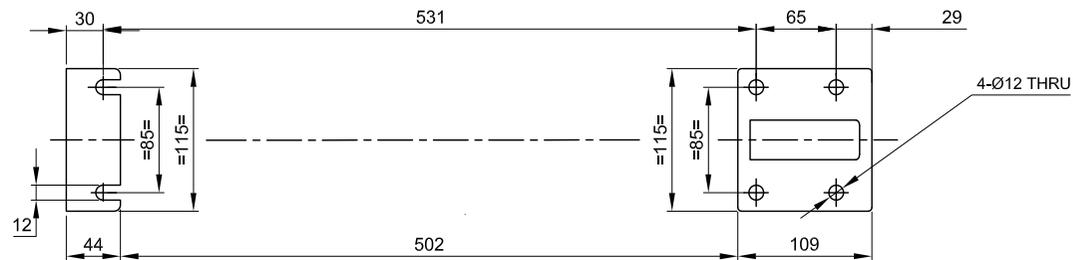
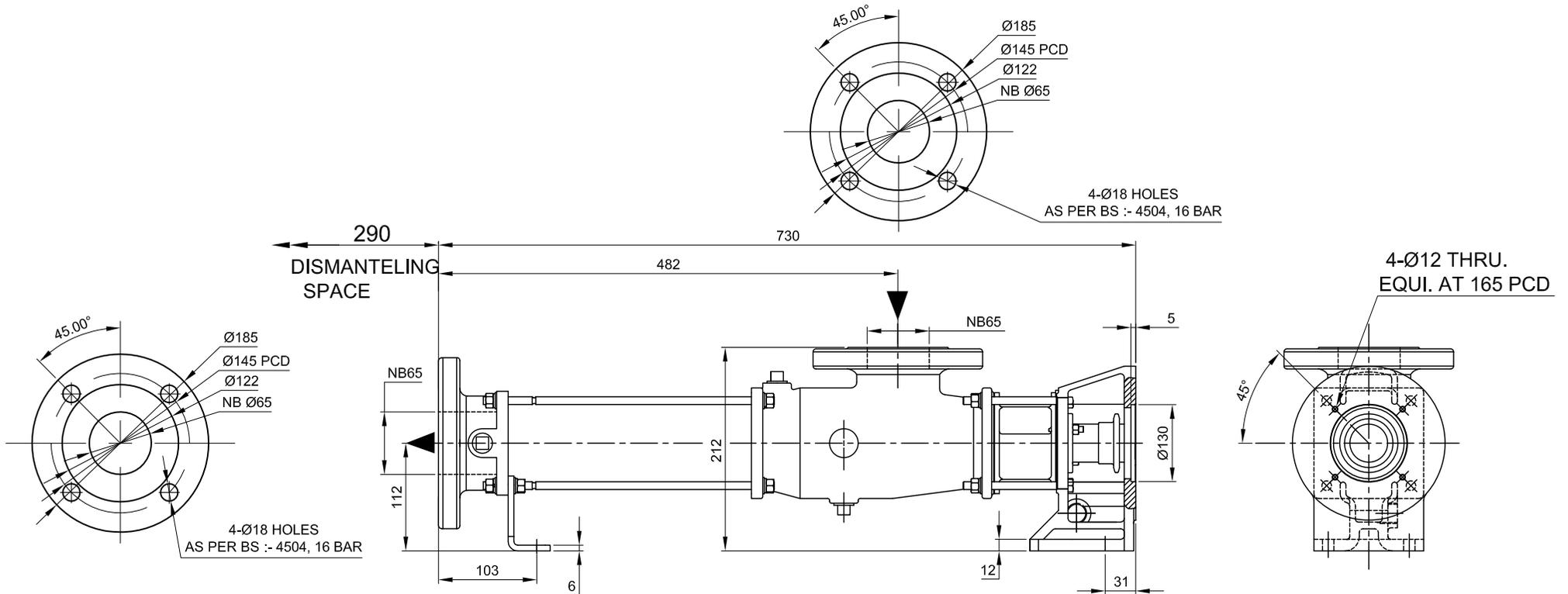




# DIMENSIONAL DRAWING FOR RDCA-551 PUMP

DRG. NO.

BD-55-013-200



Motor Shaft Dia	Moter Variant for RDCA 551			
	120	140	160	200
ø 16	✓	✓	✓	✓
ø 17	✓	✓	✓	✓
ø 19	✓	✓	✓	✓
ø 20	✓	✓	✓	✓
ø 24	✓	✓	✓	✓
ø 25	✓	✓	✓	✓
ø 28	x	✓	✓	✓
ø 30	x	✓	✓	✓

NOTE:-  
1. ALL DIMENSIONS ARE IN MM.

## **Pump & Valve Quote:**

### **1x RMCB562R2CD1P Roto Pump** with the following features:

- Robust cast iron body, HCP stainless steel rotor and shaft and nitrile stator
- 2 x heavy duty cardin joints (to remove the elliptical motion)
- Silicon carbide hard faced mechanical seal
- Consumes 4.8kW of power when running at 549rpm

*Your Price: \$4,948.90 + GST and freight*

*Delivery: 3-5 weeks ex-Australia*

The airfreight cost to bring this pump in from Australia within 2-3 weeks will be approximately \$700 + GST.

### **1x H Series Hydraulic Motor and 1SP Oil Pump (4.2cc, 58Nm, 360rpm)**

Item Code (motor): MSO-101-1700-009

Item Code (pump): MSP-1GP10010241

Your Price: \$1,074.30 + GST and freight

Delivery: before March 24th

## **Pump & Valve Contact Person:**

**Joseph Corrigan**

**Internal Sales | Pump & Valve Specialties Ltd**

06 349 0088 EXT 873

021 220 2021



[www.pumpandvalve.com](http://www.pumpandvalve.com)

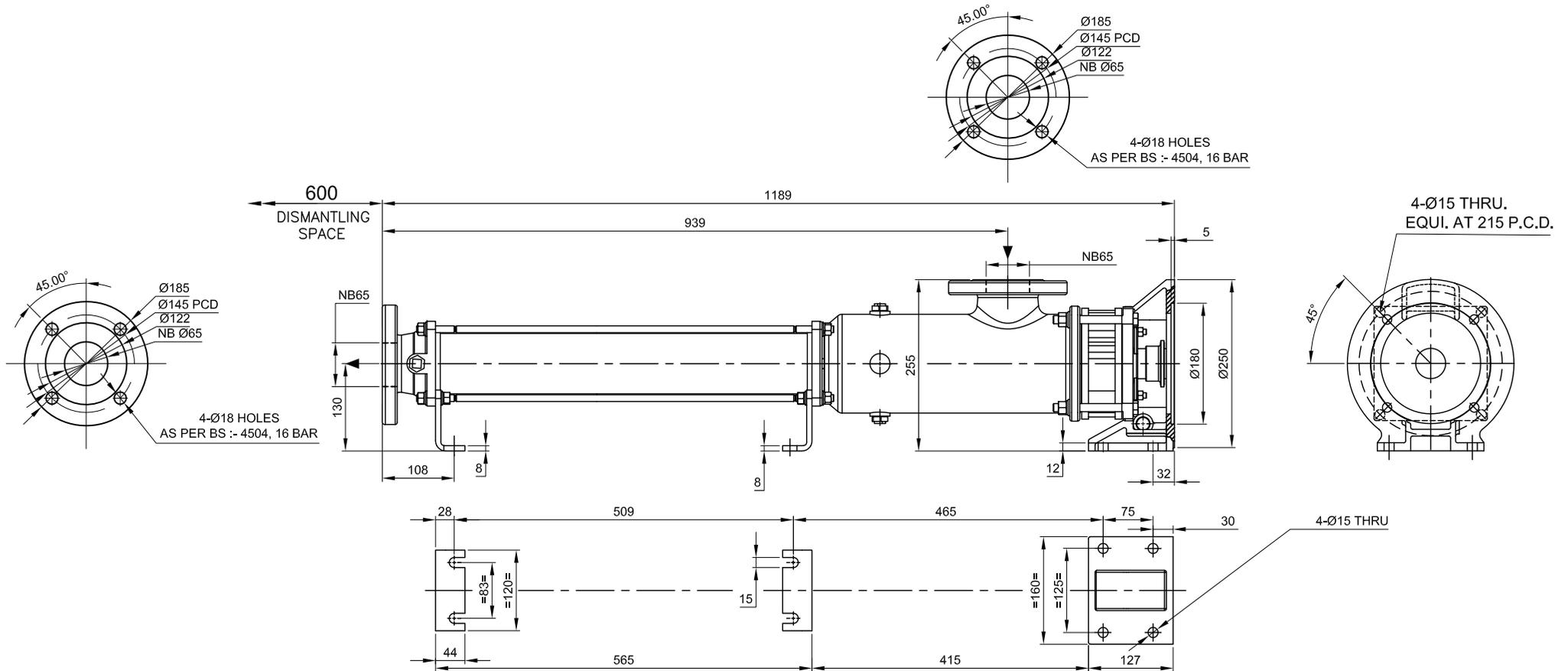
NB - All pricing is subject to P&V terms and conditions – a copy is available on request.

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# DIMENSIONAL DRAWING FOR RMCB-562 PUMP

DRG. NO.

BD-35-021-250

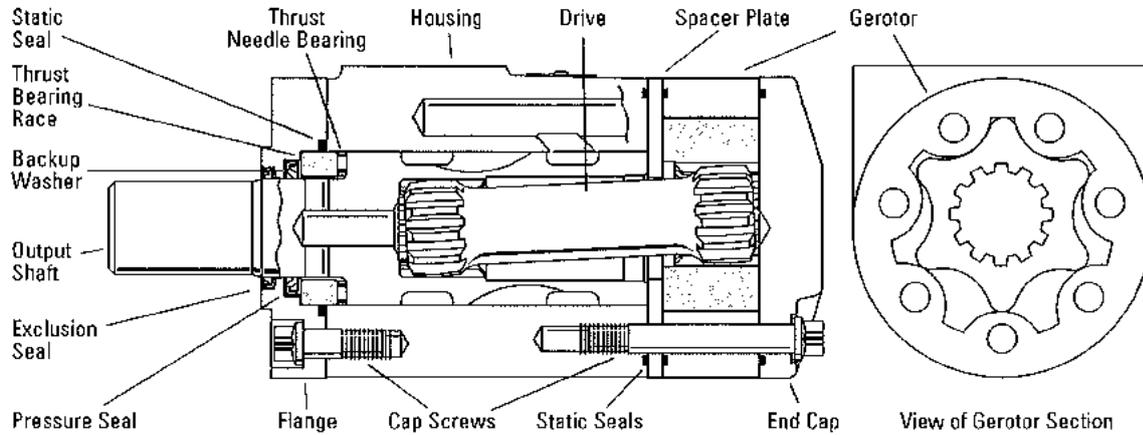


NOTE:-  
1. ALL DIMENSIONS ARE IN MM.

Motor Shaft Dia	Motor Variant for RMCA 562				
	120	140	160	200	250
ø 16	✓	✓	✓	✓	x
ø 17	✓	✓	✓	x	x
ø 19	✓	x	✓	✓	x
ø 20	✓	✓	✓	✓	x
ø 24	✓	✓	✓	✓	✓
ø 25	✓	✓	✓	✓	✓
ø 28	x	✓	✓	✓	✓
ø 30	x	✓	✓	✓	✓
ø 32	x	✓	✓	✓	✓

# H Series (101-)

## Specifications



### SPECIFICATION DATA — H MOTORS

Displ. cm <sup>3</sup> /r [in <sup>3</sup> /r]		36 [2.2]	46 [2.8]	59 [3.6]	74 [4.5]	97 [5.9]	120 [7.3]	146 [8.9]	159 [9.7]	185 [11.3]	231 [14.1]	293 [17.9]	370 [22.6]	739 [45.1]
Max. Speed (RPM) @ Continuous Flow		1021	969	953	760	585	469	385	353	304	243	192	152	74
Flow LPM [GPM]	Continuous	38 [10]	45 [12]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]	57 [15]
	Intermittent	38 [10]	53 [14]	64 [17]	68 [18]	68 [18]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]	76 [20]
Torque Nm [lb-in]	Continuous	56 [497]	73 [650]	91 [802]	118 [1044]	155 [1368]	192 [1699]	221 [1954]	233 [2059]	265 [2343]	302 [2669]	351 [3110]	407 [3604]	389 [3440]
	Intermittent	75 [668]	99 [876]	122 [1076]	158 [1401]	207 [1829]	257 [2278]	300 [2653]	319 [2824]	356 [3151]	415 [3671]	466 [4121]	484 [4283]	520 [4600]
Min. Starting Torque @ Cont. Pressure		46 [410]	59 [520]	76 [670]	95 [840]	124 [1100]	154 [1360]	176 [1560]	185 [1650]	211 [1870]	238 [2110]	282 [2500]	330 [2920]	316 [2800]
Min. Starting Torque @ Int. Pressure		63 [560]	81 [720]	104 [920]	130 [1150]	171 [1510]	210 [1860]	48 [2180]	262 [2320]	293 [2590]	339 [3000]	388 [3430]	408 [3610]	434 [3840]
Pressure Δ Bar [Δ PSI]	Continuous	124 [1800]	124 [1800]	124 [1800]	124 [1800]	124 [1800]	124 [1800]	117 [1700]	114 [1650]	110 [1600]	100 [1450]	93 [1350]	86 [1250]	41 [600]
	Intermittent	165 [2400]	165 [2400]	165 [2400]	165 [2400]	165 [2400]	165 [2400]	159 [2300]	155 [2250]	148 [2150]	138 [2000]	124 [1800]	103 [1500]	55 [800]
End Ported Units Only														
Δ Bar [Δ PSI]	Cont. Pressure	83 [1200]	83 [1200]	76 [1100]	76 [1100]	76 [1100]	69 [1000]	69 [1000]	69 [1000]	62 [900]	55 [800]	48 [700]	57 [825]	27 [396]
	Intermittent	117 [1700]	117 [1700]	110 [1600]	110 [1600]	110 [1600]	103 [1500]	103 [1500]	103 [1500]	91 [1400]	90 [1300]	83 [1200]	68 [990]	36 [528]
Weight kg [lb]		5,1 [11.2]	5,1 [11.2]	5,2 [11.5]	5,2 [11.5]	5,4 [11.8]	5,5 [12.1]	5,6 [12.4]	5,7 [12.5]	5,8 [12.8]	6,0 [13.3]	6,3 [14.0]	6,7 [14.7]	8,4 [18.6]

A simultaneous maximum torque and maximum speed NOT recommended.

#### Note:

To assure best motor life, run motor for approximately one hour at 30% of rated pressure before application to full load. Be sure motor is filled with fluid prior to any load applications.

#### Note:

The End Ported Units Only ratings are for Standard Ported Units.

#### Maximum Inlet Pressure:

172 Bar [2500 PSI] without regard to Δ Bar [Δ PSI] and/or back pressure ratings or combination thereof.

6B splined or Tapered shafts are recommended whenever operation above 282 NM [2500 lb-in] of torque, especially for those applications subject to frequent reversals.

#### Δ Pressure:

The true Δ bar [Δ PSI] difference between inlet port and outlet port

#### Continuous Rating:

Motor may be run continuously at these ratings

#### Intermittent Operation:

10% of every minute

#### Recommended Fluids:

Recommended Fluids — Premium quality, anti-wear type hydraulic oil. Minimum oil viscosity (at operating-temperature) should be the highest of the following:

$$\left[ \frac{300 \times \text{Bar}}{\text{RPM}} = \text{SUS} \right]$$

$$\left[ \frac{20 \times \text{PSI}}{\text{RPM}} = \text{SUS} \right]$$

#### Recommended Maximum System Operating Temp.:

82°C [180°F]

#### Recommended Filtration:

per ISO Cleanliness Code 4406, level 20/18/13

# H Series (101-)

## Dimensions

(Refer to pages B-4-19 thru B-4-22 for shaft and port dimensions.)

### Standard Rotation Viewed from Shaft End

- Port A Pressurized — CW
- Port B Pressurized — CCW

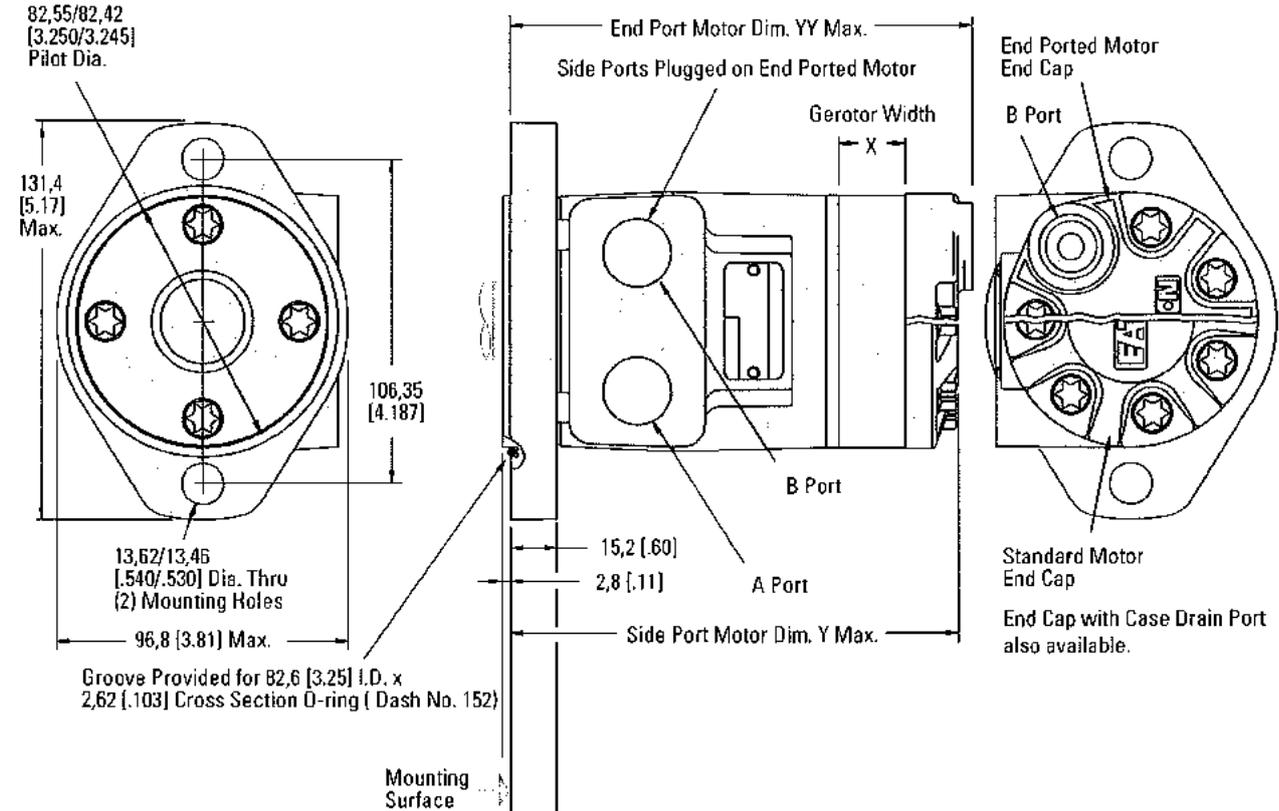
### Note:

Mounting surface flatness requirement is  $\nabla$  .13 mm (.005 inch) Max.

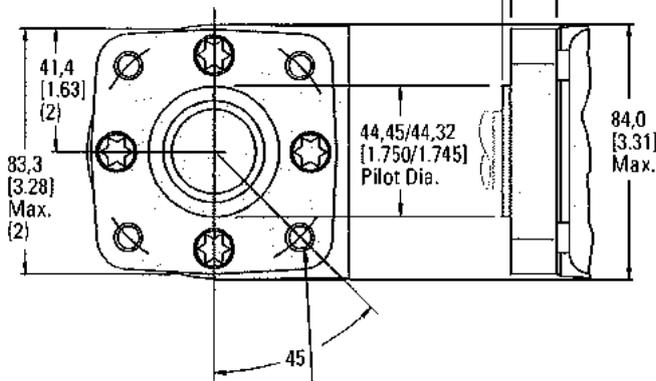
### Note:

End ported motor pressure is derated. Reference page B-2-2 for ratings.

## 2 Bolt Flange



## 4 Bolt Flange



3/8-16 UNC (15,2 [.60] Max. Bolt Thread Engagement ) Mounting Holes (4) Equally Spaced on 82,6 [3.25] Dia. Bolt Circle or M10 x 1,5 (15,2 [.60] Max. Bolt Thread Engagement ) Mounting Holes (4) Equally Spaced on 82,6 [3.25] Dia. Bolt Circle

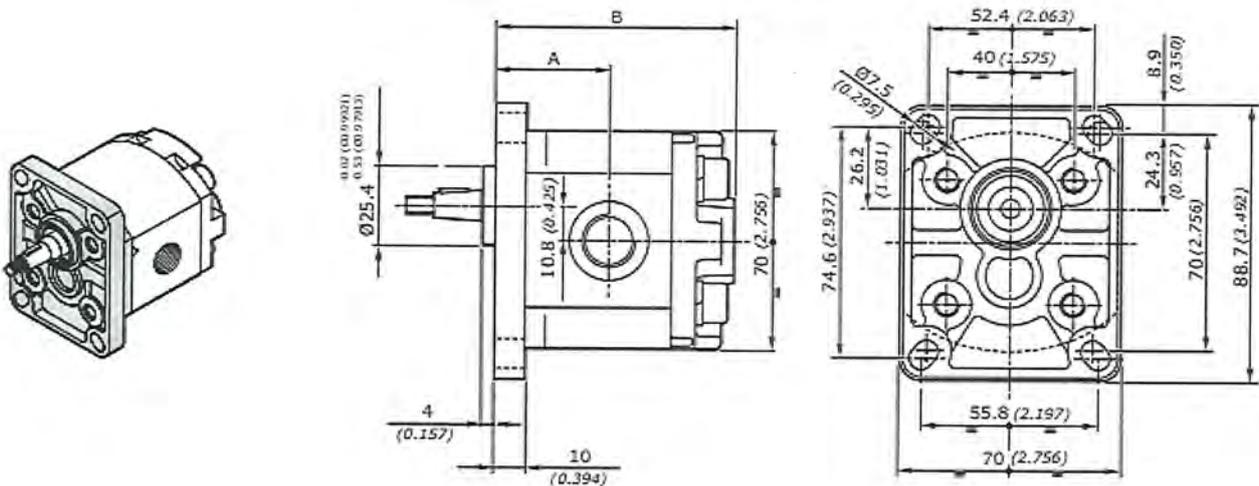
2 AND 4 BOLT FLANGE			
Displacement cm <sup>3</sup> /r [in <sup>3</sup> /r]	X mm [inch]	Y mm [inch]	YY mm [inch]
36 [ 2.2]	6,4 [ .25]	132,1 [ 5.20]	138,5 [ 5.45]
46 [ 2.8]	6,4 [ .25]	132,1 [ 5.20]	138,5 [ 5.45]
59 [ 3.6]	10,2 [ .40]	135,9 [ 5.35]	142,3 [ 5.60]
74 [ 4.5]	10,2 [ .40]	135,9 [ 5.35]	142,3 [ 5.60]
97 [ 5.9]	13,2 [ .52]	139,0 [ 5.47]	145,3 [ 5.72]
120 [ 7.3]	16,5 [ .65]	142,3 [ 5.60]	148,6 [ 5.85]
146 [ 8.9]	20,1 [ .79]	145,8 [ 5.74]	152,2 [ 5.99]
159 [ 9.7]	21,9 [ .86]	147,6 [ 5.81]	154,0 [ 6.06]
185 [ 11.3]	25,4 [ 1.00]	151,2 [ 5.95]	157,5 [ 6.20]
231 [ 14.1]	31,8 [ 1.25]	157,5 [ 6.20]	
293 [ 17.9]	40,4 [ 1.59]	166,2 [ 6.54]	
370 [ 22.6]	50,8 [ 2.00]	176,6 [ 6.95]	
739 [ 45.1]	101,6 [ 4.00]	227,4 [ 8.95]	

FLANGIA EUROPEA **EUR** STANDARD FLANGE

GRUPPO GROUP 1SP	CILINDRATA DISPLACEMENT		PRESSIONE MAX - MAX PRESSURE						VELOCITÀ MAX MAX SPEED	PORTATA MAX MAX FLOW		VELOCITÀ MIN MIN SPEED
			P1		P2		P3					
	cm <sup>3</sup> /giro	in <sup>3</sup> /rev	bar	psi	bar	psi	bar	psi	gir/min - rpm	l/min	Gal/min	gir/min - rpm
1SP 009	0.89	0.05	260	3770	280	4060	290	4205	6000	5.3	1.40	600
1SP 012	1.18	0.07	260	3770	280	4060	290	4205	6000	7.1	1.88	600
1SP 016	1.6	0.10	260	3770	280	4060	290	4205	6000	9.6	2.54	400
1SP 020	2.0	0.12	260	3770	280	4060	290	4205	5500	11	2.91	400
1SP 025	2.5	0.15	260	3770	280	4060	290	4205	5000	12.5	3.30	400
1SP 032	3.2	0.20	260	3770	280	4060	290	4205	4500	14.4	3.80	400
1SP 037	3.7	0.23	250	3625	270	3915	280	4060	4000	14.8	3.91	400
1SP 042	4.2	0.26	250	3625	270	3915	280	4060	3500	14.7	3.88	400
1SP 050	5.0	0.31	250	3625	270	3915	280	4060	3000	15	3.96	400
1SP 063	6.3	0.38	170	2465	190	2755	210	3045	2700	17	4.49	400
1SP 078	7.76	0.47	170	2465	190	2755	210	3045	2500	19.4	5.13	400
1SP 098	9.78	0.60	150	2175	170	2465	190	2755	2000	19.6	5.18	400

Nota - Per valori di pressione superiori a quelli indicati contattare il Servizio Commerciale.  
 Note - for higher pressure values please contact our Sales Dept.

DIMENSIONI • DIMENSIONS



Attachment F – Hynds Quote for Pipe and Fittings Order

Stantec New Zealand  
MWH100  
Level 13  
80 The Terrace  
Christchurch

**Job Details:**  
CHATHAM ISLANDS

Date: 15-12-20  
Date Valid To: 14-03-21  
Total Weight of Order: 0.385  
Quotation By: Leila Crosby  
Date Last Printed: 16-02-21

**Delivery Method:**  
Road transport

**Contact Name:** ANNIKA GRANT  
**Mobile No:** 04 381 5742  
**Email:** Annika.grant@stantec.com

Item No:	Item Description:	U/M	Qty Supp:	Unit Price	Line Total:
* 340.90PN12.100	Pipe PE Ø90OD 100m Rural Black Coil 12.5 Bar	EA	7	1550.00	10850.00
ODF2510.90	Coupler Ø90mm Straight PN16 Plasson	EA	7	121.15	848.05
ODF2513.90	Coupler Ø90 75mm Male PN16 Plasson	EA	3 <del>7</del>	77.50	155.00
ODF2506.90	Coupler Ø90 75mm Female PN16 Plasson	EA	1	81.12	81.12
P-ANCP	80NB SS BSP 3pc Spring Check 316	EA	2 <del>3</del>	724.28	724.28
P-ANCP	80NB SS BSP Flange TD	EA	1	102.00	102.00
P-ANCP	80NB SS BSP Hex Nipple 316	EA	2 <del>3</del>	46.66	46.66
P-ANCP	80NB x 10 SS Pipe Flange	EA	1	53.76	53.76
DSSS080P	Dressing Set SS Ø80 65mm Bolts Potable EPDM Gasket Blue TD	EA	2	30.59	61.18

To be added to quote:

1 x 2503.90.80 Iplex Plasson Line 7 Female Threaded Tee  
1 x 80NB SS BSP 316 Ball Valve with blank cap  
1 x 813.80 Iplex Novakey-U Pressure Valve Socket Solvent Cement x Male BSP Joint (F&M)  
DN80 uPVC pipe to extent exiting pipe inside pump station for connection to new pump  
Solvent cement glue

Line No.	Item Code	Item Description	Order Qty	Item Unit	Unit Price	Total
						Sub Total: \$12,922.05
						G.S.T \$1,938.31
						Total: \$14,860.36

**Standard Quote Conditions:**

1. Unit Price and Line Total do not include GST
2. Quotes are valid to the date specified in the Quote Header, or for 30 days if not specified, and subject to any stated escalation provisions. In all other respects, Hynds Pipe Systems Limited Terms and Conditions of supply shall apply.
3. The quoted prices are based on all items being purchased in full. Should the quote be accepted in part only, we reserve the right to review our prices.
4. Written confirmation that the quote has been accepted is required prior to the Validity Date shown in the Quote Header, or within 30 days of the Date Created if a Validity Date is not specified.
5. For all deliveries from a Hynds Sales Branch, freight charges will apply as per our published "Schedule of Freight Charges", unless otherwise agreed. Adequate lead-time must be given for delivery to be arranged.
6. If the quote is accepted, Hynds Pipe Systems Limited reserves the right to amend the prices for supply if we are subject to increased costs of raw materials, freight or finished goods from our suppliers, including imported goods where we may be subject to exchange fluctuations. A minimum 30 days notice will be provided for any such increase.
7. Only indicative lead times can be provided at time of quoting. If the quote is accepted, please confirm quantities and construction laying programme as soon as possible, or liaise with your area representative. Please check availability if you require a product urgently.
8. This quote is based on the specifications and quantities provided by the customer and Hynds Pipe Systems cannot accept responsibility if any item or quantity is incorrect.
9. Storage and handling fees may be incurred for all products that cannot be delivered, or are not collected, at the date agreed at time of order.
10. Non standard items included in this quote that are not stocked by Hynds will be marked with an \* and the following provision shall apply: Once an order for an \* item has been placed it may not be cancelled and the item is not eligible for return to us and/or credit.
11. Items included in this quote that are sourced from an external supplier and not stocked by Hynds, will be marked with an \* and the following provision shall apply: Once an order for an \* item has been placed it may not be cancelled and the item is not eligible for return to us and/or credit; unless our supplier agrees to accepting said item for return and/or credit, in this instance a minimum 15% surcharge will apply.
12. If this quote includes customised special items that are required to be manufactured to the customer's design, orders for these items will be subject to completion of a Specials Authorisation Form. Manufacturing or procurement of such items will not take place until the Authorisation Form is signed. Once manufacturing or procurement has commenced, the item will be deemed to be the property of the customer and is not eligible for return to us and/or credit.
13. These Standard Quote Conditions should be read in conjunction with any Specific Quote Conditions shown in the body of the quote.

**FULL TERMS & CONDITIONS OF SUPPLY AVAILABLE ON REQUEST**

Attachment G – Pipe Specifications

# Pipes and Pipelaying Specifications

## 1. Scope

The scope of works includes:

The supply of all labour, materials, equipment and temporary works required to achieve the supply and construction of the Kaingaroa Water Intake extension works including but not limited to:

The supply of all PE and stainless steel pipe and fittings as shown on the drawings:

- a) Procurement and manufacture, installation of components as required including:
  - i. Pipe anchor stakes (where required)
  - ii. Concrete pipe restraint at joint between existing uPCV and new PE100 pipe
  - iii. Relocation of the existing floating intake structure
  - iv. Anchor intake structure
  - v. Stainless steel check valve between intake structure and PE pipe
  - vi. Stainless steel check valve at interchange between on ground and floating PE pipe
  - vii. Stainless steel ball valve as filling point for commissioning
- b) Packaging, protection and insurance
- c) Uplift and loading
- d) Transportation and unloading at the work site
- e) Set-out and layout work
- f) Installation and jointing of pipes and fittings
- g) Supporting and restraining
- h) Pressure testing and quality assurance, including commissioning
- i) Provision of documentation

### 1.1 As-Built Drawings

- a) As-built drawings shall be prepared in draft and final versions as two hard copies and one electronic copy of each. The as-built drawings shall contain sufficient detail to enable the Principal to operate, maintain, adjust, and reassemble the Contract Works (except for Temporary Works).

### 1.2 Resource Management Act Requirements

- a) Where the Contract Works or their construction or associated use of the Site is the subject of a resource consent under the Resource Management Act, the Contractor shall comply with all conditions of such consents. Where certain conditions are specifically defined in the Contract as beyond the power of the Contractor to satisfy, the Contractor is excused from the obligation and the Principal will arrange for the compliance.
- b) The Contractor is bound by such consents as a contractual obligation and shall incorporate conditions of such consent into its planning of the execution of its responsibilities under the Contract. The Contractor shall maintain such records and carry out such tests and other activities as are required to prove compliance to the satisfaction of the consenting authority or its nominee.

### 1.3 Commissioning and Testing

In addition to quality control testing set out in the technical specifications, the following tests shall be applied to the Contract Works to demonstrate and confirm their compliance with the Contract.

## 1.4 Tests on Completion

### 1.4.1 General

Testing as a pre-requisite of Practical Completion ("tests on completion") shall be carried out by the Contractor with the Engineer being given sufficient notice so as to be able to arrange attendance at and the witnessing of such tests. Original documentary records of the tests certified by the Contractor shall be provided to the Engineer.

### 1.4.2 Requirements for Tests on Completion

Pressure test as per Section 2.4.1 – Pressure Testing of Pipelines

## 1.5 Other Activities on Completion

### 1.5.1 Temporary Protection

The Contractor, having arranged for temporary protection of existing or new work during construction, shall maintain such protection in place until the items are ready to be placed into service or occupied for their intended purpose.

### 1.5.2 Surplus Materials and Refuse Disposal

- a) During the construction and prior to requesting certification of completion milestones, the Contractor shall remove all surplus, redundant and faulty materials from the Site and dispose of them as its own property in a safe and legal manner. The Contractor shall also remove from the Site any demolition material or rubbish for which the Contractor or its Subcontractors are responsible.
- b) Any temporary storage of surplus materials and debris on the Site pending removal shall be limited to the minimum quantities necessary to achieve economical use of haulage Plant.

### 1.5.3 Cleaning

The Contractor shall arrange for completed items of construction about to be placed in service or occupied for their intended use to be properly and thoroughly cleaned of all foreign matter and other debris.

## 1.6 Pipe and Pipelaying - General

### 1.6.1 Applicable Codes and Standards

- a) All work, materials and practices shall comply with the requirements of current New Zealand or (where no NZ standard applies) Australian Standards for that particular class of work, or any other standard cited herein. The documents cited refer to their latest issue, including any amendments, as of the date of the Tender Documents, and are deemed to form part of the Specifications. This specification shall take precedence if it is at variance with a cited document. Compliance with these standards and with this specification shall be regarded as the minimum requirement necessary for pipes and pipework under the Contract.
- b) Due to the number of standards, codes and other reference documents applicable to this specification, refer to section 1.10. herein for the full list.

### 1.6.2 Definitions

#### 1.6.2.1 Pipes

Drain	:	Pipe or culvert for the conveyance of stormwater.
Expansion joint	:	A pipe joint that allows relative longitudinal and or vertical movement between adjacent pipes without the occurrence of fracture or leakage.
Flexible joint	:	A pipe joint that allows relative angular (radial) and longitudinal movements between adjacent pipes without the occurrence of fracture or leakage.

Flexible pipe	:	A pipe that relies primarily on side support to resist vertical loads without excessive deformation. These include pipes and fittings made from ABS, PVC, PP, PE, F/GRP, Steel, Stainless Steel. These pipes encourage 'load shedding' in the pipe embedment / backfill and rely on good compaction in both the embedment and in-situ materials.
Semi flexible pipes	:	A pipe that relies both on the pipe wall stiffness and ground support. Semi flexible pipes include Ductile Iron and Cast Iron.
Rigid joint	:	A pipe joint that allows no relative movement between adjacent pipes without the occurrence of fracture or leakage.
Rigid pipe	:	A pipe that is sufficiently strong (both within the pipe wall and joints) to withstand any reasonably anticipated live and dead loads. A pipe's ability to resist imposed loads is improved by "better" embedment conditions. Rigid pipes include pipes and fittings manufactured from Concrete and Vitrified Clay.

### 1.6.3 Abbreviations

ABS	:	Acrylonitrile butadiene styrene
ASTT	:	Australasian Society for Trenchless Technology
CI	:	Cast iron
CIV	:	Clegg impact value
CPAA	:	Concrete Pipe Association of Australasia
DI	:	Ductile iron
FBE	:	Fusion bonded epoxy
GRP	:	Glass filament reinforced thermosetting plastic
FRP	:	Fibre Reinforced Plastic
HDD	:	Horizontal Directional Drilling
HDG	:	Hot-dipped galvanised
IANZ	:	International Accreditation New Zealand
ISTT	:	International Society for Trenchless Technology
MDD	:	Maximum dry density
NCOP UOATC	:	National Code of Practice for Utility Operators' Access to Transport Corridors
PE	:	Polyethylene
PE100, HDPE	:	High Density Polyethylene (10 MPa)
PE80, MDPE	:	Medium Density Polyethylene (8 MPa)
PP	:	Polypropylene
PVC-M, mPVC	:	Modified Polyvinyl Chloride
PVC-O, oPVC	:	Oriented Polyvinyl Chloride
PVC-U, uPVC	:	Unplasticised Polyvinyl Chloride
RCA	:	Road Controlling Authority
RCRRJ	:	Reinforced Concrete Rubber Ring Joint
RCA	:	Road controlling authority
SPT	:	Standard Penetration Test
STMS	:	Site traffic management supervisor

## 1.7 Materials

### 1.7.1 Materials – General

- a) Pipes and pipe fittings shall be of the material, pipe class and joint type nominated on the Drawings.
- b) Pipes and fittings shall comply with the relevant New Zealand and Australian Standards. A full list of applicable pipe supply and installation standards is included in section 1.10. herein.

### 1.7.2 Pipe Materials

#### 1.7.2.1 Polyethylene (PE) and Polypropylene (PP)

- a) Plain wall PE pipes for pressure applications shall comply with AS/NZS 4130.
- b) Profile wall PE pipes for pressure applications shall comply with AS/NZS 4130.
- c) Fittings for PE pipes for pressure applications shall comply with AS/NZS 4129.
- d) Plain and profile wall PE and PP pipes and fittings for drainage and sewerage applications shall comply with AS/NZS 5065.

#### 1.7.2.2 Stainless Steel Pipe

- a) Stainless steel pipework shall be manufactured from Grade 316L or Grade 316 stainless steel, complying with Australian Technical Specification AS 5200.053 and AS/NZS 4020.
- b) All schedule pipe shall comply with ANSI/ASME B36.19M and B16.9, respectively. All spiral wound stainless-steel tube used shall be fabricated from grade 316 stainless steel, manufactured in accordance with the requirements set out in AS 4041 for class 3 piping or other agreed manufacturer's standards.

### 1.7.3 Fittings, Joints and Couplings

- a) Bolts, washers and nuts in joints shall be 316 stainless steel. A nickel or molybdenum based anti-galling lubricant (e.g. molybond) shall be used when installing stainless steel nuts and bolts. Where dissimilar metals in contact (fixings or fastenings) may give rise to detrimental galvanic action/corrosion, suitable isolating washers and sleeves shall be used.
- b) Metallic flanged joints shall comply with AS/NZS 4087, AS/NZS 4331 or BS EN 1092. Buried metallic flanged joints shall be protected with 'Polyken' or 'Denso Petrolatum' or any other products approved by the Engineer in accordance with the manufacturer's recommendations.
- c) Lubricants for all rubber ring joints shall contain an anti-bactericidal agent approved for potable water use.

### 1.7.4 Material Storage

- a) Pipes shall be unloaded and handled in accordance with the manufacturer's recommendations.
- b) Pipes shall be stored on level ground.
- c) PP, PE and PVC pipes that have scoring or damage to a depth greater than 10 % of the wall thickness or have been distorted because of improper handling and/or storage shall not be used. The maximum permissible wall scoring to a PVC pipe is 1 mm depth.

### 1.7.5 Defective Materials

- a) Any materials that do not comply with this specification or that have been damaged as a result of the Contractor's operations shall be removed from site and replaced at the Contractor's expense.
- b) Repairs may be considered at the sole discretion of the Engineer.

## 1.8 Execution (Installation)

### 1.8.1 Preliminaries

Prior to commencing works on Site, the Contractor shall comply with the requirements outlined in specification 1000: Preliminary and General with respect to HSQE and site management requirements, as follows:

- i. Pre-condition Survey,

- ii. Site Specific Safety Plan,
- iii. Traffic Management Plan,
- iv. Environmental control,
- v. Protection of existing services,
- vi. Public relations
- vii. Site access.

### 1.8.2 General PE Pipe Installation

- a) Jointing of PE pipes shall be by Plasson Line 7 mechanical compression fittings in accordance with the manufacturer's specifications..
- b) Appropriate rotational peeling tools shall be used when preparing joints. Hand-scraped surfaces will not be accepted.
- c) All practicable steps shall be taken to ensure joints are undertaken in as clean an environment as possible and protected against any potential deleterious effects of site conditions, weather and environment.
- d) Cleaning and surface preparation agents shall be as recommended by the fitting manufacturer.

### 1.8.3 Cutting of Pipes

- a) Where pipes are to be cut to form non-standard lengths, the Contractor shall comply with the manufacturer's recommendations.
- b) Pipes shall be cut by a method which provides a clean square profile, does not split or fracture the pipe wall, leaves no residue, and causes minimal damage to any coating or lining.
- c) Where necessary, the cut ends of pipes shall be formed to the tapers and chamfers suitable for the type of joint to be used.
- d) Pipe jointing surfaces and components shall be kept clean until the joints have been completed.

### 1.8.4 Pipe Restraint

- a) The pipe shall be fixed to the ground using two min. 1.0m long, treated wooden stakes penetrated in the ground at least half of the stake length and crossed over the pipe soffit to securely hold the pipe in place.
- b) Restraints shall be installed at 3.0m intervals along the length of the pipe on firm ground.
- c) At least 10m of the PE pipe end connected to the intake structure shall not be fixed to the ground to allow for pipe movement with changes in water level of Lake Rangitai.

## 1.9 Inspection, Testing and Commissioning

### 1.9.1 Pressure Testing of Pipelines

- a) All pipes shall be subjected to a pressure test after laying and jointing .
- b) All necessary apparatus for testing shall be supplied by the Contractor. The section to be tested shall be capped or flanged off at either end, and at branches intended to be tested separately. The blanked off ends and branches shall be securely propped or otherwise prevented from movement, before applying any pressure.
- c) For PE pipelines up to and including DN 315, test shall be completed in accordance with AS/NZS 2566.2:2002 Appendix M7 - Pressure Rebound Method for Visco-Elastic Pressure Pipeline.
- d) The Contractor shall successfully pre-test the line before requesting an acceptance test.
- e) Any faulty pipes, joints or fittings shall be replaced by the Contractor and the line retested.

## 1.9.2 Flushing, Disinfection and Bringing into Service

### 1.9.2.1 Chlorine and Sulphur Dioxide

Where the Contract requires the handling or use of chlorine or sulphur dioxide, or work to be carried out on, or immediately adjacent to, any existing or proposed chlorine or sulphur dioxide installation, the Contractor shall comply with the relevant WorkSafe provisions for the Safe Handling of Chlorine and Sulphur Dioxide.

### 1.9.2.2 Flushing and Disinfection of New Pipe

- d) When the pipe has passed the pressure test, the new pipe shall be effectively flushed out by the free discharge of clean water to the extent required to ensure that all portions of the pipework are scoured.
- b) The pipe shall then be disinfected by filling it with clean water containing 0.16 ml of Sodium Hypochlorite (NaOCl) per litre of solution. The solution shall be allowed to fill the main slowly and shall be left there for at least 24 hours.
- c) The pipe shall then be thoroughly and repeatedly flushed with clean water until a sample of the washwater drawn from the main complies with the drinking water standards of the local authority.

## 1.10 Lists of Pipework Standards

- a) The following documents are referred to specifically in this specification:

ANSI/ASME B16.9	:	Factory-Made Wrought Butt welding Fittings
ANSI/ASME B36.19M	:	Stainless Steel Pipe
ASME B16.9	:	Factory-Made Wrought Butt welding Fittings
ASME B36.19M	:	Stainless Steel Pipe
AS 1281	:	Cement mortar lining of steel pipes and fittings
AS 1289.4.4.1	:	Methods of testing soils for engineering purposes Soil chemical tests - Determination of the electrical resistivity of a soil - Method for fine granular materials
AS 1579	:	Arc-welded steel pipes and fittings for water and waste-water
AS 2239	:	Galvanic (sacrificial) anodes for cathodic protection
AS 2832.1	:	Cathodic protection of metals pipes and cables
AS 3571.1	:	Plastics piping systems - Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP) resin Pressure and non-pressure drainage and sewerage (ISO 10467:2004, MOD)
AS 3571.2	:	Plastics piping systems - Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP) resin Pressure and non-pressure water supply (ISO 10639:2004, MOD)
AS 3680	:	Polyethylene sleeving for ductile iron piping
AS 3681	:	Application of polyethylene sleeving for ductile iron piping
AS 3996	:	Access covers and grates
AS 4037	:	Pressure equipment – Examination and testing
AS 4041	:	Pressure piping
AS 4060	:	Loads on buried vitrified clay pipes
AS 5200.053	:	Plumbing and drainage products Stainless steel pipes and tubes for pressure applications
AS/NZS 1254	:	PVC-U pipes and fittings for stormwater and surface water applications
AS/NZS 1260	:	PVC-U pipes and fittings for drain, waste and vent applications
AS/NZS 1477	:	PVC pipes and fittings for pressure applications
AS/NZS 1516	:	The cement mortar lining of pipelines in situ
AS/NZS 1518	:	External extruded high-density-polyethylene coating system for pipes
AS/NZS 1554.1	:	Structural steel welding - Part 1: Welding of steel structures
AS/NZS 2032	:	Installation of PVC pipe systems
AS/NZS 2033	:	Installation of polyethylene pipe systems
AS/NZS 2280	:	Ductile iron pipes and fittings
AS/NZS 2312	:	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings
AS/NZS 2566.1	:	Buried flexible pipelines – Part 1: Structural Design

AS/NZS 2566.2	:	Buried flexible pipelines – Part 2: installation
AS/NZS 2638	:	Gate valves for waterworks purposes
AS/NZS 2648.1	:	Underground marking tape - Non-detectable tape
AS/NZS 3518	:	Acrylonitrile butadiene styrene (ABS) compounds, pipes and fittings for pressure applications
AS/NZS 3690	:	Installation of ABS pipe systems
AS/NZS 3725	:	Design for installation of buried concrete pipes
AS/NZS 3750.4	:	Paints for steel structures - Bitumen paint
AS/NZS 3862	:	External fusion-bonded epoxy coating for steel pipes
AS/NZS 4020	:	Testing of products for use in contact with drinking water
AS/NZS 4087	:	Metallic flanges for waterworks purposes
AS/NZS 4129	:	Fittings for polyethylene (PE) pipes for pressure applications
AS/NZS 4130	:	Polyethylene (PE) pipes for pressure applications
AS/NZS 4158	:	Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS/NZS 4331	:	Metallic flanges
AS/NZS 4441	:	Oriented PVC (PVC-O) pipes for pressure applications
AS/NZS 4586	:	Slip resistance classification of new pedestrian surface materials
AS/NZS 4765	:	Modified PVC (PVC-M) pipes for pressure applications
AS/NZS 5065	:	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
ASTM D5874-95	:	Standard Test Method for Determination of the Impact Value (IV) of a Soil
ASTT CJP8029-SPE-C-001, Rev 1	:	Specification for Horizontal Drilling
ASTT CPJP8029-SPE-C-002, Rev 1	:	Specification for Pipe Bursting
ASTT CPJP8029-SPE-C-003, Rev 1	:	Specification for Microtunnelling and Pipejacking
BS EN 545	:	Ductile Iron Pipes, Fittings, Accessories and their Joints for Water Pipelines - Requirements and Test Methods
BS EN 598 + A1	:	Ductile Iron Pipes, Fittings, Accessories and their Joints for Sewerage Applications - Requirements and Test Methods
BS EN 1092-1	:	Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Steel flanges
BS EN ISO 9969	:	Thermoplastics pipes. Determination of ring stiffness
ISO 13954	:	Plastics pipes and fittings - Peel decohesion test for polyethylene (PE) electrofusion assemblies of nominal outside diameter greater than or equal to 90 mm
ISO 13955	:	Plastics pipes and fittings - Crushing decohesion test for polyethylene (PE) electrofusion assemblies
NZS 3106	:	Design of concrete structures for the storage of liquids
NZS 3109	:	Concrete construction
NZS 3111	:	Methods of test for water and aggregate for concrete
NZS 3116	:	Concrete segmental and flagstone paving
NZS 3122	:	Specification for Portland and blended cements (General and special purpose)
NZS 4402	:	Methods of testing soils for civil engineering purposes
NZS 4407	:	Methods of sampling and testing road aggregates
NZS 4442	:	Welded steel pipes and fittings for water, sewage and medium pressure gas
NZS 4522	:	Underground fire hydrants
NZS 5807	:	Code of practice for industrial identification by colour, wording or other coding
NZS 7643	:	Code of practice for the installation of unplasticized PVC pipe systems
NZTA F2	:	Specification for Pipe Subsoil Drain Construction
NZUAG Code	:	National Code of Practice for Utility Operators' Access to Transport Corridors
PIPA POP001	:	Electrofusion Jointing of PE Pipe and Fittings for Pressure Applications
PIPA POP003	:	Butt Fusion Jointing of PE Pipes and Fittings - Recommended Parameters

- TNZ B/02:2005 : Specification for construction of unbound granular pavement layers
- TNZ F/1:1997 : Specification for earthworks construction
- TNZ F/5 : Specification for Corrugated Plastic Pipe Subsoil Drain Construction
- TNZ F/6 : Specification for Geotextile Wrapped Aggregate Subsoil Drain Construction
- TNZ M/4 : Specification for basecourse aggregate
- b) The following documents are not referred to specifically in this specification but may be consulted to assist with the Contract works, as applicable:
- AS 2439.1 : Perforated plastics drainage and effluent pipe and fittings - perforated drainage pipe and associated fittings
- AS 4321 : Fusion-bonded medium-density polyethylene coating and lining for pipes and fittings
- AS 4343 : Pressure Equipment – Hazard Levels
- AS/NZS 1200 : Pressure Equipment
- AS/NZS 1252.1&2 : High-strength steel fastener assemblies for structural engineering
- AS/NZS 2980 : Qualification of welders for fusion welding of steels – Additional requirements for Australia and New Zealand
- AS/NZS 3992 : Pressure equipment - Welding and brazing qualification
- AS/NZS 4058 : Precast concrete pipes (pressure and non-pressure)
- AS/NZS 4131 : Polyethylene (PE) compounds for pressure pipes and fittings
- ASTT CPJP8029-STD-C-001, Rev 1 : Standard for Horizontal Drilling
- ASTT CPJP8029-STD-C-002, Rev 1 : Standard for Pipe Bursting
- ASTT CPJP8029-STD-C-003, Rev 1 : Standard for Microtunnelling and Pipejacking
- MFE : Hazardous Substances and New Organisms Act and Regulations
- NZS 3101 : Concrete Structures Standard
- SNZ HB 2002 : Code of practice for working in the road
- WorkSafe NZ : Health and Safety in Employment (Pressure Equipment, Cranes and Passenger Ropeways) Regulations
- WorkSafe NZ : WorkSafe Approved Code of Practice for Pressure Equipment (Excluding Boilers)

<b>Client:</b>	Chatham Islands Council	<b>Stantec-TM- 2a</b>	
<b>Project:</b>	Kaingaroa WTP Upgrade	<b>Date issued:</b>	15 April 2021
<b>Project Task:</b>	GAC Filter and Hypochlorite Dosing	<b>Prepared by:</b>	Annika Grant
<b>Subject:</b>	Technical Brief for Design, Supply & Installation of WTP Upgrades	<b>Reviewed by:</b>	Andrew Wong
		<b>Approved by:</b>	Kirsten Norquay

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*This disclaimer shall apply notwithstanding that the Technical Memo may be made available to Chatham Islands Council and other persons for an application for permission or approval or to fulfil a legal requirement.*

## 1 Introduction & Purpose

### 1.1 Introduction

The Kaingaroa Water Scheme, including the Water Treatment Plant (WTP), urgently requires remedial or upgrade works to address substantial limitations, comply with regulatory requirements, and meet current best practice. The required upgrades were allowed for in Council's 2018-28 Long Term Plan but Central Government funding was not available at that time to progress these upgrades and address scheme non-compliance.

Central Government funding to address immediate issues is now available – partly through Ministry of Health (MoH) funding and partly through Tranche One funding as part of the Government's three waters reform programme. This memo does not specifically delineate between the two funding sources, however in general provision of new process units is funded via MoH and provision of online monitoring equipment is funded via Tranche One.

### 1.2 Purpose

The purpose of this memo is to present the proposed upgrades to the Kaingaroa WTP and provide supporting information (detailed in the Attachments) to Fulton Hogan and FILTEC (to be subcontracted to Fulton Hogan as WTP supplier) to design, supply, install and commission the equipment included in the upgrade as well as to the provider for data telemetry via an RTU and data reporting, alarming and historian via a cloud-based system.

### 1.3 Objectives

The objectives of the proposed upgrade at the Kaingaroa WTP are as follows:

- Achieve bacterial compliance by using the existing UV system to deliver a reduction equivalent dose of at least 40 mJ/cm<sup>2</sup> in compliance with the Drinking Water Standards for New Zealand (DWSNZ)
- Provide 3-log protozoa treatment by using the existing UV system under DWSNZ
- Remove organics with the proposed granulated activated carbon (GAC) filters to improve the performance and reliability of disinfection processes (UV & chlorination).
- Provide hypochlorite (chlorine) dosing for bacterial disinfection and provide a residual disinfectant in the distribution network.

## 2 Background

### 2.1 GAC Bench Testing and Full-Scale Proposal

The purpose of the GAC filter installation is to remove dissolved organic carbon (DOC) and to improve the UV Transmittance (UVT) of the treated water. The GAC filter system will be a similar arrangement to the existing media filters at Kaingaroa, except that it will contain a GAC media that targets organics removal.

In November 2020 FILTEC carried out GAC bench testing on a 20L sample of the treated water from the Kaingaroa WTP and measured the UVT of the raw water and treated water from the outlet of the GAC filter. Improvement of UVT is an indicator for DOC removal and can be used for the design of the full-scale GAC filters, to determine the GAC media volume and to predict the required replacement frequency of the media.

Bench-testing results are presented in Attachment F. These results, along with water quality results presented in Attachment C, are to be used by FILTEC to inform GAC filter design for Kaingaroa WTP.

## 2.2 Hypochlorite Disinfection

Chlorine disinfection of the treated water will be installed at Kaingaroa to provide residual disinfectant in the distribution network in the form of free available chlorine (FAC). It is anticipated that online FAC, pH, and turbidity measurements in the treated water leaving the WTP will reduce the need for E.coli testing as is currently been carried out in compliance with the DWSNZ. Under the current DWSNZ, E.coli testing will only be mandatory within the distribution network. However, at least initially, E.coli testing will continue at the intake and treatment plant.

The hypochlorite disinfection system shall be similar to the existing system at the Waitangi WTP, consisting of banded sodium hypochlorite storage tank and a dosing pump. Hypochlorite dosing will be calibrated during commissioning and dosing is automatically started and stopped using a flow switch on the main process line; when flow is detected the chlorine dosing pump starts. The chlorine dosing rate will be manually adjustable by the operator if required.

Additional on-line monitoring will include FAC and pH (in one instrument) with alarms and setpoints aligning with the critical control point process control for chlorine disinfection (as per Waitangi WTP). The meter will have capability to interface with a local Remote Terminal Unit (RTU) for further mobile dial out and data logging in addition to on-site data logging with manual USB stick download option.

A low-level and high-level chlorine alarm, which indicates a low and high FAC concentration in the water leaving the WTP, will be indicated via online monitoring and reporting system (by others).

## 3 Work Required

This technical memo, particularly the Attachments, is intended for use as a performance specification for the Kaingaroa WTP upgrade works. The Attachments are as follows:

- Attachment A - Mechanical work required for the upgrade including the party responsible for each work item
- Attachment B – Marked-up photographs of the existing WTP showing location of new equipment, pipework, fittings and tie-in points
- Attachment C – Design flows, existing plant design and water quality
- Attachment D – WTP upgrade design criteria, including design proformas for FILTEC to complete, scope of supply, schedule of prices, and process flow diagram for upgraded WTP
- Attachment E – Proposed drinking water compliance and critical control points post upgrade
- Attachment F – Benchtop testing results (previously provided by FILTEC)

The Kaingaroa WTP upgrade works shall be carried out under the existing Operations and Maintenance Contract between Chatham Islands Council and Fulton Hogan, where Stantec is the Engineer to Contract. For this scope of works, Kirsten Norquay will be the primary point of contact for Fulton Hogan and, where appropriate, FILTEC.

Fulton Hogan shall engage FILTEC as a subcontractor to design, supply, install and commission the Kaingaroa WTP upgrade as described in this memo.

FILTEC are required to complete the design proformas in Attachment D for approval by Stantec prior to Fulton Hogan placing the order for equipment supply.

All coordination and minor works (e.g., civil, electrical) that are required to facilitate the completion of the upgrade to the Kaingaroa WTP shall be carried out by Fulton Hogan. These minor works shall be communicated directly to Fulton Hogan by FILTEC. No minor works shall be commenced without agreement by Stantec (Kirsten Norquay).

FILTEC is required to work professionally and collaboratively with the Chatham Islands Council's (CIC) nominated contractors, which include:

- Fulton Hogan (CIC maintenance contractor)
- Stantec (CIC Engineer to Contract)
- WaterOutlook (water quality database contractor)
- Telemetry Contractor (TBC)

Chatham Islands Council require the works to be completed by **30 June 2021**.

## Attachment A - Work Required

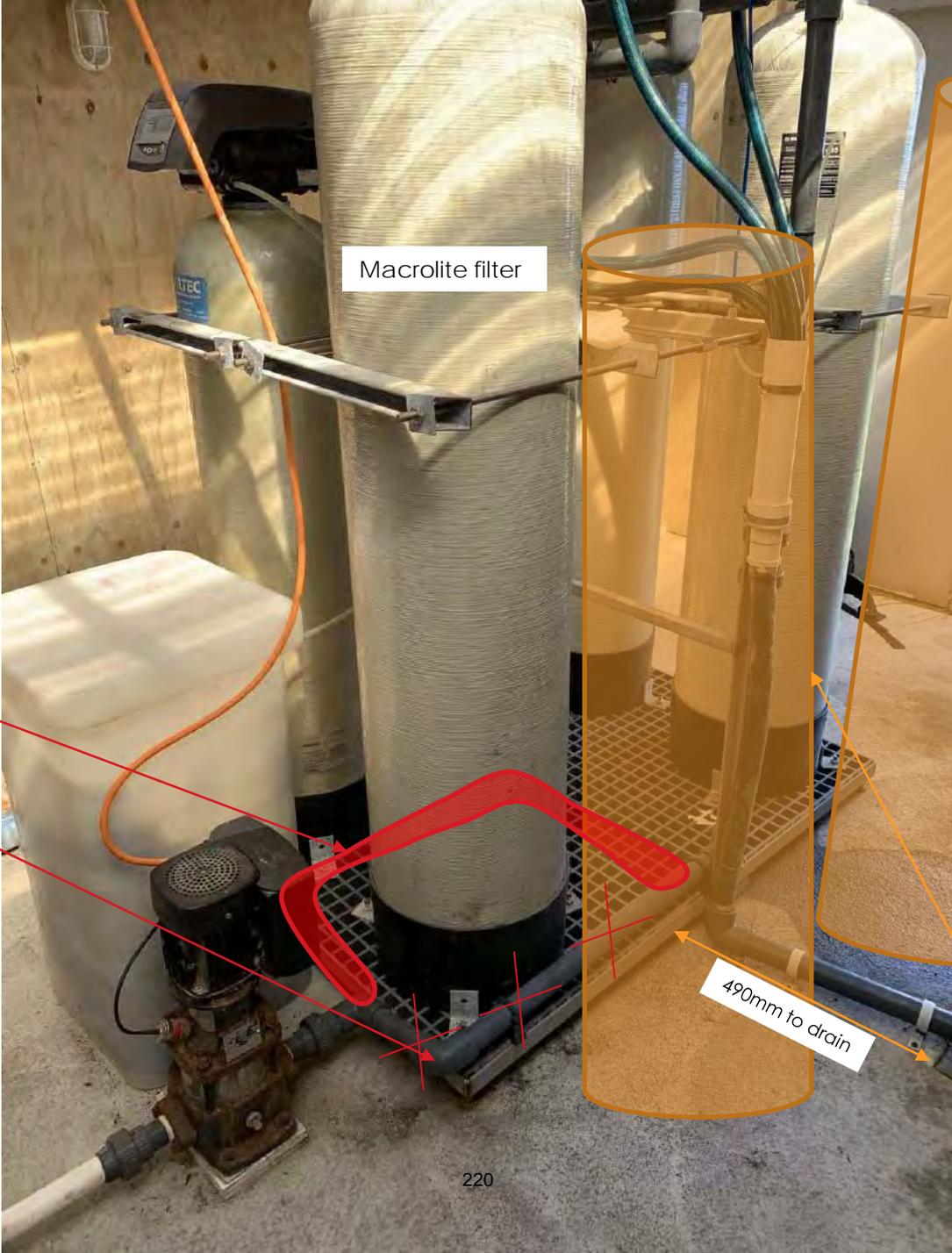
Table A-1 Mechanical Work

Item	Description	Responsibility	
1	Sampling point	Install new treated water sampling point outside the WTP building in treated water pipe leaving the WTP (post treated water tanks) for FAC/pH. Sampling point to be installed below ground level in valve box to ensure full pipe at all times.	Fulton Hogan
2	GAC filters	Installation of filters and ancillaries including skid(s), inlet and outlet pipework, drain hose and drainpipe modifications to allow for additional drain hoses	FILTEC
3	WTP feed pump	Check WTP feed pump suitability to feed through additional GAC filters. If new pump is required, provide suitable pump.	FILTEC to confirm
4	Relocation of multimedia feed pipe	Realign raw water feed pipe to multimedia filters to go behind macrolite filter to allow for easier deinstallation of macrolite filter for media replacement	FILTEC
5	Hypochlorite dosing tank	Installation of skidded and bunded hypochlorite dosing tank with calibration column	FILTEC
6	Hypochlorite dosing pump and dosing point	Installation of start and stop hypochlorite dosing pump (controlled by a flow switch on the main pump flow) and dosing point (in treated water pipe post UV) including tubing connections from hypochlorite storage tank to dosing point	FILTEC
7	Online monitoring (meters)	Install FAC & pH meter including sampling pump and display including tubing from sampling point and waste pipe to drain. Install main process line flow meter with both instantaneous flow and totalised flow outputs. Provide an analog UV sensor adapter (to connect to local RTU provided by others). Note: Existing turbidity meters to be retained	FILTEC
8	Local RTU, alarming and reporting	Separate package of work, outlined in a separate memo	Others

All equipment shall be installed in accordance with manufacturer's requirements.

The materials and diameter of all required pipe and fittings shall match existing as detailed in the photo mark-ups in Attachment B.

Attachment B – WTP Upgrade Layout



Macrolite filter

Redirect raw water pipe behind macrolite filter

490mm to drain

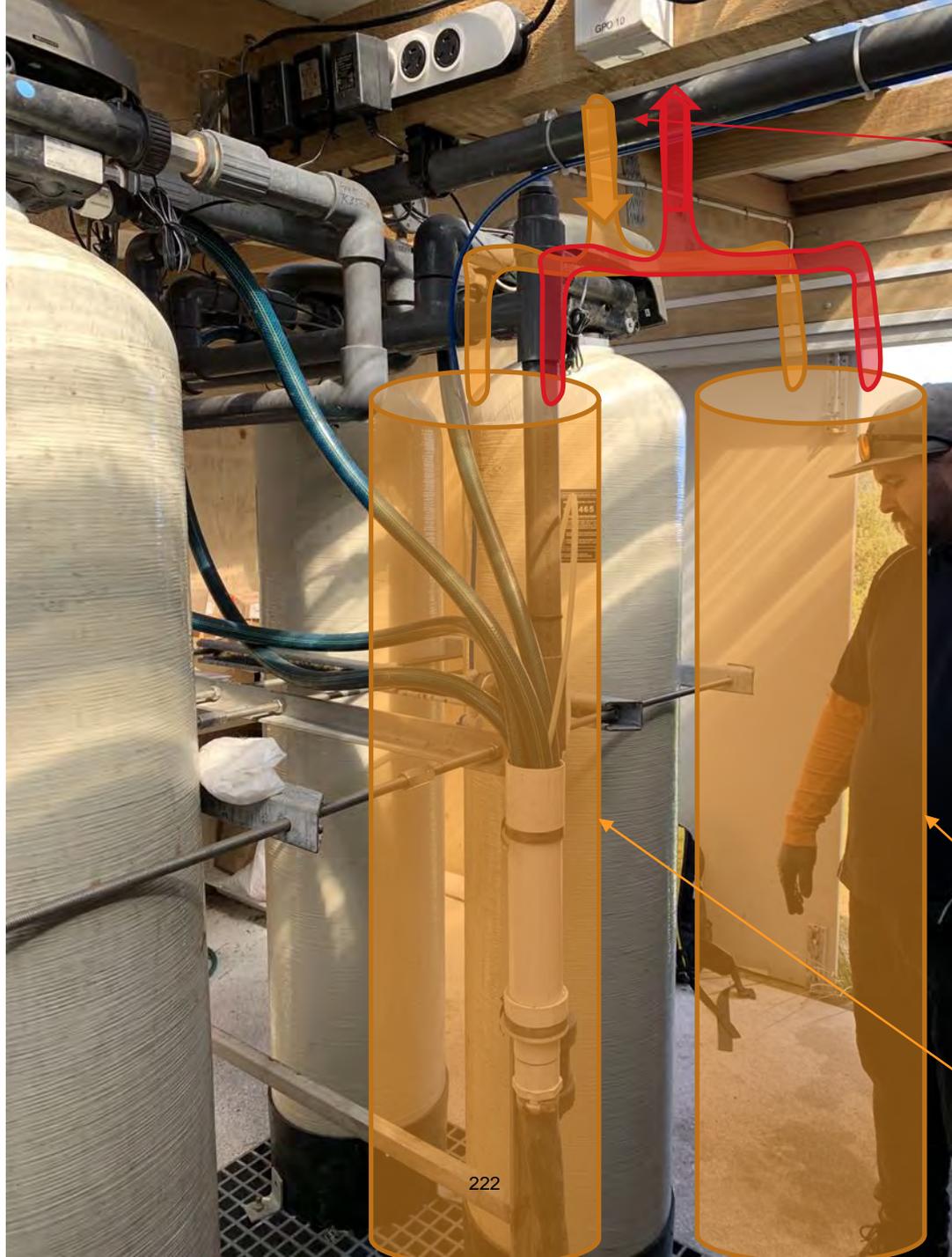
2 x new 400 dia GAC filters on skid (500 x 1400mm max) or 2 skids (500 x 500mm max) –  
Final sizing of filters to be confirmed by Filtec

2 spare power points on multi plug



Treated water pipe to be cut and fitted with offtakes to GAC filters and return from GAC filters

Drain pipe to be replaced with bigger pipe to take additional 2 hoses from GAC filters



Current treated water pipe kept as bypass -  
Filtec to confirm if valve is needed.

2 x new GAC filters on skids (500 x 1400mm max) or 2 skids (500 x 500mm max) - Filtec to confirm filter sizes



Hypochlorite dosing point- location to be determined by Filtec (somewhere downstream of UV unit)





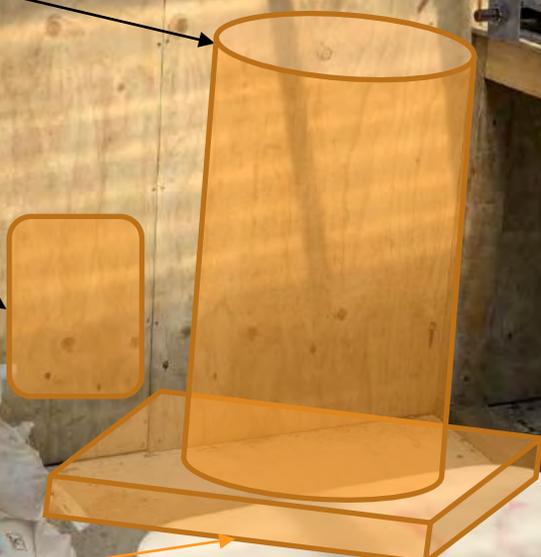
Hypochlorite dosing pump

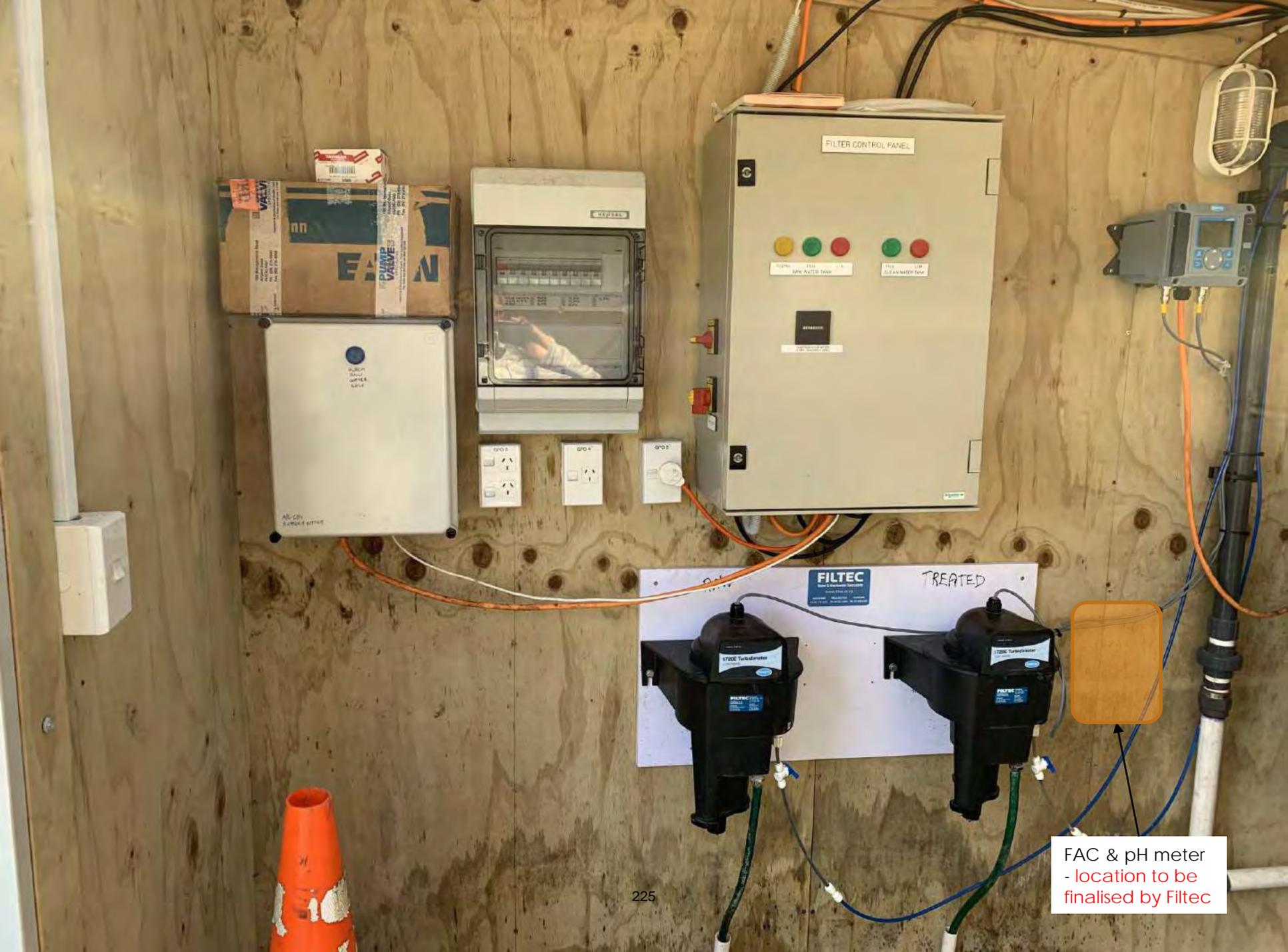


Hypochlorite solution tank – to be sized by Filtec to ensure max refill cycle of 2 x per week



Storage bund – undrained – to be sized by Filtec





FILTER CONTROL PANEL

FILTER FULL  
SPIN RATED TANK

FILTER LOW  
CLEAN WATER TANK

FILTEC

TREATED

FILTEC 1700E Turbometer

FILTEC 1700E Turbometer

FAC & pH meter  
- location to be  
finalised by FilteC



FAC/pH  
sampling point  
below ground  
level in valve box

## Attachment C – WTP Design Flow and Existing Plant Design

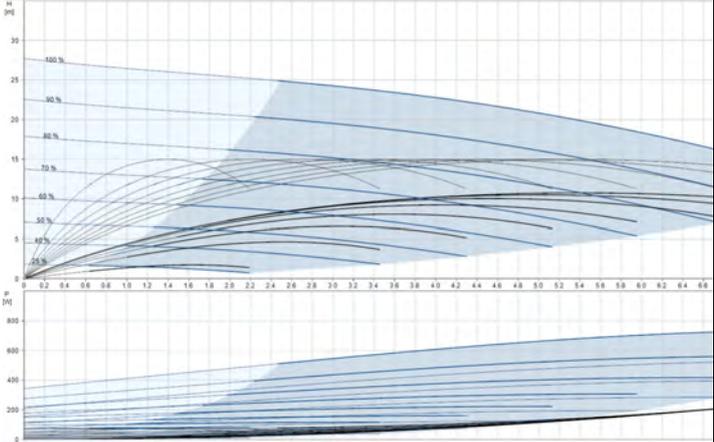
### C.1 Flow

Current Resident Population	60
Current Visitor Population (estimate)	5 Overnight
Water Demand per Resident & Overnight Visitors	250 L/person/day (NZS4404:2010)
Water Demand per Day Visitor	80 L/day
Total Estimated Water Demand	16,250 L/day
Current Average Daily Flow	14,000 L/day – 6 Monthly Report: January-July 2020
Current Maximum Daily Flow	19,000 L/day – 6 Monthly Report: January-July 2020 Up to 32,000 L/day
Future Resident Population	82
Current Visitor Population (estimate)	15 Overnight and 5 Day
Water Demand per Resident & Overnight Visitors	250 L/person/day (NZS4404:2010)
Water Demand per Day Visitor	80 L/day
Total Estimated Water Demand	24,650 L/day
<b>Future Design Flow</b>	<b>2.2 m<sup>3</sup>/h (based on existing flow restrictor for UV reactor)</b>

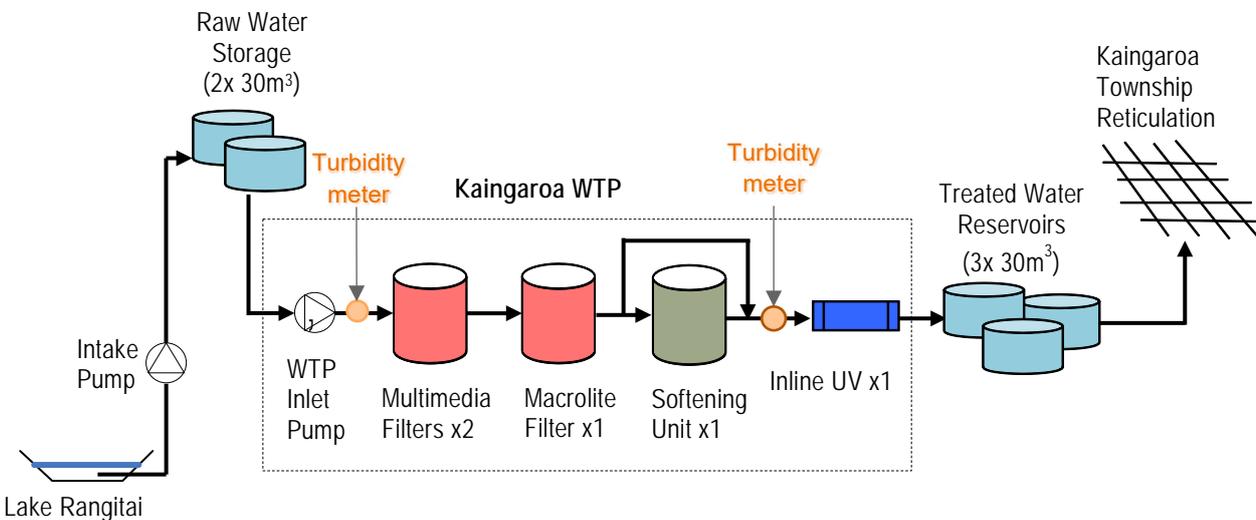
### C.2 Existing Process Capacity

Note: Information from manufacturer data sheets

<b>Multimedia Filter</b>	
Number of Units	2 (in parallel)
Model Number	AquaFlo MM350A
Media Type	Anthracite (22 kg) Filter Sand (60 kg) C Grade Fine Garnet (22 kg) A Grade Coarse Garnet (22 kg) Gravel (24 kg)
Maximum Design Flow Rate, per unit	58.3 L/min (3.5 m <sup>3</sup> /h)
Vessel Diameter	350 mm
Maximum Loading Rate, per unit	35 m/h
Maximum Pressure, per unit	8 bar
Head Loss at Design Flow Rate (min / max), per unit	1 bar / 3 bar
<b>Macrolite Filter</b>	
Number of Units	1
Model Number	AquaFlo K350A
Media Type	Macrolite 70/80 (56 L) C Grade Fine Garnet (22 kg) A Grade Coarse Garnet (22 kg) Gravel (12 kg)
Maximum Design Flow Rate	33.3 L/min (2.0 m <sup>3</sup> /h)
Vessel Diameter	350 mm
Maximum Loading Rate	20 m/h
Maximum Pressure	8 bar
Head Loss at Design Flow Rate (min / max)	1 bar / 3 bar
<b>Softener</b>	
Number of Units	1
Model Number	AquaFlo SF300L
Resin	Rohm & Haas IR1200NA (56 L)
Maximum Design Flow Rate	41.6 L/min (2.5 m <sup>3</sup> /h)
Vessel Diameter	300 mm
Maximum Loading Rate	35.7 m/h
Head Loss at Design Flow Rate (min / max)	0.6 bar / 1.7 bar
Minimum Feed Pressure	2 bar
Maximum Feed Pressure	7 bar
<b>UV Reactor</b>	

Number of Units	1
Model Number	Trojan UVMax Pro50
Maximum Design Flow Rate at 40 mJ/cm <sup>2</sup> and 95% UVT	189 L/min (3.2 L/s, 50 gpm)
Minimum UVT	75%
Maximum Pressure	6.9 Bar (100 psi)
Minimum Pressure	0.7 Bar (10 psi)
Flow Restrictor Capacity	37 L/min (2.2 m <sup>3</sup> /h, 10 gpm, 53,300 L/day)
Total Power	230 W
Lamp Power	200 W
<b>Feed Pump</b>	
Number of Units	1
Model Number	Grundfos CRE 5-4 AN-A-A-E HQQE (from FILTEC 2014 Process Description)
Motor Size	0.55 kW
Maximum Flow Duty Point	2.2 m <sup>3</sup> /h at 25.3 mH <sub>2</sub> O (2.5 bar)
Available Head at Design Flow Rate	2.5 bar Verified by FILTEC commissioning report (15/03/2014) <ul style="list-style-type: none"> <li>Multimedia Filter DP = 0</li> <li>Macrolite Filter DP = 0.6 bar</li> </ul>
Pump Curve	 <p><a href="https://product-selection.grundfos.com/product-detail.product-detail.html?custid=GMA&amp;productnumber=96518435&amp;qcid=1016410126">https://product-selection.grundfos.com/product-detail.product-detail.html?custid=GMA&amp;productnumber=96518435&amp;qcid=1016410126</a></p>

### C.3 Existing Process Flow Diagram



## C.4 Water Quality Data

Note: Lake Rangitai data provided by ECAN from State of the Environment monitoring (2005 to late 2020), except for E.coli and total coliform data which is collected by the Council for drinking water monitoring. Treated water data collected by the Council as part of drinking water compliance (2013 to late 2020).

Parameter	Raw Water Lake Rangitai	Treated Water Kaingaroa WTP
	Average (min-max)	
Turbidity	1.09 NTU (0.19-9.35 NTU)	0.09 NTU (0.06-0.22 NTU)
TOC	N/A	N/A
DOC	9.75 mg/L (6-13.2 mg/L)	N/A
Total Iron	N/A	N/A
Dissolved Iron	N/A	N/A
Total Manganese	N/A	N/A
Dissolved Manganese	N/A	N/A
pH	8.2 (8.1-8.4)	N/A
UVT	N/A	N/A
E.coli	5 MPN/100 mL (<1 - 21 MPN/100 mL)	Typically <1 MPN/100 mL (<1 - 5 MPN/100 mL)
Total Coliforms	59 MPN/100 mL (<1 - 200 MPN/100 mL)	19 MPN/100 mL (<1 - 70 MPN/100 mL)

## Attachment D – WTP Upgrade Design Criteria

### D.1 Objectives

The objectives of the proposed upgrade at the Kaingaroa WTP are as follows:

- Provide 3-log protozoal treatment by using existing UV system.
- Achieve bacterial compliance by using existing UV system
- Remove organics to improve the performance and reliability of disinfection processes (UV & chlorination).
- Provide chlorine injection for bacterial disinfection and provide a residual disinfectant in the distribution network.
- Provide treated water quality and flow monitoring.

The minimum design flow for the new equipment is 2.2 m<sup>3</sup>/h. This is based on the existing flow restrictor for the UV.

### D.2 Granular Activated Carbon Filter

**FILTEC to complete and provide to Stantec for approval prior to Fulton Hogan placing order.**

<b>GAC Pressure Filter</b>				
Number of Units				
Model Number				
Filter Media				
Maximum Flow Rate Per Unit				
Surface Area per Filter				
Maximum Loading Rate				
Bed Depth				
Empty Bed Contact Time at Vessel Maximum Flow Rate				
Maximum Design Flow Rate (Flow Restrictor)				
Loading Rate at Maximum Design Flow Rate				
EBCT at Maximum Design Flow Rate				
Maximum Feed Turbidity				
TOC/DOC Removal				
GAC Media Change-out Frequency.				
Once every [ ] months (Target is >1year)				
Differential Pressure (min / max)				
System Head Loss Estimate at 2.2 m <sup>3</sup> /h				
		<b>Process Unit</b>	<b>Clean (bar)</b>	<b>Dirty (bar)</b>
		Multimedia Filter		
		Macrolite Filter		
		Softener		
		GAC Filter		
		UV		
		Total Head Loss		
		Pump Outlet		
		Available Head		
FILTEC to confirm if new pump is required.				

### D.3 Chlorine Dosing System

**FILTEC to complete and provide to Stantec for approval prior to Fulton Hogan placing order.**

<b>Chlorine Dosing System</b>	
Target Chlorine Residual Concentration leaving WTP	0.4 mg/L (TBC based on network results; require operational range of 0.2 – 0.6 mg/L leaving the WTP).
DOC Concentration After GAC filtration (based on 50% removal)	
Estimated DOC Chlorine Demand	
Sodium Hypochlorite Dose	
Sodium Hypochlorite Concentration	5,000 mg/L (0.5 wt%) Typical hypochlorite makeup procedure: <ul style="list-style-type: none"> <li>• Dilute stock hypochlorite by [ ] <ul style="list-style-type: none"> <li>○ [ ] L of 13 wt% hypochlorite</li> <li>○ 100 L of water</li> </ul> </li> </ul>

Maximum Design Flow Rate	
Sodium Hypochlorite Pump Rate	
Sodium Hypochlorite Storage Tank Volume	Total tank volume Working Volume
Days of Storage	<ul style="list-style-type: none"> <li>days – at current average daily flow (14,000 L/day)</li> <li>days – at current peak daily flow (19,000 L/day)</li> <li>days – at 2030 demand horizon (24,650 L/day)</li> <li>days – at maximum rated capacity (52,800 L/day)</li> </ul>

## D.4 Scope of Supply

### General

The Kaingaroa WTP upgrade works shall be carried out under the existing Operations and Maintenance Contract between Chatham Islands Council and Fulton Hogan, where Stantec is the Engineer to Contract. For this scope of works, Kirsten Norquay will be the primary point of contact for Fulton Hogan and, where appropriate, FILTEC.

Fulton Hogan shall engage FILTEC as a subcontractor to design, supply, install and commission the Kaingaroa WTP upgrade. FILTEC are required to complete the design proformas in Attachment D for approval by Stantec prior to Fulton Hogan placing the order for equipment supply.

All coordination and minor works (e.g., civil, electrical) that are required to facilitate the completion of the upgrade to the Kaingaroa WTP shall be carried out by Fulton Hogan. These minor works shall be communicated directly to Fulton Hogan by FILTEC. No minor works shall be commenced without the agreement of Stantec (Kirsten Norquay).

FILTEC is required to work professionally and collaboratively with the Chatham Islands Council's (CIC) nominated contractors, which include:

- Fulton Hogan (CIC maintenance contractor)
- Stantec (CIC Engineer to Contract)
- WaterOutlook (water quality database contractor)
- Telemetry Contractor (TBC)

Fulton Hogan shall provide a programme which includes the expected delivery date for equipment to Chatham Island and date for Practical Completion. The work shall be completed no later than 30 June 2021.

### Equipment to be provided

Items that FILTEC are required to design, supply, install and commission include those listed below:

GAC pressure filter with instrumentation and automated backwash

- Pressure gauges
- Aquasorb H200 media
- Sufficient additional GAC filter media to enable media to be replaced twice (to be stored at WTP)

Skidded and banded sodium hypochlorite storage and dosing with calibration column

- Hypo dosing calibrated and manually adjusted.
- Start and stop hypo dosing pump using a flow switch based on main pump flow.

Online monitoring with ability to download data locally via USB stick and to interface with RTU (provided by others)

- FAC and pH
  - DEPOLOX 400M and flow cell module
  - Free chlorine sensor
  - pH sensor
- Flow meter
  - Krohne OPTIFLUX 1100 (or equal)
  - 4-20mA analog signal outputs for instantaneous flow rate
  - Digital pulse for totalised flow
- UV sensor adapter
  - 4-20mA analog UVI sensor interface

Other

- ICE-PIC calibration unit for existing turbidity meters (HACH 1720E)

### Documentation to be provided

- Testing and commissioning report
- As-built P&IDs and photos
- Equipment schedules
- O&M manual

- Validation certificate for the UV system (previously provided by FILTEC) to demonstrate protozoal and bacterial compliance with the DWSNZ at a minimum of 70% UV transmittance and maximum of 2.2 m<sup>3</sup>/hour.

**Warranty**

FILTEC shall warrant that all equipment, when installed and commissioned, will achieve the required performance, and operate for its expected design life. For each item of equipment designed and /or manufactured as part of this Contract, FILTEC shall provide warranties to Chatham Islands Council, and render all reasonable assistance for the purpose of enforcing these. The duration of the warranty for all equipment and services rendered shall be 12-months from the date of Practical Completion, notwithstanding warranties offered by the equipment suppliers. Practical Completion is achieved when the equipment has been installed, commissioned, and demonstrated to operate as required.

**Insurances**

This work shall be carried out under the existing Operations and Maintenance Contract, which includes insurance and liability requirements.

**Quotation and Payment**

Fulton Hogan shall provide an updated quotation for the Kaingaroa WTP upgrade that includes FILTEC’s work as well as minor works to be carried out by Fulton Hogan (eg minor civil works and any electrical works).

As a minimum, the quotation shall include a schedule of prices presented in Table D-1.

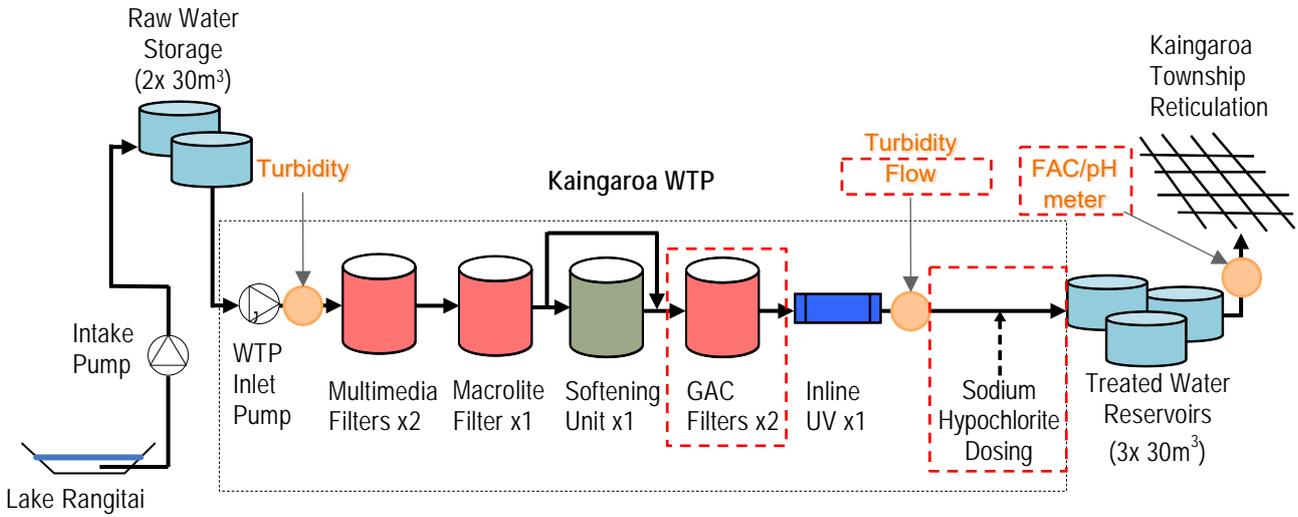
Table D-1 Schedule of Prices

	Item	Description	Price
1	Sampling point	New treated water sampling point	\$
2	GAC filters	Design and supply filters and ancillaries	\$
3	WTP feed pump	Check WTP feed pump suitability to feed through additional GAC filters. If new pump is required, provide suitable pump.	\$
4	Multimedia filter	Realign raw water feed pipe to multimedia filters	\$
5	Hypochlorite dosing tank	Design and supply hypochlorite dosing tank	\$
6	Hypochlorite dosing pump and dosing point	Design and supply hypochlorite dosing pump, pipework, fittings and flow switch	\$
7	Online monitoring	Supply FAC & pH meter (including sampling pump) and flow meter. Supply analog UV sensor adapter.	\$
8	Installation & Commissioning	Installation and commissioning of supplied process equipment.	\$
9	Minor Works	Other minor civil and electrical works	\$
	Contingency	Additional works carried out on approval by Stantec	\$10,000
	Total		

Payment will be based on work completed, with two milestone payments:

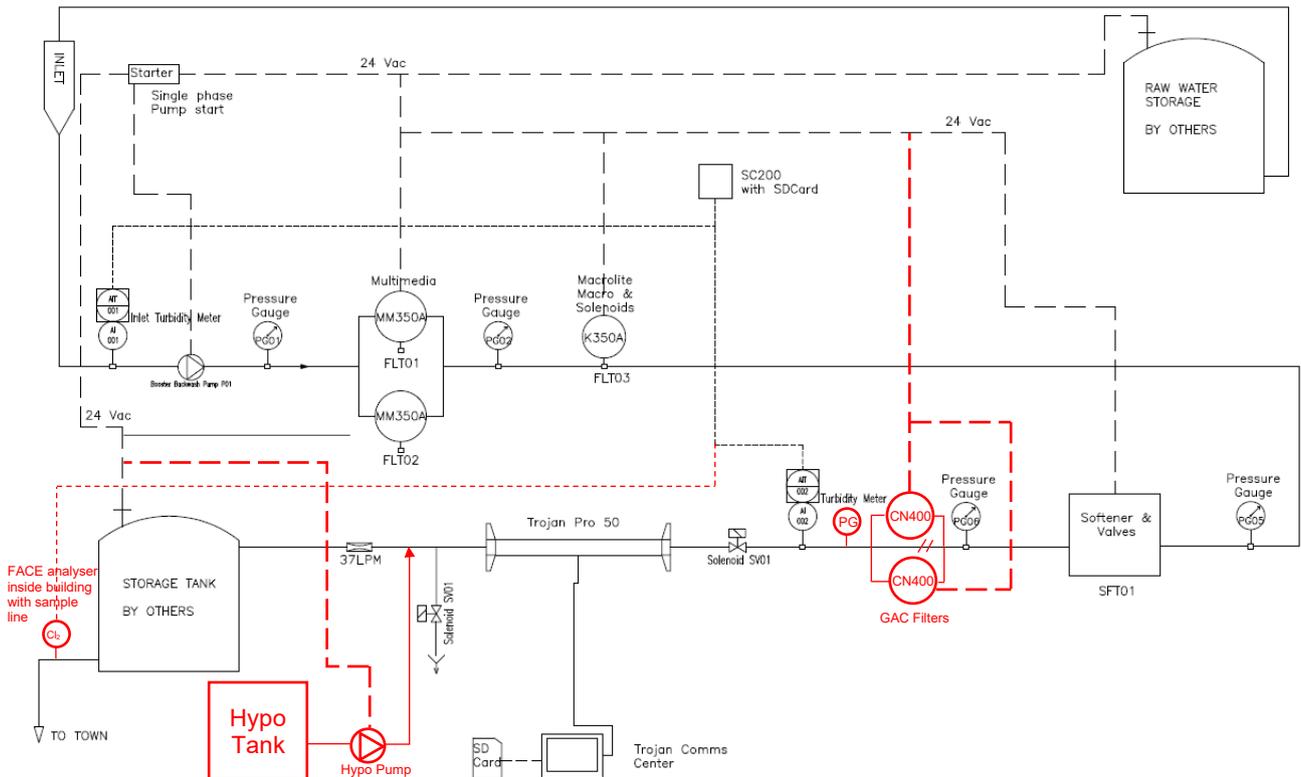
- First milestone – Receipt of equipment and instrumentation at Chatham Island
- Second milestone - Practical Completion

## D.5 Process Flow Diagram for Upgraded WTP



Note: New equipment and instrumentation indicated by red dotted box.

## D.5 P&ID for Upgraded WTP (Indicative only, FILTEC to design)



Note: New equipment and instrumentation indicated in red.

## Attachment E – Proposed Drinking Water Compliance and Critical Control Points

This has been on the basis that cell phone coverage is not available. It will be updated once a telemetry and cloud-based reporting system is operational.

### E.1 Drinking Water Compliance

Compliance Parameter	Compliance Method
Bacterial	Criterion 5 – UV disinfection, dose of at least 40 mJ/cm <sup>2</sup>
Protozoa	Source water – 3-log inactivation or removal (default in Section 5.2.1.2)  UV disinfection ( <b>Validation certificate required for 3-log from FILTEC</b> ): <ul style="list-style-type: none"> <li>• Flow – flow restrictor</li> <li>• Turbidity – online turbidity manually recorded each month</li> <li>• UV Intensity – continuous monitoring</li> <li>• UVT – manual UVT grab sample (monthly)</li> <li>• Lamp replacement hour meter – continuous monitoring</li> <li>• Lamp outage – continuous monitoring</li> </ul>
Viral	N/A at present
Cyanotoxin	N/A at present
Chemical	N/A at present
Radiological	N/A at present

Critical Control Points:

- UV Disinfection
- Residual chlorination

### E.2 Critical Control Points

#### E.2.1 UV Disinfection

**Process objectives:**

1. Provide a **primary disinfection Critical Control Point** to inactivate bacterial, viral, and protozoan pathogens that may have entered upstream of dosing point

**Operational day-to-day monitoring of control process:**

What	<ul style="list-style-type: none"> <li>• <b>UV dose</b> in mJ/cm<sup>2</sup></li> <li>• <b>Turbidity</b> in NTU</li> </ul>
When	<ul style="list-style-type: none"> <li>• Manually recorded at least <b>5 days per week</b></li> <li>• Data logged <b>continuously</b> and downloaded via USB at least <b>once a week</b></li> </ul>
Where	<ul style="list-style-type: none"> <li>• UV reactor</li> <li>• Treated water turbidity instrument</li> </ul>
How	<ul style="list-style-type: none"> <li>• Online UVI sensor (Trojan UVMax Pro50).</li> <li>• Online NTU Meter (Hach SC200).</li> </ul>
Who	<ul style="list-style-type: none"> <li>• Water Treatment Plant Operator</li> </ul>
Records	<ul style="list-style-type: none"> <li>• Log book hard copy. Contract Manager inputs data into Water Outlook, a proprietary database that the Water Engineer can access.</li> <li>• Download data via USB. Contract Manager inputs data into an Excel spreadsheet and forwards to Water Engineer.</li> </ul>

**Process performance criteria at monitoring point:**

**Correction if performance criteria are not met:**

Target Range:	<ul style="list-style-type: none"> <li>• UV dose: 40 mJ/cm<sup>2</sup></li> <li>• NTU: &lt;1.0</li> </ul>	<ul style="list-style-type: none"> <li>• Operator to check filters are operating normally and <b>manually backwash filters</b> as required.</li> <li>• Perform <b>UV reactor sensor and lamp check</b> during routine inspections.</li> <li>• Check UV dose and raw water quality</li> </ul>
Action Limits:	<ul style="list-style-type: none"> <li>• UV dose: &lt;40 mJ/cm<sup>2</sup></li> <li>• NTU: &gt;1.0 (&gt;15 min)</li> </ul>	<ul style="list-style-type: none"> <li>• Operator to <b>adjust/maintain UV reactor</b> so that the target dose is achieved.</li> <li>• Operator to undertake <b>troubleshooting</b>.</li> <li>• Operator to <b>manually backwash filters</b> and <b>reduce flow</b> to achieve the target NTU.</li> </ul>

		<ul style="list-style-type: none"> <li>Operator to <b>notify Contract Manager</b></li> </ul>
Critical Limits:	<ul style="list-style-type: none"> <li>UV dose: &lt;40 mJ/cm<sup>2</sup></li> <li>NTU: &gt;2 (&gt;3 min)</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>shut down network pump</b> and <b>service the UV reactor</b> and <b>manually backwash filters</b> and then restart network pump</li> <li>Operator to <b>notify Contract Manager</b></li> <li>Contract Manager to <b>notify Water Engineer.</b></li> <li>Water Engineer to <b>notify CEO and DWA</b> if water outside of critical limits needs to be supplied or has been supplied and follow Contingency Plan 3 in the Water Safety Plan.</li> </ul>

**Supporting programs:**

- Monthly analysis for E.coli and total coliforms by accredited laboratory.** Laboratory reports sent directly to Contract Manager and Water Engineer. Water Engineer reports monthly to CEO, and Water Engineer reports exceedances as soon as practicable to CEO and DWA if results are outside DWSNZ.
- Annual refresher training** of Operator in operation, maintenance and trouble-shooting of treatment process units and instrumentation by service agent (FILTEC).
- Monthly monitoring instrument checks and calibration by Operator.
- Training and competency assessment of operator in UV reactor performance and turbidity monitoring of drinking water.
- Laboratory verification checks for E.coli and total coliforms, with transgression reporting to operator and district health board.
- Raw water chemistry sampling programme (colour, iron, manganese, hardness)

**Planned programs:**

- Extend raw water intake into deeper water of Lake Rangitai.
- Install telemetry and cloud-based reporting system for monitored parameters. Reliant on provision of cell phone coverage to Chathams via the government's rural connectivity project.

### E.2.2 Residual Chlorination

**Process objectives:**

- Provide a **primary disinfection Critical Control Point** to inactivate bacterial and viral pathogens that may have entered upstream of dosing point
- Provide **residual disinfection Control Point** to help inactive pathogens entering downstream of the dosing point.

<b>Operational day-to-day monitoring of control process:</b>	
What	<ul style="list-style-type: none"> <li>Free Available Chlorine (<b>FAC</b>) concentration in mg/L</li> <li><b>pH</b> in pH units. (Note: pH is not able to be adjusted if outside ideal range.)</li> <li><b>Turbidity</b> in NTU</li> </ul>
When	<ul style="list-style-type: none"> <li>Manually recorded at least <b>5 days per week</b></li> <li>Data logged <b>continuously</b> and downloaded via USB at least <b>once a week</b></li> </ul>
Where	<ul style="list-style-type: none"> <li>Treated water FAC, pH and turbidity instrument</li> </ul>
How	<ul style="list-style-type: none"> <li>Online FAC and pH meter (Depolox 400M with FC2 and pH sensors)</li> <li>Online NTU meter (Hach 1720E/SC200)</li> </ul>
Who	<ul style="list-style-type: none"> <li>Water Treatment Plant Operator</li> </ul>
Records	<ul style="list-style-type: none"> <li>Log book hard copy. Contract Manager inputs data into Water Outlook, a proprietary database that the Water Engineer can access.</li> <li>Download data via USB. Contract Manager inputs data into an Excel spreadsheet and forwards to Water Engineer.</li> </ul>
<b>Process performance criteria at monitoring point:</b>	
<b>Correction if performance criteria are not met:</b>	

Target Range:	<ul style="list-style-type: none"> <li>FAC: 0.2 - 0.5 mg/L</li> <li>NTU: &lt;1.0</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>adjust chlorine dosing</b> system to achieve target range</li> <li>Operator to check filters are operating normally and <b>manually backwash filters</b> as required.</li> </ul>
Action Limits:	<ul style="list-style-type: none"> <li>FAC: &lt; 0.2 mg/L or &gt; 0.6 mg/L</li> <li>NTU: &gt;1.0 (&gt;15 min)</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>adjust chlorine dosing</b> to within targets</li> <li>Operator to undertake <b>troubleshooting</b> (eg dosing pump function, age of solution, filters)</li> <li>Operator to <b>manually backwash filters</b> and <b>reduce flow</b> to achieve the target NTU.</li> <li>Operator to <b>notify Contract Manager</b></li> </ul>
Critical Limits:	<ul style="list-style-type: none"> <li>FAC: &lt; 0.1 mg/L or &gt; 1 mg/L</li> <li>NTU: &gt;2 (&gt;3 min)</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>shut down network pump</b> and <b>adjust chlorine level, manually backwash filters</b> and then restart network pump</li> <li>Operator to <b>notify Contract Manager</b></li> <li>Contract Manager to <b>notify Water Engineer</b>.</li> <li>Water Engineer to <b>notify CEO and DWA</b> if water outside of critical limits needs to be supplied or has been supplied and follow Contingency Plan 3 in the Water Safety Plan.</li> </ul>

**Supporting programs:**

1. **Monthly analysis** for **E.coli** and **total coliforms by accredited laboratory**. Laboratory reports sent directly to Contract Manager and Water Engineer. Water Engineer reports monthly to CEO, and Water Engineer reports exceedances as soon as practicable to CEO and DWA if results are outside DWSNZ.
2. Monthly monitoring instrument checks and calibration by Operator. FAC and pH to also be cross-checked using a handheld meter (eXact Micro 20 Photometer)
3. **Annual check** of monitoring instruments by service agent (FILTEC) as part of annual WTP servicing.
4. **Annual refresher training** of Operator in operation, maintenance and trouble-shooting of treatment process units and instrumentation by service agent (FILTEC).
5. Training and competency assessment of operator in monitoring of drinking water.
6. Laboratory verification checks for E.coli and total coliforms, with transgression reporting to operator and district health board.
7. Raw water chemistry sampling programme (colour, iron, manganese, hardness)

**Planned programs:**

1. Extend raw water intake into deeper water of Lake Rangitai.
2. Install telemetry and cloud-based reporting system for monitored parameters. Reliant on provision of cell phone coverage to Chathams via the government's rural connectivity project.

Attachment F – Benchtop Testing Results (Provided by Filtec)

Carbon Filtration Bench test, Filtec Service bay Wellington carried out by Leighton Grieves 13/11/2020

Mls/min	GPM/Sqft	UVT %	Turbidity	Chlorine Demand
Raw		42	0.52	
194	3.3	96.3	0.34	0.4 g/m3 after 20 minutes
230	3.8	85	0.4	
242	4	81.9	0.43	
274	4.5	78.7	0.49	

The above testing was stopped at 4.5gpm/sqft as the results were getting worse. The above confirms our original proposal of using 2 only CN400L carbon units for Kaingaroa.

### Methodology

Take one litre sample for lab testing, send to Eurofins for TOC, DOC and UVT

Fill carbon test rig

Rinse for 20 minutes with Distilled water at 120 mls per minute

Adjust flow to steps in above table record data.

### Results from Eurofins

0040 Total Organic Carbon TOC 9.8 g/m3

0440 Dissolved Organic Carbon 9.6g/m3

1250 Transmissivity @254.7 nm 37.8%

119,3\*

Filtec - Private Water Tests -  
Cash Sale Account  
Unit 4, 98 Main Rd  
PO Box 51-261  
Tawa  
WELLINGTON 5249  
Attention: Craig Freeman

**Analytical Report**

Report Number: 20/65039  
Issue: 1  
10 December 2020

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
20/65039-01 Notes: Chatham's Kaingaroa Raw	Miscellaneous Sample		25/11/2020 14:00	02/12/2020 13:19	70857
Test	Result	Units	Test Date	Signatory	
0040 Total (NP) Organic Carbon	9.8	g/m <sup>3</sup>	04/12/2020	Tracy Morrison KTP	
0440 Dissolved (NP) Organic Carbon	9.6	g/m <sup>3</sup>	04/12/2020	Tracy Morrison KTP	
1250 Transmissivity @ 253.7nm	37.8	%	10/12/2020	Gordon McArthur KTP	

**Comments:**

Sampled by customer using ELS approved containers.  
All samples analysed as we receive them. Delivery was within the correct time and temperature conditions.

**Test Methodology:**

Test	Methodology	Detection Limit
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA Online Edition 5310 B.	0.1 g/m <sup>3</sup>
Dissolved (NP) Organic Carbon	Dissolved Non-Purgeable Organic Carbon. APHA Online Edition 5310 B	0.1 g/m <sup>3</sup>
Transmissivity @ 253.7nm	UV-VIS spectrophotometer	0.1 %

Unless otherwise stated, all tests are performed in Wellington.  
The laboratory is not responsible for the information provided by the customer which can affect the validity of the results, for example: sampling information such as date/time, field data etc.  
"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.  
For liquid samples g/m<sup>3</sup> is the equivalent to mg/L and ppm, solid samples are reported as mg/kg which is equivalent to ppm.



Report Released By  
Rob Deacon

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.  
This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not an accredited test", which are outside the scope of this laboratory's accreditation.

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<b>Client:</b>	Chatham Islands Council	<b>Stantec-TM- 3a</b>	
<b>Project:</b>	Waitangi WTP Upgrade	<b>Date issued:</b>	19 April 2021
<b>Project Task:</b>	UV Disinfection & Analysers	<b>Prepared by:</b>	Annika Grant
<b>Subject:</b>	Technical Brief for Design, Supply & Installation of WTP Upgrades	<b>Reviewed by:</b>	Andrew Wong
		<b>Approved by:</b>	Kirsten Norquay

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## 1 Introduction & Purpose

### 1.1 Introduction

The Waitangi Water Treatment Plant (WTP) urgently requires remedial or upgrade works to address substantial limitations, comply with regulatory requirements, and meet current best practice. The required upgrades were allowed for in Council's 2018-28 Long Term Plan, but Central Government funding was not available at that time to progress these upgrades and address scheme non-compliance to date.

Central Government funding to address immediate issues is now available – partly through Ministry of Health (MoH) funding and partly through Tranche One funding as part of the Government's three waters reform programme. This memo does not specifically delineate between the two funding sources, however in general provision of new process units is funded via MoH and provision of online monitoring equipment is funded via Tranche One.

### 1.2 Purpose

The purpose of this memo is to present the proposed upgrades to the Waitangi WTP and provide supporting information (detailed in the Attachments) to Fulton Hogan and FILTEC (to be subcontracted to Fulton Hogan as the WTP supplier) to design, supply, install, and commission the equipment included in the upgrade as well as to the provider for data telemetry via an RTU and data reporting, alarming and historian via a cloud-based system.

### 1.3 Objectives

The objectives of the proposed upgrade at the Waitangi WTP are as follows:

- Achieve bacterial compliance by providing a UV system that delivers a reduction equivalent dose of at least 40 mJ/cm<sup>2</sup> in compliance with the Drinking Water Standards for New Zealand (DWSNZ)
- Provide 3-log protozoa inactivation under DWSNZ by providing a UV system
- Modify the multimedia filter backwash system to prevent untreated water reaching the treated water storage tank during a backwash cycle.

## 2 Background

### 2.1 UV System

The UV system currently installed at Waitangi WTP cannot be serviced, and is validated to provide 3-log protozoa inactivation nor a reduction equivalent dose of at least 40 mJ/cm<sup>2</sup>. Therefore, the current system is to be deinstalled and replaced with a new UV system that meets the Drinking Water Standards for New Zealand (DWSNZ) requirements.

The Waitangi WTP does not have the capacity to treat the forecasted future water demand and the long-term plan is to install a new WTP at a different location, with a different raw water source and a greater treatment capacity. The UV system described in this technical memo is to be designed for the forecasted future water demand for Waitangi and Te One and will be relocated to the new WTP location. Refer to Attachment D for the upgrade design criteria.

### 2.2 Multimedia Filter Backwash System

During the site visit in November 2020, it was discovered that a modification to the automated filter backwash settings resulted in untreated water bypassing the filter and travelling downstream to the treated water tank. During this site visit, FILTEC reset the factory settings preventing untreated water from bypassing the filter during a backwash cycle. However, this change resulted in an increase in the system pressure to approximately 6 bar (90 psi). Modifications to the

existing raw water feed and backwash system are required. The solution proposed by FILTEC is outlined in Attachment A.

### 3 Work Required

This technical memo, particularly the Attachments, is intended for use as a performance specification for the Waitangi WTP upgrade works. The Attachments are as follows:

- Attachment A - Mechanical work required for the upgrade including the party responsible for each work item
- Attachment B – Marked-up photographs of the existing WTP showing location of new equipment, pipework, fittings and tie-in points
- Attachment C – Design flows, existing plant design and water quality
- Attachment D – WTP upgrade design criteria, including design proformas for FILTEC to complete, scope of supply, schedule of prices, and process flow diagram for upgraded WTP
- Attachment E – Proposed drinking water compliance and critical control points post upgrade.

The Waitangi WTP upgrade works shall be carried out under the existing Operations and Maintenance Contract between Chatham Islands Council and Fulton Hogan, where Stantec is the Engineer to Contract. For this scope of works, Kirsten Norquay will be the primary point of contact for Fulton Hogan and, where appropriate, FILTEC.

Fulton Hogan shall engage FILTEC as a subcontractor to design, supply, install and commission the Waitangi WTP upgrade as described in this memo.

FILTEC are required to complete the design proformas in Attachment D for approval by Stantec prior to Fulton Hogan placing the order for equipment supply.

All coordination and minor works (e.g., civil, electrical) that are required to facilitate the completion of the upgrade to the Waitangi WTP shall be carried out by Fulton Hogan. These minor works shall be communicated directly to Fulton Hogan by FILTEC. No minor works shall be commenced without agreement by Stantec (Kirsten Norquay).

FILTEC is required to work professionally and collaboratively with the Chatham Islands Council's (CIC) nominated contractors, which include:

- Fulton Hogan (CIC maintenance contractor)
- Stantec (CIC Engineer to Contract)
- WaterOutlook (water quality database contractor)
- Telemetry Contractor (TBC)

Chatham Islands Council require the works to be completed by **30 June 2021**.

## Attachment A - Work Required

Table A-1 Mechanical Work

	Item	Description	Responsibility
1	Treated water sampling point	Install new sampling point at a location specified by FILTEC in the treated water pipe leaving the WTP (post treated water tanks) for FAC/pH and treated water turbidity.	FILTEC
2	Raw water sampling point	Install new sampling point at a location specified by FILTEC in the raw water pipe before the multimedia filter for raw water turbidity.	FILTEC
3	UV system	Installation of new UV disinfection system including ancillary equipment and required pipework and valving, in compliance with the manufacturer's requirements.	FILTEC
4	Multimedia filter backwash modification	Installation of all required pipework, valving, pump, controls etc to ensure that no untreated water enters the treated water tank during backwash cycles and the high-pressure issue is rectified. This is further outlined below.	FILTEC
5	Online monitoring (instruments)	Install turbidimeters, FAC & pH meter including sampling pump and display including tubing from sampling point and waste pipe to drain. Install an electromagnetic flow meter either upstream or downstream of the treated water delivery pumps. The flow meter must report both instantaneous and totalised flow, and be installed downstream of the filter backwash pump offtake.	FILTEC
6	Local RTU, alarming and reporting	Separate package of work, outlined in a separate memo	Others

All equipment shall be installed in accordance with manufacturer's requirements.

The materials and diameter of all required pipe and fittings shall match existing as detailed in the photo mark-ups in Attachment B.

### Multimedia filter backwash modification

Modifications to the existing raw water feed and backwash system are required to ensure that untreated water does not enter the treated water tank during backwash cycles and the high-pressure issue is rectified. The solution proposed by FILTEC is as follows, and illustrated in Figure A1:

- Procure a dedicated backwash pump with a selected duty appropriate for the flow and pressure requirements of the exiting multimedia filter. FILTEC to size the new backwash pump.
- Supply all necessary piping and fittings to provide a complete and functioning system.
- Plumb the new pump to the outlet of the existing Tikitiki reservoir with isolation valves and non-return valves.
- Plumb the backwash pump discharge to the inlet line of the multimedia filter.
- Wire the existing multimedia filter microswitch that closes when a backwash is initiated to start the new backwash pump and stop the Tikitiki Bore and inlet booster pumps.

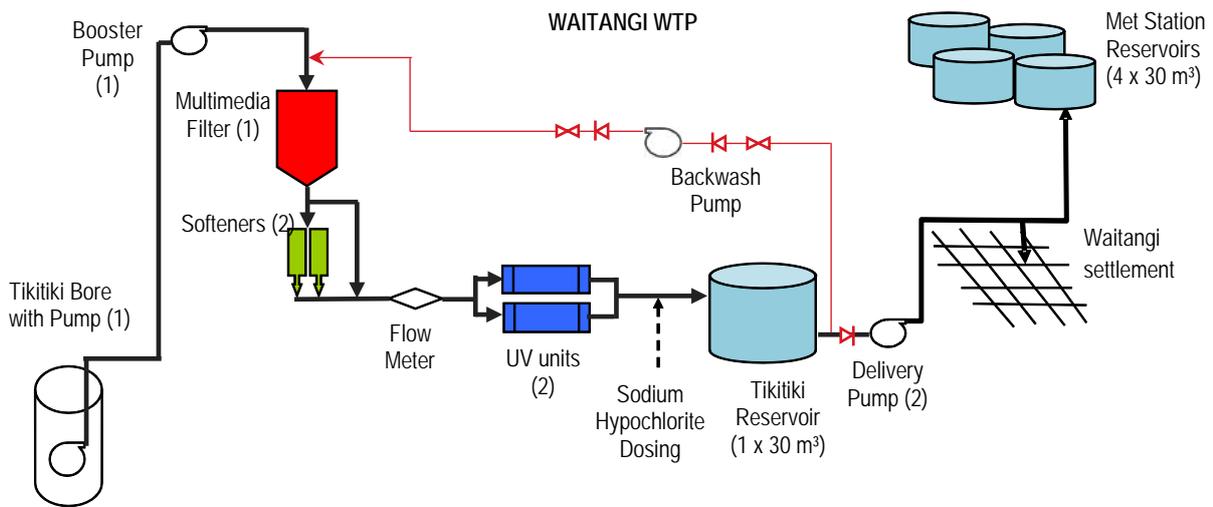


Figure A1: Multimedia filter backwash upgrade

Attachment B – WTP Upgrade Layout

2.1m to wall

Power point arrangement to be changed to allow for one UV appliance per power point – to be provided by Fulton Hogan

Spare power point for new UV unit

New pipework with shut-off valve – to be designed by Filtec

New pipework with shut-off valve – to be designed by Filtec

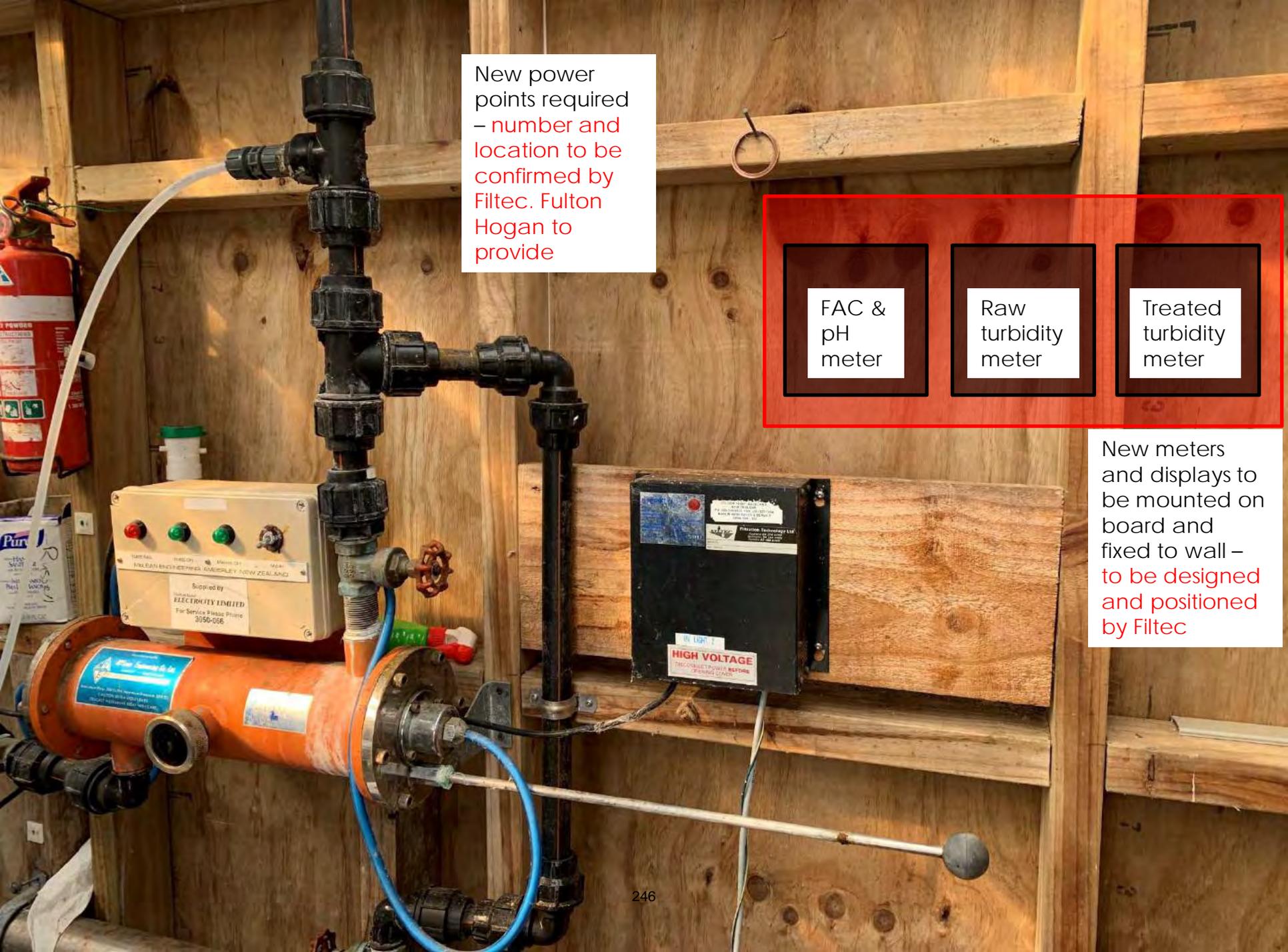
New UV unit – to be sized and position confirmed by Filtec. Unit to be installed in accordance with manufacturer's requirements.

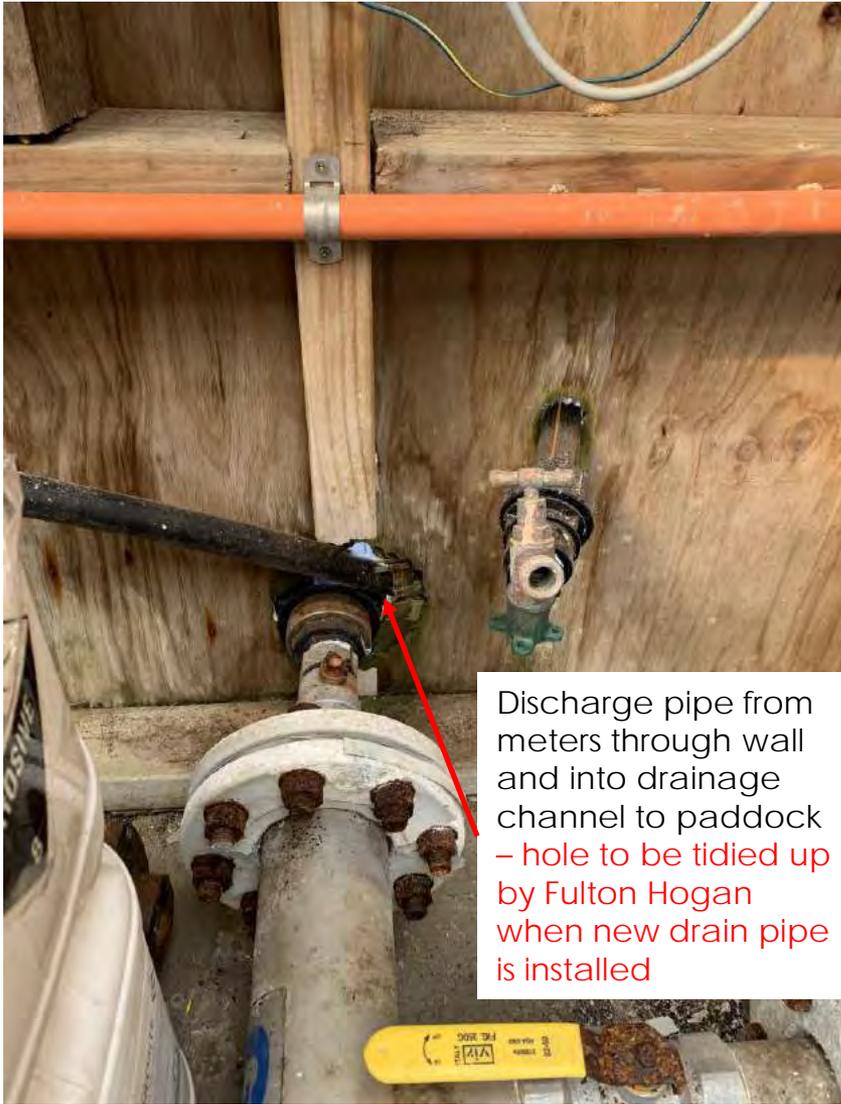
Note for pipe design: Mag flow meter installation with five pipe diameters of straight pipe upstream from the meter and three pipe diameters of straight pipe downstream. Piping shall ensure full pipe flow during operation.

New power points required – number and location to be confirmed by Filtec. Fulton Hogan to provide



New meters and displays to be mounted on board and fixed to wall – to be designed and positioned by Filtec





Discharge pipe from meters through wall and into drainage channel to paddock – hole to be tidied up by Fulton Hogan when new drain pipe is installed



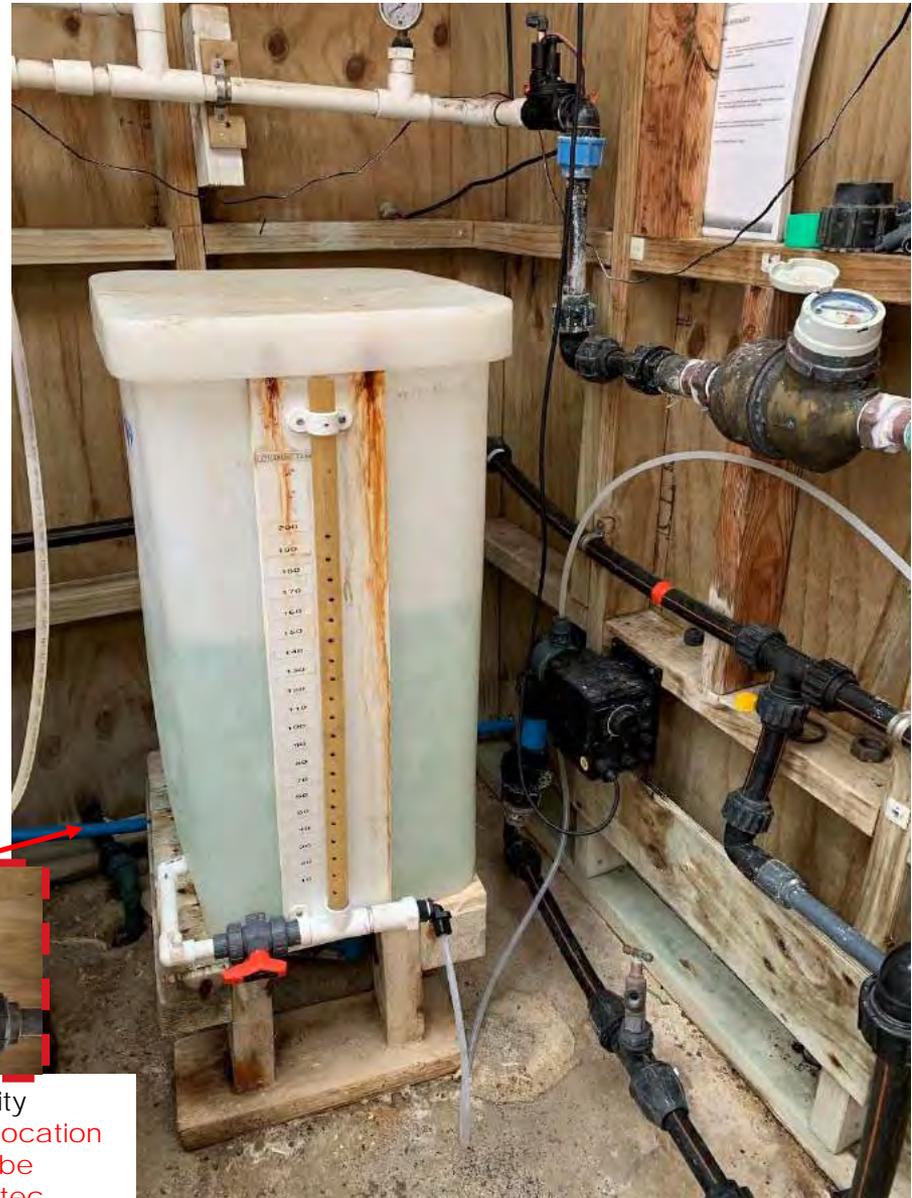
Discharge pipe from meters through wall and into drainage channel to paddock



Tee on hose connection or tapping band on pipe outside the building for pipework to treated water turbidity and FAC/pH meters – to be designed by Filtec



New pressure relief valve for filter backwash to be designed and installed by Filtec



Raw water turbidity sampling point – location and pipework to be determined by Filtec (upstream of filter)

## Attachment C – WTP Design Flow and Existing Plant Design

### C.1 Flow

Current Resident Population	170
Current Visitor Population (estimate)	35 Overnight
Water Demand per Resident & Overnight Visitors	250 L/person/day (NZS4404:2010)
Water Demand per Day Visitor	30 L/day
Total Estimated Water Demand	46,250 L/day; generally consistent with 2017 Preliminary Design Report.
Current Average Daily Flow	60,000 L/day – 6 Monthly Report: January-July 2020
Current Maximum Daily Flow	75,000 L/day – 6 Monthly Report: January-July 2020 (90%tile)
Future Resident Population	305 (187 Waitangi, 118 Te One) Refer to Future Population Growth Tech Memo
Future Visitor Population (estimate)	111 (77 Waitangi, 34 Te One) Refer to Future Population Growth Tech Memo
Water Demand per Resident & Overnight Visitors	250 L/person/day (NZS4404:2010)
Water Demand per Day Visitor	30 L/day
Commercial / Institutional Demands	Shipping Wharf, Moana Fish Supply, Te One Marae, Te One School, Waitangi Seafoods, Other Refer to Future Population Growth Tech Memo
Current Design Daily Flow	100,000 L/day
Future Average Design Daily Flow	200,000 L/day Refer to Future Population Growth Tech Memo; consistent with 2017 Preliminary Design Report.
<b>Future Design Flow</b>	<b>2.3 L/s</b> (Consistent with 2017 Preliminary Design Report)

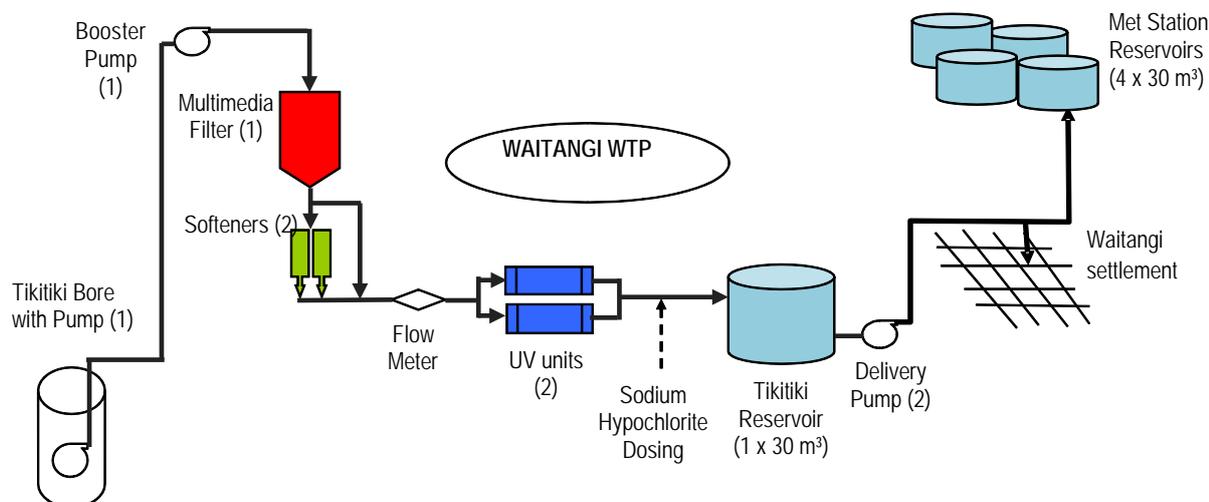
### C.2 Existing Process Capacity

Note: Information from manufacturer data sheets

<b>Raw Water Booster Pump</b>	
Number of Units	1
Model Number	Grundfos CM5-6
Motor Size	1.2kW
Maximum Flow Duty Point	6 m <sup>3</sup> /h at 34.9 mH <sub>2</sub> O (3.5 bar)
Pump Curve	<p><a href="https://product-selection.grundfos.com/products/cme-for-boosters/cm5-6-97991791?productnumber=97991791&amp;custid=GMA&amp;tab=variant-curves&amp;pumpsystemid=1157545634">https://product-selection.grundfos.com/products/cme-for-boosters/cm5-6-97991791?productnumber=97991791&amp;custid=GMA&amp;tab=variant-curves&amp;pumpsystemid=1157545634</a></p>
<b>Multimedia Filter</b>	
Number of Units	1
Model Number	AquaFlo MM400A
Media Type	Anthracite (30 kg)

	Filter Sand (80 kg) C Grade Fine Garnet (30 kg) A Grade Coarse Garnet (30 kg) Gravel (31 kg)
Maximum Design Flow Rate	78.3 L/min (4.7 m <sup>3</sup> /h)
Vessel Diameter	400 mm
Maximum Loading Rate	37 m/h
Maximum Pressure	7 bar
Head Loss at Design Flow Rate (min / max)	1 bar / 3 bar
<b>Softener</b>	
Number of Units	2 (in parallel)
Model Number	Aquaflor SF300L
Resin	Rohm & Haas IR1200NA (56 L)
Maximum Design Flow Rate, per unit	41.6 L/min (2.5 m <sup>3</sup> /h)
Vessel Diameter	300 mm
Maximum Loading Rate, per unit	35.7 m/h
Head Loss at Design Flow Rate (min / max), per unit	1.1 bar / 1.7 bar
Minimum Feed Pressure	2 bar
Maximum Feed Pressure	7 bar
<b>UV Reactor</b>	
Number of Units	1 (one is out of service)
Model Number	McLean Engineering Co. Ltd. (circa 1989)
Maximum Design Flow Rate at 40 mJ/cm <sup>2</sup> (assumed dose)	31.5 L/min (1.89 m <sup>3</sup> /h, 500 gph)
Minimum UVT	Unknown
Maximum Pressure	3.5 Bar (50 psi)
Minimum Pressure	Unknown
Total Power	Unknown
Lamp Power	Unknown
<b>Chlorine Dosing Pump</b>	
Number of Units	1
Model Number	Wallace and Tiernan P75
Maximum Flow Duty Point	79 L/h at 14.3 mH <sub>2</sub> O (1.4 bar)
<b>Reticulation Pumps</b>	
Number of Units	2 (duty/standby)
Model Number	Grundfos CRN 15-02
Motor Size	2.2 kW
Maximum Flow Duty Point	23.8 m <sup>3</sup> /h at 14.7 mH <sub>2</sub> O (1.44 bar)
Pump Curve	<p>The figure displays two performance graphs for Grundfos CRN 15-02 pumps. The top graph plots Total Head (H) in meters (left y-axis, 0-30) and feet (right y-axis, 0-100) against Flow Rate (Q) in m<sup>3</sup>/h (x-axis, 0-24). It shows a downward-sloping head curve and an upward-sloping power curve. The bottom graph plots Power (P) in kW (y-axis, 0.0-1.5) against Flow Rate (Q) in m<sup>3</sup>/h (x-axis, 0-24), showing two distinct power curves labeled P1 and P2. The pump model is identified as CRN 15-2, 3*400 V, 50Hz.</p> <p><a href="https://product-selection.grundfos.com/products/cr-cre-cri-crie-crn-crne-crt-crte/crn/crn-15-2-96501770?productnumber=96501770&amp;custid=GMA&amp;tab=variant-curves&amp;pumpsystemid=1157561306">https://product-selection.grundfos.com/products/cr-cre-cri-crie-crn-crne-crt-crte/crn/crn-15-2-96501770?productnumber=96501770&amp;custid=GMA&amp;tab=variant-curves&amp;pumpsystemid=1157561306</a></p>

### C.3 Process Flow Diagram



### C.4 Water Quality Data

Note: Raw and treated water turbidity, pH and indicator organisms data for Waitangi WTP collected by the Council as part of drinking water compliance (2008 to late 2020). Other raw water data for Tikitiki bore is from Water Safety Plan (prior to 2008). Raw water data for MPA bore collected by Council to inform design of proposed new WTP (single grab sample in 2015 and 2016 analysed for full suite, monthly grab samples from late 2016 to early 2018 analysed for indicator organisms).

<b>Raw Water – Waitangi WTP (Tikitiki Bore)</b>	<b>Typical (range)</b>
Turbidity	0.15 NTU (0.05-0.82 NTU)
TOC	N/A
DOC	N/A
Total hardness	219 mg/L as CaCO <sub>3</sub>
Total Iron	<0.01 mg/L
Dissolved Iron	N/A
Total Manganese	<0.005 mg/L
Dissolved Manganese	N/A
pH	6.9-7.9
UVT	N/A
E.coli	<1 MPN/100 mL (<1 – 2 MPN/100mL)
Total Coliforms	<1 MPN/100 mL (<1 – 38 MPN/100mL)
<b>Treated Water – Waitangi WTP</b>	<b>Typical (range)</b>
Turbidity	0.18 NTU (0.024-1.22 NTU)
TOC	N/A
DOC	N/A
Total hardness	Typically 80 mg/L as CaCO <sub>3</sub> (based on Filtec service report, dependent on % flow passed through softeners)
Total Iron	N/A
Dissolved Iron	N/A
Total Manganese	N/A
Dissolved Manganese	N/A
pH	6.6 (6.2-7.7)
UVT	N/A
E.coli	<1 MPN/100 mL (all <1 MPN/100mL)
Total Coliforms	<1 MPN/100 mL (<1 – 1 MPN/100mL)
<b>Raw Water – MPA Bore</b>	<b>Typical (range)</b>
Turbidity	N/A
TOC	2.1 mg/L (<0.5-3.6 mg/L)
DOC	9.75 mg/L (6-13.2 mg/L)
Total Hardness	205 mg/L as CaCO <sub>3</sub> (200-210 mg/L as CaCO <sub>3</sub> )

Total Iron	6.5 mg/L (6.4-6.5 mg/L)
Dissolved Iron	0.44 mg/L (0.03-0.84 mg/L)
Total Manganese	0.087 mg/L (0.083-0.090 mg/L)
Dissolved Manganese	0.081 mg/L (0.080-0.082 mg/L)
pH	7.5 (7.4-7.6)
UVT (filtered)	86.7% (85.5-87.9%)
UVT (unfiltered)	49.9% (49.4-50.3%)
E.coli	<1 MPN/100 mL (<1 – 18 MPN/100mL)
Total Coliforms	<1 MPN/100 mL (<1 – >200 MPN/100mL)

## Attachment D – WTP Upgrade Design Criteria

### D.1 Objectives

The objectives of the proposed upgrade at the Waitangi WTP are as follows:

- Provide 3-log protozoal treatment by providing a new UV system
- Achieve bacterial compliance by providing a new UV system
- Modify the multimedia filter backwash system to prevent untreated water reaching the treated water storage tank during a backwash cycle.
- Provide treated water quality and flow monitoring.

The minimum design flow for the new equipment is 2.3 L/s. This is based on the 2017 Preliminary Design Report.

### D.2 UV Reactor

**FILTEC to complete and provide to Stantec for approval prior to Fulton Hogan placing order.**

<b>UV Reactor</b>	
Number of Units	1
Model Number	
USEPA Validated Dose	Provide 3-log protozoa inactivation (dose of at least 40 mJ/cm <sup>2</sup> )
Minimum Validated UVT	70%
Maximum Flow Rate at Minimum Validated UVT	200,000 L/day, 2.3 L/s
Power Supply	240V/50Hz
Power Consumption	
Maximum Operating Pressure	
Ambient Water Temperature	
Required Features	Lamp Failure Alarm UV Intensity Monitoring Flow Monitoring
UV Start-up/lamp warmup period and controller (in min)	

### D.3 Backwash Pump Supply

**FILTEC to complete and provide to Stantec for approval prior to Fulton Hogan placing order.**

<b>Backwash Pump</b>	
Number of Units	
Model Number	
Motor Size	
Maximum Flow Duty Point	

### D.4 Supplier Scope of Supply

#### General

The Waitangi WTP upgrade works shall be carried out under the existing Operations and Maintenance Contract between Chatham Islands Council and Fulton Hogan, where Stantec is the Engineer to Contract. For this scope of works, Kirsten Norquay will be the primary point of contact for Fulton Hogan and, where appropriate, FILTEC.

Fulton Hogan shall engage FILTEC as a subcontractor to design, supply, install and commission the Waitangi WTP upgrade. FILTEC are required to complete the design proformas in Attachment D for approval by Stantec prior to Fulton Hogan placing the order for equipment supply.

All coordination and minor works (e.g., civil, electrical) that are required to facilitate the completion of the upgrade to the Waitangi WTP shall be carried out by Fulton Hogan. These minor works shall be communicated directly to Fulton Hogan by FILTEC. No minor works shall be commenced without the agreement of Stantec (Kirsten Norquay).

FILTEC is required to work professionally and collaboratively with the Chatham Islands Council's (CIC) nominated contractors, which include:

- Fulton Hogan (CIC maintenance contractor)
- Stantec (CIC Engineer to Contract)
- WaterOutlook (water quality database contractor)
- Telemetry Contractor (TBC)

Fulton Hogan shall provide a programme which includes the expected delivery date for equipment to Chatham Island and date for Practical Completion. The work shall be completed no later than 30 June 2021.

### **Equipment to be provided**

Items that FILTEC are required to design, supply, install and commission include those listed below:

#### UV Reactor

- 1 duty unit only
- Lamp failure alarm
- UV Intensity monitoring
- Flow monitoring
- VIQUA PRO30 UV Reactor
  - COMMcentre module
  - Dry contact for alarms
  - UVI analog interface output
  - Flow rate analog interface output

Online monitoring with ability to download data locally via USB stick and to interface with RTU (provided by others)

- Raw Water Monitoring:
  - Turbidity
    - Hach TU5300 ([LXV445.99.31112](#))
    - Hach sc200, 2 channel ([LXV404.99.20442](#))
- Treated Water Monitoring
  - Turbidity
    - Hach TU5300 ([LXV445.99.31112](#))
  - FAC / pH
    - DEPOLOX 400M and flow cell module
    - Free chlorine sensor
    - pH sensor
  - Flow meter
    - Krohne OPTIFLUX 1100 (or equal)
    - Instantaneous flow analog output (4-20mA)
    - Totalised flow digital pulse output

#### Backwash Pump

- Procure and install a new backwash pump with appropriate duty, with the necessary piping, isolation and non-return valves.
- Wire the existing multimedia filter microswitch to start the new backwash pump, and shutdown the Tikitiki Bore and inlet booster pumps.

### **Documentation to be provided**

- Testing and commissioning report
- As-built photos and notes
- Equipment schedules
- O&M manual
- Validation certificate for the UV system to demonstrate protozoal and bacterial compliance with the DWSNZ at a minimum of 70% UV transmittance and maximum of 2.3 L/s.

### **Warranty**

FILTEC shall warrant that all equipment, when installed and commissioned, will achieve the required performance, and operate for its expected design life. For each item of equipment designed and /or manufactured as part of this Contract, FILTEC shall provide warranties to Chatham Islands Council, and render all reasonable assistance for the purpose of enforcing these. The duration of the warranty for all equipment and services rendered shall be 12-months from the date of Practical Completion, notwithstanding warranties offered by the equipment suppliers. Practical Completion is achieved when the equipment has been installed, commissioned, and demonstrated to operate as required.

### **Insurances**

This work shall be carried out under the existing Operations and Maintenance Contract, which includes insurance and liability requirements.

### **Quotation and Payment**

Fulton Hogan shall provide an updated quotation for the Waitangi WTP upgrade that includes FILTEC's work as well as minor works to be carried out by Fulton Hogan (eg minor civil works and any electrical works).

As a minimum, the quotation shall include a schedule of prices presented in Table D-1.

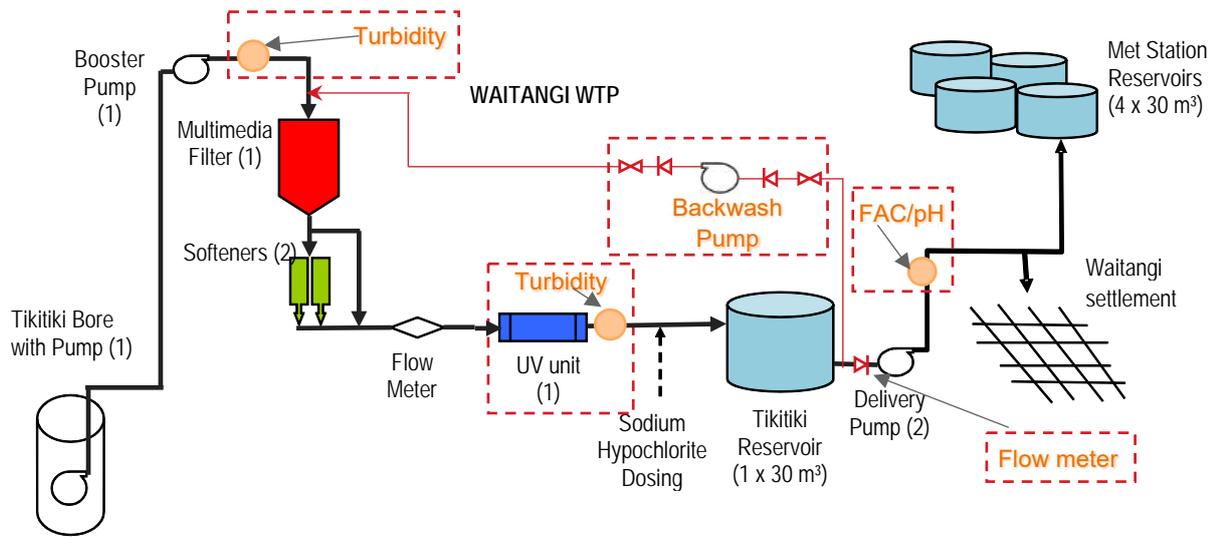
Table D-1 Schedule of Prices

Item	Description	Price	
1	Treated water sampling	New treated water sampling point	\$
2	Raw water sampling	New raw water sampling point	\$
3	UV system	Design and supply UV system and ancillaries	\$
4	Multimedia filter	Supply pipework, valving, pump, controls and ancillaries for backwash modification	\$
7	Online monitoring	Supply turbidimeters, FAC & pH meter (including sampling pump) and flow meter	\$
8	Installation & Commissioning	Installation and commissioning of supplied process equipment.	\$
9	Minor Works	Other minor civil and electrical works	\$
	Contingency	Additional works carried out on approval by Stantec	\$10,000
	Total		

Payment will be based on work completed, with two milestone payments:

- First milestone – Receipt of equipment and instrumentation at Chatham Island
- Second milestone - Practical Completion

### D.5 Process Flow Diagram



Note: New equipment and instrumentation indicated by red dotted box.

## Attachment E – Proposed Drinking Water Compliance and Critical Control Points

This has been on the basis that cell phone coverage is not available. It will be updated once a telemetry and cloud-based reporting system is operational.

### E.1 Drinking Water Compliance

Compliance Parameter	Compliance Method
Bacterial	Criterion 5 – UV disinfection, dose of at least 40 mJ/cm <sup>2</sup>
Protozoa	Source water – 3-log inactivation or removal (default in Section 5.2.1.2)  UV disinfection ( <b>Validation certificate required for 3-log from FILTEC</b> ): <ul style="list-style-type: none"> <li>• Flow – flow restrictor</li> <li>• Turbidity – online turbidity manually recorded each month</li> <li>• UV Intensity – continuous monitoring</li> <li>• UVT – manual UVT grab sample (weekly, may be reduced to monthly after 12 months and to not required after 2 years)</li> <li>• Lamp replacement hour meter – continuous monitoring</li> <li>• Lamp outage – continuous monitoring</li> </ul>
Viral	N/A at present
Cyanotoxin	N/A at present
Chemical	N/A at present
Radiological	N/A at present

Critical Control Points:

- UV Disinfection
- Residual chlorination

### E.2 Critical Control Points

#### E.2.1 UV Disinfection

**Process objectives:**

1. Provide a **primary disinfection Critical Control Point** to inactivate bacterial, viral, and protozoan pathogens that may have entered upstream of dosing point

**Operational day-to-day monitoring of control process:**

What	<ul style="list-style-type: none"> <li>• UV dose in mJ/cm<sup>2</sup></li> <li>• Turbidity in NTU</li> </ul>
When	<ul style="list-style-type: none"> <li>• Manually recorded at least <b>5 days per week</b></li> <li>• Data logged <b>continuously</b> and downloaded via USB at least <b>once a week</b></li> </ul>
Where	<ul style="list-style-type: none"> <li>• UV reactor</li> <li>• Treated water turbidity instrument</li> </ul>
How	<ul style="list-style-type: none"> <li>• Online UVI sensor (Trojan UVMax Pro30).</li> <li>• Online NTU Meter (Hach SC200).</li> </ul>
Who	<ul style="list-style-type: none"> <li>• Water Treatment Plant Operator</li> </ul>
Records	<ul style="list-style-type: none"> <li>• Log book hard copy. Contract Manager inputs data into Water Outlook, a proprietary database that the Water Engineer can access.</li> <li>• Download data via USB. Contract Manager inputs data into an Excel spreadsheet and forwards to Water Engineer.</li> </ul>
<b>Process performance criteria at monitoring point:</b>	
Target Range:	<ul style="list-style-type: none"> <li>• UV dose: 40 mJ/cm<sup>2</sup></li> <li>• NTU: &lt;1.0</li> </ul>
<b>Correction if performance criteria are not met:</b>	
<ul style="list-style-type: none"> <li>• Operator to check filters are operating normally and <b>manually backwash filters</b> as required.</li> <li>• Perform <b>UV reactor sensor and lamp check</b> during routine inspections.</li> <li>• Check UV dose and raw water quality</li> </ul>	

Action Limits:	<ul style="list-style-type: none"> <li>UV dose: &lt;40 mJ/cm<sup>2</sup></li> <li>NTU: &gt;1.0 (&gt;15 min)</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>adjust/maintain UV reactor</b> so that the target dose is achieved.</li> <li>Operator to undertake <b>troubleshooting</b>.</li> <li>Operator to <b>manually backwash filters</b> and <b>reduce flow</b> to achieve the target NTU.</li> <li>Operator to <b>notify Contract Manager</b></li> </ul>
Critical Limits:	<ul style="list-style-type: none"> <li>UV dose: &lt;40 mJ/cm<sup>2</sup></li> <li>NTU: &gt;2 (&gt;3 min)</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>shut down network pump</b> and <b>service the UV reactor</b> and <b>manually backwash filters</b> and then restart network pump</li> <li>Operator to <b>notify Contract Manager</b></li> <li>Contract Manager to <b>notify Water Engineer</b>.</li> <li>Water Engineer to <b>notify CEO and DWA</b> if water outside of critical limits needs to be supplied or has been supplied and follow Contingency Plan 3 in the Water Safety Plan.</li> </ul>

**Supporting programs:**

1. **Monthly analysis for E.coli and total coliforms by accredited laboratory.** Laboratory reports sent directly to Contract Manager and Water Engineer. Water Engineer reports monthly to CEO, and Water Engineer reports exceedances as soon as practicable to CEO and DWA if results are outside DWSNZ.
2. **Annual refresher training** of Operator in operation, maintenance and trouble-shooting of treatment process units and instrumentation by service agent (FILTEC).
3. Monthly monitoring instrument checks and calibration by Operator.
4. Training and competency assessment of operator in UV reactor performance and turbidity monitoring of drinking water.
5. Laboratory verification checks for E.coli and total coliforms, with transgression reporting to operator and district health board.
6. Raw water chemistry sampling programme (colour, iron, manganese, hardness)

**Planned programs:**

1. Complete MPA bore investigations to confirm its suitability as a future potable water supply.
2. Install telemetry and cloud-based reporting system for monitored parameters. Reliant on provision of cell phone coverage to Chathams via the government's rural connectivity project.

## E.2.2 Residual Chlorination

**Process objectives:**

1. Provide a **primary disinfection Critical Control Point** to inactivate bacterial and viral pathogens that may have entered upstream of dosing point
2. Provide **residual disinfection Critical Point** to help inactive pathogens entering downstream of the dosing point.

<b>Operational day-to-day monitoring of control process:</b>	
What	<ul style="list-style-type: none"> <li>Free Available Chlorine (<b>FAC</b>) concentration in mg/L</li> <li><b>pH</b> in pH units. (Note: pH is not able to be adjusted if outside ideal range.)</li> <li><b>Turbidity</b> in NTU</li> </ul>
When	<ul style="list-style-type: none"> <li>Manually recorded at least <b>5 days per week</b></li> <li>Data logged <b>continuously</b> and downloaded via USB at least <b>once a week</b></li> </ul>
Where	<ul style="list-style-type: none"> <li>Treated water FAC, pH and turbidity instrument</li> </ul>
How	<ul style="list-style-type: none"> <li>Online FAC and pH meter (Depolox 400M with FC2 and pH sensors)</li> <li>Online NTU meter (Hach SC200)</li> </ul>
Who	<ul style="list-style-type: none"> <li>Water Treatment Plant Operator</li> </ul>
Records	<ul style="list-style-type: none"> <li>Log book hard copy. Contract Manager inputs data into Water Outlook, a proprietary database that the Water Engineer can access.</li> <li>Download data via USB. Contract Manager inputs data into an Excel spreadsheet and forwards to Water Engineer.</li> </ul>
<b>Process performance criteria at monitoring point:</b>	
<b>Correction if performance criteria are not met:</b>	

Target Range:	<ul style="list-style-type: none"> <li>FAC: 0.2 - 0.5 mg/L</li> <li>NTU: &lt;1.0</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>adjust chlorine dosing</b> system to achieve target range</li> <li>Operator to check filters are operating normally and <b>manually backwash filters</b> as required</li> </ul>
Action Limits:	<ul style="list-style-type: none"> <li>FAC: &lt; 0.2 mg/L or &gt; 0.6 mg/L</li> <li>NTU: &gt;1.0 (&gt;15 min)</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>adjust chlorine dosing</b> to within targets</li> <li>Operator to undertake <b>troubleshooting</b> (eg dosing pump function, age of solution, filters)</li> <li>Operator to <b>manually backwash filters</b> and <b>reduce flow</b> to achieve the target NTU.</li> <li>Operator to <b>notify Contract Manager</b></li> </ul>
Critical Limits:	<ul style="list-style-type: none"> <li>FAC: &lt; 0.1 mg/L or &gt; 1 mg/L</li> <li>NTU: &gt;2 (&gt;3 min)</li> </ul>	<ul style="list-style-type: none"> <li>Operator to <b>shut down network pump</b> and <b>adjust chlorine level, manually backwash filters</b> and then restart network pump</li> <li>Operator to <b>notify Contract Manager</b></li> <li>Contract Manager to <b>notify Water Engineer</b>.</li> <li>Water Engineer to <b>notify CEO and DWA</b> if water outside of critical limits needs to be supplied or has been supplied and follow Contingency Plan 3 in the Water Safety Plan.</li> </ul>

**Supporting programs:**

1. **Monthly analysis** for **E.coli** and **total coliforms by accredited laboratory**. Laboratory reports sent directly to Contract Manager and Water Engineer. Water Engineer reports monthly to CEO, and Water Engineer reports exceedances as soon as practicable to CEO and DWA if results are outside DWSNZ.
2. Monthly monitoring instrument checks and calibration by Operator. FAC and pH to also be cross-checked using a handheld meter (eXact Micro 20 Photometer)
3. **Annual check** of FAC and pH analyser by service agent (FILTEC) using a second meter as part of annual WTP servicing.
4. **Annual refresher training** of Operator in operation, maintenance and trouble-shooting of treatment process units and instrumentation by service agent (FILTEC).
5. Training and competency assessment of operator in monitoring of drinking water.
6. Laboratory verification checks for E.coli and total coliforms, with transgression reporting to operator and district health board.
7. Raw water chemistry sampling programme (colour, iron, manganese, hardness)

**Planned programs:**

1. Complete MPA bore investigations to confirm its suitability as a future potable water supply.
2. Install telemetry and cloud-based reporting system for monitored parameters. Reliant on provision of cell phone coverage to Chathams via the government's rural connectivity project.

<b>Client:</b>	Chatham Islands Council	<b>Stantec-TM- 4</b>	
<b>Project:</b>	MoH Funded Upgrades	<b>Date issued:</b>	12 May 2021
<b>Project Task:</b>	MPA Bore Investigations	<b>Prepared by:</b>	Andrew Wong
<b>Subject:</b>	MPA Bore Redevelopment Works	<b>Reviewed by:</b>	Lesley Veale
		<b>Approved by:</b>	Kirsten Norquay

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## 1 Introduction

The purpose of this Technical Memorandum is to document the history of the Memorial Park Alliance (MPA) concrete batching bore, key findings of investigations completed to date and present the proposed bore investigations for a qualified drilling contractor and Fulton Hogan to undertake in 2021.

The intent of the past and proposed investigations are to evaluate the feasibility of upgrading the potable water scheme to better meet the current and future demand of the Waitangi Community, and to facilitate the extension of the reticulated network to supply the Te One community. The proposed investigations to be undertaken in 2021 are funded by the Ministry of Health.

### 1.1 Objectives

The objectives of the proposed investigations to be undertaken in 2021 are as follows:

- Confirm the technical feasibility of the existing MPA batching bore, or a new similarly located bore, for potable water supply.
- Confirm the technical feasibility of the existing aquifer, accessed at the MPA concrete batching site, for potable water supply.

### 1.2 Water Demand and Design Basis

The settlement of Waitangi comprises of approximately 170 residents, with sufficient accommodation for 70 visitors at various establishments. There are a number of current commercial consumers including Waitangi Hall, Hotel Chathams, Chatham Motels, Chatham Islands Council (CIC) offices, Kokiri Community Maori Health and Fulton Hogan's Works Depot. The village of Te One comprises of approximately 107 residents, and there is sufficient accommodation for 30 visitors mainly at the Marae. The main island primary school, located at Te One, currently has 70 pupils, 5 staff, and a swimming pool. Waitangi is currently serviced by a reticulated community water supply, however Te One is not. For additional detail, refer to the 2017 Preliminary Design Report<sup>1</sup>.

A review of the population and water demands (current and future) to confirm the design basis of the potable water supply was completed<sup>2</sup>. It was concluded that the peak design target of 200 m<sup>3</sup>/day is appropriate and future peak flows greater than 200 m<sup>3</sup>/day will be mitigated with treated water reservoirs with a working volume of 400 m<sup>3</sup>. The treatment plant shall be sized for an instantaneous flow rate of 2.5 L/s (200 m<sup>3</sup>/day over 22 hours of operation), and the reticulation network shall be sized for a peak day flow rate of 308.1 m<sup>3</sup>/day.

## 2 MPA Batching Bore

For additional detail on the MPA batching bore and its hydrogeology, sustainable yield, water quality, and health risks, refer to Appendix A of the Preliminary Design Report<sup>3</sup>.

### 2.1 Construction and Operation

The MPA Batching Bore, previously referred to as the "Wharf Construction Yard Bore", was drilled and constructed between 22 and 30 August 2015 by Websters Drilling. The water from the bore was used for concrete batching for the wharf construction project, and it is understood that there have been no issues with the concrete batching due to water quantity or quality.

<sup>1</sup> Preliminary Design Report – Waitangi & Te One Water Supply Upgrade, Stantec, November 2017

<sup>2</sup> Technical Memo - Chatham Islands Water Supply Upgrade Future Population Growth, Stantec, August 2020

<sup>3</sup> Wharf Construction Yard Bore – Ground Water Supply and Quality, Stantec, August 2017

Refer to Figure 2-1 for an illustration of the key locations related to the water supply scheme at Waitangi.



Figure 2-1: Key water supply scheme locations for Waitangi

The bore construction details, as provided by Webster Drilling, are as follows:

- The bore hole was drilled to a depth of 38 m at a diameter of 150 mm. The bore casing and screen are 100 mm diameter PVC.
- The bore itself is 32 m deep with a 1 mm slotted PVC screen from 23 m to 32 m.
- The annulus between the bore casing and inside of the borehole was filled with 2 mm sand from the base of the hole to 5 m above the top of the screen. This was overlain by blinding sand (2 m thick), bentonite (1 m thick), pea metal (9 m thick), bentonite (2 m thick), gravel pack (1 m thick) and concrete (1 m thick) to ground level.
- At ground level the bore head is surrounded by a 1 m x 1 m x 0.15 m thick concrete pad.

Groundwater data is not available in the surrounding area and to date there has been no ongoing monitoring of groundwater levels. During drilling of the bore hole, the drilling contractor did not see any discernible changes in groundwater pressures that would indicate multiple aquifers above that screened by the MPA batching bore.

Overall, the bore is screened in the weathered limestone. This is overlain by low permeability material consisting of silt and clay. The groundwater level in the bore was 4.8 m below ground level at the time of its construction, which is higher than the top of the limestone into which the bore is screened. This indicated that the limestone aquifer was at least partially confined, and there may be leakage of groundwater to the aquifer from the overlying silts and clays.

The bore was in operation for concrete batching from January 2016<sup>4</sup> until approximately May 2018. It was decommissioned by MPA prior to their demobilisation from Chatham Island. The bore is currently in poor condition and while require some improvement works prior to using it as a potable water source (Figure 2-2).



Figure 2-2: MPA batching bore on November 2020

## 2.2 Yield Testing

Following the construction of the bore in August 2015, Webster Drilling undertook a 24-hour constant-rate aquifer test followed by a 24-hour water level recovery monitoring period. The flow rate during this test was 1.7 L/s (147 m<sup>3</sup>/day, over 24 hours). Further analysis of the geological strata and the drawdown test data indicated that sustainable yield may be in the range of 2.0-2.3 L/s (170-200 m<sup>3</sup>/day, over 24 hours). However, this has yet to be confirmed as this aquifer requires a larger pump to abstract at the peak design flow rate.

A second constant rate aquifer test was undertaken in March 2017 to determine if the bore could provide a sustainable yield of up to 2.3 L/s. The test results revealed an unusual water level response and key information on the testing methodology was not recorded; hence, the results were considered unreliable. It was confirmed later that the test was completed with a smaller capacity pump, which replaced the original larger pump.

A third aquifer test was undertaken in November 2019<sup>5</sup> to confirm its maximum sustainable yield, and intended to last for seven days. The test was terminated after two days primarily due to a drop in water level in the MPA batching bore over the last 24-hours of pumping. It was stated by Washingtons in its report that the water level in a local spring, located approximately 1 km ENE of the MPA batching bore, decreased during the 48-hour pumping period and recovered after the MPA bore pumping test was stopped. However the report did not provide many details about the spring (e.g., exact location, construction, hydrogeology), did not confirm if there is a hydraulic connection between the MPA batching bore and the local spring, or investigate if other factors may have influenced the spring level.

It was also stated by Washingtons in its report that after the pumping was stopped that the Hospital bore, located approximately 1.2 km NE of the MPA batching bore, had ran dry. The Hospital bore was investigated by CIC after the MPA batching bore pumping test, and it was confirmed that the bore going “dry” was due to a mechanical failure, and not a lack of water due to MPA bore pumping test.

The average pumping flow rate observed during the third aquifer test was 1.5 L/s and ranged from 1.2-1.7 L/s; the fluctuation in the flow rate was attributed to the generator governor. The well took less than ten minutes to run clear from the start of pumping. Analysis of the pumping test data indicated that the maximum yield of the MPA bore has reduced to approximately 1.0 L/s; based on this yield and if performance cannot be recovered, the bore, and possibly the aquifer, may not be suitable for the proposed drinking water supply upgrade. However, the MPA batching bore was inactive for over a year prior to the test, and no reference to surging or air lifting the bore to scour the screen prior to testing were noted. Rehabilitation efforts may improve the current bore performance.

<sup>4</sup> An exercise in logistics, *Contractor Magazine*, June 2018, <https://contractormag.co.nz/project/an-exercise-in-logistics/>

<sup>5</sup> CY1 Test Pump Summary, Craig Kerwin – Washingtons Exploration Ltd., November 2019

## 2.3 Water Quality

Grab samples have been collected from the MPA batching bore to understand its existing raw water quality and assess the level of treatment required to comply with the Drinking Water Standards for New Zealand (DWSNZ). All samples were collected directly from the bore head to provide a representative sample of the groundwater quality. Two full-suite samples were collected on 27 August 2015 and 27 September 2016, and monthly samples were collected for microbiological analysis (E.coli and Total Coliforms). The water quality is summarised in Table 1. Additional water quality data is presented in Appendix A of the Preliminary Design Report.

**Table 1: MPA batching bore water quality August 2015 to April 2018**

Parameter	Unit	No. Samples	Results	DWSNZ MAV/GV	Comment
Total Iron	mg/L	2	6.4-6.5	<0.2 (staining)	>30x GV (Tikitiki <0.01 mg/L)
Dissolved Iron	mg/L	2	0.03-0.84	<0.2 (staining)	Up to 4x GV
Total Manganese	mg/L	2	0.083-0.090	<0.04 (staining) <0.1 (taste)	~2x GV for staining (Tikitiki <0.005 mg/L)
Dissolved Manganese	mg/L	2	0.082-0.080	<0.04 (staining) <0.1 (taste)	~2x GV for staining
Turbidity	NTU	2	58 -58	<2.5 (appearance) <1 (disinfection)	Water appeared clear from bore on sampling. However, the water became cloudy overnight and likely due to iron oxidation in the sample bottle (Tikitiki <0.1 NTU)
Total hardness	mg/L	2	200-210	100-300 (taste)	~2x lower GV for taste (Tikitiki 219mg/L but treated)
Total Organic Carbon	mg/L	2	<0.5 -3.6		Suitable for chlorination
pH	-	2	7.4-7.6	7-8.5 <8 (chlorination)	Neutral pH (Tikitiki 6.9-7.9) Suitable for chlorination
UVT	%T	2	49.4-50.3		Not suitable for disinfection, but likely due to iron oxidation
Filtered UVT	%T	2	85.5-87.9		Suitable for disinfection
E.coli	MPN/ 100mL	13	<1 -18	<1 (MAV)	>MAV since 22 August 2017, but not prior. (Tikitiki <1 MPN/100mL)
Total coliforms	MPN/ 100mL	13	<1 - >200		Detectable since 21 March 2017, but not prior. (Tikitiki < 1 MPN/100mL)

### 3 Outcomes and Next Steps

In 2017, the Preliminary Design report concluded that the MPA batching bore's sustainable yield required confirmation. However, the water quality data indicated that it could be used as a potable water supply and a treatment concept was developed. The proposed treatment process included: softening, greensand filtration with pre-chlorination, UV disinfection, and chlorine disinfection.

Following the 2019 drawdown test of the MPA batching bore and the conclusion that its yield may be reducing, it was recommended that a new bore that is larger and deeper than the existing MPA batching bore is installed at the site<sup>6</sup>. The site is the preferred location as it is owned by CIC, and enables the conveyance of treated water around the network, including the extension to Te One, without booster pumping.

Ministry of Health (MoH) funding was secured to investigate the MPA batching bore with the intention of constructing a new and larger bore at the existing site.

#### 3.1 Plan A – Construct New Bore

Based on the recommendation from the hydrogeologist to drill a new bore at the former MPA Construction Yard, technical specifications<sup>7</sup> were developed. The specifications were issued to MacMillan Drilling Group (MacMillan), Washingtons Exploration Ltd. (Washingtons) and Webster Drilling & Exploration (Webster) for quotations. Budgetary pricing was received from Washingtons and Webster ranging from \$175,000 to \$250,000. The quotes were approximately two to three times greater than the approved funding budget received from the MoH.

In response to the budget limitations, an alternative plan to complete additional investigations on the MPA batching bore are summarised in Section 3.2.

#### 3.2 Plan B – Redevelop and Rehabilitate MPA Batching Bore

Given that the MPA batching bore was not operated for approximately 1.5 years prior to the drawdown test that was completed on November 2019, it is possible that the bore capacity declined due to a variety of factors (e.g., sand bridging, clogged screen, etc.). No reference to bore redevelopment activities prior to the November 2019 drawdown test were recorded in the pump test summary report. The condition of the bore, and not a reduction in the aquifer yield, may have impacted the drawdown test results and the conclusion that its sustainable yield has reduced to 1 L/s.

Redevelopment, inspection, and restoration works of the bore is proposed to be undertaken by a qualified drilling contractor:

- CCTV inspection
  - Inspect the condition of the bore and bore screen and document the physical condition and possible fouling.
  - Inspect before and after bore redevelopment activities.
- Chemical clean of the bore screen
  - Use Chemdrex ADPA-Dry or equivalent
    - Pelletised acid developed to clean bore screens of calcium carbonate, magnesium carbonate, iron deposits, and moderate biological growth.
    - Poured directly into the bore at the prescribed amount and sinks to the bottom of the bore to ensure the highest acid concentrations are present at the bore screen.
    - Overdosing the cleaning chemical may release excessive heat and could damage the PVC screen.
- Redevelop the bore mechanically: Well development methods are based on establishing flow velocities greater than those produced by the expected rate of pumping of the completed well<sup>8</sup>.
  - Compressed Air / Air Lift Pumping (surging)
    - Inject compressed air into the bore to lift the water. As the water reaches the top of the casing, shut off the air causing the aerated water column to fall forcing water through the screen in the reverse direction.
    - Periodically operate the air supply without stopping to remove sediment from the bore
    - If there isn't an adequate air supply to lift water out of the bore, connect the compressed air to a smaller diameter pipe that is inserted into the bore to create an airlift pump.
- Step drawdown testing
  - Four flow rates equally spaced, up to 2.5 L/s
  - Pump at each flow rate for 30 minutes without pauses between steps.
    - Ideally repeat historical step testing flow rates for comparison, but no historical step testing data is available.
- Constant rate pumping test
  - Pump at a flow rate up to 2.5 L/s for 2 days.

<sup>6</sup> CIC Water and Wastewater Monthly Update – January 2020, Meeting Notes, Stantec

<sup>7</sup> Specification for Chatham Islands Bore Drilling, Stantec, October 2020

<sup>8</sup> Water Well Drilling Manual, Lifewater Canada, [https://www.lifewater.ca/drill\\_manual/Section\\_Content.htm](https://www.lifewater.ca/drill_manual/Section_Content.htm)

- Install level monitoring at the MPA batching bore and three other existing private bores nearby.
  - Locations to be confirmed based on a private bore survey being completed by Environment Canterbury
- Collect samples for water quality analysis
  - Sample at the start, middle, and end of the constant rate pumping test.
  - Refer to Appendix C for the water quality parameters for analysis.
- Restore the bore head and complete protection works. Bore protection works shall include:
  - Seal the bore to prevent the ingress of water. Replace the existing blind flange and gasket. Modify the existing pipes and cables as required so that the blind flange can be installed properly.



- Fulton Hogan to construct stock fencing and a surface water diversion trench around the bore.



All pumping tests shall be completed at a consistent rate by the Contractor. Variations in the flow rate are not acceptable, and the test will be repeated at no additional cost.

### 3.2.1 Recommended Equipment

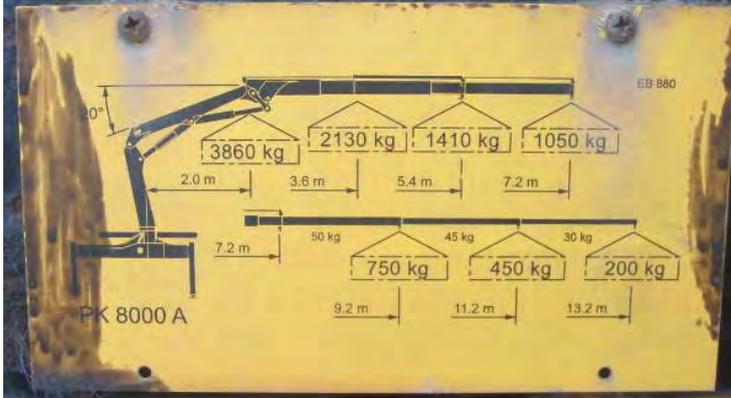
A summary of recommended equipment to complete the works outlined in Section 3.2 is listed as follows:

- CCTV camera equipment
- Three-phase generator
- Bore pump:
  - Capacity of 2.5 L/s at 35 mH<sub>2</sub>O
- Bore hole/screen cleaning chemicals
- Crane
- Air compressor and hose
- Flow monitoring
- Level monitoring for the MPA batching bore and three additional bores (locations to be confirmed)

### 3.2.2 On-Island Available Equipment

The following equipment, owned by FH, are available for use:

- HIAB truck mounted crane
  - Load lifting limits:



- Air compressor: Precision Air Contractor 20
  - Motor Size: 7HP (5kW)
  - Displacement (CFM): 19.4
  - Air Delivery (FAD): 16.2
  - Max Psi: 150
  - Tank Capacity (L): 70
  - Hose availability unknown

### 3.2.3 Private Bore Survey

It is recommended that a private bore survey be completed in advance of the bore redevelopment and pump testing. With information of the private bore locations, level monitoring could be added to determine if the pumping from the MPA Batching Bore impacts the groundwater supply in the area. This work is currently being undertaken by Environment Canterbury (ECan).

We have been in contact with Adrian Meredith of ECan who is progressing this work. He has noted that the McMillan Drilling Group has provided information for approximately 15 domestic bores that they have drilled on the island, but they are awaiting permission from the property owners to use the information. ECan has planned to travel to the Chathams in May 2021 to speak with the property owners and locate bores. This information may not be available to Stantec in advance of the pump testing. If the results of the private bore survey are no available, adding level monitoring to the Hospital Bore is recommended.

### 3.2.4 Drilling Contractors

Three drilling contractors have been contacted requesting a quotation for the MPA Batching Bore redevelopment works. These include:

- McMillan Drilling Group (McMillan)
- Washingtons Exploration Ltd. (Washingtons)
- Webster Drilling and Exploration Ltd. (Webster)

A quotation was received from Webster to complete the redevelopment work, excluding the fence and surface water diversion channel construction for the total of \$18,725, excluding GST. The price excludes the cost of a vehicle and HIAB truck hire, as well as support by Fulton Hogan. Current flight schedules dictate that they will depart Wellington on a Monday and return on a Friday. A price breakdown summary is provided in Table 3-1 with additional contingency.

Table 3-1: MPA batching bore investigation cost summary

Item	Unit Cost	No.	Extended Cost
Mob/Demob of 1 staff member	\$1,250	1	\$1,250
Labour cost per day	\$1,630	5	\$8,150
Equipment rental per day - Air compressor and generator	\$65	45	\$2,925
Three level logger hire per week	\$600	2	\$1,200
Equipment by sea freight (round trip)	\$5,200	1	\$5,200
Travel expenses (estimate)	\$2,000	1	\$2,000
<b>Subtotal</b>			<b>\$20,725</b>
<b>Contingency (10%)</b>			<b>\$2,100</b>
<b>GST</b>			<b>\$3,424</b>
<b>Total</b>			<b>\$26,249</b>

### 3.2.5 Recommendation

It is recommended that Webster is engaged to complete the MPA batching bore redevelopment work. Webster has proposed to arrive at Waitangi and complete the work during the month of May.

## 4 Work Required

This technical memorandum, and Appendices, is intended for use as a performance specification for the MPA batching bore investigations. The attachments are as follows:

- Appendix A – Summary of bore investigations and timeline
- Appendix B – Summary of work required including the party responsible for each work item
- Appendix C – Summary of the water quality parameters to be sampled for testing during the constant rate pumping test
- Appendix D – Schedule of prices
- Appendix E – Quotation provided by Webster Drilling for the proposed investigation works

The MPA batching bore investigation works shall be carried out under the existing Operations and Maintenance Contract between CIC and Fulton Hogan, where Stantec is the Engineer to Contract. For this scope of works, Kirsten Norquay will be the primary point of contact for Fulton Hogan, and where appropriate, the drilling contractor.

Fulton Hogan shall engage the drilling contractor as a subcontractor to complete the investigation works as described in this technical memorandum. The drilling contractor shall be Webster, unless approved otherwise by Stantec.

The drilling contractor is required to confirm the scope and quotation for the works for approval by Stantec prior to Fulton Hogan placing the order for the services.

All coordination and minor works (e.g., civil, electrical) that are required to facilitate the completion of the investigations shall be carried out by Fulton Hogan. These minor works shall be communicated directly to Fulton Hogan by the drilling contractor. No minor works shall be commenced without agreement by Stantec (Kirsten Norquay).

The drilling contractor is required to work professionally and collaboratively with CIC's nominated contractors, which include:

- Fulton Hogan (CIC maintenance contractor)
- Stantec (CIC Engineer to Contract)

#### Documentation to be provided

- Testing and commissioning report detailing bore redevelopment activities and test data results to determine the sustainable yield
- Photos during the test
- Photos of the capped bore

#### Insurances

This work shall be carried out under the existing Operations and Maintenance Contract, which includes insurance and liability requirements.

#### Quotation and Payment

Fulton Hogan shall provide an updated quotation for the MPA batching bore investigations that includes work by the drilling contractor as well as works to be carried out by Fulton Hogan (e.g., minor civil and electrical works). As a minimum, the quotation shall include the schedule of prices presented in Appendix D.

## Appendix A – Summary of Investigations

A timeline of the MPA batching bore investigations is summarised in .

**Table 2: MPA batching bore investigations summary**

<b>Date</b>	<b>Event / Milestone</b>
August 2015	<ul style="list-style-type: none"> <li>MPA concrete batching bore constructed</li> <li>24-hour draw down test at 1.7 L/s. This indicated that its sustainable yield was at least 1.7 L/s.</li> <li>Further analysis concluded that the sustainable yield is 2.0-2.3 L/s</li> </ul>
January 2016	<ul style="list-style-type: none"> <li>The MPA batching bore is operated for the wharf construction project.</li> </ul>
March 2017	<ul style="list-style-type: none"> <li>Second drawdown test of the MPA batching bore is completed.</li> <li>Test results were deemed unreliable and confirmed the original pump was replaced with a smaller one for production. The smaller pump was used for the drawdown test.</li> <li>No conclusions were made regarding the bore's sustainable yield.</li> </ul>
November 2017	<ul style="list-style-type: none"> <li>Preliminary design report issued.</li> </ul>
April 2018	<ul style="list-style-type: none"> <li>Water quality sampling from the MPA batching bore ends</li> </ul>
May 2018	<ul style="list-style-type: none"> <li>Operation of the MPA batching bore ends with the conclusion of the wharf construction project.</li> <li>The bore is "decommissioned" by MPA</li> </ul>
November 2019	<ul style="list-style-type: none"> <li>Third drawdown test of the MPA batching bore is completed.</li> <li>The 7 day test ended after 2 days.</li> <li>Average pumping flow rate of 1.5 L/s.</li> <li>Hydrogeological analysis concluded the bore's a sustainable yield was at least 1 L/s, but may be as high as 2 L/s. There was insufficient data to confirm that the sustainable yield is greater than 1 L/s.</li> <li>No notes of surging/flushing prior to the pumping test were recorded.</li> </ul>
January 2020	<ul style="list-style-type: none"> <li>Recommendation to drill a new and larger bore at the MPA Construction Yard.</li> <li>Confirmed preliminary design report demand estimate of 2.3 L/s over 24 hours of operation was appropriate. Increased the instantenous demand estimate to 2.5 L/s over 22 hours of operation.</li> </ul>
August 2020	<ul style="list-style-type: none"> <li>MoH funding for MPA batching bore investigations secured.</li> </ul>
October 2020	<ul style="list-style-type: none"> <li>Bore drilling specifications developed and issued to Washingtons Exploration Ltd. (Washintons) / McNeill Drilling and Webster Drilling &amp; Exploration (Webster)</li> </ul>
November 2020	<ul style="list-style-type: none"> <li>Budget quotations received from Washingtons and Webster were both above the approved MoH funding budget.</li> <li>Stantec to confirm a way forward. Preliminary recommendation is to complete additional investigation into the condition of the existing bore prior to committing to the construction of a new bore, or bores.</li> </ul>
April 2021	<ul style="list-style-type: none"> <li>Stantec has proposed a "Plan B" for additional MPA batching bore investigations.</li> </ul>

## Appendix B – Work Required

Table B-1 MPA Batching Bore Investigation Works

	Item	Description	Responsibility
1	MPA bore testing and capping	Complete bore redevelopment, step testing, and constant rate testing. Cap the bore to prevent the future ingress of water.	Drilling Contractor (Webster, unless approved otherwise by Stantec)
2	Bore protection	Construct stock fencing and a surface water diversion trench around the bore.	Fulton Hogan
3	Water Quality Testing	Collect water samples for off-site laboratory testing at the start, middle, and end of the constant rate pump testing. Parameters to be tested are summarised in Appendix C.	Fulton Hogan

## Appendix C – Water Quality Testing Parameters

Table C-1 Water quality testing parameters

Parameter	Unit	DWSNZ MAV/GV	Comment
Total Iron	mg/L	<0.2 (staining)	
Dissolved Iron	mg/L	<0.2 (staining)	
Total Manganese	mg/L	<0.04 (staining) <0.1 (taste)	
Dissolved Manganese	mg/L	<0.04 (staining) <0.1 (taste)	
Turbidity	NTU	<2.5 (appearance) <1 (disinfection)	Measured on-site at the time of sampling and off-site
Total hardness	mg/L	100-300 (taste)	
Total Organic Carbon	mg/L		
Dissolved Organic Carbon	mg/L		
Total Chloride	mg/L	250	
Nitrate-Nitrogen (NO <sub>3</sub> -N)	mg/L	50 (short-term)	
Ammonia-Nitrogen (NH <sub>4</sub> -N)	mg/L	1.5 (odour)	
pH	-	7-8.5 <8 (chlorination)	Measure on-site at the time of sampling
Temperature	°C		Measure on-site at the time of sampling
UVT	%T		
Filtered UVT	%T		
E.coli	MPN/ 100mL	<1 (MAV)	
Total coliforms	MPN/ 100mL		

## Appendix D – Schedule of Prices

Table D-1 Schedule of Prices

	Item	Description	Price
1	MPA bore testing and capping	Bore redevelopment, step testing, constant rate testing, and bore capping	\$
2	Bore protection	Stock fencing and a surface water diversion trench	\$
3	Water Quality Testing	Collection and analysis of water samples during constant rate pumping test	\$
4	Minor Works	Other minor civil and electrical works	\$
	Contingency	Additional works carried out on approval by Stantec	\$2,500
	Total		

Payment will be based on work completed, with no more than three milestone payments:

- First milestone – Receipt of equipment at Chatham Island (if required by the drilling contractor)
- Second milestone – Completion of bore testing and submission of the final report
- Third milestone – Bore protection works

## Appendix E – MPA Bore Investigations Quote from Webster Drilling

<b>Client:</b>	Chatham Islands Council	<b>Stantec-TM- 5</b>	
<b>Project:</b>	Three Waters Stimulus Funded Upgrades	<b>Date issued:</b>	10 June 2021
<b>Project Task:</b>	Kaingaroo and Waitangi WTP Upgrades	<b>Prepared by:</b>	Julie Lam / Samdrub Dawa
<b>Subject:</b>	Telemetry and Data Reporting Specification	<b>Reviewed by:</b>	Andrew Wong
		<b>Approved by:</b>	Kirsten Norquay

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# 1 Background

## 1.1 Introduction

A series of instrumentation and telemetry improvements are proposed at the Kaingaroo and Waitangi Water Treatment Plants (WTP) to enable monitoring in accordance with the Drinking Water Standards for New Zealand (DWSNZ) and smarter data collection to allow alarm messages to be sent to operator cell phones and/or landlines. This is illustrated in the network diagrams for both the Kaingaroo and Waitangi WTPs in Attachment B.

The proposed telemetry improvements rely on a cellular network to function. There is currently no cellular phone network on the Chatham Islands. However, this is being deployed by Central Government as part of its rural connectivity initiative. The work required for these improvements, outlined in Attachment A, will be carried out as soon as practicable, but will not be fully commissioned until the cellular network has gone live.

This document covers the specification of the proposed telemetry and reporting associated with the online monitoring upgrade works only. For more information related to the proposed instrumentation upgrades, refer to *Kaingaroo WTP Upgrade - Technical Brief for Design, Supply & Installation of WTP Upgrades (TM-2a)* and *Waitangi WTP Upgrade – Technical Brief for Design, Supply & Installation of WTP Upgrades (TM-3a)*.

A schematic of the Kaingaroo and Waitangi WTPs is provided for context in Figure 1-1 and Figure 1-2.

## 1.2 Purpose

The purpose of this Technical Memorandum is to present the proposed instrumentation and telemetry improvements to the Kaingaroo and Waitangi WTPs and provide supporting information (detailed in the Attachments) to Fulton Hogan and the telemetry contractor (to be subcontracted to Fulton Hogan) to design, supply, install, and commission the required equipment for data telemetry via an RTU and data reporting, alarming, and historian via a cloud-based system.

## 1.3 Objectives

The objectives of the proposed improvements at the Kaingaroo and Waitangi WTPs are as follows:

- Comply with the online monitoring and data collection requirements of the DWSNZ
- Verify compliance with the bacterial and protozoal treatment requirements through online data collection.
- Include good quality operational data in compliance reports.

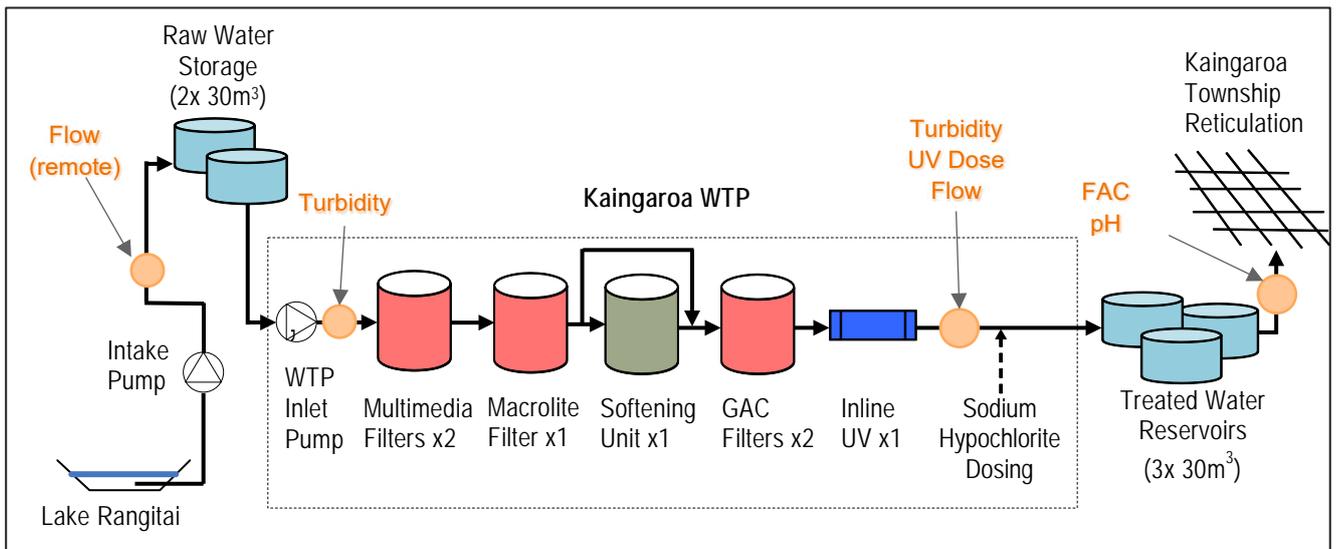


Figure 1-1: Kaingaroa Water Treatment Plant site schematic

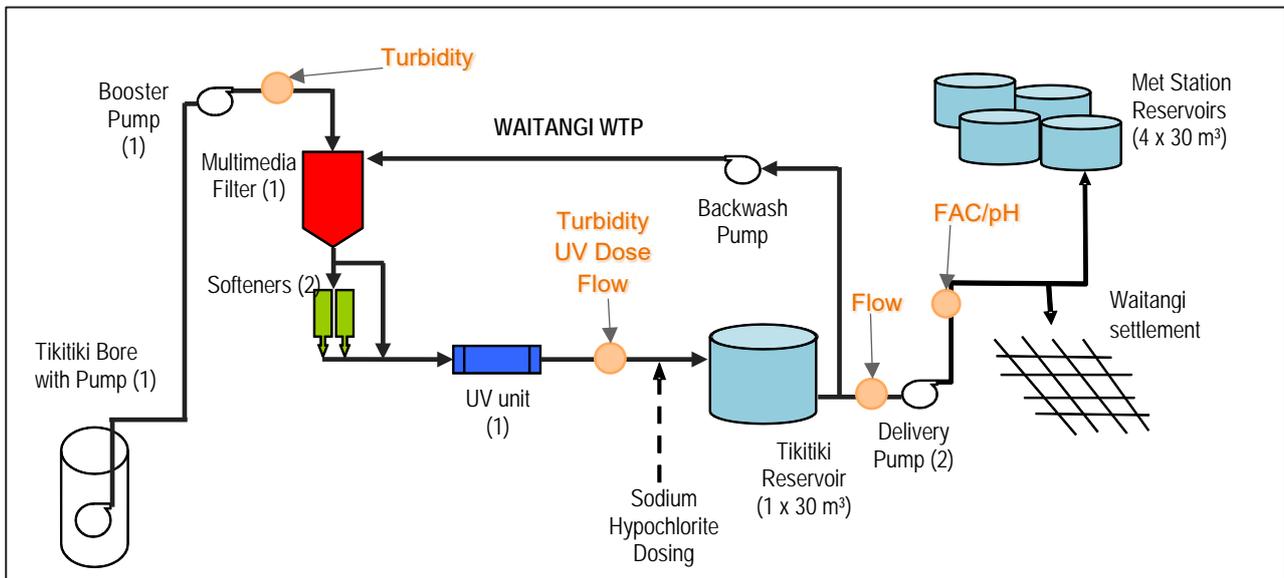


Figure 1-2: Waitangi Water Treatment Plant site schematic

## 2 Scope of Works

This technical memorandum, and attachments, is intended for use as a performance specification for the proposed telemetry and reporting improvements at the Kaingaroa and Waitangi WTPs. The attachments are as follows:

- Attachment A – Summary of work required including the party responsible for each work item
- Attachment B – Kaingaroa and Waitangi WTP network diagrams
- Attachment C – Schedule of prices
- Attachment D – Instrument and telemetry equipment details
- Attachment E – Quotation provided by ConnectM2M for the proposed improvement works

The telemetry and reporting improvement works shall be carried out under the existing Operations and Maintenance Contract between Chatham Islands Council (CIC) and Fulton Hogan, where Stantec is the Engineer to Contract. For this scope of works, Kirsten Norquay will be the primary point of contact for Fulton Hogan, and where appropriate, the telemetry contractor.

Fulton Hogan shall engage the telemetry contractor as a subcontractor to complete the improvement works as described in this technical memorandum.

The telemetry contractor is required to confirm the scope and quotation for the works for approval by Stantec prior to Fulton Hogan placing the order for the equipment and services.

All coordination and minor works (e.g., civil, electrical) that are required to facilitate the completion of the instrumentation and telemetry improvement works shall be carried out by Fulton Hogan. These minor works shall be communicated directly to Fulton Hogan by the telemetry contractor. No minor works shall be commenced without agreement by Stantec (Kirsten Norquay).

Fulton Hogan shall provide a programme which includes the expected delivery date for equipment to the Chatham Islands, expected date for installation, and date for Practical Completion. A fully commissioned system shall be completed no later than December 2021. This is assuming that the cellular network is live by December 2021. It is our understanding that the cellular network is scheduled to go live by November 2021.

### **Insurances**

This work shall be carried out under the existing Operations and Maintenance Contract, which includes insurance and liability requirements.

### **Warranty**

The telemetry contractor shall warrant that all equipment, when installed and commissioned, will achieve the required performance, and operate for its expected design life. For each item of equipment designed and /or manufactured as part of this Contract, the telemetry contractor shall provide warranties to Chatham Islands Council, and render all reasonable assistance for the purpose of enforcing these. The duration of the warranty for all equipment and services rendered shall be 24-months from the date of Practical Completion, notwithstanding warranties offered by the equipment suppliers. Practical Completion is achieved when the equipment has been installed, commissioned, and demonstrated to operate as required.

### **Quotation and Payment**

Fulton Hogan shall provide an updated quotation for the instrumentation and telemetry improvement works that includes work by the telemetry contractor as well as works to be carried out by Fulton Hogan (e.g., minor civil and electrical works).

As a minimum, the quotation shall include a schedule of prices presented in Attachment C. Payment will be based on work completed, with three milestone payments as outlined in Attachment C.

## 2.1 Telemetry

Design, supply, installation, and commissioning of the following equipment:

- Remote terminal unit (RTU) to store output data from plant instruments and upload to the cloud-based software via the future cellular IoT network at regular intervals.
- Associated cabling to instruments/transmitters.
- A remote pulse flow metering station at the Kaingaroa raw water feed pump discharge.
  - 100 mm pulse flow meter with digital output module as required
  - 37South Metermade N1 (or equal)

- Confirm requirements for power supply connections to all provided telemetry equipment (e.g., RTU) from the existing site power supply. Telemetry contractor to notify Fulton Hogan of these power requirements, and Fulton Hogan to complete the electrical work as required.

These works may involve mounting of the RTU and associated equipment in a suitable cabinet (exact position on wall to be confirmed on site with telemetry contractor and operations staff) and modifications to the existing WTP building as required.

## 2.2 Documentation

The required final documentation is outlined below:

- Testing and commissioning report
- As-built network diagram
- As-built I/O schedule with equipment tags
- Equipment schedules
- O&M manual

## 2.3 Cloud-based Software

Design, supply, installation, and commissioning of the following software:

- Cloud-based software to store and display data from the plant telemetry system via web portal maintained by the telemetry contractor, send alarm messages via the cellular network, and upload historical data to WaterOutlook.

## 2.4 Collaborative Working with Nominated Contractors

The telemetry contractor is required to work professionally and collaboratively with CIC's nominated contractors, which include:

- Fulton Hogan (CIC Maintenance Contractor)
- Stantec (CIC Engineer to Contract)
- FILTEC (CIC Process Equipment Contractor)
- WaterOutlook (water quality database Contractor)

The telemetry contractor shall work as a subcontractor to Fulton Hogan.

### 3 Input/Output Schedules

The data input / output (I/O) types for the Kaingaroa and Waitangi WTP instruments are outlined in the sections below. The telemetry contractor shall review the I/O list and confirm with the Engineer.\

The new instruments and transmitters shall be provided by others (FILTEC) as part of a separate package of work, unless stated otherwise.

#### 3.1 Kaingaroa WTP

The I/O list for the Kaingaroa WTP instruments is presented in Table 3-1.

**Table 3-1: Kaingaroa WTP input/output schedule**

Instrument / Transmitter	Status	Description	Input to / Output from RTU	Signal type	Signal range and units	Comment
Flow meter (TBC)	New	Kaingaroa intake pump flow meter	Input to Metermade	Digital	Flow totalisation pulse	Supplied by telemetry contractor
Metermade N1	New	Kaingaroa intake pump	Output to cloud			Supplied by telemetry contractor
Hach SC200 Controller	Existing	Hach 1720E Turbidimeters connected to Hach SC200	Input	4-20mA	0.001 to 100 NTU	Raw water tank turbidity
			Input	4-20mA	0.001 to 100 NTU	Treated water tank turbidity
Wallace and Tiernan Depolox 5	New	Treated water tank pH/FAC analyser	Input	4-20mA	4.0 to 11.0	pH levels
			Input	4-20mA	0.00 to 20.0 mg/L	FAC levels
Microflow reed switch	New	Raw water sample flow switch	Input	Digital		Show flow or no flow status
Microflow reed switch	New	Treated water tank sample flow switch	Input	Digital		Show flow or no flow status
Euromag MUT2200EL with MC608A converter	New	Treated water flow meter	Input	4-20mA	Flow rate (L/s)	Analog for instantaneous flow rate
			Input	Digital	Flow totalisation pulse (every 10 litres)	Pulse count for totalised flow
Trojan Pro 50	Existing	UV controller module	Input	4-20mA	UV intensity (mW/cm <sup>2</sup> )	UV intensity
			Input	Digital		Alerts the following: <ul style="list-style-type: none"> <li>Lamp fault</li> <li>Ballast fault</li> <li>UV sensor fault</li> <li>Low UV fault</li> </ul>
Solenoid Valve	New	Treated Water Valve	Output	Digital	Close Command	Normally Open
Solenoid Valve	New	Filter to Waste Valve	Output	Digital	Open Command	Normally Closed
<b>Total RTU analog input count</b>				<b>6</b>		
<b>Total RTU digital input count</b>				<b>4</b>		
<b>Total RTU digital output count</b>				<b>2</b>		

## 3.2 Waitangi WTP

The I/O list for the Waitangi WTP instruments is presented in Table 3-2.

Table 3-2: Waitangi WTP input/output schedule

Instrument / Transmitter	Status	Description	Input to / Output from RTU	Signal type	Signal range and units	Comment
Hach SC200 Controller	New	Hach TU5300sc Turbidimeters connected to Hach SC200	Input	4-20mA	0.001 to 100 NTU	Raw water tank turbidity
			Input	4-20mA	0.001 to 100 NTU	Treated water tank turbidity
Wallace and Tiernan Depolox 5	New	Treated water tank pH/FAC analyser	Input	4-20mA	4.0 to 11.0	pH levels
			Input	4-20mA	0.00 to 20.0 mg/L	FAC levels
Microflow reed switch	New	Raw water sample flow switch	Input	Digital		Show flow or no flow status
Microflow reed switch	New	Treated water tank sample flow switch	Input	Digital		Show flow or no flow status
Euromag MUT2200EL with MC406 converter	New	Filtered water flow meter	Input	4-20mA	Flow rate (L/s)	Analog for instantaneous flow rate
			Input	Digital	Flow totalisation pulse (every 10 litres)	Pulse count for totalised flow
Viqua Pro 50	New	UV controller module	Input	4-20mA	UV intensity (mW/cm <sup>2</sup> )	UV intensity
			Input	Digital		Alerts the following: <ul style="list-style-type: none"> <li>Lamp fault</li> <li>Ballast fault</li> <li>UV sensor fault</li> <li>Low UV fault</li> </ul>
Euromag MUT2200EL with MC406 converter	New	Treated water flow meter	Input	4-20mA	Flow rate (L/s)	Analog for instantaneous flow rate
			Input	Digital	Flow totalisation pulse (every 10 litres)	Pulse count for totalised flow
Solenoid Valve	New	Treated Water Valve	Output	Digital	Close Command	Normally Open
Solenoid Valve	New	Filter to Waste Valve	Output	Digital	Open	Normally Closed
<b>Total RTU analog input count</b>			<b>7</b>			
<b>Total RTU digital input count</b>			<b>5</b>			
<b>Total RTU digital output count</b>			<b>2</b>			

# 4 Specifications

## 4.1 Performance Criteria

The proposed telemetry and data logging solution shall meet the following performance criteria:

### 4.1.1 RTU(s)

- Self-contained, compact, IP-rated device with built-in cellular communications which can be used over the future cellular IoT network.
- Compatible with WTP instrument outputs (analog and digital) as per Table 3-1 above.
- Flexibility to add more inputs in the future, without the need for an excessive number of units (a minimum of 10% spare IO).
- Capable of storing and transmitting time-stamped data recorded in 1-minute logging intervals.
- Local data storage can be relied upon in the event of a power outage, with upload to the cloud once power has been restored. There shall be no loss of data.
- Minimal servicing required and long product life (warranties/guarantees).

### 4.1.2 Cabling, Terminals and other Wiring

- All new cabling, terminals and other wiring required to install the RTU(s) shall be supplied and installed by the telemetry contractor.
- The telemetry contractor should be suitably equipped to determine the layout of the supplied equipment on-site.
- Cabling shall consider locations of instruments and ease of connection; new cabling runs may be required.
- Provide and install conduit, ducting or other cable supports where required.

### 4.1.3 Power Supply

- The existing site power supply is assumed to be sufficient to accommodate the proposed upgrades.
- The telemetry contractor shall provide an estimate of the anticipated load for the new equipment being supplied.
- The telemetry contractor shall provide equipment designed to be protected against power surge.

### 4.1.4 Equipment/Instrument Earthing

New equipment and cabling shall be earthed according to manufacturer's instructions by the telemetry contractor.

### 4.1.5 Kaingaroa Intake Remote Flow Monitoring Station

The telemetry contractor shall supply and install a remote flow monitoring station at the Kaingaroa Intake pumping station. The flow monitoring station shall include a 100 mm pulse flow meter with and digital pulse output module. Flow meter to be a magnet-driven dry type, or equal. Output pulse module shall be compatible with and connect to the 37South Mathermade N1 module for cellular data transfer to the cloud-based software via the future cellular IoT network at regular intervals.

### 4.1.6 Telemetry Cabinet

- RTU(s) and associated equipment may be housed within a cabinet in a spare space on the WTP wall.
- The exact location of the RTU(s) or cabinet will be determined on site in conjunction with FILTEC and operations staff.

### 4.1.7 PLC and SCADA System Compatible Equipment

Telemetry hardware that is procured shall come equipped with a panel PLC or have the ability to add it in the future so that basic "Run to Waste" control can be added to both the Kaingaroa and Waitangi WTPs. The cloud-based data monitoring portal shall also have the ability to be integrated into an existing or new SCADA system, for both monitoring and control, if and when CIC joins a new water entity.

### 4.1.8 Software Programming

- The telemetry contractor-supplied software shall allow intelligent programming of alerts and alarms via text message and phone call alerts to mobile phones/landlines.
- RTU(s) shall be initially programmed by the telemetry contractor, who will provide training to operators/Council staff to allow independent configuration of alarm and alert setpoints.
- Operators/Council staff shall have access and functionality within the software to securely view and edit/manage plant parameters/data.
- Software shall be user-friendly and provide useful visualisation of data which can be exported if necessary.
- Software shall be secure with an authentication system.

- Capability to complete software upgrades and reconfiguration remotely.
- Data upload frequency can be customised i.e., to reduce dialling-in times or to report more when a trigger level has been breached.
- Capable of uploading historical data in correct format to WaterOutlook.
- The software shall be compatible and non-restrictive so that if the NZ water reform results in Council water assets being amalgamated into a new entity, it can be easily integrated.

#### 4.1.9 Tags

The telemetry contractor shall determine equipment tag names for all new equipment under this project, with Stantec to review. The telemetry contractor shall create new tag attributes in the SCADA for new instrument variables and allocate I/O in the RTU.

#### 4.1.10 Alarms

The telemetry contractor shall coordinate with Fulton Hogan to create an alarm list for each instrument as required. Setpoints to be determined during commissioning.

#### 4.1.11 Testing and Commissioning

The Contractor shall test and commission each instrument to the respective Supplier's guidelines. Coordinate with the other Contractors listed in Section 2.4 for scheduling works for commissioning the entire system upgrade, and full commissioning once the cellular network is live.

## 5 Market Investigations

Stantec approached several vendors to assess the market's capability and ability to meet CIC's needs. These vendors are listed below, along with a summary of capabilities and experience. Product information sheets provided by vendors are included in Attachment D.

The prospective vendors were evaluated according to the following criteria:

- Experience working in a similarly remote location/geography.
- Resources to travel to both WTP sites on the Chatham Islands to install and commission hardware, and setup software.
- Proven track record of performance and reliability.
- Ability to provide effective ongoing maintenance/operational/service support from offshore.
- Competitive price (capital costs, operational/computer programme/data servicing support and maintenance).
- Capable of working collaboratively with CIC's nominated contractors (refer to Section 2.4).
- Procurement times shall not create undue delay.

### 5.1 ConnectM2M

ConnectM2M has 25 years of experience and has completed similar work in remote locations, including the Cook Islands. ConnectM2M proposed 37South's Site Sentinel P1, which is a high performance, industrial data logger and RTU. Two Site Sentinel P1 units would be required at each site to manage the outputs listed in Table 3-1 and Table 3-2 above – with one unit acting as a slave to the other master device.

#### Key Findings

- Additional Site Sentinel P1 units can be added in the future if additional I/O is required.
- Servicing is not required for the first five years. Thereafter, the unit should be checked by site staff on an annual basis.
  - ConnectM2M to provide instruction on checks that need to be completed.
- Should data/software need to be transferred into the ownership of a new water entity, ConnectM2M have offered their assistance at their standard rate.
- Alarms via text, email, and phone calls.
- Full admin access to data service via Microsoft 365 authentication.
- Data upload frequency can be modified and customised.
- Holds data in the event of a power outage, for upload to the cloud when power is restored.
- Includes surge protection.
- Able to provide services for other uses on the Chatham Islands (RTUs on residential connection flowmeters, lake level monitoring, remote tank level monitoring), which could streamline procurement.
  - This has not been considered further at this stage
- All hardware is made in Australia.
- A Siemens panel PLC can be added to the proposed Site Sentinels in the future for run to waste control capability.
  - The additional cost has been estimated at approximately \$1,000 per site, excluding GST, piping, and valves.
  - This has not been considered further at this stage.
- The cost estimate for the base system (Site Sentinel Monitoring Package) at Kaingaroa and Waitangi WTPs is approximately \$10,000 excluding GST and travel expenses (airfare, meals, and accommodation).
  - An allowance of 2 days for installation have been included. However, this may be closer to 5 days accounting for travel and potential delays (\$4,500 for an additional 3 days excluding GST).
  - The hosted data service for 1 year at each WTP is included; the annual cost is \$420 (excluding GST) per WTP.
    - This includes SIM card, data charges, visualisation, alarming, and integration into WaterOutlook

### 5.2 Pacific Technologies

Pacific Technologies has been working in the Pacific for 32 years and has recommended the Point Orange 3G, which is a compact logger/RTU device. The Point Orange has been used by Water Authority Fiji and American Samoa Power Authority. Three Point Orange devices would be required at each WTP due to a maximum of two analog inputs per Point Orange device and cables being limited to 2m lengths; each Point Orange device has space for up to four inputs. In addition, extra devices would need to be added if additional inputs are required in the future. A further irritation is that the Point Orange devices do not have the capability to send digital outputs should Run to Waste functionality be added in the future.

#### Key Findings

- Can be configured to communicate with Mesosphere's cloud-based SCADA system, Palette.
- Dynamic alarm settings.
- Experience integrating into WaterOutlook.

- Remote firmware upgrade.
- Remote configuration.
- If there is a power outage the RTU is reset and data is lost.
- The cost estimate for the base system at Kaingaroa and Waitangi WTPs is approximately \$14,000 excluding GST.
  - No allowance has been included for on-site installation and commissioning or travel expenses.
  - The hosted data service for 1 year at each WTP is included; the annual cost is \$390 per WTP.

### 5.3 Automation for Industry

Automation for Industry (AFI) has proposed a conventional monitoring and control solution, which is additional to the identified functions in this document. AFI has completed similar installations with Filtec. AFI propose to include actuated valves to allow the treatment plant to automatically run to waste or shutdown in the event of non-compliant water. The plant will be controlled via a Schneider SCADAPack 574 RTU.

#### Key Findings

- The quotation does not include electrical installation or commissioning, or configuration of data export to WaterOutlook.
- SCADA control capability available on day one.
- The proposed system has event logging functionality of up to one week to comply with the DWSNZ data logging requirements. However, its limited data storage does not allow it to function as a data historian; this functionality would need to be provided by WaterOutlook and would be additional to the current contract.
- Viewing real time data and dialing into the PLC relies on a stable cellular network.
- Charge is on a cost and expenses basis. Non-quoted services and ongoing support will be charged at a standard rate of \$125/hr and \$187/hr after hours.
- The cost estimate for systems at the Kaingaroa and Waitangi WTPs is approximately \$51,000 excluding GST.
- On-site installation, commissioning, and expenses is estimated at \$12,000 excluding GST.
  - Estimate based on one technician, 8 hours per day, for 10 days, and 20% for expenses.

### 5.4 Recommendation

It is recommended that ConnectM2M is engaged to complete the online monitoring telemetry upgrade for the following reasons:

- Experienced working in remote locations with proven track record and ability to provide support remotely.
- Ability to expand the I/O capacity in the future with minimal modifications.
- All components are modular with adequate capacity and functionality.
- Cloud-based web portal with the ability to integrate into a future or existing SCADA system.
- Can be procured through the existing Fulton Hogan contract, or directly to help minimise delays in procurement.
- Lowest cost option.

The addition of a panel PLC and “Run to Waste” functionality is not recommended at this time but should be added in the future; the cost for the “Run to Waste” functionality has been excluded and noted as optional scope. A cost summary the necessary works is summarised in Table 5-1.

Table 5-1: Telemetry upgrade cost summary

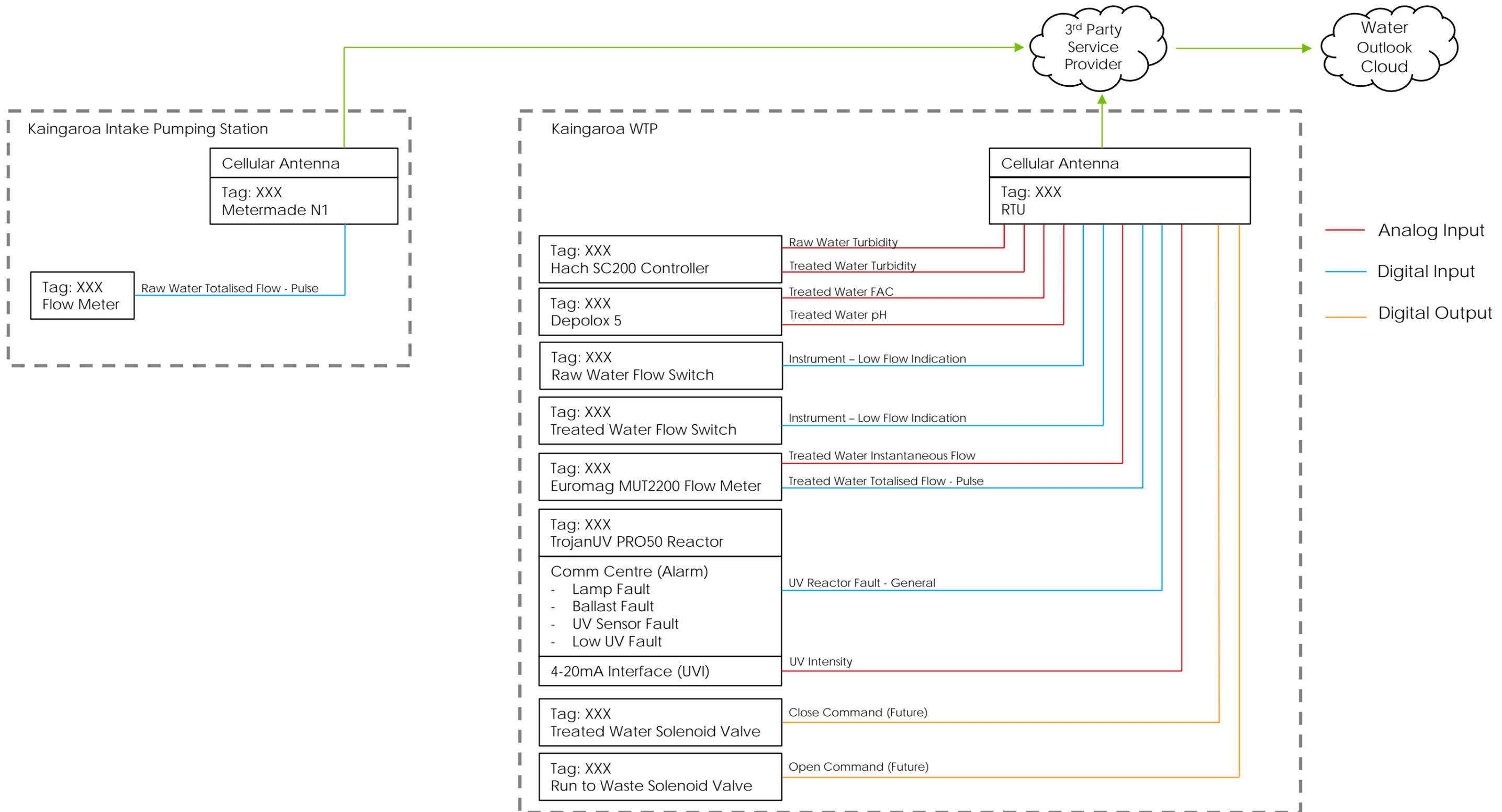
Item	Unit Cost	No.	Extended Cost
Equipment			
- RTUs, antennas, cables, terminals, surge protection, RTU enclosure, consumables	\$3,019	2	\$6,038
Hosted Data Service			
- cost per year per WTP	\$420	2	\$840
Kaingaroa raw water intake flow monitoring	<b>TBD</b>	1	<b>TBD</b>
On-site installation and commissioning			
- excluding travel costs	\$1,500	5	\$7,500
Travel expenses (estimate)	\$2,000	1	\$2,000
<b>Total (excluding GST)</b>			<b>\$16,378</b>
<b>O&amp;M Cost</b>			
Hosted Data Service (cost per year per WTP)	\$420	2	\$840
<b>Optional Scope (To be confirmed)</b>			
PLC and run to waste functionality	\$1,500	2	\$3,000

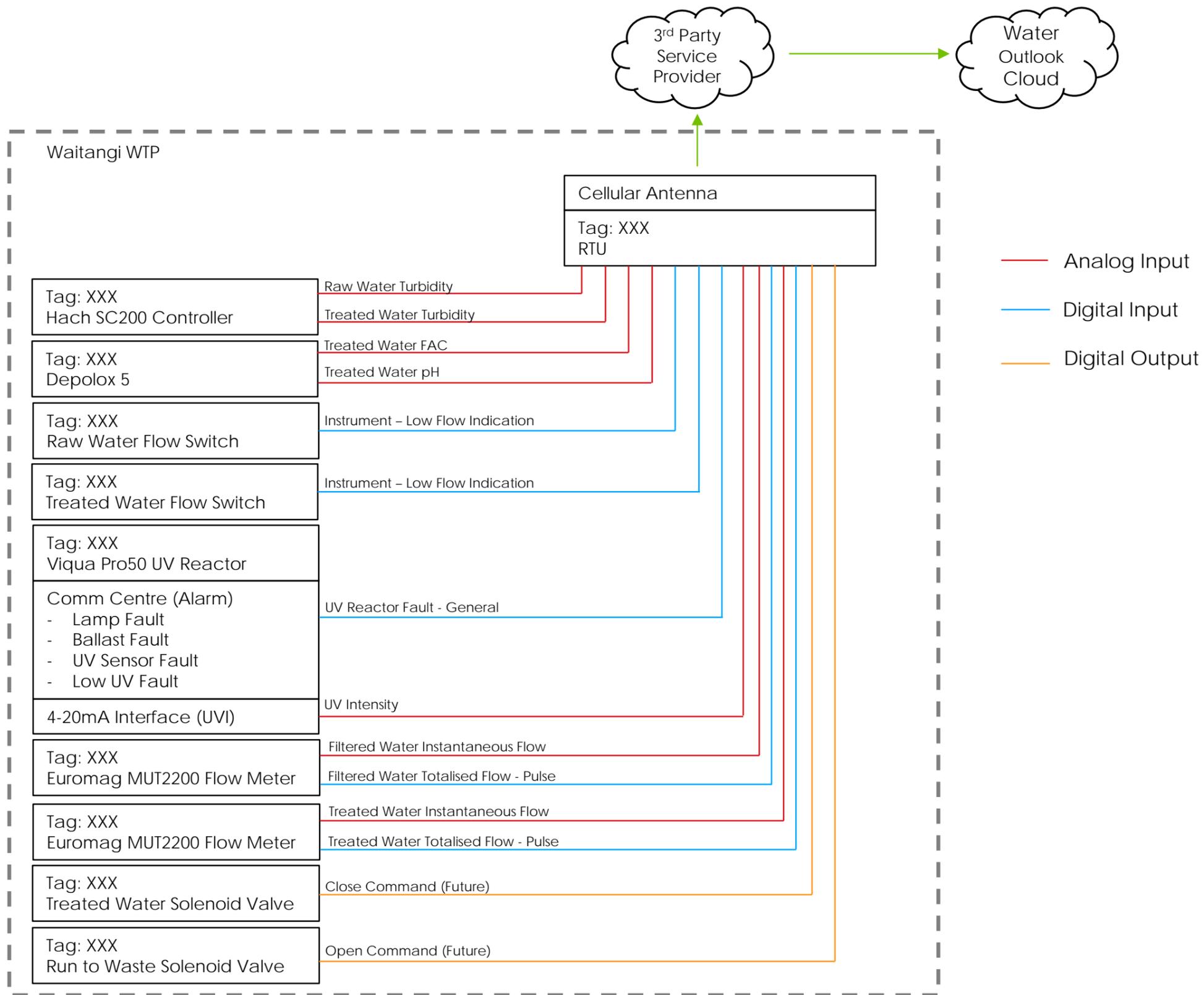
# Attachment A – Work Required

Table A-1 Kaingaroa and Waitangi WTP instrumentation and telemetry improvement works

	Item	Description	Responsibility
1	Kaingaroa WTP	Supply, install, integrate, and commission new RTU with existing and new instruments. All data to report to a cloud-based SCADA system accessible to CIC via web portal. Programming of alarms and reporting. Data export to WaterOutlook.	ConnectM2M
2	Waitangi WTP	Supply, install, integrate, and commission new RTU with existing and new instruments. All data to report to a cloud-based SCADA system accessible to CIC via web portal. Programming of alarms and reporting. Data export to WaterOutlook.	ConnectM2M
3	Minor works	Provide civil, electrical, and operational support.	Fulton Hogan

# Attachment B – Kaingaroa and Waitangi WTP Network Diagrams





# Attachment C – Schedule of Prices

Table D-1 Schedule of Prices

	Item	Description	Price
1	Kaingaroa WTP	Supply, install, integrate, and commission new RTU with existing and new instruments with cloud-based SCADA system.	\$
2	Waitangi WTP	Supply, install, integrate, and commission new RTU with existing and new instruments with cloud-based SCADA system.	\$
3	Hosted Data Service	First year cost	\$
4	Minor Works	Other minor civil and electrical works	\$
	Contingency	Additional works carried out on approval by Stantec	\$2,500
	Total		\$

Payment will be based on work completed, with no more than three milestone payments:

- First milestone – Receipt of equipment at Chatham Island
- Second milestone – Completion of installation and commissioning with submission of all required documentation as far as possible without the cellular IoT network live.
- Third milestone – Completion of commissioning once the cellular IoT networking is live, and submission of any outstanding documentation (Practical Completion) for project works.

# Attachment D – Equipment Details



## **DEPOLOX® 400 M ANALYZER FOR POTABLE WATER**

### **WALLACE & TIERNAN® ANALYZERS/CONTROLLERS**

The DEPOLOX® 400 M system is an on-line analyzer designed to measure the disinfectant concentration in drinking and other clean water applications.

The new state of the art electronics incorporates a color touch screen the size of today's popular smart phones making the user interface truly intuitive. Communication with the instrument includes a standard Ethernet port which allows access to built-in web visualization of all pertinent information when connected to a local area network. An RS 485 port and four mA outputs are also standard for communication to other plant monitoring and control systems.

All popular disinfectants utilized today can be measured including: free chlorine, total chlorine, chlorine dioxide, ozone and potassium permanganate. Choose from two types of amperometric disinfectant measurements for use with the new electronics: unless water quality dictates otherwise, the well proven, lowest life cycle cost and extremely fast reacting DEPOLOX 5 C bare electrode measurement is the obvious choice; otherwise choose from a number of membrane based amperometric sensors fitted into our precisely flow controlled VariaSens™ C flow cell. A temperature measurement is standard and there is a choice of adding either an additional pH measurement or a fluoride measurement.

The electronics includes smart operation features such as user configured calibration and service reminders. Instructions are provided on how to set up the analyzer to be compliant with calibration check intervals required by regulatory agencies. The new flow cell LED light indication changing color along with user defined alarm text can easily alert personnel to perform a required calibration check.

### **Benefits**

- Intuitive operation as well as easy visualization of all measured parameters via a 4" color touch panel
- LED lit flow cell that can be programmed to change color in case of an alarm or fault condition
- Data logging of measurement values with easy transfer to remote devices
- Smart operation features: user configured intervals for calibration checks and also for the instrument's service intervals
- State of the art communication possibilities via an Ethernet interface (Modbus® TCP) as well as a RS 485 port
- Very fast reaction to a change in disinfectant concentration with the popular DEPOLOX bare electrode measurement

## ELECTRONIC MODULE

### Touch panel:

4 inch capacitive color touchscreen with backlight

### Measurement inputs:

Rugged 3-electrode sensor DEPOLOX® 5 C for free chlorine, ClO<sub>2</sub>, O<sub>3</sub>, KMnO<sub>4</sub> or 1 x VariaSens™ flow cell with a choice of membrane sensors: FC2 - free chlorine, TC3 - total chlorine, OZ7 - ozone, CD7 - chlorine dioxide and sensors 1 x pH or 1 x fluoride & 1 x temperature

### Digital inputs:

5 x freely definable

### Output contacts:

Max. six freely definable fused alarm contacts/general fault messages

Relay status is depicted on the display;

max. 3.15 A /250 V AC; 0.2 A/220 V DC

### Analog outputs:

4 x 0/4 - 20 mA, freely configurable

Load ≤ 1000 Ohm, accuracy < 0.5 % FS

Galv. isolated up to 50 V relative to earth

### Interfaces:

Ethernet interface (HTTP protocol/Modbus® TCP protocol); RS 485 to connect to the Wallace & Tiernan® Process Monitoring System (option)

### Power supply:

100 - 240 V AC ± 10 %, 50/60 Hz, 48 VA

24 V DC ± 20 % 30 W

Ambient temperature: 0 - 50 °C (32 - 122 °F)

Protection: IP 66

Tests and marks: Conform to CE, CSA

Weight (incl. packaging): 4.5 kg (9.9 lbs)

Dimensions (W x H x D):

320 x 311 x 153 mm (12.6 x 12.2 x 6.0 ")

## DEPOLOX 5 C FLOW CELL MODULE

The DEPOLOX 5 C flow cell houses the amperometric bare electrode. Stable measuring signals are achieved with hydrodynamic grit cleaning together with optimized flow around all sensors.

## VARIASENS C FLOW CELL MODULE

The VariaSens™ C flow cell houses one disinfectant based amperometric membrane sensor.

Both flow cells include a temperature measurement and can include either an optional pH or a fluoride measurement. The flow cells are available as discharge to a gravity drain or to a pressurized line. The following components are integral to both of the above mentioned flow cells.

### Flow control valve:

- Controlled sample water flow: 33 l/h (0.15 US gpm)
- Control range: 0.25 - 3.0 bar (3 - 60 psi at valve inlet)
- Back-pressure: max. 1.5 bar (21.7 psi) for press. model
- Sample water temperature: max. 50 °C (122 °F)

### Multi-sensor:

- Monitoring of correct sample water flow  
Switching point: 21 l/h +/- 3; Switching hysteresis: 2 l/h
- Measurement of sample water temperature with sensor Pt 1000 for the temperature compensation of the chlorine and possibly the pH measurement
- Sample water earthing with stainless steel sleeve

### Sample water connections:

PVC hose 6 x 3 mm or PE hose 6 x 1 mm hose connector adaptors to 1/2 " threaded hose connection

Weight (incl. packaging): approx. 2.5 kg (5.5 lbs)

### Dimensions (W x H x D):

253 x 375 x 163 mm (9.9 x 14.7 x 6.4 ")

## MEASURING RANGES

DEPOLOX 5 sensor: free chlorine, ClO<sub>2</sub>, O<sub>3</sub>, KMnO<sub>4</sub>:

0 to 20 mg/l ; min 200 µS/cm

pH: pH 0 to 12 (short time to 14)

pH compensation (free chlorine measurement with DEPOLOX 5 sensor): within the pH range of 5.0 - to 8.0

Fluoride: 0 to 20 mg/l

FC2 membrane sensor; Free chlorine: 0 to 10 mg/l

TC3 membrane sensor; total chlorine: 0.05 to 10 mg/l

CD7 membrane sensor; chlorine dioxide: 0 to 10 mg/l

OZ7 membrane sensor; ozone: 0 to 10 mg/l



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+49 (8221) 904-0 [www.evoqua.com](http://www.evoqua.com)

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# Owner's Manual



**Models:  
270272-R**

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## Congratulations

on the purchase of your ultraviolet (UV) water disinfection system! This system uses the most advanced UV technology on the market and is designed to provide you with years of trouble free operation with minimal maintenance required to protect your drinking water from microbiological contaminants.

To ensure ongoing disinfection of your water, UV lamps need to be replaced annually with VIQUA factory-supplied replacements. VIQUA lamps are the result of extensive development resulting in a highly efficient disinfection platform with extremely stable UV output over the entire 9000 hour lifetime. Its success has led to a proliferation of non-genuine copies in the market.

The UV lamp is the heart of the disinfection system, and there should be no compromise when it's time for a replacement.

Why should you insist on genuine factory supplied VIQUA replacement lamps?

- Use of widely available, non-genuine, replacement lamps has been shown to damage the control module of VIQUA UV disinfection equipment.
- An increasing number of calls to VIQUA Technical Support are connected with non-genuine lamps being used (unknowingly) as replacements.
- Damage arising from the use of non-genuine lamps poses a safety risk and is not covered by equipment warranty.
- Unless the UV equipment is equipped with a UV sensor (monitor), it is not possible to verify the UV (invisible) output of replacement lamps.
- Similar appearance to the original lamp and the presence of (visible) blue light does not mean equivalent disinfection performance.
- VIQUA replacement lamps undergo rigorous performance testing and strict quality control processes to ensure that the safety and performance certifications of the original equipment are not compromised.

So, you can see that it's simply not worth the risk! Insist on genuine VIQUA replacement lamps.

# Section 1 Safety Information

Please read this entire manual before operating this equipment. Pay attention to all danger, warning, and caution statements in this manual. Failure to do so could result in serious personal injury or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in the installation manual.

## 1.1 Potential Hazards:

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

	Waste electrical and electronic equipment (WEEE). This symbol indicates that you should not discard wasted electrical or electronic equipment (WEEE) in the trash. For proper disposal, contact your local recycling/reuse or hazardous waste center.		This symbol indicates gloves must be worn.
	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. When on the equipment, refer to the Operational and Maintenance manual for additional safety information.		This symbol indicates safety boots must be worn.
	This symbol indicates a risk of electrical shock and/or electrocution exists.		This symbol indicates the operator must read all available documentation to perform required procedures.
	This symbol indicates that the contents of the transport package are fragile and the package should be handled with care.		This symbol indicates that the system should only be connected to a properly grounded, grounding-type controller receptacle that is protected by a Ground Fault Circuit Interrupter (GFCI).
	This symbol indicates a safety glasses with side protection is required for protection against UV exposure.		

**Warning:** This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

## 1.2 Safety Precautions:

<b>⚠ DANGER</b>	
 	<p>Failure to follow these instructions will result in serious injury or death.</p> <ul style="list-style-type: none"> <li><b>Electric Shock:</b> To avoid possible electric shock, special care should be taken since water is present near the electrical equipment. Unless a situation is encountered that is explicitly addressed by the provided maintenance and troubleshooting sections, do not attempt repairs yourself, refer to an authorized service facility.</li> <li><b>GROUNDING:</b> This product must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electrical shock. This system is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances. Improper connection of the equipment-grounding conductor can result in a risk of electrocution. Check with a qualified electrician or service personnel if you are in doubt as to whether the outlet is properly grounded. Do not modify the plug provided with this system – if it does not fit in the outlet, have a proper outlet installed by a qualified electrician. Do not use any type of adapter with this system.</li> <li><b>GROUND FAULT CIRCUIT INTERRUPTER PROTECTION:</b> To comply with the National Electrical Code (NFPA 70) and to provide additional protection from the risk of electric shock, this system should only be connected to a properly grounded, grounding-type controller receptacle that is protected by a Ground Fault Circuit Interrupter (GFCI). Inspect operation of GFCI as per manufacturers suggested maintenance schedule.</li> </ul>
<b>NOTICE</b>	
	<p>Read and understand the Owner's Manual before operating and performing any maintenance on this equipment.</p>

## Section 2 General Information

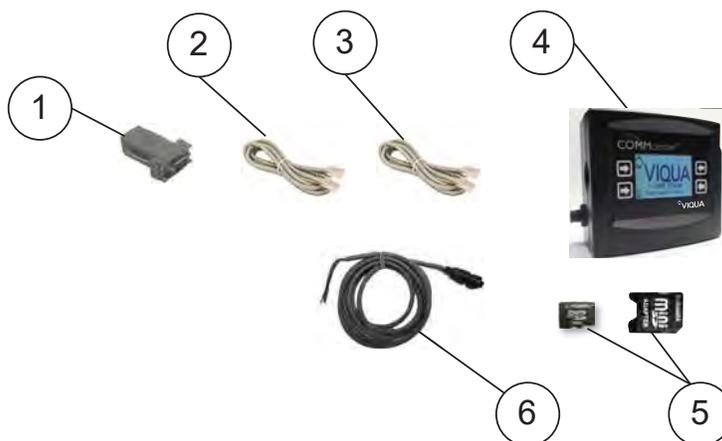


Figure 1 System Components

Item	Description	Part Number
1	RJ11 to RS232 Adapter	602982
2	RJ11 to RJ11 Straight through Cable	260176-R
3	RJ45 (Ethernet) cable	602942
4	COMMcenter ((includes parts #602942, 602982, 230440-R and 260176-R))	270272-R
5	2GB Micro-SD with Mini-SD adapter	230440-R
6	Cable Assembly. Commcenter Dry Contact	260201-R

### Additional Accessories Purchased Separately:

To connect multiple units:

- RJ45 cable(s). Available from VIQUA and retailers. One is provided with each COMMcenter.

To connect to a computer:

- RJ11 cable. Available from VIQUA and various retailers. One is provided with each COMMcenter.
- Dry Contact cable. Available from VIQUA and various dealers. One is provided with each COMMcenter.

## Section 3 Installation

### 3.1 Single Unit

#### Procedure:

1. Install water treatment unit(s) if required.

**Note:** A “unit” is a complete system.

2. Power up the unit(s).
3. Mount the COMMcenter on wall, if so desired (it may also rest on a flat surface). If using RJ45 (Ethernet) cable, COMMcenter may be installed at any distance from unit(s).

**Note:** Mounting holes are 2.5" (6.8 cm) apart.

4. If connecting to a single unit, connect the unit's controller (refer to [Figure 2](#)) to the COMMcenter using the cable provided with the COMMcenter.
5. To connect to multiple units, refer to [Figure 3](#) then return to step 5.
6. Refer to [Section 4](#) for basic operations of the COMMcenter.
7. Set the time and date on the COMMcenter. Refer to [How do I set the time?](#) and [How do I set the date?](#).
8. If data-logging is desired, insert mini-SD card or connect to computer using MAXtrack software (available at [www.viqua.com](http://www.viqua.com)). For details, refer to [Section 5](#).



Figure 2 Controller

## 3.2 Multiple Units

- Up to 9 units may be linked to the COMMcenter.
- Make the required connections in the sequence as shown in [Figure 3](#).
- The port closest to the front of each controller is for the line out and the port closest to the back is for the line in.
- Only one Ethernet connection cable is provided with the COMMcenter.
- The units are identified by an “address”. Until they have been connected, all units are addressed as “0”.
- The COMMcenter assigns each unit an address when first connected.
- Each unit then retains the address it is assigned, even when unplugged or connected to another COMMcenter.
- Refer to [How do I connect multiple units?](#) for more information.

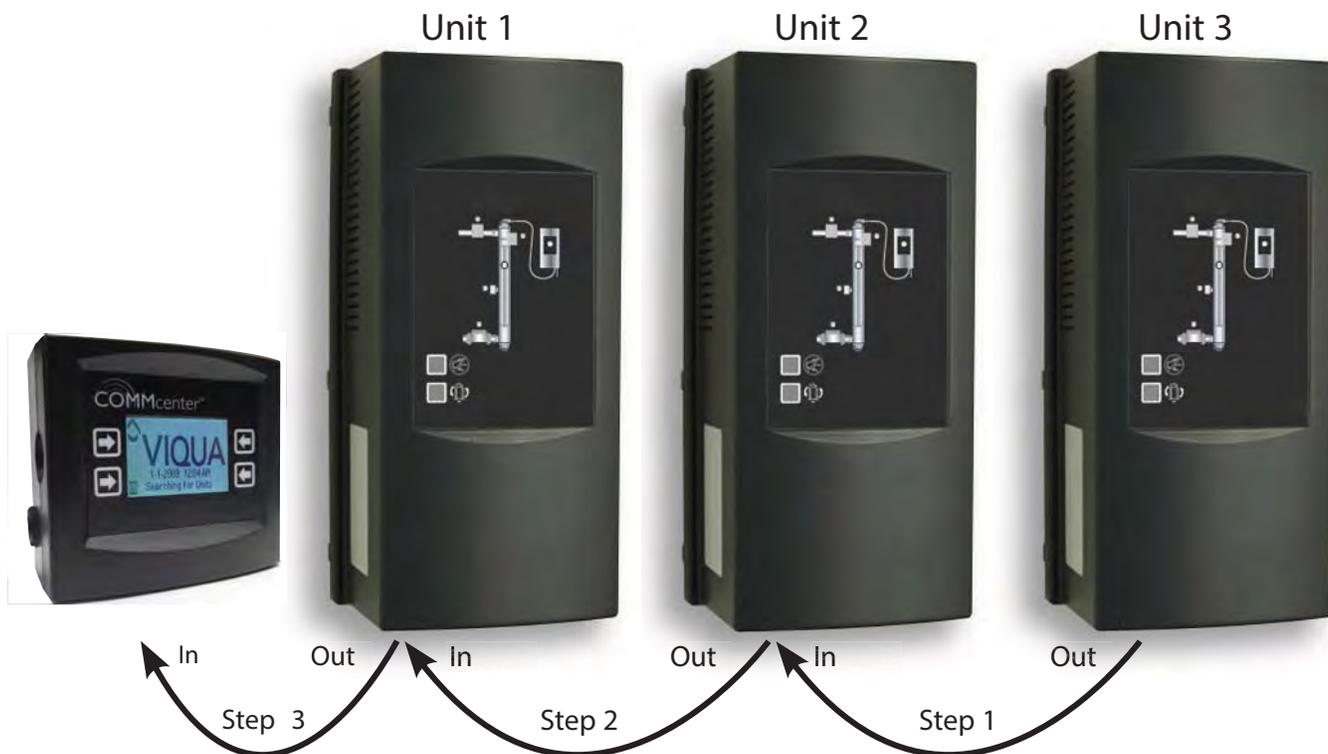


Figure 3 Multiple Unit Installation

## Section 4 Operation

### Navigation

There are four buttons on the COMMcenter. Their function corresponds to what is displayed on the screen next to each button, as illustrated below.



Figure 4 COMMcenter

1	Use this button to select "Settings".	3	Use this button to move up through options.
2	This button does not have an assigned function on this screen.	4	Use this button to move down through options.

### Standard and Advanced Menu Settings

There are two menu settings: Standard and Advanced. For the features of each, refer to the Menu Structure on the next page. When the COMMcenter is connected to more than one unit, it defaults to Advanced Menu mode. Otherwise, this mode may be selected - refer to [How do I change the menu mode?](#)

## Welcome Page and Home Page

The Welcome page appears during start-up. Left unattended, the COMMcenter will alternate between the Welcome page and the Home page. The latter displays the most critical information about the performance of the unit(s). To view the menu options from the Welcome page or the Home page, press any button.

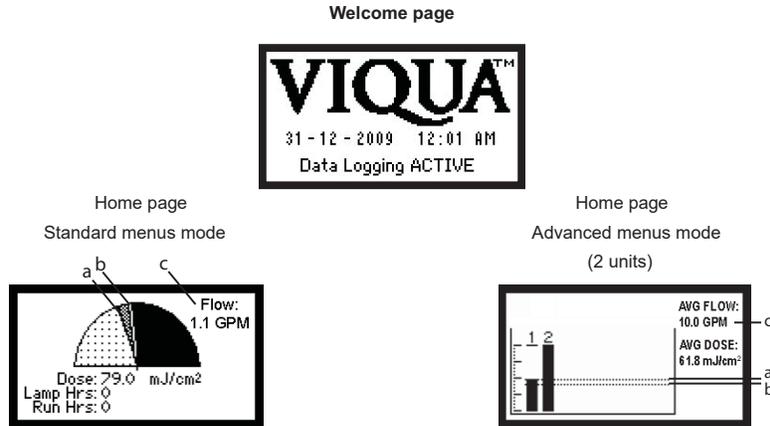
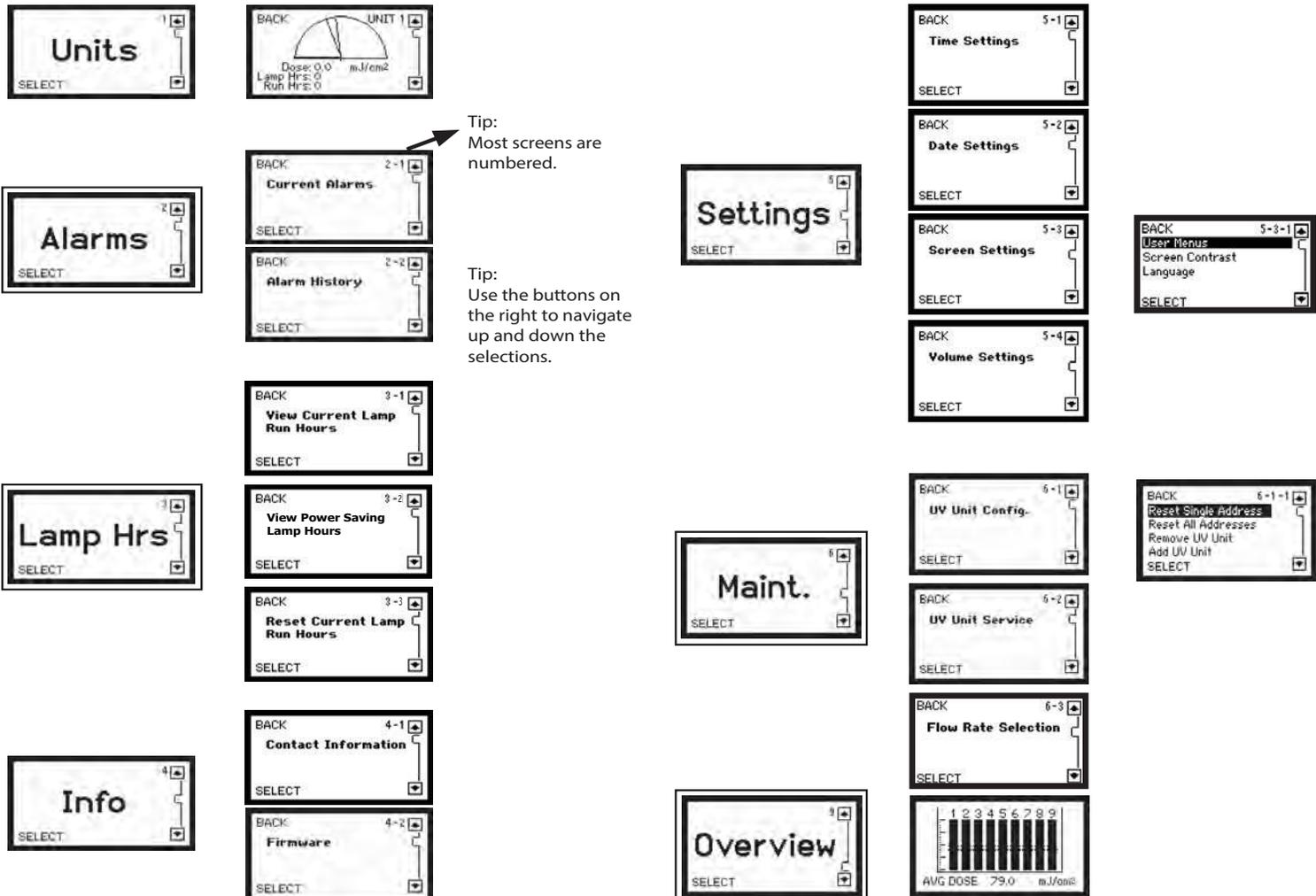


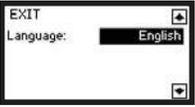
Figure 5 COMMcenter

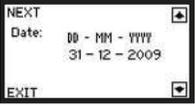
a) Dose 45, nearing alarm set point	c) GPM Flow rate (if so equipped with flow meter)
b) Dose 40, alarm set point. Unit will shut solenoid valve (if so equipped) below this level.	

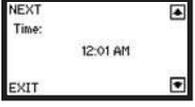
Screens with a double outline are only visible when in Advanced Menu mode.

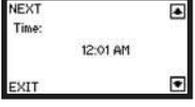


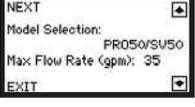
## Initial Setup - First-time On Sequence

→  Use buttons on right to set language

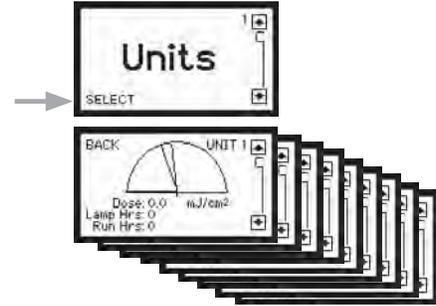
→  Use buttons on right to set date

→  Use buttons on right to set time

→  Use buttons on right to set model

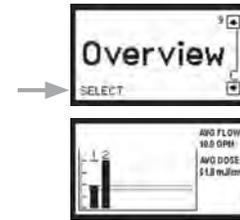
→  Use buttons on right to set max flow rate

## What dose is being delivered? How long has my lamp been running? How long has my system been running?



One screen for each unit, up to a maximum of 9. Navigate between units using buttons on the right. If only one unit is present, this is the Home page.

**Note:** The Home page for multiple systems is also useful as it displays the dose being delivered by each unit. It may be viewed by selecting the following:

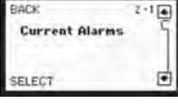


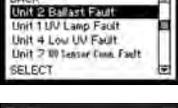
## What alarms are currently present?

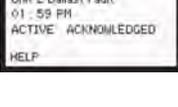
Alarms must first be acknowledged by pressing any button on the COMMCenter or by pressing the Mute button on the power supply. This does not remove the alarm condition.

**Note:** The "Alarms" screens may only be viewed when in Advanced Menus mode.

→ 

→ 

→  Use buttons on right to scroll through alarm

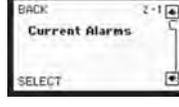
→  You can review helpful advice by simply pressing the bottom left button.

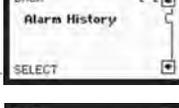
## What alarms have occurred?

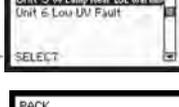
The COMMCenter stores the last 40 alarms that have occurred in memory. For greater data-logging capability, including the ability to data-log dose, use our free MAXtrack software or insert a mini-SD card.

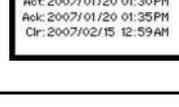
**Note:** The "Alarms" screens may only be viewed when in Advanced Menus mode.

→ 

→ 

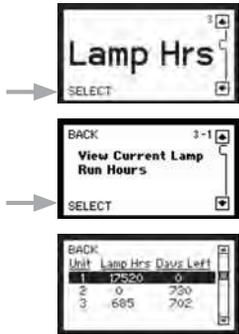
→ 

→  Use buttons on right to scroll through alarm

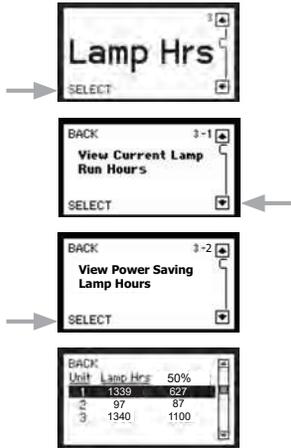
→ 

**How many more days should my lamp last?**

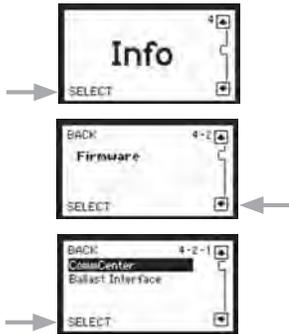
*Note: The "Lamp Hours" screens may only be viewed when in Advanced Menus mode.*



**How do I check my power savings hours?**



**What firmware revision do I have?**

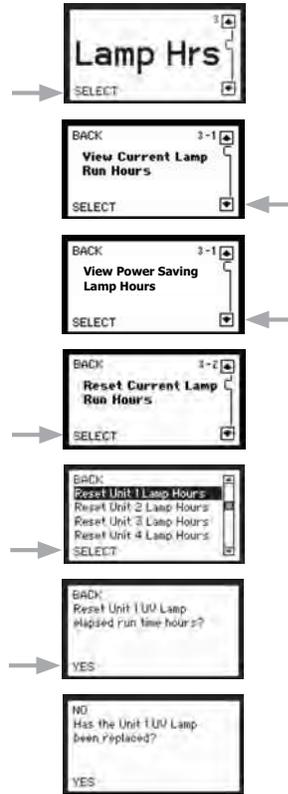


*Use buttons on right to choose COMMcenter or ballast interface (controller).*

**How can I reset the lamp run hours after installing a new lamp?**

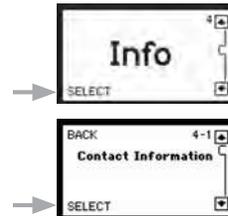
The lamp run hours can also be reset at the power supply. Refer to system Owner's Manual for details.

*Note: the "Lamp Hours" screens may only be viewed when in Advanced Menus mode.*



*Use buttons on right to scroll through the unit.*

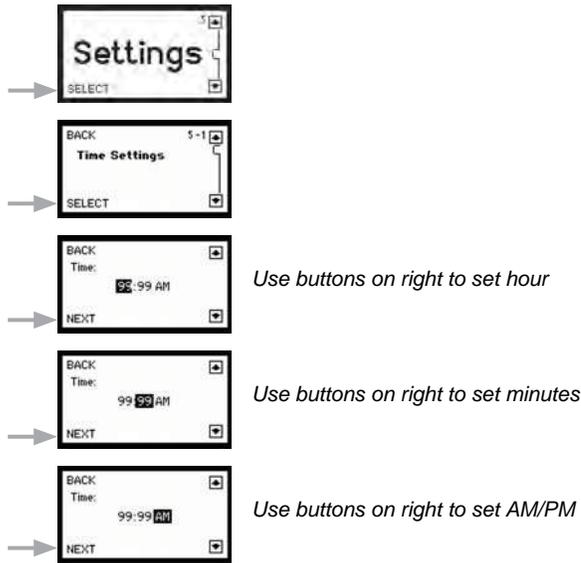
**Who do I contact for help?**



# Operation

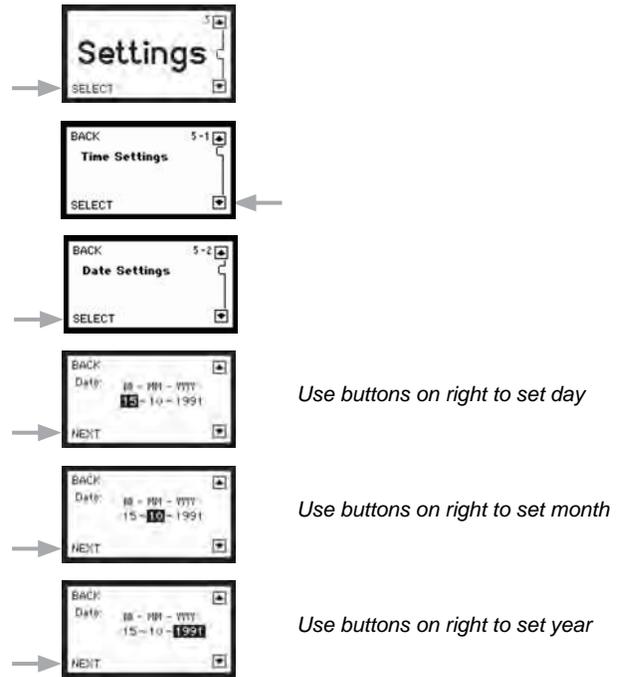
## How do I set the time?

The COMMcenter is equipped with a battery that will allow it to track the time for the life of the product.

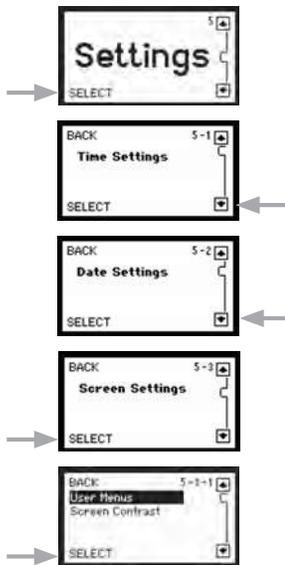


## How do I set the date?

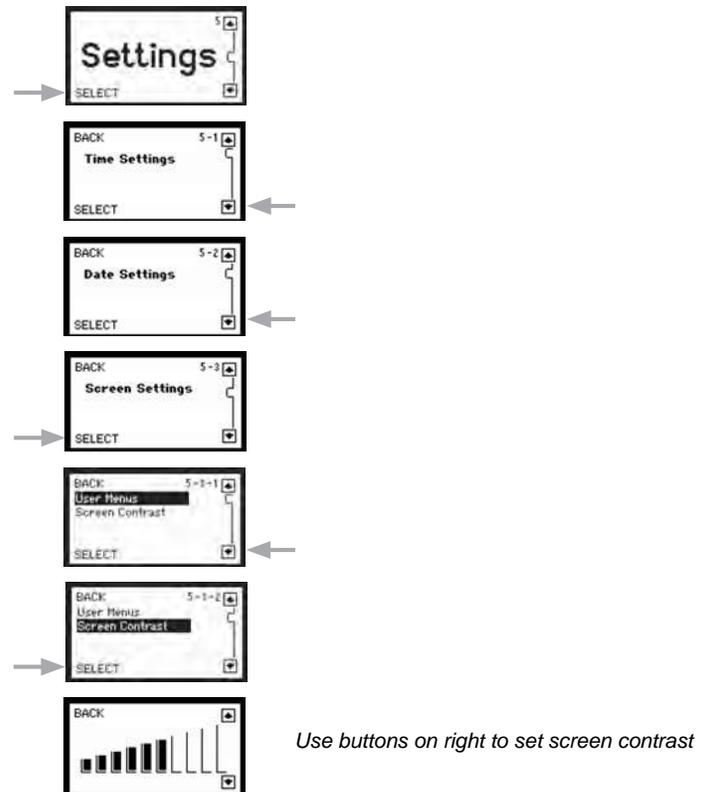
The COMMcenter is equipped with a battery that will allow it to track the date for the life of the product.



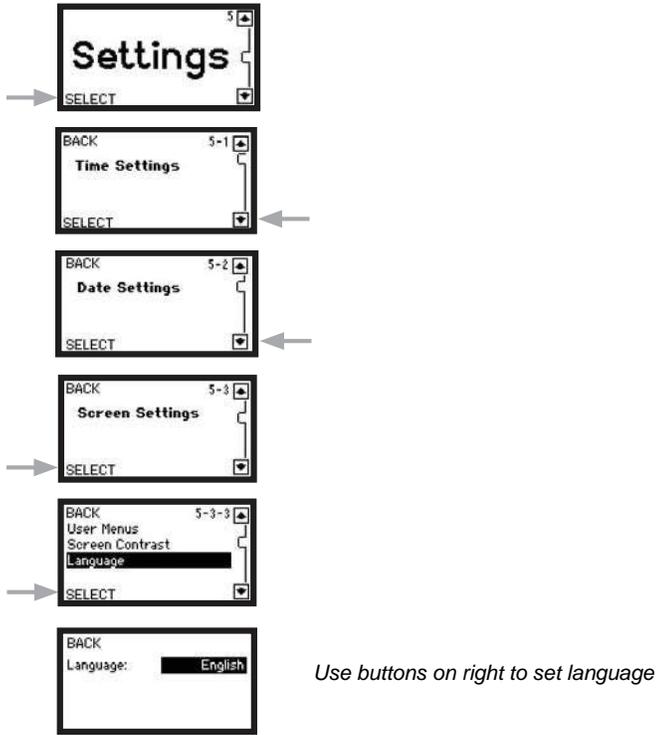
## How do I change the menu mode?



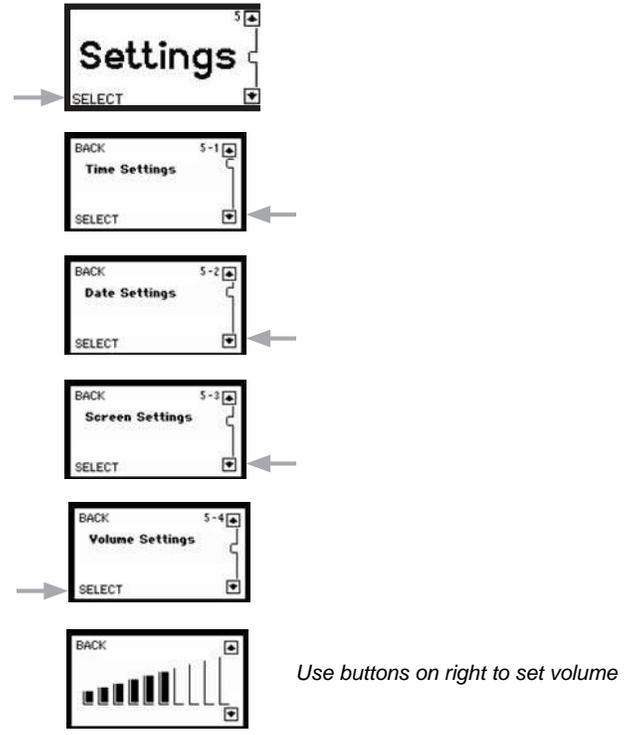
## How do I adjust the screen contrast?



**How do I change the language?**



**How do I adjust the volume of the audible alarm?**



**How do I permanently remove a unit?**

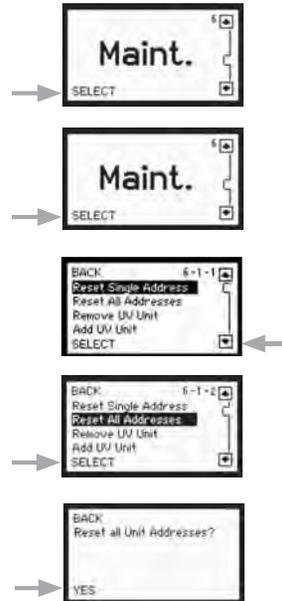
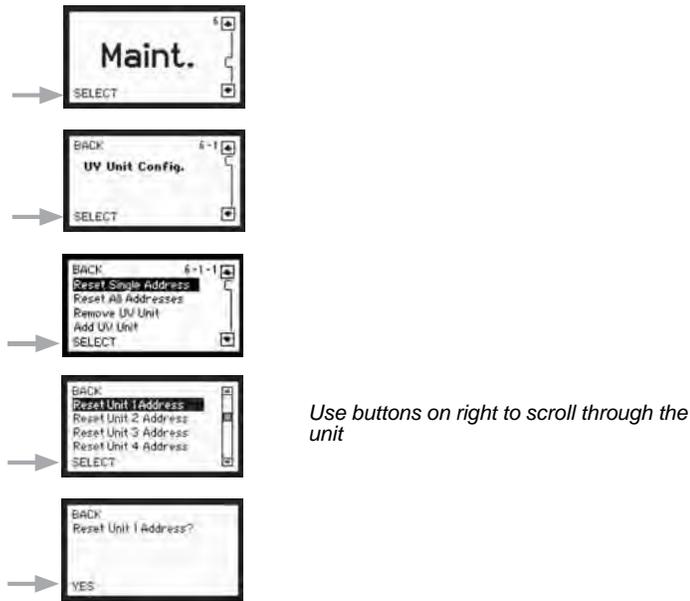
This procedure resets the address for one unit to “zero”, and the COMMcenter will no longer track this unit. Use this when permanently removing a unit. This way, if it is used again in another location, it will not have an assigned address.

**Note:** The “Maintenance” screens may only be viewed when in Advanced Menu mode.

**How do I reset all addresses?**

This procedure resets the addresses of all units to “zero”. Use this only after consulting with VIQUA Technical Services at 11-800-265-7246.

**Note:** The “Maintenance” screens may only be viewed when in Advanced Menu mode.

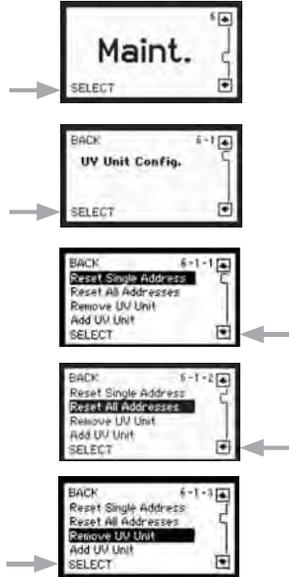


## Operation

### How do I remove a unit?

When this procedure is followed, the unit that is removed is no longer tracked by the COMMCenter. Use this procedure when removing a unit from service, such as when turning off a unit that is only used as a back-up. This avoids lost-communications alarms.

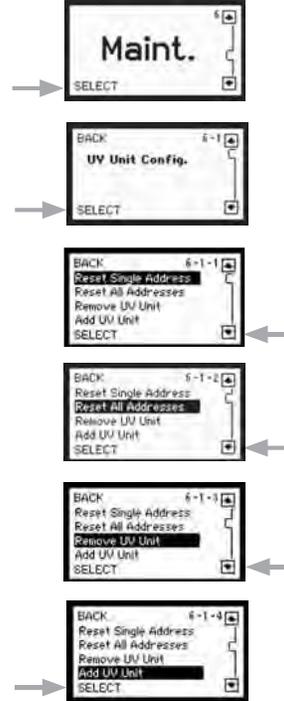
**Note:** The “Maintenance” screens may only be viewed when in Advanced Menus mode.



### How do I re-install a unit?

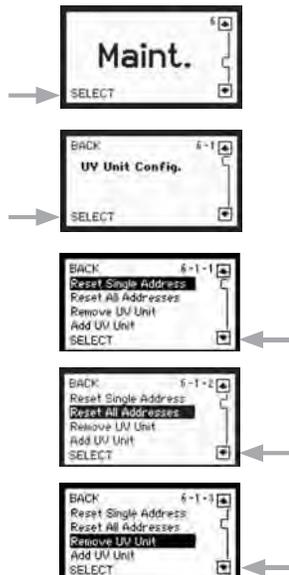
Use this procedure when a unit that was previously removed from service (ex: back-up system) needs to be returned to service. You must know the address of the system being returned to service.

**Note:** The “Maintenance” screens may only be viewed when in Advanced Menus mode.



### How do I connect multiple units?

Use this procedure when connecting multiple units to the COMMCenter (additional Ethernet cable(s) required, refer to [Section 2](#)). It is advised to connect and add one additional unit at a time, so that their addresses will match up with their location. Refer to the diagram on page 5 for directions on linking additional units to the COMMCenter. After selecting “Add UV Unit”, follow the prompts to add units to increase the number of existing units.



### What if I am replacing the COMMCenter?

First, it is important to reset the address on the primary unit using the original COMMCenter. This can be done by following the procedure to permanently remove a unit (page 14). The new COMMCenter should then automatically detect the primary unit. If additional units were connected to the original COMMCenter, they can be added using the procedure for connecting multiple units. In this case however, choose “No” when asked if units are being added to increase the number of additional units, and select “Yes” when asked if units have already been assigned a designated address. If the unit was not removed from service properly, it may be necessary to reset the unit before it can connect to the new COMMCenter (Refer to [How do I reset the ballast unit?](#)).

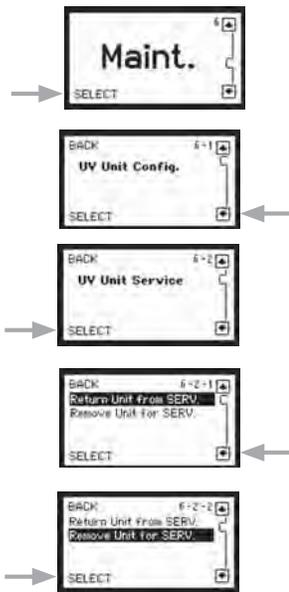


**How do I reset the COMMcenter?**

To reset a COMMcenter, hold down any two buttons diagonally opposite each other while connecting it to a unit. This will return the COMMcenter to its factory default settings.

**How do I turn off a unit for servicing?**

This procedure provides a two hour window during which the COMMcenter no longer tracks the specified unit. Use this procedure when a unit must undergo service so as to avoid alarms.



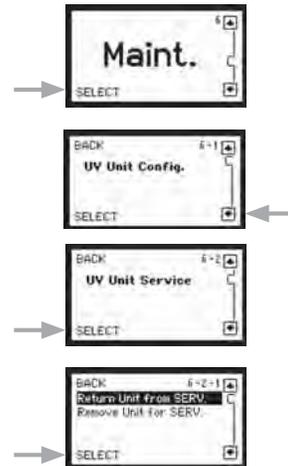
**How do I reset the ballast unit?**

To reset the ballast unit, hold down both buttons on the front of the unit while connecting the power cord. This will reset the address and lamp life counter within the unit.

**WARNING:** Resetting the ballast unit will erase all information regarding lamp life and reset the lamp life counter. If you wish to reset the lamp hours, do so through the COMMcenter.

**How do I turn a unit on after servicing?**

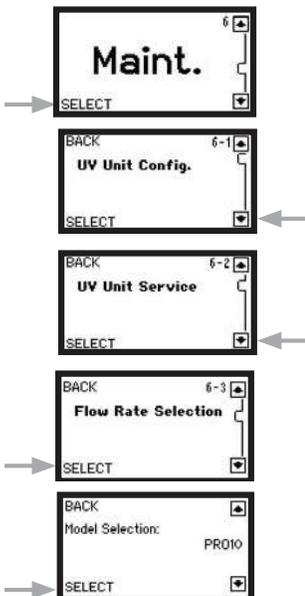
This procedure triggers the COMMcenter to resume tracking the unit specified. Note that if this procedure is not followed the COMMcenter will try to resume tracking of the given unit automatically, two hours after it was first turned off for servicing.



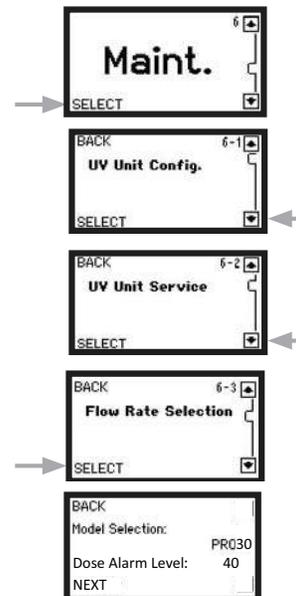
**How do I change the flow rate?**

**How do I change the Dose Alarm Level?**

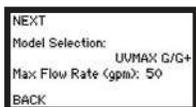
\* For Pro10, 20 and 30 models only



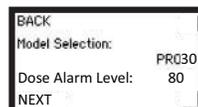
Use buttons on right to set model



Use buttons on right to set model



Use buttons on right to set max flow rate



Use buttons on right to set dose alarm level 40, 80 or 120mJ/cm<sup>2</sup>

## Section 5 Data-Logging

### 5.1 Using a Mini-SD Card

The COMMcenter has the ability to store data on the performance of your system(s) to a mini-SD card, refer to [Figure 6](#). Mini-SD cards are available at various retailers.

Information is recorded every minute and a 512MB card should store 18 years worth of information.

To use this data-logging feature, simply insert a mini-SD card into the slot on the left side of the COMMcenter.

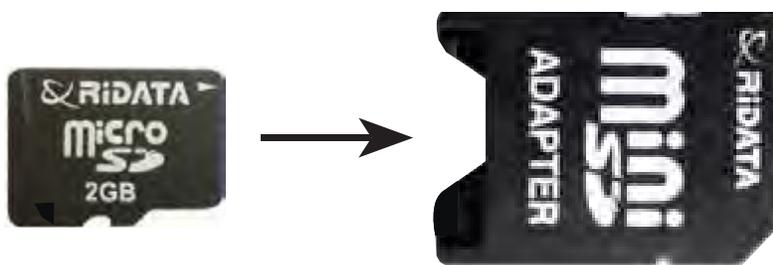


Figure 6 Mini-SD card

#### 5.1.1 Extract Mini-SD Card

##### Procedure:

9. Push the card into the COMMcenter.
10. This will cause the card to spring out slightly for removal.



Figure 7 Extracting Mini-SD card

## 5.1.2 Download Information Stored on Mini-SD Card

### Procedure:

1. Insert the card into a card reader that is attached to a computer.

**Note:** Card readers are available from various retailers.

2. Use the computer's file management application to view the contents of the card.
3. A folder with name “dd\_mm\_yy” format contains the data-log files, with CSV extension.
4. These files may be opened in Microsoft Excel or VIQUA's free MAXtrack software (refer to [Section 5.2](#)) for easy viewing of the data.
5. You may wish to save the file to the computer's hard drive.
6. To re-use the mini-SD Card, re-insert the card into the COMMcenter.

## 5.1.3 When Data-logging from Multiple Units

When using a standard Ethernet (RJ45) cable to connect the COMMcenter to the first controller, it is important to note that power is provided to the COMMcenter through this cable. Therefore, if power to this unit is interrupted the COMMcenter loses power and data-logging is temporarily stopped. This may not be desirable in situations where multiple units are installed. To avoid this situation, it is recommended that you reconnect and reconfigure the COMMcenter using another unit.

## 5.2 Using MAXtrack Software

Your COMMcenter has the ability to store information directly to a PC equipped with MAXtrack software, which is available for free. MAXtrack software allows you to easily search and view system performance, and presents real-time information as well. To learn more about the great features of this software or to download, visit [www.viqua.com](http://www.viqua.com).

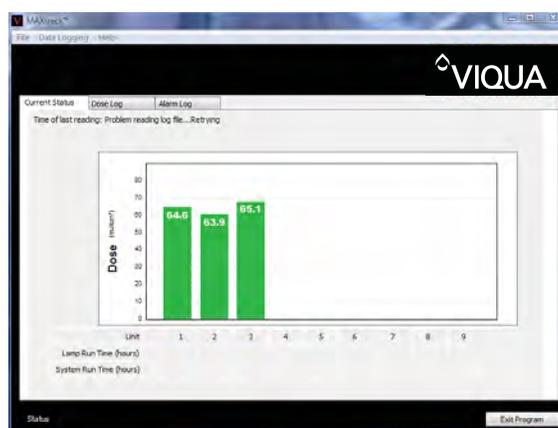


Figure 8 MAXtrack Software

**Note:** Screen caption of real-time performance monitoring using MAXtrack software.

### 5.2.1 Minimum Requirements

- Pentium II 233MHz
- 128 MB RAM (256MB for Windows XP)
- 3GB free hard drive space

## COMMcenter Programming

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- One free Serial Port (RS232, 9-pin female)
- Windows 2000 or better

### 5.2.2 Installation

#### Procedure:

1. Connect the provided RJ11 cable to the COMMcenter.
2. Connect the other end of the cable to the adapter provided with the COMMcenter.
3. Connect the adapter to your computer. If no suitable port is available, a USB adapter may be purchased from a retailer.
4. Go to [www.viqua.com](http://www.viqua.com) and download your free MAXtrack software.
5. Open the software application now installed on your computer, either from the shortcut on your desktop or by choosing “Start” then “All Programs” then “MAXtrack”.

### 5.2.3 Operation

The MAXtrack program is an interface for viewing the data received from the COMMcenter. The program receives and stores information even when the program is closed. For assistance with this program, please contact our technical support staff at 1-800-265-7246 (North America) or 519-763-1032 (International).

## Section 6 COMMcenter Programming

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### 6.1 SD Card Firmware Updating

COMMcenter firmware updates can be easily done via the SD Card. Power off the COMMcenter and remove SD card. Load the new firmware version onto the SD card via a computer device. Reinsert the SD card back into the COMMcenter. While holding down the top right button power up the COMMcenter until the screen displays Updating Firmware. Release the button and wait until the COMMcenter reboots.

## Section 7 Dry Contact

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### 7.1 Description

The COMMcenter has a Dry Contact output connector that can be used to signal a remote device such as a remote alarm of auto dialer when a major alarm occurs with the UV system.

### 7.2 Alarm Descriptions

The Dry Contact output will inform you of the following major Alarms

- Lamp Fault
- Ballast Fault
- UV Sensor Fault
- Low UV Fault

## 7.3 Connections

Connection to the Dry Contact output connector is done via the supplied Dry Contact Cable assembly PN 260201-R. Wiring connections are as follows:

- Normally Open (N.O.) - RED Wire
- Normally Closed (N.C.) - GREEN Wire
- Common (COM) - BLACK Wire

### 7.3.1 Connection Logic Chart

The following is the logic chart for the Dry Contact relay.

Wire	Output Terminal	UV System Running Normally (No Major Alarms)	UV System is in one of the Major Alarms or there is no power to the UV system
RED	N.O. (Normally Open Contact)	The Electrical path between these contacts are closed	The Electrical path between these contacts are open
BLACK	COM. (Common)		
	COM. (Common)	The Electrical path between these contacts are open	The Electrical path between these contacts are closed
GREEN	N.C. (Normally Closed Contact)		

# Section 8 Manufacturer's Warranty

### Our Commitment

VIQUA is committed to ensuring your experience with our products and organization exceeds your expectations. We have manufactured your UV disinfection system to the highest quality standards and value you as our customer. Should you need any support, or have questions about your system, please contact our Technical Support team at 1.800.265.7246 or [technicalsupport@viqua.com](mailto:technicalsupport@viqua.com) and we will be happy to assist you. We sincerely hope you enjoy the benefits of clean, safe drinking water after the installation of your VIQUA disinfection system.

### How to Make a Warranty Claim

**Note:** *To maximise the disinfection performance and reliability of your VIQUA product, the system must be properly sized, installed and maintained. Guidance on the necessary water quality parameters and maintenance requirements can be found in your Owner's Manual.*

In the event that repair or replacement of parts covered by this warranty are required, the process will be handled by your dealer. If you are unsure whether an equipment problem or failure is covered by warranty, contact our Technical Support team at 1.800.265.7246 or e-mail [technicalsupport@viqua.com](mailto:technicalsupport@viqua.com). Our fully trained technicians will help you troubleshoot the problem and identify a solution. Please have available the model number (system type), the date of purchase, the name of the dealer from whom you purchased your VIQUA product ("the source dealer"), as well as a description of the problem you are experiencing. To establish proof of purchase when making a warranty claim, you will either need your original invoice, or have previously completed and returned your product registration card via mail or online.

### Specific Warranty Coverage

Warranty coverage is specific to the VIQUA range of products. Warranty coverage is subject to the conditions and limitations outlined under "[General Conditions and Limitations](#)".

#### Ten-Year Limited Warranty for VIQUA UV Chamber

VIQUA warrants the UV chamber on the VIQUA product to be free from defects in material and workmanship for a period of ten (10) years from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective VIQUA UV chamber. Please return the defective part to your dealer who will process your claim.

#### Three-Year Limited Warranty for Electrical and Hardware Components

VIQUA warrants the electrical (power supply) and hardware components to be free from defects in material and workmanship for a period of three (3) years from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective parts covered by the warranty. Please return the defective part to your dealer who will process your claim.

#### One-Year Limited Warranty for Lamps, Sleeves, and UV Sensors

VIQUA warrants lamps, sleeves, and UV sensors to be free from defects in material and workmanship for a period of one (1) year from the date of purchase. During this time, VIQUA will repair or replace, at its option, any defective parts covered by the warranty. Your dealer will process your claim and advise whether the defective item needs to be returned for failure analysis.

**Note:** *Use only genuine VIQUA replacement lamps and sleeves in your system. Failure to do so may seriously compromise disinfection performance and affect warranty coverage.*

### General Conditions and Limitations

None of the above warranties cover damage caused by improper use or maintenance, accidents, acts of God or minor scratches or imperfections that do not materially impair the operation of the product. The warranties also do not cover products that are not installed as outlined in the applicable Owner's Manual.

Parts repaired or replaced under these warranties will be covered under warranty up to the end of the warranty period applicable to the original part.

The above warranties do not include the cost of shipping and handling of returned items

The limited warranties described above are the only warranties applicable to the VIQUA range of products. These limited warranties outline the exclusive remedy for all claims based on a failure of or defect in any of these products, whether the claim is based on contract, tort (including negligence), strict liability or otherwise. These warranties are in lieu of all other warranties whether written, oral, implied or statutory. Without limitation, no warranty of merchantability or of fitness for a particular purpose shall apply to any of these products.

VIQUA does not assume any liability for personal injury or property damage caused by the use or misuse of any of the above products. VIQUA shall not in any event be liable for special, incidental, indirect or consequential damages. VIQUA's liability shall, in all instances, be limited to repair or replacement of the defective product or part and this liability will terminate upon expiration of the applicable warranty period.



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t. (+31) 73 747 0144 (Europe only) • f. (+1) 519.763.5069  
e-mail: [info@viqua.com](mailto:info@viqua.com)  
[www.viqua.com](http://www.viqua.com)



**EUROMAG**  
INTERNATIONAL

*Measure > Sense > Innovate*

# SENSOR **MUT2200EL**

Electromagnetic flowmeter



*The electromagnetic flowmeter for all applications*



DS100-7-ENG



## Sensor MUT2200EL

MUT2200EL sensors represent the state of the art of Euromag International production for water cycle and process applications. The new structure for the generation of the magnetic field and the innovative route of the signal generated by the electrodes, provide a sensor with an extremely wide measurement range:

EL= Extended Linearity

This new sensors series follows the successful tradition of the MUT2200EL, introducing a measurement range of more than 1:1000 without linearization software. These kinds of performances allow very accurate measures on a wide flowrate range and to count lower flow rates that, before, would have been reset because of the effect of the converters cut off.

This flanged sensors series bases its operation on the Faraday Principle, by which a conductor crossing a magnetic field generates a potential perpendicularly orientated to the same field.

In this case the flow tube made in stainless steel AISI 304 is equipped with carbon steel or stainless steel flanges, two coils are installed on the top and inferior part; the magnetic field, generated by the electric current crossing the coil, induces in the electrodes a difference in the potential proportional to the flow rate.

With the aim of measuring such potential of very low values, the interior of the flow tube is electrically insulated, thus the process liquid is no longer in contact neither with the material of the flow tube nor with that of the flange.

The converter used generates the current supplying the coil, acquires the electrodes difference of potential, process the signal to calculate the flowrate and administers the communication with the exterior.

The entire sensor, when installed in the separate version, has a degree of protection IP68 suitable for a permanent immersion in water up to a depth of 1.5m thanks to a welded plate structure containing the coil and the electrodes.



## Body and flanges

The flange and the sensor external surface are acrylic painted. This treatment gives the sensor an excellent resistance to water, even in permanent immersion. When special ambient conditions require it, the MUT2200EL may be supplied in stainless steel, flange included or special painting for C4 class environments.

## Internal lining

The standard internal insulating lining is in PTFE for diameters from DN15 to DN100, in hard rubber (Ebonite) for diameters equal or bigger than DN125. On request, sensors may be supplied coated with PTFE with diameters bigger than DN100. The suitable temperature is limited by the type of internal lining used.

## Electrodes

Standard electrodes in Hastelloy C guarantee a wide compatibility with different kind of liquids; if required, they may be supplied in Hastelloy B, Titanium, Tantalum or Platinum.

## Coupling and sensor connection

MUT2200EL sensors may be coupled with any Euromag converters. In the separate version the sensor is connected to the converter by means of cables whose length depends on the liquid conductivity; the maximum length shall not exceed 100 metres (30 meters in combination with battery operated electronics).

When installed in plastic or coated pipe lines, sensors may require the use of two grounding rings, which are inserted between the flange and the counter flange. On sensors greater or equal than DN50 an empty pipe electrode is supplied as a standard (empty pipe alarm).

## Reference standards

The Euromag magnetic meters are marked CE and are manufactured according to the following standards:

- 2014/35/EU - EN 61010-1:2013 (LVD)
- 2014/30/EU - EN 61326-1:2013 (EMC)
- OIML R49-1:2013
- European directive 2014/32/EU (MID)
- 2014/34/UE - IEC 60079 - 0, IEC 60079 - 18 (ATEX - IECEx) Separate version
- EN ISO 15609-1 and EN ISO 15614-1
- UNI EN ISO 12944-2, painting for C4 class environments (on request)
- PTFE conform to the norms WRAS, FDA, DPR 777/82 e DM 21/09/773
- Ebonite conform to the norms WRAS, FDA e DM174



MUT2200EL - MC608A



Integrated pressure sensor



MUT2200EL - MC608B - GSM - Pressure

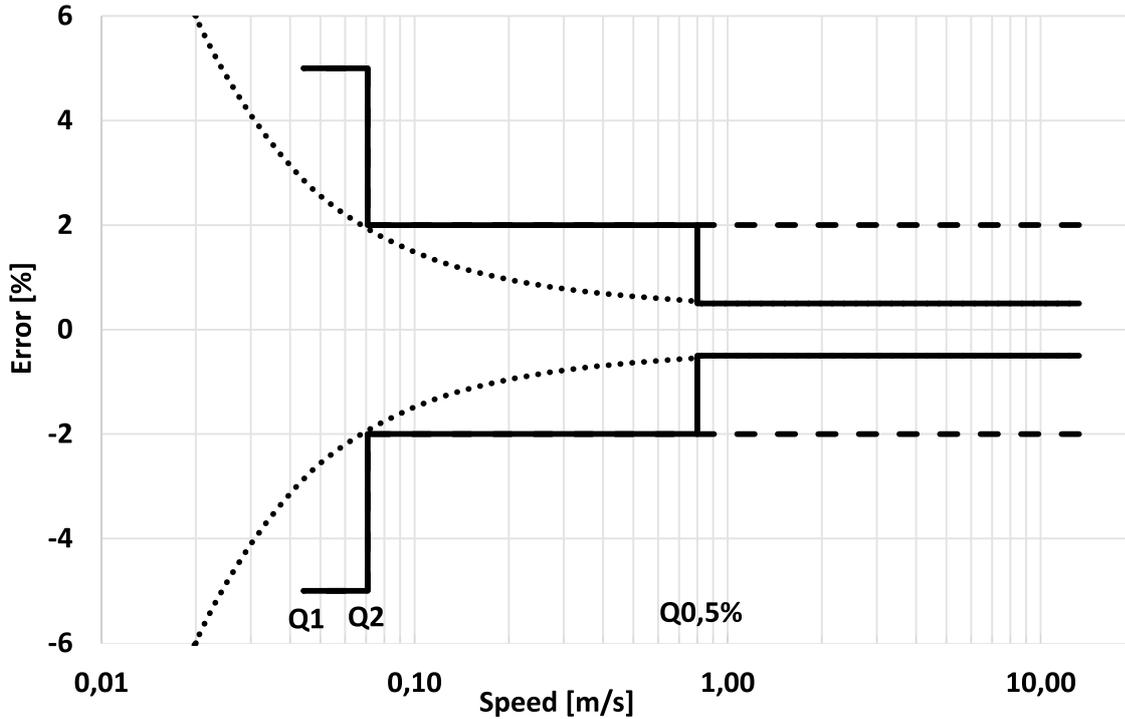


MUT2200EL - PTFE liner

# Calibration and maximum error

Each sensor is calibrated on an hydraulic test rig equipped with a ISO17025 traceable weighing system. The accuracy is equal to 0,2% ± 2mm/s. The repeatability of the measure is about 0,1%. Bi-directional measure. On request the sensors can be supplied certified MID OIML R49 (if coupled to MC406M converters) for custody transfer or OIML R49 with MC608A.

Maximum Permissible Error is within the limits indicated in the following graph:



# Flow rates chart

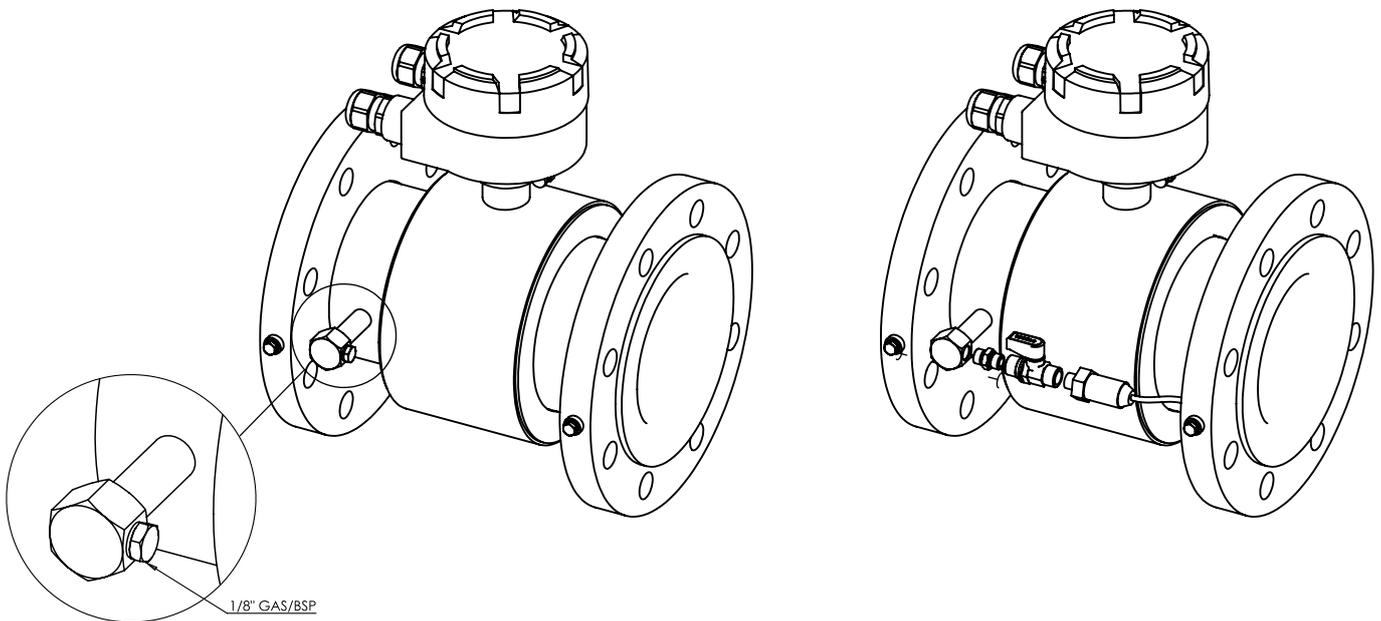
Sensor diameter	Flow rate [m³/h]					Ratio Q3/Q1
	Min. Q1	Trans. Q2	Q0,5%	Perm. Q3	Overl. Q4	
DN25 - 1"	0,080	0,128	1,40	10,00	12,50	125
DN32 - 1 1/4"	0,080	0,128	2,30	10,00	12,50	125
DN40 - 1 1/2"	0,128	0,205	3,60	16,00	20,00	125
DN 50 - 2"	0,200	0,320	5,65	25,00	31,25	125
DN 65 - 2 1/2"	0,320	0,512	9,55	40,00	50,00	125
DN 80 - 3"	0,504	0,806	14,50	63,00	78,75	125
DN 100 - 4"	0,800	1,280	22,60	100,00	125,00	125
DN 125 - 5"	1,280	2,048	35,30	160,00	200,00	125
DN 150 - 6"	2,000	3,200	51,00	250,00	312,50	125
DN 200 - 8"	3,200	5,120	90,50	400,00	500,00	125
DN 250 - 10"	5,040	8,064	140,00	630,00	787,50	125
DN 300 - 12"	8,000	12,800	200,00	1.000,00	1.250,00	125
DN 350 - 14"	12,800	20,480	280,00	1.600,00	2.000,00	125
DN 400 - 16"	12,800	20,480	360,00	1.600,00	2.000,00	125

Sensor diameter	Flow rate [m³/h]					Ratio Q3/Q1
	Min. Q1	Trans. Q2	Q0,5%	Perm. Q3	Overl. Q4	
DN450 - 18"	25	40	460	2.500	3.125	100
DN500 - 20"	25	40	570	2.500	3.125	100
DN600 - 24"	50	80	820	4.000	5.000	80
DN700 - 28"	50	80	1.100	4.000	5.000	80
DN800 - 32"	100	160	1.450	6.300	7.875	63
DN900 - 36"	100	160	1.840	6.300	7.875	63
DN1000 - 40"	200	320	2.270	10.000	12.500	50
DN1200 - 48"	320	512	3.270	16.000	20.000	50
DN1400 - 56"	500	800	4.440	25.000	31.250	50
DN1500 - 60"	800	1.280	5.100	40.000	50.000	50
DN1600 - 64"	1.260	2.016	5.800	63.000	78.750	50
DN1800 - 72"	2.000	3.200	7.350	100.000	125.000	50
DN2000 - 80"	3.200	5.120	9.100	160.000	200.000	50

# MUT2200EL general features

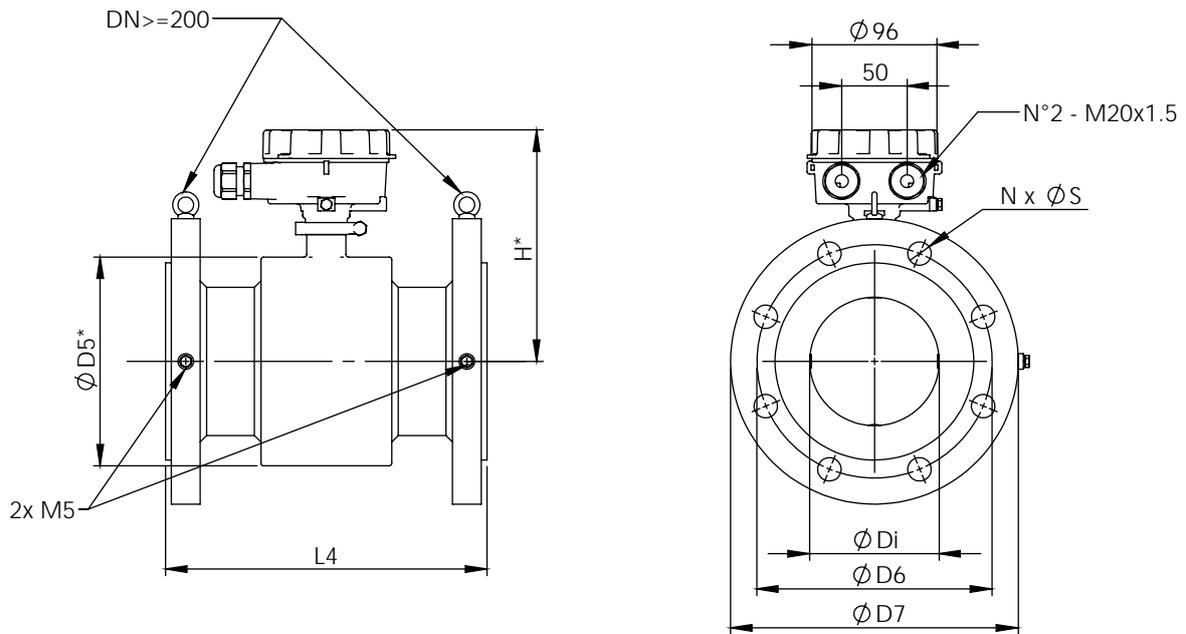
<b>Flow tube material</b>		AISI 304 (std), AISI 316																
<b>Flanges material</b>		Carbon steel painted (std), AISI 304, AISI 316																
<b>Electrodes material</b>		Hastelloy C (std), Hastelloy B, Titanium, Tantalio, Platinum																
<b>Internal lining and liquid temperature</b>		<b>Internal lining</b>								<b>Liquid temperature</b>								
		PTFE								Standard -40 /+130°C (up to +180° on request)								
		Ebonite								-40°C / +80°C								
<b>Available sizes</b>		mm	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
		pollici	1/2"	3/4"	1"	1.1/4"	1.1/2"	2"	2.1/2"	3"	4"	5"	6"	8"	10"	12"	14"	16"
		mm	450	500	600	700	800	900	1000	1200	1300	1400	1500	1600	1700	1800	2000	
		pollici	18"	20"	24"	28"	32"	36"	40"	48"	52"	56"	60"	64"	68"	72"	80"	
<b>Flange standards available</b>		EN1092-1, ANSI 150, ANSI 300, ANSI 600, ANSI 900, DIN 2501, BS 4504, AS 2129 (TABLE D - E - F), AS 4087, ISO 7005-1, KS 10K																
<b>Protection Degree</b>		IP68 1,5 m continuous immersion (EN 60529)																
<b>Compatible converters</b>		MC608 A/B/R/P/I, MC406																
<b>Electrical connections</b>		Cable glands M20 x 1.5 + terminal block + sealing resin																

## Pressure port integrated



## Applications

MUT2200EL sensors are suitable for any on-line application. These sensors are typically used in the measure of potable or not potable water, industrial waste water, industrial process liquids, muds and concretes.



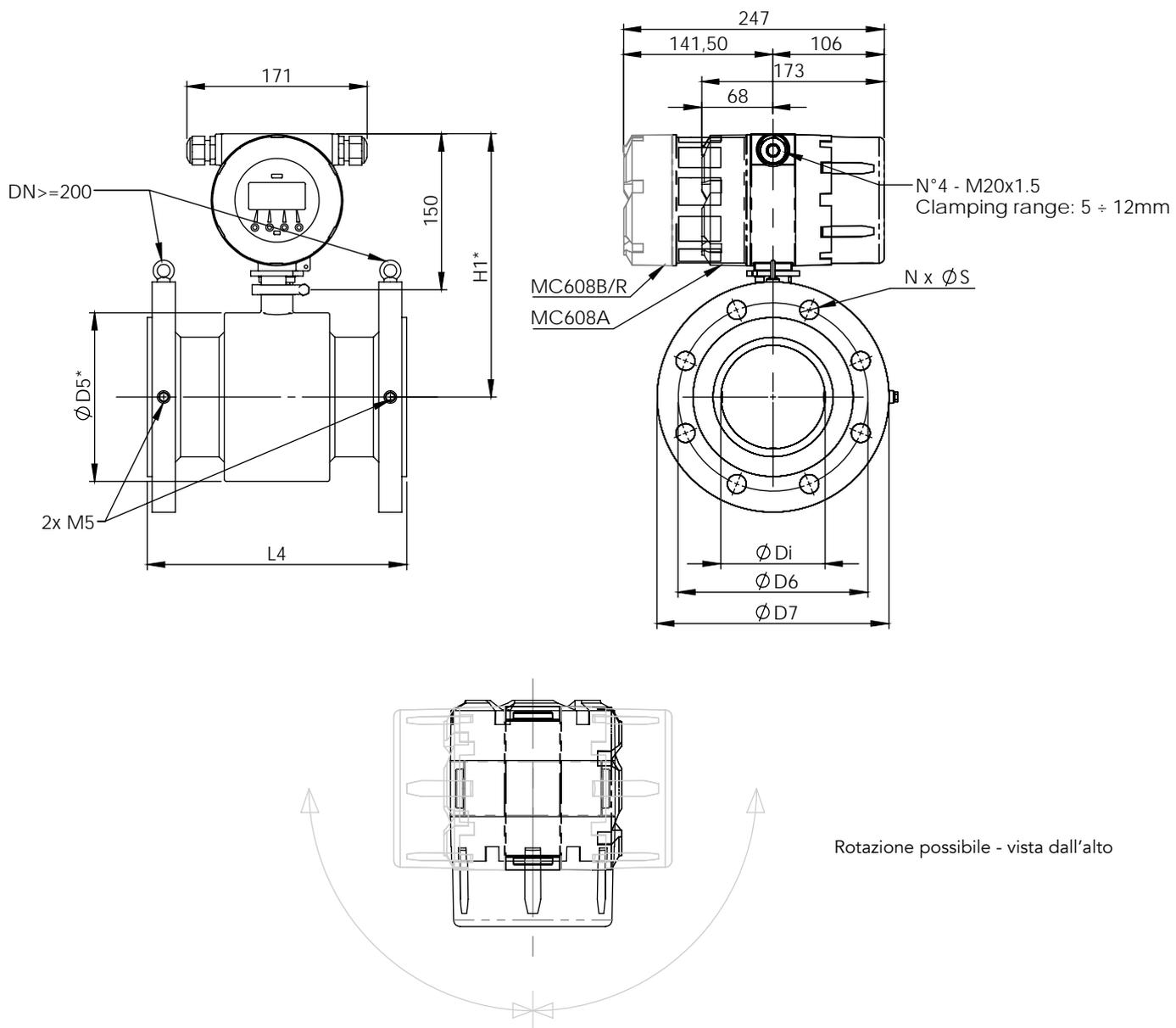
MUT2200EL PN 10 EN 1092-1

DN	L4	D5	Di	D6	D7	N	S	H	H1	H2	H3
15	200(+0/-3)	84	11	65	95	4	14	156	195	190	236
20	200(+0/-3)	84	17	75	105	4	14	156	195	190	236
25	200(+0/-3)	74	24	85	115	4	14	151	190	185	231
32	200(+0/-3)	83	31	100	140	4	18	155	195	190	236
40	200(+0/-3)	88	37	110	150	4	18	158	197	192	238
50	200(+0/-3)	102	47	125	165	4	18	165	204	199	245
65	200(+0/-3)	114	63	145	185	8	18	171	210	205	251
80	200(+0/-3)	127	75	160	200	8	18	177	217	212	258
100	250(+0/-3)	161	99	180	220	8	18	194	234	229	275
125	250(+0/-3)	187	124	210	250	8	18	207	247	242	288
150	300(+0/-3)	210	152	240	285	8	22	219	258	253	299
200	350(+0/-3)	261	201	295	340	8	22	244	284	279	325
250	450(+0/-5)	319	255	350	395	12	22	273	313	308	354
300	500(+0/-5)	371	308	400	445	12	22	299	339	334	380
350	550(+0/-5)	404	340	460	505	16	22	316	355	350	396
400	600(+0/-5)	455	390	515	565	16	26	341	381	376	422
450	450(+0/-7)	519	441	565	615	20	26	373	413	408	454
500	500(+0/-9)	570	492	620	670	20	26	399	438	433	479
600	600(+0/-9)	684	592	725	780	20	30	456	495	490	536
700	700(+0/-9)	783	695	840	895	24	30	505	545	540	586
800	800(+0/-9)	885	795	950	1015	24	33	556	596	591	637
900	900(+0/-15)	996	896	1050	1115	28	33	612	651	646	692
1000	1000(+0/-15)	1098	996	1160	1230	28	36	663	702	697	743
1200	1200(+0/-15)	1312	1199	1380	1445	32	39	770	809	804	850
1400	1400(+0/-15)	1512	1402	1590	1675	36	42	870	909	904	950
1500	1500(+0/-15)	1612	1500	1700	1785	36	44	920	959	954	1000
1600	1600(+0/-15)	1712	1602	1820	1915	40	48	970	1009	1004	1050
1800	1800(+0/-15)	1922	1803	2020	2115	44	48	1075	1114	1109	1155
2000	2000(+0/-15)	2122	2004	2230	2325	48	48	1175	1214	1209	1255

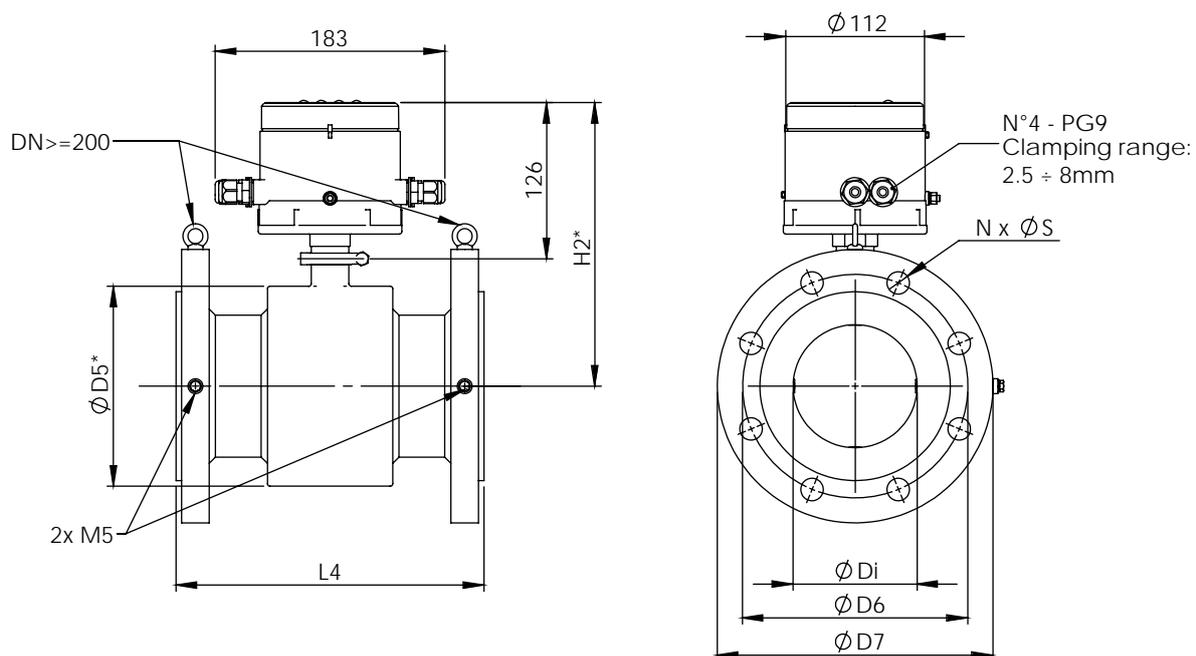
MUT2200EL PN 16 EN 1092-1

<b>DN</b>	<b>L4</b>	<b>D5</b>	<b>Di</b>	<b>D6</b>	<b>D7</b>	<b>N</b>	<b>S</b>	<b>H</b>	<b>H1</b>	<b>H2</b>	<b>H3</b>
15	200(+0/-3)	84	11	65	95	4	14	156	195	190	236
20	200(+0/-3)	84	17	75	105	4	14	156	195	190	236
25	200(+0/-3)	74	24	85	115	4	14	151	190	185	231
32	200(+0/-3)	83	31	100	140	4	18	155	195	190	236
40	200(+0/-3)	88	37	110	150	4	18	158	197	192	238
50	200(+0/-3)	102	47	125	165	4	18	165	204	199	245
65	200(+0/-3)	114	63	145	185	8	18	171	210	205	251
80	200(+0/-3)	127	75	160	200	8	18	177	217	212	258
100	250(+0/-3)	161	99	180	220	8	18	194	234	229	275
125	250(+0/-3)	187	124	210	250	8	18	207	247	242	288
150	300(+0/-3)	210	152	240	285	8	22	219	258	253	299
200	350(+0/-3)	261	201	295	340	12	22	244	284	279	325
250	450(+0/-5)	319	255	355	405	12	26	273	313	308	354
300	500(+0/-5)	371	308	410	460	12	26	299	339	334	380
350	550(+0/-5)	404	340	470	520	16	26	316	355	350	396
400	600(+0/-5)	455	390	525	580	16	30	341	381	376	422
450	450(+0/-7)	519	439	585	640	20	30	373	413	408	454
500	500(+0/-9)	570	490	650	715	20	33	399	438	433	479
600	600(+0/-9)	684	592	770	840	20	36	456	495	490	536
700	700(+0/-9)	783	691	840	910	24	36	505	545	540	586
800	800(+0/-9)	885	791	950	1025	24	39	556	596	591	637
900	900(+0/-15)	996	890	1050	1125	28	39	612	651	646	692
1000	1000(+0/-15)	1098	992	1170	1255	28	42	663	702	697	743
1200	1200(+0/-15)	1312	1191	1390	1485	32	48	770	809	804	850
1400	1400(+0/-15)	1512	1392	1590	1685	36	48	870	909	904	950
1500	1500(+0/-15)	1612	1492	1710	1820	36	57	920	959	954	1000
1600	1600(+0/-15)	1712	1594	1820	1930	40	56	970	1009	1004	1050
1800	1800(+0/-15)	1922	1795	2020	2130	44	56	1075	1114	1109	1155
2000	2000(+0/-15)	2122	1994	2230	2345	48	62	1175	1214	1209	1255

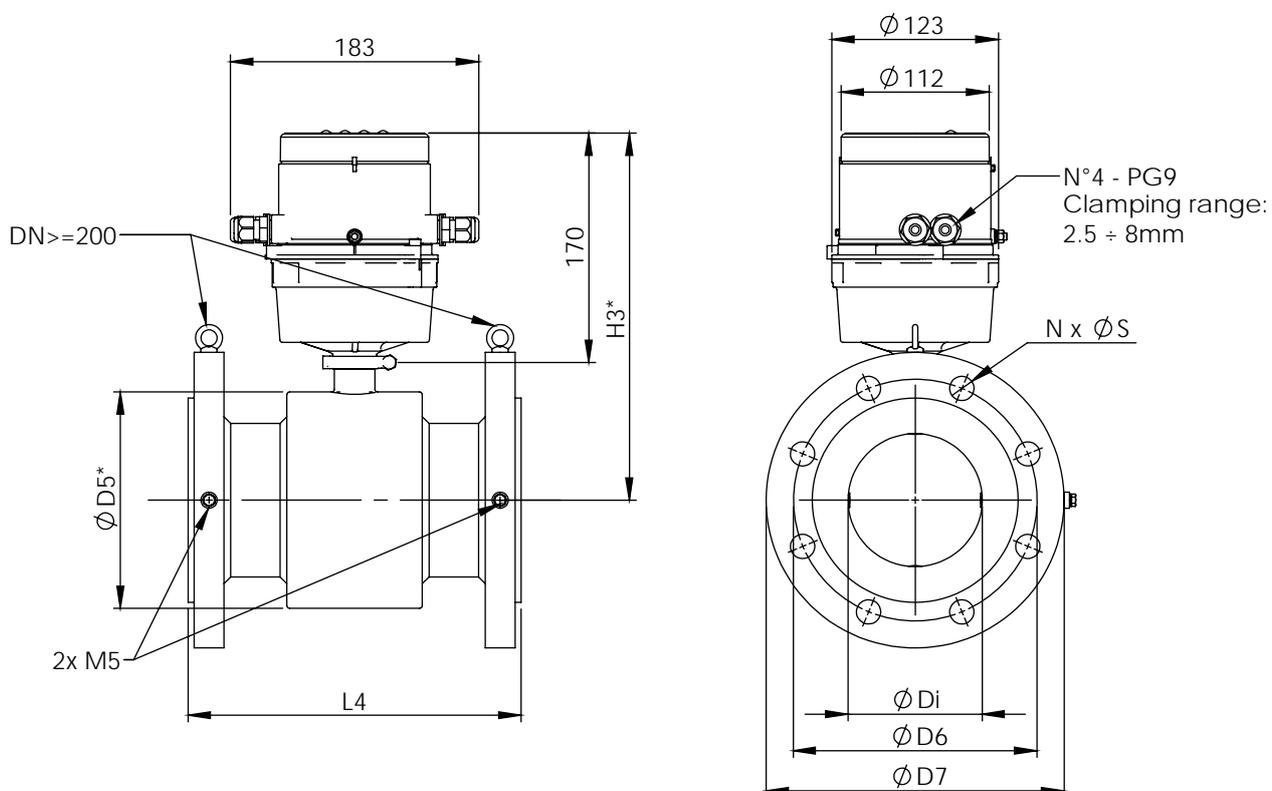
# MUT2200EL - MC608 A/B/R\*



## MUT2200EL - MC406 - max DN 600



## MUT2200EL - MC406 GSM - max DN 600





*Measure > Sense > Innovate*



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*Measure > Sense > Innovate*



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**TORMENE**  
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# TU5 Series Turbidimeters

## Applications

- Drinking Water
- Power
- Beverage
- Pharmaceutical



## The next standard in the evolution of turbidity

Only the new TU5 Series Lab & Process Turbidimeters with 360° x 90° Detection™ deliver unprecedented confidence that a change in your reading is a change in your water.

### Groundbreaking 360° x 90° Detection™ Technology

The TU5 Series employs a patented optical design that sees more of your sample than any other turbidimeter, delivering the best low level precision and sensitivity while minimizing variability from test to test.

### Matching lab and online results

For the first time you will be able to remove the uncertainty of which measurement to trust, thanks to identical 360° x 90° Detection™ Technology in both instruments.

### Everything about turbidity – faster

The TU5 Series dramatically reduces the time needed to get a turbidity measurement you can rely on, with 98% less online sample surface area to clean, sealed vials for calibration, and the elimination of the need for indexing and silicone oil in the lab. Not to mention, a smaller online sample volume means you will detect events almost immediately.

### No surprises

Prognosys™ monitors your TU5 Series online instrument, proactively alerting you to maintenance needs before your measurement becomes questionable. And a Hach Service Agreement protects your investment and helps ensure that you stay in compliance and on budget.

*USEPA and ISO 7027 reporting: The TU5 Series Turbidimeters apply the instrument design and meet performance criteria established by EPA Approved Hach Method 10258 and ISO 7027-1:2016, making them suitable for regulatory reporting.*



Be Right™

**Technical Data\*****TU5200**

<b>Light Source</b>	Class 2 laser product, with embedded 650 nm (EPA 0.43 mW) or Class 1 laser product, with embedded 850 nm (ISO), max. 0.55 mW (complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50)
<b>Range</b>	EPA: 0 - 700 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 175 EBC  ISO: 0 - 1000 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 250 EBC
<b>Accuracy</b>	±2 % plus 0.01 NTU from 0 - 40 NTU;  ±10 % of reading from 40 - 1000 NTU based on Formazin primary standard (at 25 °C)
<b>Resolution</b>	0.0001 NTU / FNU / TE/F / FTU / EBC / mg/L
<b>Repeatability</b>	<40 NTU: Better than 1% of reading or ±0.002 NTU on Formazin at 25 °C, whichever is greater  >40 NTU: Better than 3.5% of reading on Formazin at 25 °C
<b>Stray Light</b>	<10 mNTU
<b>Units</b>	NTU, FNU, TE/F, FTU, EBC; mg/L if calibrated with Degrees calibration curve
<b>Operating Temperature Range</b>	10 - 40 °C (50 - 104 °F)
<b>Operating Humidity</b>	80% at 30 °C (non condensing)
<b>Sample Temperature</b>	4 - 70 °C (39 - 158 °F)
<b>Storage Conditions</b>	-30 - 60 °C (-22 - 140 °F)
<b>Power Requirements (Voltage)</b>	100 - 240 VAC
<b>Power Requirements (Hz)</b>	50/60 Hz
<b>Certifications</b>	CE compliant  US FDA accession number: 1420493-000 EPA version, 1420492-000 ISO version  Complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50)  Australian ACMA Marking
<b>Dimensions (H x W x D)</b>	195 mm x 409 mm x 278 mm
<b>Weight</b>	2.4 kg (5.29 lbs.)
<b>Warranty</b>	1 year

**TU5300sc / TU5400sc**

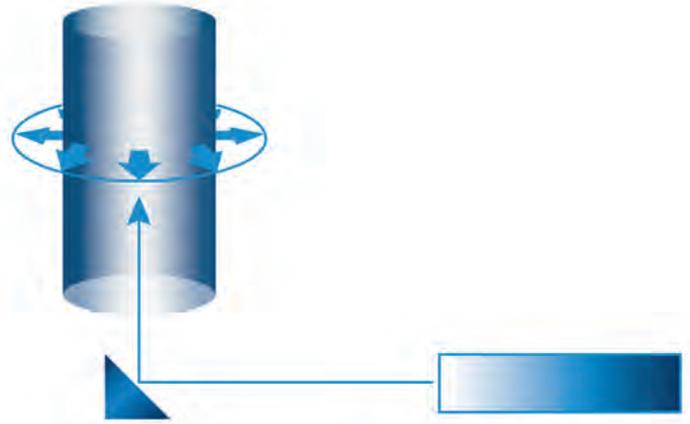
<b>Light Source</b>	Class 2 laser product, with embedded 650 nm (EPA 0.43 mW) or Class 1 laser product, with embedded 850 nm (ISO), max. 0.55 mW (complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50)
<b>Range</b>	EPA: 0 - 700 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 175 EBC  ISO: 0 - 1000 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 250 EBC
<b>Accuracy</b>	±2% or 0.01 NTU from 0 - 40 NTU  ±10% of reading from 40 - 1000 NTU based on Formazin primary standard
<b>Resolution</b>	0.0001 NTU / FNU / TE/F / FTU / EBC
<b>Repeatability</b>	Better than 1% of reading or ±0.002 NTU (TU5300) or ±0.0006 NTU (TU5400) on Formazin at 25 °C (77 °F), whichever is greater
<b>Stray Light</b>	<10 mNTU
<b>Units</b>	NTU, FNU, TE/F, FTU, EBC
<b>Signal Average Time</b>	TU5300sc: 30 - 90 seconds TU5400sc: 1 - 90 seconds
<b>Response Time</b>	TU5300sc: T90 <45 seconds at 100 mL/min TU5400sc: T90 <30 seconds at 100 mL/min
<b>Sample Temperature</b>	2 - 60 °C (35 - 140 °F)
<b>Sample Pressure</b>	6 bar (87 psi) maximum, compared to air at sample temperature range from 2 - 40 °C (35.6 - 104 °F)
<b>Sample Flow Rate</b>	100 - 1000 mL/min; optimal flow rate: 200 - 500 mL/min
<b>Operating Temperature Range</b>	0 - 50 °C (32 - 122 °F)
<b>Operating Humidity</b>	Relative humidity: 5 - 95% at different temperatures, non-condensing
<b>Storage Conditions</b>	-40 - 60 °C (-40 - 140 °F)
<b>Enclosure Rating</b>	Electronic compartment IP55; all other functional units IP65 with process head/ACM attached to the TU5300sc/TU5400sc instrument
<b>Certifications</b>	CE compliant  US FDA accession number: 1420493-000 EPA version, 1420492-000 ISO version  Australian ACMA Marking
<b>Dimensions (H x W x D)</b>	249 mm x 268 mm x 190 mm
<b>Weight</b>	5.95 lbs. (2.7 kg); 11 lbs. (5.0 kg) with all accessories
<b>Warranty</b>	1 year

### Principle of Operation

The TU5 Series turbidimeters measure turbidity by directing a laser into a sample to scatter off suspended particles. The light that is scattered at a 90° angle from the incident beam is reflected through a conical mirror in a 360° ring around the sample before it is captured by a detector.

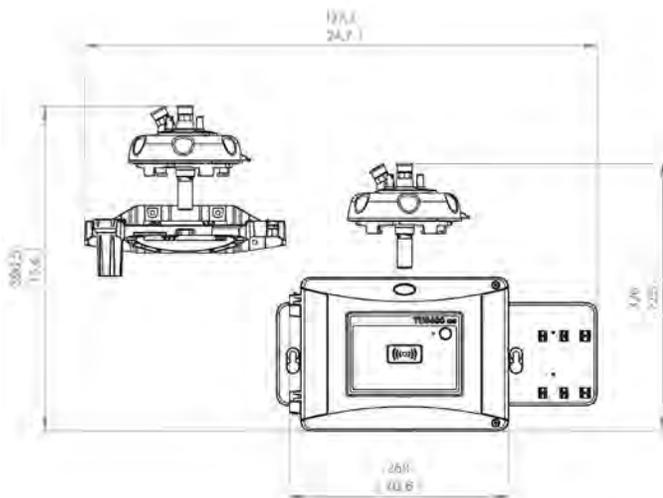
The amount of light scattered is proportional to the turbidity of the sample. If the turbidity of the sample is negligible, little light will be scattered and detected by the photocell and the turbidity reading will be low. High turbidity, on the other hand, will cause a high level of light scattering and result in a high reading.

The 360° x 90° optics of the TU5 series were optimized for high accuracy at low turbidity ranges and therefore the TU5 does not include ratio technology. Ratio technology is only applicable for high turbidity applications which have interference from color and large particles.

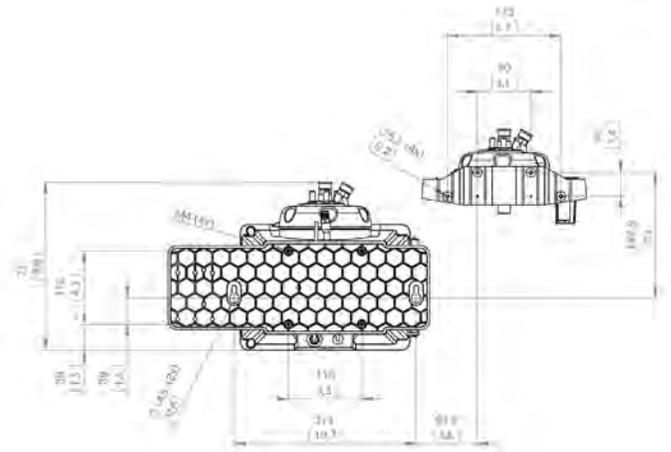


### Dimensions

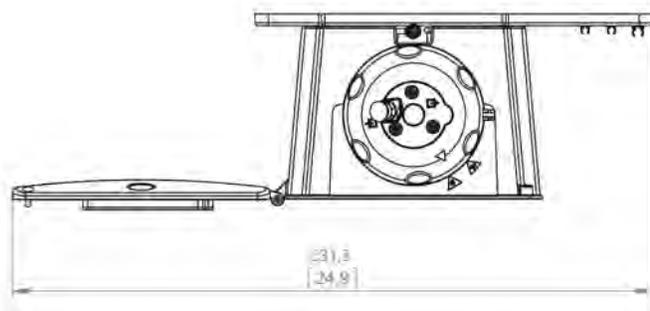
TU5300sc and TU5400sc front view



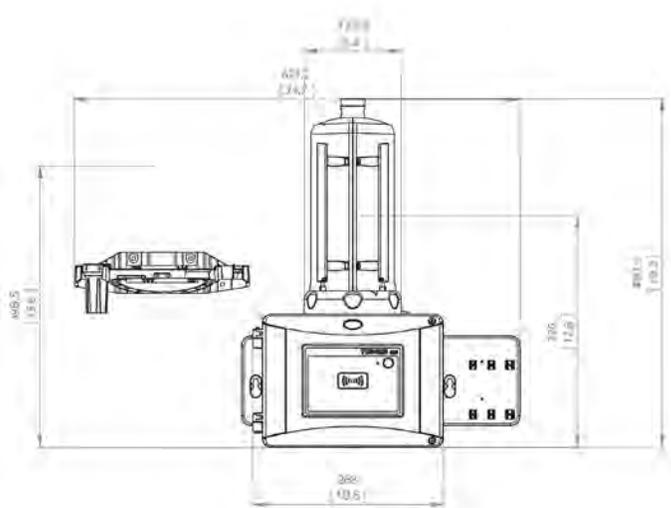
TU5300sc and TU5400sc rear view



TU5300sc and TU5400sc top view



TU5300sc and TU5400sc with automatic cleaning module



## Order Information

### TU5200 Benchtop Laser Turbidimeters

<b>LPV442.99.03012</b>	TU5200 Benchtop Laser Turbidimeter with RFID, EPA Version
<b>LPV442.99.01012</b>	TU5200 Benchtop Laser Turbidimeter without RFID, EPA Version
<b>LPV442.99.03022</b>	TU5200 Benchtop Laser Turbidimeter with RFID, ISO Version
<b>LPV442.99.01022</b>	TU5200 Benchtop Laser Turbidimeter without RFID, ISO Version

### TU5300sc/TU5400sc Online Laser Turbidimeters

<b>LXV445.99.10112</b>	TU5300sc Low Range Laser Turbidimeter, EPA Version
<b>LXV445.99.10212</b>	TU5400sc Ultra-High Precision Low Range Laser Turbidimeter, EPA Version
<b>LXV445.99.53112</b>	TU5300sc with Flow Sensor, Automatic Cleaning, RFID, and System Check, EPA Version
<b>LXV445.99.53212</b>	TU5400sc with Flow Sensor, Automatic Cleaning, RFID, and System Check, EPA Version

*Please note: Other turbidimeter configurations are available and RFID may not be available in all areas. Please contact your local Hach representative.*

*Please note: An SC controller is required for operation of the TU5300sc or TU5400sc.*

### Calibration and Verification

<b>LZY835</b>	Stabcal® Calibration Set with RFID
<b>LZY898</b>	Stabcal® Calibration Set without RFID
<b>LZY901</b>	Glass Rod Secondary Turbidity Standard <0.1 NTU/FNU
<b>LZY834</b>	Replacement Vial for TU5300sc and TU5400sc
<b>LZV946</b>	Sample Vials for TU5200

### TU5 Series Accessories

<b>LQV159.97.00002</b>	Automatic Cleaning Module for TU5300sc and TU5400sc
<b>LQV160.99.00002</b>	Flow Sensor for TU5300sc and TU5400sc
<b>LZY876</b>	Desiccant Cartridge for TU5300sc and TU5400sc
<b>LZY907.97.00002</b>	Maintenance Kit for TU5300sc and TU5400sc
<b>LQV157.99.50002</b>	SIP10 Sipper Unit for TU5200
<b>LZY903</b>	Manual Vial Wiper for TU5200, TU5300sc, and TU5400sc



With Hach Service, you have a global partner who understands your needs and cares about delivering timely, high-quality service you can trust. Our Service Team brings unique expertise to help you maximise instrument uptime, ensure data integrity, maintain operational stability, and reduce compliance risk.

### HACH COMPANY World Headquarters: Loveland, Colorado USA

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*In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.*

# METERMADE® N1

Ultra low-power, weather-sealed flow meter cellular RTU



-  PULSE-OUTPUT FLOW METER MONITORING
-  INTERNAL 3G OR 4GX CAT-M1/NB-IoT MODEM
-  REMOTE DEVICE MANAGEMENT
-  LONG BATTERY LIFE

## N1

The Metermade® N1 Meter Interface Unit (MIU) is an ultra-low power device, designed to operate in the field for up to ten years on a single set of batteries (based on one report per day). It's housing meets the IP68 rating, permitting direct installation onto a flow meter and is capable of surviving submersion to a depth of four metres for four days.

The Metermade® N1's flexible device configuration enables the measurement of digital and pulse counter signals. This data is stored internally on non-volatile flash memory with upstream communications provided using an internal 3G or 4GX cellular modem. The cellular options provide support for tri-band 3G or 4GX option, permitting use on CAT-M1 and NB-IoT networks.

The Metermade® N1 is the lowest cost option to provide highly reliable billing revenue data, directly to a host database using the industry standard DNP3 or FTP protocol. Remote configuration and device management is supported via leading industry SCADA applications, remote firmware download capability is provided via FTP file transfer.

The N1 is equipped with two (2) digital inputs and provides Forward/Reverse/Nett Totalisers and instantaneous flow calculation as standard. A 'magnetic swipe' function is provided to allow on-demand meter reads and data updates by field personnel.

The MIU configuration supports bulk editing/generation permitting high volume configuration and deployment.

# TECHNICAL SPECIFICATIONS

## General

Supply Voltage	3.5 – 8.5V DC, High-capacity, internal Lithium battery pack (field replaceable)
Current Draw	50 $\mu$ A sleep, 5 mA active, 200 mA 3G communications, 2 A (peak) 3G network detect, (measured at 3.6V DC)
Real Time Clock	Internal – Year, month, date, hour, minute, second, Automatic DNP3 time synchronisation from DNP3 master, Automatic cellular network time sync when using FTP data export mode
Temperature	–20°C to +65°C Celsius
Humidity	0 to 90% relative humidity, non-condensing
Programming	Windows based Configurator M+ configuration software, Remote device management via DNP3, Remote firmware download via FTP, local programming port
Mounting	90 mm (h) x 125 mm (d, nominal) / 155 mm (d, maximum), supplied with stainless steel mounting bracket
Environmental	NATA certified to IP68 (4 metres depth/4 days duration)

## IO Interfaces

Digital Input	2x low-current dry-contact binary inputs (non-isolated), each input supports pulse counting, up to 3KHz (sleep/wake mode dependant), Forward/Reverse/Nett Totalisers with 32-bit rollover
System Input	Internal measurement of Cell Network RSSI, MIU temperature, MIU battery voltage and session status code

## Telemetry

3G Cellular (Standard)	Supports 3G B1 (2100), B5 (850), B8 (900), Class 3 output power (+24dBm)
4G Cellular ("-4G" Option)	Supports 4G/LTE CAT-M1/NB-IoT, B28 (700), B3 (1800), Class 3 output power (+23dBm)
Antenna	Internal antenna (2 dBi Gain)
SIM Card	1.8 and 3V UICC (Standard size SIM card)
Data Protocols	DNP3.0 Slave unsolicited / polled mode, FTP data export, Sigfox data export
Host Support	True TCP support to DNP host (supports three Master IP addresses)
Security	CHAP or PAP authentication, SIM credentials, configurable username, password and APN, built in IP firewall, 512-Bit AES Encrypted firmware download

## Approvals

Build	RoHs assembly
Standards	RCM (AUST/NZ), EMC compliance, other export standards on request
Production	Proudly Made in Australia

## Factory Accessories

Accessories	A comprehensive range of factory manufactured or sourced accessories to ensure reliable and swift solution deployment (see website)
-------------	---

# SITE SENTINEL® P1

High performance, industrial data logger + RTU



- REMOTE DATA LOGGING
- TANK LEVEL MONITORING
- CATHODIC PROTECTION MONITORING
- PRESSURE SEWER PUMP STATIONS
- INTERNAL 3G OR 4GX CAT-M1/NB-IoT MODEM
- REMOTE DEVICE MANAGEMENT

## P1

The P1 is the industrial-focused variant of the Site Sentinel® data logger and RTU family, providing highly-reliable, direct-to-host data monitoring in a single package.

The Site Sentinel® P1's flexible device configuration enables the measurement of a variety of analog and digital signals. This data is stored internally on non-volatile flash memory with upstream communications provided using an internal 3G or 4GX cellular modem. The cellular options provide support for tri-band 3G or 4GX option, permitting use on CAT-M1 and NB-IoT networks.

The device is housed in a low-profile, robust enclosure supporting a variety of installation options, including DIN rail compatibility and flat-panel mounting.

Additional communications ports provide DNP3.0 Slave and Modbus Master communications capability. User configurable Modbus table permits download of pre-defined or ad-hoc Modbus data profiles to support downstream devices such as flowmeters. Remote configuration and device management is supported via leading industry SCADA applications, remote firmware download capability is provided via FTP file transfer.

The P1 suits a wide range of industrial applications, such as data logging of remote sites, tank level and flow recording, pipeline cathodic protection monitoring and integration with pressure sewer pump stations.

# TECHNICAL SPECIFICATIONS

## General

Supply Voltage	9–36V DC (isolated supply input)
Current Draw	20 mA nominal, 200 mA 3G communications, 2 A (peak) 3G network detect, (measured at 12V DC)
Real Time Clock	Internal – Year, month, date, hour, minute, second, Automatic DNP3 time synchronisation from DNP3 master, Automatic cellular network time sync when using FTP data export mode
Temperature	–20°C to +65°C Celsius
Humidity	0 to 90% relative humidity, non-condensing
Programming	Windows based Configurator M+ configuration software, Remote device management via DNP3, Remote firmware download via FTP, local programming port
Mounting	180 mm (w) x 112 mm (h) x 35 mm (d), DIN Rail mounting clips provided

## IO Interfaces

Digital Input	4x opto-isolated dry-contact binary inputs, Each input supports pulse counting, up to 3KHz (sleep/wake mode dependant), Forward/Reverse/Nett Totalisers with 32-bit rollover
Analogue Input	4x 0–20 mA, 0–2.048V DC, 0–5V DC or digital input (user selectable, per channel), 15 bit resolution (non-isolated), 4x user-configurable alarm limits per channel
System Input	Internal measurement of Cell Network RSSI, RTU temperature, RTU battery voltage and session status code
Digital Output	2x SPST relay outputs, dry-contact outputs, common / N.O. contact pairs, 24V DC, 2 A contact rating per output
Communications	1x Modbus Master 3-wire RS232 or 2-wire RS485 (user selectable), 1x DNP3 Slave RS232

## Telemetry

3G Cellular (Standard)	Supports 3G B1 (2100), B5 (850), B8 (900), Class 3 output power (+24dBm)
4G Cellular ("4G" Option)	Supports 4G/LTE CAT-M1/NB-IoT, B28 (700), B3 (1800), Class 3 output power (+23dBm)
Antenna	External SMA female connector
SIM Card	1.8 and 3V UICC (Standard size SIM card)
Data Protocols	DNP3.0 Slave unsolicited / polled mode, FTP data export
Host Support	True TCP support to DNP host (supports three Master IP addresses)
Security	CHAP or PAP authentication, SIM credentials, configurable username, password and APN, built in IP firewall, 512-Bit AES Encrypted firmware download

## Approvals

Build	RoHs assembly
Standards	RCM (AUST/NZ), EMC compliance, other export standards on request
Production	Proudly Made in Australia

## Factory Accessories

Accessories	A comprehensive range of factory manufactured or sourced accessories to ensure reliable and swift solution deployment (see website)
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# Attachment E – ConnectM2M Quotation

# QUOTE

Stantec

**Date**  
15 Feb 2021

ConnectM2M Ltd  
Ph: 09 887 6988

**Expiry**  
1 Mar 2021

**Quote Number**  
QU-1328

**Reference**  
Chatham

**GST Number**  
126894325

Item	Description	Quantity	Unit Price	GST	Amount NZD
	**Hardware**				
P1-001-EA-4G	<p>Site Sentinel® P1-001-EA-4G Industrial RTU / Logger.</p> <p>4Gx Cellular Cat-M1 / NB-IOT Communications.</p> <p>Approved for Spark NZ</p> <p>Supports 4G/LTE CAT-M1/NB-IoT, B28 (700), B3 (1800). DNP3 Slave or CSV File Export via FTP.</p> <p>Internal Antenna or External SMA Antenna Connection.</p> <p>4 x Physical Digital Inputs / Counters. 4 x Physical Analog Inputs (0-5V / 0-20mA). 2 x Digital Relay Outputs, 1 x Modbus Master Comms Port (RS232/RS485).</p> <p>9-36 Volt DC Power Supply Input Range.</p> <p>Supplied with two pieces DIN Rail Mounting Clamp.</p>	2.00	1,610.00	15%	3,220.00
P1-001-IO	<p>Site Sentinel® P1-001-IO P1-001-IO Industrial Remote I/O Module.</p> <p>4 x Physical Digital Inputs / Counters. 4 x Physical Analog Inputs (0-5V / 0-20mA). 2 x Digital Relay Outputs, 1 x Modbus Master Comms Port (RS232/RS485).</p> <p>9-36 Volt DC Power Supply Input Range.</p> <p>Supplied with two pieces DIN Rail Mounting Clamp.</p>	2.00	670.00	15%	1,340.00

Item	Description	Quantity	Unit Price	GST	Amount NZD
XANT-002	External High Gain Antenna, 10 metre cable	2.00	199.00	15%	398.00
XPS-001	Main Power Supply - Suit X1/P1 - Includes Surge Protection	2.00	90.00	15%	180.00
<b>**Data Costs and Visualisation**</b>					
XHST-001-CEL	Hosted Data Service (Monthly Fee) Cloud Based Data Service Minimum 3 month commitment Includes Sim card and Data Charges  Includes all visualisation, alarming and integration into Water Outlook as a standard function  Note: 12 Months allowed for each device	24.00	35.00	15%	840.00
<b>**Installation**</b>					
	On site Installation of P1 and Module, Including cabling to instruments, mounting in suitable enclosure, configuration of instrumentation outputs and cloud host.  Allow 1 day per WTP  Note: Travel Costs (Airfare, Meals, Accomodation) have not been allowed for	2.00	1,500.00	15%	3,000.00
	Enclosure for Site Sentinels (Only if there is no suitable enclosure on site)	2.00	300.00	15%	600.00
	Cabling, Terminals, Other wiring accessories and consumables	2.00	150.00	15%	300.00
Subtotal					9,878.00
TOTAL GST 15%					1,481.70
<b>TOTAL NZD</b>					<b>11,359.70</b>

## Terms

Quotation is valid for 14 Days.

<b>Client:</b> Chatham Islands Council	<b>Stantec-TM- 6</b>		
<b>Project:</b> Three Waters Stimulus Funding	<b>Date issued:</b>	11 June 2021	
<b>Project Task:</b> WWTP Upgrade	<b>Prepared by:</b>	Andrew Wong	
<b>Subject:</b> Drone Survey	<b>Reviewed by:</b>	Lee Paterson	
	<b>Approved by:</b>	Richard Bennett	

*This Technical Memo has been prepared for the benefit of Chatham Islands Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.*

*This disclaimer shall apply notwithstanding that the Technical Memo may be made available to Chatham Islands Council and other persons for an application for permission or approval or to fulfil a legal requirement.*

## 1 Introduction

The purpose of this Technical Memorandum is to outline the drone surveying requirements for the Waitangi Wastewater Treatment Plant (WWTP) system. The information obtained from the drone survey shall be used to advance the Waitangi WWTP upgrade design works.

### 1.1 Objectives

The objectives of the drone survey for the Waitangi WWTP system are as follows:

- Obtain general topographic data for the Inlet Pumping Station, sewage inlet pipe corridor, Waitangi WWTP, and land application area.
- Obtain high resolution point cloud orthographic survey for key structures

## 2 Survey Requirements

This section outlines the survey constraints, outputs, verification, and area requirements.

### 2.1 Survey Constraints

The reference datums to be used are as follows:

- Geodetic Datum: NZGD2000
- Vertical Datum: NZVD2016

The topographic surveying accuracy shall be 15 cm or less in the x, y, and z co-ordinates.

High resolution point clouds shall be provided for structures of importance.

### 2.2 Outputs

The following outputs are to be provided:

- Digital Terrain Model (DTM) lowest point per 0.5m x 0.5m grid contours free from vegetation
- High resolution orthographic images
- Raw point cloud model

If there is residual battery power available:

- General site photos with the horizon in view
- Aerial tracking video

### 2.3 Verification

Provide a report on the accuracy of the survey relative to survey ground control and redundant checkpoints.

### 2.4 Survey Area

The overall survey area is illustrated in Figure 2-1. The Wastewater Pumping Station and Waitangi WWTP survey areas and highlighted structures of importance (blue) are illustrated in Figure 2-2 and Figure 2-3, respectively.



Figure 2-1: Drone survey area outlined in red



Figure 2-2: Wastewater Pumping Station survey area and high-resolution point cloud survey area in blue



Figure 2-3: Waitangi WWTTP survey area and high-resolution point cloud survey area in blue

## Appendix H CCP AND BACKGROUND

This Appendix includes the following:

- Waitangi Water Supply – CCP for chlorination
- Kaingaroa Water Supply – CCP for filtration (Macrolite)
- Background information on water quality parameters monitored in water supplies.

**Note: CCPs at both WTPs will change during the next reporting period following the commissioning of the upgrades**

## Waitangi Water Treatment Plant

### Critical Control Point Process Control Summary – Chlorination

#### Process objectives

1. Provide a **primary disinfection Critical Control Point** to inactivate bacterial and viral pathogens that may have entered upstream of dosing point
2. Provide a **residual disinfection control point** to help inactive pathogens entering downstream of the dosing point.

#### Operational day-to-day monitoring of control process

What	<ul style="list-style-type: none"> <li>Free Available Chlorine (FAC) concentration in mg/L</li> <li>pH in pH units. (Note: pH is not able to be adjusted if outside ideal range.)</li> </ul>
When	<ul style="list-style-type: none"> <li>At least 5 days per week</li> </ul>
Where	<ul style="list-style-type: none"> <li>Collect water sample from designated treated water sampling point</li> </ul>
How	<ul style="list-style-type: none"> <li>Analyse sample using handheld meter (eXact Micro 20 Photometer) and record result</li> </ul>
Who	<ul style="list-style-type: none"> <li>Operator</li> </ul>
Records	<ul style="list-style-type: none"> <li>Log book hard copy. Contract Manager inputs data into Water Outlook, a proprietary database that the Water Engineer can access.</li> </ul>

Process performance criteria at monitoring point		Correction if performance criteria are not met
Target Range:	<ul style="list-style-type: none"> <li>FAC: 0.2 - 0.5 mg/L</li> <li>pH: &lt;8</li> <li>Turbidity: &lt;0.3 NTU</li> </ul>	<ul style="list-style-type: none"> <li>Operator to adjust chlorine dosing system to achieve target range if identified as outside of target range during routine checks</li> </ul>
Action Limits:	<ul style="list-style-type: none"> <li>FAC:                             <ul style="list-style-type: none"> <li>&lt;0.2 mg/L</li> <li>&gt;0.6 mg/L</li> </ul> </li> <li>pH: &gt;8.5</li> <li>Turbidity: &gt;0.5 NTU</li> </ul>	<ul style="list-style-type: none"> <li>Operator to respond by adjusting chlorine dosing to within targets.</li> <li>Operator to undertake troubleshooting as required (eg checking dosing pump function, age of solution)</li> <li>Operator to notify Contract Manager</li> </ul>
Critical Limits:	<ul style="list-style-type: none"> <li>FAC:                             <ul style="list-style-type: none"> <li>&lt;0.1 mg/L</li> <li>&gt;2 mg/L</li> </ul> </li> <li>pH: &gt;9</li> <li>Turbidity: &gt;1 NTU</li> </ul>	<ul style="list-style-type: none"> <li>Operator to isolate supply and run off storage until rectified and back within critical limits</li> <li>Operator to notify Contract Manager</li> <li>Contract Manager to notify Water Engineer.</li> <li>Water Engineer to notify CEO and DWA if water outside of critical limits needs to be supplied or has been supplied and follow Contingency Plan 3 in the Water Safety Plan.</li> </ul>

#### Supporting programmes

1. Routine checks by operator at least 5 days a week.
2. Operators authorised to perform FAC analysis with handheld meter. Note: DWA authorisation expires Jan 2021.
3. Annual verification of FAC analyser by service agent (Filtec) using a second meter as part of annual WTP servicing.
4. Annual service and condition assessment of chlorine dosing system by service agent (Filtec).
5. Annual refresher training of operator in operation, maintenance and troubleshooting of treatment process units and instrumentation by service agent (Filtec).

Appendix H CCP and Background

6. Monthly laboratory verification checks for E. coli, total coliforms and turbidity. Laboratory reports sent directly to Contract Manager and Water Engineer, Water Engineer reports monthly to CEO, and Water Engineer reports transgressions as soon as practicable to CEO and DWA if results are outside the DWSNZ.

***Planned programmes***

1. Interim upgrade of Waitangi water supply, including a new UV disinfection system to replace the existing system that has no longer effective. Dependent on Central Government funding.
2. Upgrade of Waitangi water supply, including a new bore, new treatment plant with online monitoring and modifications to the network. Upgrade (and extent of upgrade) is dependent on Central Government funding and additional tests at the new bore site.

*Date of Issue: January 2020*

## Kaingaroa Water Treatment Plant

### Critical Control Point Process Control Summary – Filtration (Macrolite)

#### Process objectives

1. Provide a **primary particle removal Critical Control Point** to physically trap pathogens that may have entered the system.
2. Provide a **primary particle removal Critical Control Point** to separate material that will compromise the efficacy of subsequent disinfection barriers.

<i>Operational day-to-day monitoring of control process</i>		
What	<ul style="list-style-type: none"> <li>Filtrate turbidity in NTU</li> </ul>	
When	<ul style="list-style-type: none"> <li>At least 2 times per week</li> </ul>	
Where	<ul style="list-style-type: none"> <li>At online turbidity meter (Hach SC200) downstream of Macrolite filter (ie treated water)</li> </ul>	
How	<ul style="list-style-type: none"> <li>Record value from online turbidity meter</li> </ul>	
Who	<ul style="list-style-type: none"> <li>Operator</li> </ul>	
Records	<ul style="list-style-type: none"> <li>Log book hard copy. Contract Manager inputs data into an Excel spreadsheet and forwards to Water Engineer.</li> </ul>	
<i>Process performance criteria at monitoring point</i>		
<i>Correction if performance criteria are not met</i>		
Target Range:	<ul style="list-style-type: none"> <li>Turbidity: &lt;0.3 NTU</li> </ul>	<ul style="list-style-type: none"> <li>Operator to check headloss across filter and manually backwash filter as required to achieve target range if identified as outside of target range during routine checks</li> </ul>
Action Limits:	<ul style="list-style-type: none"> <li>Turbidity: &gt;0.5 NTU</li> </ul>	<ul style="list-style-type: none"> <li>Operator to respond by checking headloss across Macrolite and multimedia filters then manually backwashing as required.</li> <li>Operator to undertake troubleshooting as required (eg checking raw water intake, softener operation)</li> <li>Operator to notify Contract Manager</li> </ul>
Critical Limits:	<ul style="list-style-type: none"> <li>Turbidity: &gt;1 NTU</li> </ul>	<ul style="list-style-type: none"> <li>Operator to isolate supply and run off storage until rectified and back within critical limits</li> <li>Operator to notify Contract Manager</li> <li>Contract Manager to notify Water Engineer.</li> <li>Water Engineer to notify CEO and DWA if water outside of critical limits needs to be supplied or has been supplied and follow Contingency Plan 3 in the Water Safety Plan.</li> </ul>

#### Supporting programmes

1. Routine checks by operator at least twice a week.
2. Annual calibration of turbidity meter by service agent (Filtec) using StablCal (or equivalent) as part of annual WTP servicing.
3. Annual service and condition assessment of filter (including media condition) by service agent (Filtec).
4. Annual refresher training of Operator in operation, maintenance and troubleshooting of treatment process units and instrumentation by service agent (Filtec).

Appendix H CCP and Background

5. Monthly laboratory verification checks for E. coli and total coliforms. Laboratory reports sent directly to Contract Manager and Water Engineer, Water Engineer reports monthly to CEO, and Water Engineer reports transgressions as soon as practicable to CEO and DWA if results are outside the DWSNZ.
6. Operator training using a Hach ICE-PIC to verify turbidity meter readings (by DCC operators, 17 April 2018, Mt Grand WTP, Dunedin) for planned monthly verification using this method (see planned programmes).
7. Flow restrictor on UV unit limits process flow so filter hydraulic design capacity not exceeded and six-monthly checks of water demand (based on manual flow meter readings).

***Planned programmes***

1. Monthly verification of turbidity meter using a Hach ICE-PIC (or equivalent). The cost of the portable unit for verification has been included in the Waitangi Upgrade Project, however until this project proceeds there is insufficient funding to purchase this unit. The portable unit would be used at Kaingaroa and Waitangi WTPs.
2. Upgrade of Kaingaroa water supply, including improving raw water quality by extending raw water intake into deeper water in Lake Rangitai and improving level of treatment by reducing dissolved organics which will improve effectiveness of existing UV disinfection and by providing residual chlorination. Upgrade (and extent of upgrade) is dependent on Central Government funding.

*Date of Issue: January 2020*

## Background Information

### E. coli and Total Coliforms

Coliform bacteria are abundant in the faeces of warm-blooded animals, but can also be found in the aquatic environment, in soil and on vegetation. DWSNZ compliance for bacterial quality of drinking water leaving the treatment plant and within the distribution is based on a prevalence of the coliform bacteria *Escherichia coli* (*E. coli*) of less than 1 MPN/100ml. For compliance testing, a method that enumerates *E. coli* and total coliforms is required. DWSNZ compliance for protozoal quality of untreated water from a 'secure' bore is currently based on the same criteria and so, whilst Tikitiki bore no longer has 'secure' status, results from the raw water provide some perspective on the public health risk.

Whilst the new DWSNZ require monitoring of total coliforms, they do not include maximum values. The Ministry of Health's summary of the DWSNZ changes notes: *"A high total coliform reading does not necessarily pose a risk to human health as the subset of faecal coliforms, and specifically E. coli, is recognised as the primary indicator that the drinking-water supply may be contaminated with pathogens. However, total coliforms are a useful indicator of drinking-water quality and may detect abnormalities and changes in quality over time. Monitoring total coliforms may provide warning to a water supplier that water quality is changing, such that further testing and assessment is appropriate."*<sup>25</sup>

In addition, the guidelines to the new DWSNZ<sup>26</sup> note:

- *"Total coliforms have limited interest in their own right, but with one important exception: when total coliforms are detected in the absence of E.coli, it is important that the source be investigated as their presence may be indicative of a barrier failure or biofilm development."* (Chapter 6.3.2)
- *"Frequently finding total coliforms in distribution system and service reservoir samples in the absence of E.coli suggests biofilm development, which tends to occur more often in the summer, or contamination from the environment... Maintaining a chlorine residual is an effective technique for controlling this problem, if not the cause."* (Chapter 5.3.2).

### FAC, pH and Turbidity

Free Available Chlorine (FAC), pH and turbidity monitoring are not currently required for DWSNZ compliance under the approved WSP. However, at Waitangi WTP, these parameters provide an indication of the level of bacterial protection provided by residual chlorine in water leaving the WTP. At both water treatment plants turbidity also provides an indication of the effectiveness of the filtration processes at removing any turbidity in the raw water as well as the level of bacterial and protozoal protection provided by the UV disinfection process.

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<sup>25</sup> Ministry of Health. 2018. *"Drinking-water Standards for New Zealand 2005 (Revised 2018): Summary of changes"*

<sup>26</sup> Ministry of Health. 2019. *"Guidelines for Drinking-water Quality Management for New Zealand"*

# CREATING COMMUNITIES

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Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

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## 4. Works & Services

### 4.6 National Land Transport Programme – Final Decisions

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	4.6
<b>Author/s</b>	Owen Pickles, Chief Executive Officer

#### Purpose

Information for Council.

#### Recommendations

**THAT the information be received.**

#### Background

The attached email was received on 7<sup>th</sup> September 2021 confirming the Council's funding allocation for the 2021-24 period.

The Council has been allocated –

Local roads maintenance	\$11,365,000
Road Safety promotion	\$21,000
Low cost / low risk	\$2,021,000
	<b>\$13,407,000</b>

This is essentially what was applied for though there is some confusion with the low cost / low risk allocation.

The letter refers to works in Kaingaroa being funded but the official spread sheets refer to the Owenga loading ramp and not Kaingaroa.

We hope to have this clarified for the meeting.

## Owen Pickles

---

**From:** Official Correspondence <Official.Correspondence@nzta.govt.nz>  
**Sent:** Tuesday, 7 September 2021 11:52 am  
**To:** 'monique.croon5@gmail.com'; 'owen@cic.govt.nz'  
**Cc:** James Caygill  
**Subject:** 2021-24 National Land Transport Programme – Final decisions  
**Attachments:** Chatham Islands Council – 2021-24 NLTP – Appendix.pdf

Kia ora Monique and Owen

The Waka Kotahi NZ Transport Agency Board has now adopted the 2021-24 National Land Transport Programme (NLTP).

Thank you for the huge amount of time and effort you've put in to developing your bids and programmes. It's only through working closely together that we've been able to develop this NLTP – which is our commitment to a safe and accessible land transport system now and into the future.

At its recent meeting, the Board approved revised allocations for continuous programmes as well as funding for activities in the remaining improvement activity classes, including low cost low risk programmes.

We have attached details of your revised continuous programme allocations and your low cost low risk programme allocations within each activity class.

Please refer to [www.nzta.govt.nz/nltp](http://www.nzta.govt.nz/nltp) to view the complete list of included activities.

### **2021-24 NLTP investment in the Chatham Islands**

During the 2021-24 NLTP we will invest \$13.3 million in the Chatham Islands transport system to make it safer, more efficient and reliable to support the local economy. This work includes the resurfacing of unsealed roads and road renewals works in Kaingaroa.

### **Working together in the next three years**

We recognise that funding may be less than you hoped for and that these decisions may have an impact on your transport programmes. Both continuous programmes and improvement activities have been nationally assessed and prioritised to give effect to the Government Policy Statement on land transport (GPS) 2021 and manage the NLTP within available funding.

We'll continue to work with you to ensure your activities are in good position to receive funding should any come available during the next three years and ensure these are best positioned to be considered for funding as part of the 2024-27 NLTP.

If you'd like to discuss these decisions with us please contact your Director of Regional Relationships: James Caygill, [James.Caygill@nzta.govt.nz](mailto:James.Caygill@nzta.govt.nz).

Ngā mihi

## 4. Works & Services

### 4.7 Te Matarae Road Realignment

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<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	4.7
<b>Author/s</b>	Owen Pickles, Chief Executive Officer

#### **Purpose**

The purpose of the report is to inform Council on the options available to realign the intersection of Waitangi Wharf – Owenga Road and Te Matarae Road.

#### **Recommendations**

1. **THAT the information be received;**
2. **THAT Council advise Stantec to proceed to detailed design of Option 2.**

#### **Background**

Stantec have been investigating safety and drainage improvements to the intersection of Waitangi Wharf-Owenga Road and Te Matarae Road.

The attached report provides two options for improving the intersection.

# Waitangi Wharf – Owenga / Te Matarae Intersection Improvements

*This report has been prepared for the benefit of Chatham Islands Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.*

Rev. No.	Date	Description	Prepared By	Checked By	Reviewed By	Approved By
0	07/09/2021	For Discussion	R Tinga	N Lister	N Lister	N Lister

## 1 Background

Stantec have been investigating safety and drainage improvements to the intersection of Waitangi Wharf-Owenga Road and Te Matarae Road. The current intersection layout is represented in Figure 1 below showing the extended "slip" lane area.



**Figure 1 - Waitangi Wharf - Owenga / Te Matarae Intersection**

This intersection has previously been identified as a safety concern in multiple Road Safety Audits due to the following factors:

- Split 'Y' arrangement of intersection, which encourages high speed entry and exit.
- Entry "slip" lane area which is used by drivers to both enter and exit Te Matarae Rd. resulting in drivers travelling in the incorrect lane when exiting and restricting visibility to vehicles from Owenga.
- Constrained visibility when at the intersection due to road geometry. This both blocks the view of the exiting driver, but also hides any exiting vehicles from drivers approaching the intersection from the Owenga direction.
- Uncontrolled intersection priority i.e. no Give Way or Stop control.

- Drainage / water ponding issues on and between the "slip" lane area / intersection throat due to a lack of connection / continuity of drainage features. This has the effect of allowing water to flow over the road during large storm events, and weaken the pavement due to the subgrade being saturated for longer periods of time.

The combination of the above features results in a greater risk of a crash occurring at this intersection. With the current intersection form resulting in drivers incorrectly exiting the intersection, and the potential for a higher impact crash to occur than at a comparable standard intersection.

Figure 2, Figure 3, and Figure 4 below highlight the available visibility in both directions for drivers exiting Te Matarae Road.

The visibility is severely restricted in the Owenga direction due to the height of the cut bank and the approach road vertical geometry, which obscures approaching vehicles, and hides vehicles exiting Te Matarae from vehicles approaching the intersection. This level of restriction requires a Stop control be implemented.

Towards Waitangi the visibility is only slightly impeded by the presence of signage and other features.



**Figure 2 - View Towards Owenga 5m Behind Edge of Road Formation**



Figure 3 - View Towards Owenga at Edge of Road Formation



Figure 4 - View Towards Waitangi at 5m Behind Edge of Road Formation

## 2 Proposed Treatment

Two options have been developed and are briefly detailed below followed by the recommendations. Both options include new / upgraded signage to better highlight the intersection and define the intersection controls.

### 2.1 Option 1 – Removal of Slip Road + Introduce Stop Priority Control

Remove the entry "slip" Lane area and complete minor widening at the intersection. By removing the entry "slip" lane the correct usage of the intersection will be enforced and a decrease in vehicle entry / exit speeds will be achieved, this also will improve the current drainage situation as the "slip" lane currently blocks the connectivity between the roadside swale and under road culvert.

Completion of minor earthworks to the bank which impedes visibility towards Owenga to improve vehicle visibility to approaching vehicles. This would only achieve a minor level of improvement to visibility, as the major restriction is the vertical alignment on Waitangi Wharf – Owenga Road.

Install Stop control and intersection chevron signage at the intersection. To reinforce the need to stop when exiting Te Matarae Road and highlight the intersection to drivers unfamiliar with the area at night.

### 2.2 Option 2 – Full Reconstruction of Intersection incl. Modifications to WW-O Road

Complete a full reconstruction of the intersection, as per the design drawings in Appendix A, this includes the following works:

- Widen Te Matarae Road at the intersection to allow both exiting and entering vehicles at the same time
- Straighten Te Matarae Road to remove the kink in the current alignment on approach to the intersection
- Lower the level at the intersection to improve visibility towards Owenga
- Raise the road level on Waitangi Wharf Owenga Road prior on the Waitangi side and lower it on the Owenga side to improve driver Safe Intersection Site Distance (SISD). From 60m visibility to 100m.
- Complete earthworks to remove the bank visibility restriction.
- Install Stop control and intersection chevron signage at the intersection.
- Install new swales and culverts to manage stormwater flows.

The combination of the above will result in a significant improvement in the safety at this intersection. However, due to the vertical geometry on Waitangi Wharf – Owenga Road the improvement in Owenga approach SISD is still slightly deficient against the current design standard, with a SISD of 110m being required.

## 3 Recommendation

Option 2 is our preferred solution as the proposed full intersection upgrade will provide the largest safety benefits at the site. By implementing the associated drainage upgrades at the same time, the pavement life will be extended in this area. Option 1 only provides a minor level of improvement, with a similar level of safety risk remaining as the current arrangement due to the visibility restrictions.

Stantec recommends that we proceed to detailed design of Option 2 with the view to permanently construct the intersection geometry improvements, pavement widening, signage and drainage upgrades in the next or following construction season.

# Appendix A – Scheme Drawings











## 6. Regulatory

### 6.1 Activity Report from Environment Canterbury

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Date of meeting	16 September 2021
Agenda item number	6.1
Author/s	Environment Canterbury Staff

#### Purpose

To provide an update on the services being performed by Environment Canterbury for the Chatham Islands Council contract.

#### Recommendations

THAT Chatham Islands Council

1. Receives the report.

#### Background

The following reports are for your information only. All resolutions included in these reports were considered at the Steering Group meeting on 31 August 2021.

## 5. Operational Delivery

### 5.1. Quarterly Report

#### Chatham Islands Council Steering Group

---

Date of meeting	Tuesday, 31 August 2021
Activity	Operations
Author	Guy Harris, Deputy Harbourmaster

#### June 2021

1. Chatham Islands Council Navigation Safety Bylaw were reviewed and the recommended changes approved by the Chatham Islands Council. The review part of the process had a regulatory deadline of the end of June, as the review was finalised (review methodology accepted and recommendations approved) by the Council on the 13 May. This deadline was met.
2. 90m vessel simulation, Jim Dilley went up to Devonport, Auckland on 8 and 9 May on behalf of the Chatham Island Council to participate in simulations of a 90m vessel using Waitangi Port and approach, he passed on his feedback to the company running the vessel assessment project. All costs incurred by Jim have been invoiced to Chatham Islands Port Limited.

#### July 2021

3. Chatham Islands Council Navigation Safety Bylaw was reviewed, updated and signed by the Chatham Islands Council.
4. Josh Thomas (CIC Harbourmaster) and Nigel Ryan (CIC Deputy Harbourmaster) attended the Harbourmaster Special interest Group meeting and the Port and Harbour Safety Code (PHSC) meeting on 6 and 7 July in Wellington. On 5 July, Josh Thomas, Nigel Ryan and Guy Harris (Environment Canterbury Deputy Harbourmaster) reviewed the Navigation Safety Risk Assessment, PHSC Application statement and completed the PHSC yearly Joint Assessment report.

#### August 2021

5. 90m vessel simulation. A report on behalf of Chatham Island Shipping is now being compiled by their consultant.
6. PHSC Joint Assessment report has been completed, signed and is now with the PHSC Secretariat.
7. Josh is currently away. Once he is back we will begin the process of reviewing the Harbourmaster's Direction.

## 5.2. Communications and Engagement

### Chatham Islands Council Steering Group

---

Date of meeting	Tuesday, 31 August 2021
Activity	Communications and Engagement
Author	Jo Simkiss, Communications and Engagement Advisor

#### Communications Report for July

##### 1. Website updates

- a. Long-term plan updates
  - i. Changes to several webpages to align with the newly adopted Long-Term Plan. This included mostly updating various pages with new costs and figures.
- b. Rates Information Database pdf uploaded to website.
- c. Dated pages content review (Pages are reviewed every six months. Some news stories were updated and approved, some old ones that were no longer relevant were archived).
- d. Newsletter web story – serving our community.
- e. Update to Meet the Team page.

##### 2. Facebook posts done by Environment Canterbury staff

- a. Posts regarding residents survey
  - i. First post: 172 reach, 12 engagements (corporate version)
  - ii. Second post: 158 reach, 7 engagements
- b. Post announcing new LTP: 126 reach, 4 engagements
- c. Waste minimisation campaign, post series
  - i. First post: 225 reach, 16 engagement
  - ii. Second post: 140 reach, 1 engagement
  - iii. Third post: 150 reach, 1 engagement
- d. Council monthly newsletter post: 1526 reach, 222 engagements (!)

##### 3. Council e-newsletter

- a. Council monthly newsletter, July, note change to email subject
  - i. 60.1% open rate, 14.7% clicks.

**4. Other tasks – in progress**

- a. Waste minimisation project – new signage in progress
- b. Area coordinators map redesigned - complete
- c. Rates information Database uploaded to website. News story to come.
- d. CIC Annual Report
- e. Rates booklet content – complete
- f. Wharf signage - complete

**5. Website report: 18 July – 18 August 2021**

**What has been viewed on the website?**

	Page Title	Page Views	Δ
1.	Home » Chatham Islands Council	982	201 ↑
2.	Visit the Chatham Islands » Chatham Islands Council	281	86 ↑
3.	Meet the Team » Chatham Islands Council	202	-2 ↓
4.	News and Events » Chatham Islands Council	179	10 ↓
5.	Search all Documents » Chatham Islands Council	148	140 ↑
6.	Contact » Chatham Islands Council	97	-7 ↓
7.	Serving our community » Chatham Islands Council	96	-
8.	Your Rates » Chatham Islands Council	70	16 ↑
9.	Your Council » Chatham Islands Council	68	-10 ↓
10.	Chatham Islands Long-Term Plan 2021-2031 » Chatham I...	67	-13 ↓
	<b>Grand total</b>	<b>3,398</b>	<b>423 ↑</b>

1 - 10 / 168 < >

## Where was the website traffic coming from?

"(direct)/(none)" is from typing into browser address bar, or via bookmark/favourite.

"organic" is from search results. | "referral" is a link from another website.

	Source/Medium	Sessions	
1.	google / organic	1,056	271 ↑
2.	(direct) / (none)	266	-115 ↓
3.	bing / organic	35	17 ↑
4.	us17.campaign-archive.com / refe...	22	-10 ↓
5.	mailchi.mp / referral	9	-11 ↓
	<b>Grand total</b>	<b>1,475</b>	<b>156 ↑</b>

1 - 5 / 38 < >

## How have visitors used the website?

How many times was the website visited?

Sessions  
**1,475**  
↑ 156

How many users visited the website?

Users  
**1,178**  
↑ 129

How many pages were viewed on the website per visit?

Pages/Session  
**2.3**  
\* 0.05



## Attachments

Nil

## 6. Corporate Support

### 6.1. Corporate Reporting August

#### Chatham Islands Council Steering Group

---

Date of meeting	Tuesday, 31 August 2021
Activity	Finance
Author	Tanya Clifford, Corporate Reporting Accountant

#### Purpose

1. The purpose of this paper is to provide an update on the Finance services being performed under the corporate services umbrella for the Chatham Islands Council Regional Council contract. This paper is informative only, no decision is required.

#### Key points

2. *2021/22 Annual Report:* Preparation for the 2021/22 Annual Report is underway. Audit NZ is experiencing resource shortages, and therefore it is unlikely the audit will commence within 'normal' timeframes at the end of September.
3. However, we aim to have the document ready within our standard reporting timeframes. We are currently working through the financial information and collecting information from CIC to support key values. Responses for performance measure results have been requested from appropriate staff / contractors and are being reviewed as they are received. The document narrative has not yet commenced but will occur in consultation with CIC. Once information is drafted, we will work with communications to create a designed version for Council's approval.
4. *Reporting to Council and Department of Internal Affairs:* Key reports have been provided to Council, the Performance, Audit & Risk Committee and the Department of Internal Affairs based on agreed presentation and timelines. Feedback has requested a grant reconciliation and a rating impact summary of excluding Three Water rates. We are considering how to provide this information in a user-friendly and readable version, with the intent the information will be available for the next PARC meeting.
5. We continue to look for improvements in our reporting packages and will gladly accept feedback on recommended alterations to increase reader understanding.
6. *Payroll:* CIC payroll is processed fortnightly by Environment Canterbury staff. There are no issues of note to highlight for Council's attention.
7. *Additional management support:* Financial information is reviewed as part of the preparation process for Council reporting. We continue to work with Council on an ad

hoc basis to improve and strengthen their management control environment and improve financial reporting. Focus on reviewing information within the financial system and ensuring it remains robust will become a priority as part of the preparation work for the 2020/21 Annual Report.

8. *System upgrade*: The Chatham Islands Council are upgrading the Authority financial reporting system to a new version. Additional support from the Environment Canterbury Systems Accountant is available, if required.
9. *Three waters reform*: Significant financial information has been provided as part of the DIA Request for Information and Canterbury Mayoral Forum packages. Additional information and review is occurring on an as requested basis.
10. *Long-Term Plan 2021-31*: The Long-Term Plan was approved by Council on 29<sup>th</sup> June 2021. All legal requirements associated with this document, including making it publicly available within prescribed timeframes have occurred.

Peer reviewers	Catherine McMillan, Mark O'Dwyer
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## 6.2. Financial Updates

### Chatham Islands Council Steering Group Report

Date of meeting	Tuesday, 31 August 2021
Activity	Finance
Author	Mark Smith, Team Leader Finance Business Partnership

#### Purpose

1. Provide a financial update for the year ending 30 June 2021.
2. Provide a summary of the 2021/22 budget.

#### Recommendations

That the Chatham Islands Council Steering Group:

1. receives the financial report for year ending 30 June 2021
2. receives the budget information for the 2021/22 financial year.

#### Background

3. This report contains the financial results to June 2021. As the month of June is the financial year-end, the June 2021 monthly accounts have not yet been finalised. This will occur once the audit is completed in December 2021.
4. This report includes information on the 2021/22 budget broken down by work area.

#### Attachments

1. Financial report for the year ended 30 June 2021.
2. Budget report for the year ending 30 June 2022.

Peer reviewers	Tarsha Triplow
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**Reporting Period**

01/07/2020 30/06/2021

**YTD Actual Revenue vs YTD Forecast Revenue**



**YTD Actual Expenditure vs YTD Forecast Expenditure**

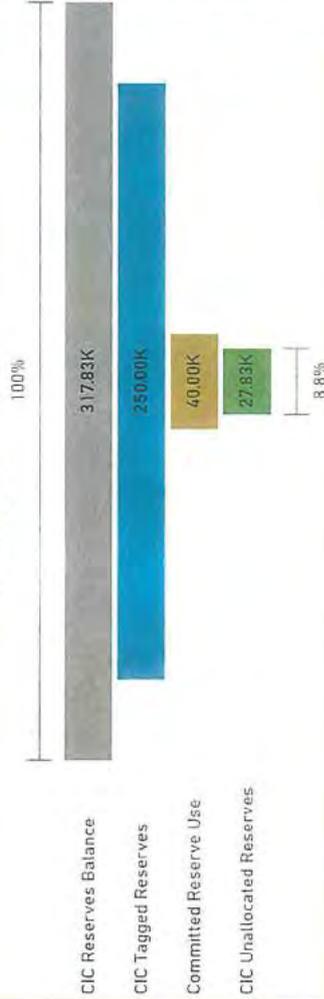


**YTD Actual Expenditure vs Full Year Forecast**



- Select all
- Biosecurity
- Corporate Services
- Emergency Management
- External Communications
- Investigation and Monitoring
- Navigation Safety
- Project Management
- Resource Management and Consents

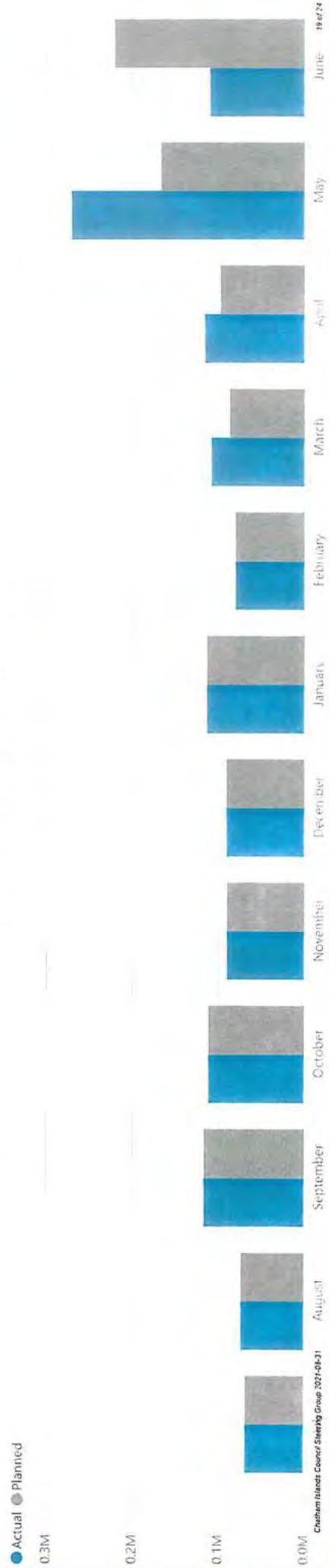
**Reserves Summary**



**Committed Reserve Use**

Committed Reserve Description	Committed Reserve Amount	Approved Date
Predator Free 2050	25,000	1/07/2020
Website Upgrade	15,000	1/07/2020
<b>Total</b>	<b>40,000</b>	

**Actual Expenditure vs Forecast Expenditure**



Section Name

Biosecurity	Corporate Services	Emergency Management	External Communications	Investigation and Monitoring	Navigation Safety	Project Management	Resource Management and Consents
-------------	--------------------	----------------------	-------------------------	------------------------------	-------------------	--------------------	----------------------------------

Year To Date Actual Expenditure vs Year To Date Forecast Expenditure



**Biosecurity expenditure:** Additional approved expenditure in relation to Predator Free 2050.  
**Corporate services expenditure:** Expenditure not required to budget at levels. Budget utilised in other work areas.  
**Emergency management expenditure:** No significant variance to budget.  
**External communications expenditure:** Additional approved expenditure for the website upgrade.  
**Investigation and Monitoring expenditure:** No significant variance to budget.  
**Navigation safety expenditure:** No significant variance to budget.  
**Project management expenditure:** No significant variance to budget.  
**Resource management and consents expenditure:** Increased expenditure to undertake bi-annual compliance visits.

*Environment Canterbury continues to operate within the overall budgetary constraints of the Council.*

Section Name

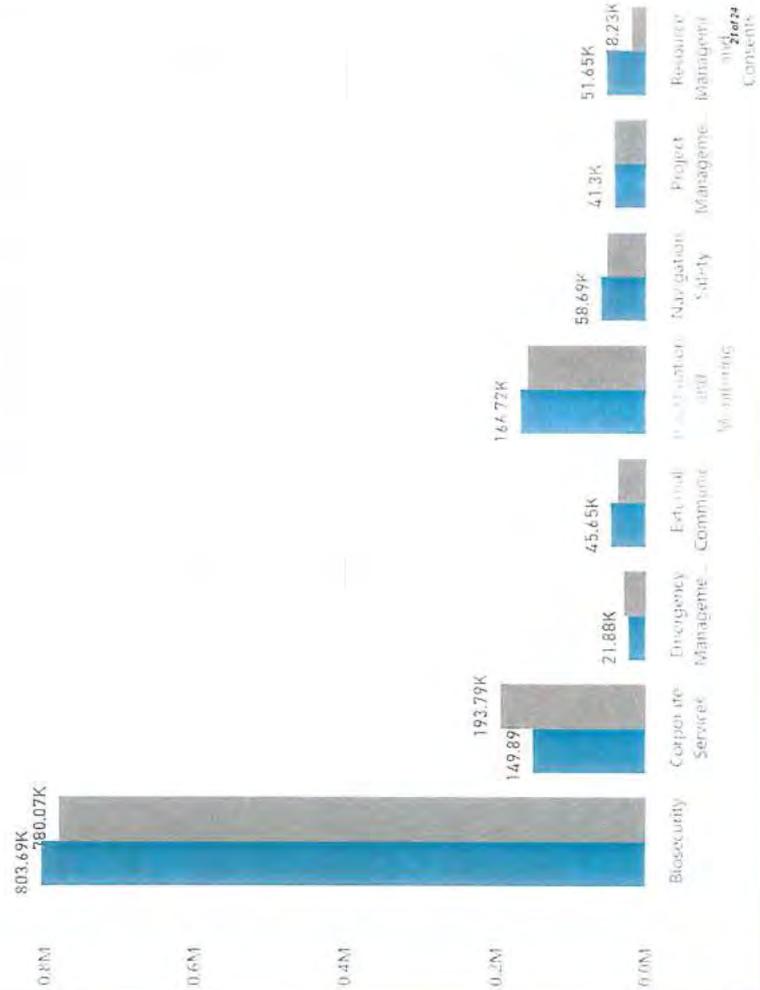


Expenditure Details By Project Level

Project Name	YTD Actual Expenditure	Full Year Planned Expenditure
CIC Biosecurity - Border Control	124,166.41	113,374.30
CIC Biosecurity, Pest Strategy & Implementation	679,521.89	666,693.72
CIC Compliance Monitoring	25,835.55	5,753.01
CIC Corporate Service	41,914.83	36,437.27
CIC Education	45,652.40	36,197.83
CIC Emergency Management	21,882.44	28,090.64
CIC Finance - Services	107,973.72	157,351.20
CIC Hydrology	109,672.46	115,356.20
CIC Maritime Safety	58,689.18	51,037.57
CIC Project Management	41,296.31	41,924.82
CIC Resource Management & Consents	25,815.96	12,474.60
CIC Water Quality, Ecology & Hydrology	57,052.39	42,427.53
<b>Total</b>	<b>1,339,473.54</b>	<b>1,307,118.69</b>

Expenditure availability against Forecast

● YTD Actual Expenditure ● Full Year Planned Expenditure



## CHATHAM ISLANDS COUNCIL WORK PROGRAMME BUDGETS 2021/22 (PROVISIONAL)

	BUDGET \$
<b>Corporate Services</b>	<b>67,500</b>
H&S - Response Advice, Systems Support	
HR - Support & Advice	
IT - Building Status, Connectivity Options, Infrastructure	
<b>Finance</b>	<b>143,000</b>
Annual Report, Annual Plan, Financial Reporting, Payroll	
<b>Resource Management (Planning &amp; Compliance)</b>	<b>47,800</b>
Amendments to CIC Act	
Fully operative CIRMD	
Compliance Monitoring	
<b>Environmental Data Collection</b>	<b>149,000</b>
Coastal Science	
Freshwater Ecology	
Groundwater resource evaluation and monitoring	
Hydrology and climate stations	
Water Quality	
<b>Biosecurity</b>	<b>795,000</b>
Border Control	
Communciation & Community Engagement	
Community Initiatives	
Low Incidence Pest Surveillance and control	
RPMP Review & Consultation	
<b>Emergency Management</b>	<b>28,000</b>
Community Resilience	
Policy and Planning Support	
Training and Exercise	
Welfare and Civil Defence Centre	
<b>Maritime Safety</b>	<b>54,500</b>
LINZ hydrographic issue at Waitangi Wharf	
Review of Navigation Safety Bylaw	
Risk assessment and SMS review	
Taraoa offshore berth panel review	
<b>Communciations</b>	<b>38,000</b>
Annual Plan & Annual Report	
Communications Strategy/BAU	
E-Newsletter	
RPMP Comunciations & Engagement	
Website Maintenance	
<b>Project Management</b>	<b>17,000</b>
Annual Plan Preparation/Contract Planning	
Procurement Support	
RPMP	
SLA coordination	
<b>Total Allocated Budget</b>	<b>1,339,800</b>
Total Contract Value	1,375,080
<b>Total Unallocated budget</b>	<b>35,280</b>

## 6.3. Travel Schedule

### Chatham Islands Council Steering Group Report

---

Date of meeting	Tuesday, 31 August 2021
Author	Juliet Bruce, Committee Advisor

#### Travel Schedule 2021

The following upcoming travel schedule has been advised:

Name	Departure Date	Return Date	Notes
Kerri Moir	3-Sep-21	TBC	***Cancelled*** HM Annual meeting & Physc meeting, Chatham Islands to Wellington
Josh Thomas	9-Sep-21	TBC	Conservation dog hui and handler certificate
Guy Harris	30-Nov-21	3-Dec-21	HM System Review

## 6. Regulatory

### 6.2 Dog & Stock Control Update

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	6.2
<b>Author/s</b>	Nadia Thomas, Dog & Stock Control

#### Purpose

Report to Chatham Islands Council on Dog & Stock activities for the year ending 30 June 2021.

#### Recommendations

**THAT the Chatham Islands Council receives the report.**

#### Background

The attached report covers the previous 12 months activities of the Dog & Stock Control officer, Nadia Thomas.



chatham islands council

### Dog and stock control update:

It has been a year since I started in this position at the council and have found there is a lot to keep me occupied/ animal wise. Since starting we have had to acquire new kennels, which we were lucky to have come across on island at a good price!! Once we had paid for those I had a group of friends help me move them to our dump paddock by Hiab and we assembled them with ease. They also had a thick tarp which covers the kennels to keep them warm from our harsh weather.



In this picture there is no tarp as we were moving them..

#### The dog run:

Something new to me!! I thought I'd have this sorted, although with everyone being so busy changing positions at work I was put back by not having a second person.. This job requires two people for safety purposes, eg- Dog attack or owner haha. Rana S from Emergency Management and Rob S from ECAN took turns at helping me out which was super cool as they are both warranted with their jobs. Then Danielle McQuarrie was warranted and helped me finish it off (working for love and experience)☺ We managed to cover the whole island but over a longer period of time as we had a lot of setbacks /deaths, people missing from the island and paperwork fix ups. With all the above going on we managed to get an overall number of 450 dogs/ not including 29 pups- after all the culling.

#### Some of the issues I have had to deal with over the past year are:

- Wild cattle being aggressive towards people
- Wild horses intruding on roads and private property
- Dogs worrying other animals
- Animal on animal attacks
- Animal v's vehicle
- Neighbours at war ☺
- Animal cruelty acts ☹ neglected animals
- Starving animals ☹ due to drought, no food growth
- Broken fences, need fixing.
- Cast/ stuck animals.
- People being sassy! Intimidating and stand over'ish. And difficult!



1. Animal vs vehicle



2. Animal v's weather/ starvation!



3. Worried sheep/ dogs



4. Cattle harassing people



4. Fences broken



5. Wild horses on the road.



6. Animal cruelty/ shot in the back!  
3 days wait till we knew to put it down!



7. Milking cow viciously attacked  
By wild bulls in roaring season



8. neglected stock

9/10. Illegal poaching/animal cruelty /axed to death!!

ILL TAKE ALL THE HELP I CAN GET!! SOME SUCCESSFUL MISSIONS:



The amount of people helping me has been amazing!



## FENCES:



There are a lot of fences that have had around 60 years of weathering and neglect. I have ordered and use this flagging tape, same as D.O.C but blue to attach to any broken fences that I notice or see stock escape through... so far I have had positive feedback on the blue tape and have had around half a dozen farmers fix or temp fix the areas that I have taped. The tape is a non-stick tape that handles the roughest heavy weathers, which is good as it doesn't quickly deteriorate like other materials so is economical, and can be re used if needed. I've found it a good incentive for farmers to fix their fences as I've shown them where the holes are rather than them having to go look for them..

## WILD HORSES AND CATTLE:

I have been working alongside Robin Seymour (ECAN) to try thin out the wild stock. We have had a lot of the public on side who have been giving us permission to cull on private property as the numbers of wild stock have grown quite significantly. We have been asked to keep a tally of each beast and horse we cull which is currently 75 bulls and 30 horses. So we are getting there slowly but in time we hope it will make a difference. Again only positive feedback! All the animals we kill are utilized. If accessible we cut them up and disperse the meat around the island to whoever may need it.



## 6. Regulatory

### 6.3 Chatham Islands Border Quarantine & Biosecurity

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	6.3
<b>Author/s</b>	SPS Biota on behalf of Environment Canterbury

#### Purpose

Report to Chatham Islands Council on consents and licences issued for the year ending 30 June 2021.

#### Recommendations

**THAT the Chatham Islands Council receives the report.**

#### Background

The attached report summarises border biosecurity and quarantine activity in relation to the Chatham Islands between July 2020 and June 2021.



## Chatham Islands Border Quarantine and Biosecurity

1 July 2020 – 30 June 2021

*Prepared for Environment Canterbury by*

SPS Biota | July 2021



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# Chatham Islands Border Quarantine and Biosecurity

July 2020 – June 2021

## 1.0 Summary

This activity report summarises border biosecurity and quarantine activity in relation to the Chatham Islands between July 2020 and June 2021.

The border biosecurity programme initiates and supports activities aimed at preventing new pests establishing on the Chatham Islands and works in accordance with desired outcomes of the Chatham Islands Pest Management Strategy, Biosecurity Act and Chatham Islands Council legislation.

Three main areas of work reported on are:

- Quarantine and risk site management
- Pest responses
- Development and implementation of recommendations arising from science provider recommendations.
- Increasing sector biosecurity awareness

Programmes of work have a scientific foundation and take account of objective evidence gathered annually on pests and pest risk pathways affecting the Chathams.

Procedures and activities for the Chatham Islands border biosecurity programme are independently audited by Telarc. We have received our reaccreditation certificate.

The 2020-2021 year saw a busy workload for our Inspectors in Napier and Timaru supported by SPS Biota staff in other regions (Auckland and Christchurch) conducting inspections of:

- vehicles, machinery,
- equipment and building supplies associated with the Apollo construction project.

Where possible inspection, cleaning and treatment with residual insecticide was conducted at suppliers/consolidators yards before transport of goods to CISL depots. This was so that biosecurity risks could be dealt with off-site to avoid issues with space constraints, timing and safety issues that can occur at the depots or on wharf.

Scion commenced air freight shipments of plants to Manukau Nursery on the Chatham Islands in June. Inspection and treatment protocols were put in place to prevent hitchhikers such as ants and ensuring only healthy specimens are shipped. **Refer to Appendix D**

Consultant entomologists, Entecol were commissioned in 2020 to review current treatment regimes. This report is pending due to disruption caused by Covid and the German Wasp incursion.

## 2.0 Key outcomes & outputs for 2020-2021:

- Pest management, surveillance, and audits in NZ
- Continued surveillance and site risk assessments on 'high risk' supplier sites of current key regular suppliers to the Chatham Islands

- Site risk assessments done on 'new' suppliers by our dedicated inspectors based in Napier and Timaru
- Treatment of selected freight for potential biosecurity risks (review pending Entocol report and findings from German Wasp surveillance)
- Review and risk assess air freight pathway at Chathams Air depots in Auckland and Wellington. Identified potential issues with live plants purchased by individuals from various sources.
- Delimitation survey and surveillance for German Wasps undertaken by Biosecurity Inspectors on the Island with the assistance of DoC staff in Feb/March 2021 using baited traps. This follows discovery of a German Wasp nest in March 2020 with successful eradication of the nest in April 2020. Trapping plan and traps for surveillance provided by SPS Biota with advice from Entocol.
- Review and update of the "No Pests Please" information leaflets now printed and distributed.
  - Air Chathams Cargo Akl
  - Napier CISL
  - Timaru CISL
  - Chatham Islands Kerri
- Provide pre-shipment Biosecurity advice for key projects:
  - Apollo (Building - Museum and Council Office)
  - Airport Runway
  - Rural Connectivity
  - Wind Farm
- Conduct pre-shipment inspections and advise treatments/cleaning where required at consolidators/supplier yards prior to delivery to CISL depots. Aim to reduce last minute cleaning and treatment issues and potential delay of shipment if items do not pass inspection.
- Re-confirm treatment protocols required for depots, vessel, and key suppliers.
- Revise treatment provider contracts to ensure fit for purpose.

### 3.0 Border quarantine and risk site surveillance

To help prevent new pests establishing on the Chatham Islands, there are targeted inspections of the physical connections by which pests can move and establish. This includes monitoring shipping, air links, freight, and freight consolidation sites.

In addition to the 'points of departure' and freight consolidation areas, places of origin for some products deemed 'high risk' for harbouring pests, are also inspected. This season our staff inspected freight consolidated at a number of sites such as Fulton and Hogan and Downer depots in Auckland, Hamilton, Masterton, Brosnan's Timaru, and Scion Rotorua.

**Table 1. Summary of components of the border quarantine and biosecurity programme**

Pest management programmes	
Pest Management – Ships <ul style="list-style-type: none"> <li>• <i>Southern Tiare</i></li> <li>• Ad hoc tugs, barges, and other vessels</li> </ul>	On-board pest control and monitoring programme primarily for rodents and crawling insects using bait stations.
Treatment (ships, buildings, containers)	Regular residual treatment of shipping containers, cargo sheds and selected areas on vessels.
Pest Programmes – Cargo consolidation/ storage premises:  <b>Timaru – Craigs’s Pest Solutions Ltd</b> <ul style="list-style-type: none"> <li>• Chatham Island Shipping Yard</li> </ul> <b>Napier – Pest Control Specialists (PCS)</b> <ul style="list-style-type: none"> <li>• Chatham Island Shipping Yard</li> <li>• Turton Farm Supplies Dannevirke</li> </ul> <b>Auckland - Flick</b> <ul style="list-style-type: none"> <li>• Air NZ Post Depot, Chatham Island Cargo</li> </ul> <b>Wellington – Ecolab/Rentokil</b> <ul style="list-style-type: none"> <li>• Air, NZ Post) independent pest control provider.</li> </ul> <b>Christchurch - Flick</b> <ul style="list-style-type: none"> <li>• Chatham’s Air &amp; Depot</li> </ul>	Regular monitoring (monthly) and bait stations in place for rodent control.  Monitoring for other pests and treatment if necessary. <ul style="list-style-type: none"> <li>• Ants</li> </ul> Regular scheduled residual insect spray treatment of some interior areas.  Environs and aggregate checks
Rodent control programmes (conducted by Chatham Biosecurity Officers) at Waitangi, Owenga and several other sites associated with transiting freight to Pitt Island <ul style="list-style-type: none"> <li>• Waitangi Wharf</li> <li>• Airport Hanger</li> <li>• Owenga Wharf</li> <li>• Glen &amp; Megan King’s (Pitt Island Storage)</li> </ul>	Use of bait stations for rodent control. Monitoring for other pests and treatment if necessary (day to day management by Ecan).
Active surveillance	
<b>Active surveillance</b> For specific pests (New Zealand and Chatham’s)	Surveys for reptiles (in particular plague skink) and baiting for invasive ants, in particular Darwin and Argentine ants, are conducted at Auckland Airport (Courier Post), Christchurch Airport (Menzie’s Aviation – Chatham’s Air Depot), Port of Timaru. Surveillance and ant baiting conducted at additional key suppliers or high freight volume sites. Surveillance and trapping for German Wasp on the Island

Audits	
<b>Audits</b>	<p>Audits of pest control programmes were also conducted at Auckland (airport), Napier, Wellington (airport) and Timaru.</p> <p>Third party auditing of all SPS Biota activity is conducted by Telarc.</p>
Sampling & Diagnostic	
<b>Sampling and Diagnostic provisions for the Chatham's</b>	Maintained a diagnostic service for processing collections of suspected pests. (In collaboration with Landcare Research and AgResearch).
Risk Analysis	
<b>Risk Analysis</b>	SPS Biota adaptation of a freight and risk site analysis tool. Pathway and pest analysis commissioned by science providers.
<b>Risk Site and Key Supplier Checks</b>	<p>Key Supplier list have 16 receive an intensive survey and risk assessment.</p> <p>Periodic checks on suppliers outside our approved list or on request (new supplier or potential).</p>
Pitt Island Border Biosecurity	
<b>Pitt Island Border Biosecurity</b> (Most activities conducted by Ecan Chatham Islands Biosecurity Officers)	<p>Inspection and treatment for specific pests at sites of departure from Chatham (Chatham Biosecurity Officers)</p> <ul style="list-style-type: none"> <li>• Waitangi Wharf</li> <li>• Airport Hanger</li> <li>• Owenga Wharf</li> <li>• Glen &amp; Megan King's (Pitt Island Storage)</li> </ul> <p>One-off inspection and treatment of direct New Zealand to Pitt movements.</p> <p>Marine Biosecurity Chatham-Pitt, New Zealand-Pitt movements.</p> <p>Pitt Island inspection sites (every second year*)</p> <ul style="list-style-type: none"> <li>• Flowerpot</li> <li>• Pitt Island Lodge</li> <li>• Pitt Island Airstrip</li> <li>• Caravan Bush (including buildings within Caravan Bush)</li> <li>• DOC accommodation adjacent to Caravan Bush</li> <li>• MPA accommodation on Pitt</li> </ul> <p>*Or as required</p>
Infrastructure Programmes	
<b>Infrastructure Programmes</b>	Working with contractors to ensure biosecurity compliance for infrastructure project shipments.

### 3.1 Key supplier/ risk pathways sites and active surveillance sites

A list of suppliers and points of origin for Chatham goods is maintained and added to as information comes to hand. The sites in New Zealand receive inspections to identify any significant pest threats and potential risk pathways which could allow pests to travel to the Chatham Islands. It also provides the opportunity to make suppliers aware of the “No Pests Please” programme.

“No Pests Please” pamphlets have been updated, printed, and distributed to key locations – CISL shipping depots, Air Chathams and key suppliers. This information has also been updated on the Ecan website:

<https://www.cic.govt.nz/services/primary-services/pest-management/>

#### 3.1.2 Biosecurity Fact Sheets

SPS Biota has produced a leaflet with an update on *Mycoplasma bovis* for people wanting to ship bovine products and cattle. This was as a result of a meeting farming groups held on the Chatham Islands in June where a unanimous decision was made that Chatham Islands, including Pitt Island, are to remain a closed border for the import of cattle and Bovine related items including semen and embryos. A review on the border opening to occur by farmers meeting with MPI representation was to occur in March 2021. There have been no updates.

A future focus will be to try and reduce the blanket use of insecticide treatments on risk-products. However, this is dependent on the results of a current review by Entecol on treatments and the findings of German Wasp surveillance programme currently being conducted on the Island.

Pre-inspection of sites still occurs for high-risk freight types such as plant nurseries. Sites found to be well managed or low risk are added to the list of inspected suppliers (is contained in Table 2 below).

#### 3.1.3 Summary of key risk products

##### Soil

- Not allowed (unchanged)

##### Aggregate

- Fulton Hogan, Levels Processing Plant, Washdyke. (Currently the only ‘low risk’ supply in reasonable proximity to a port)
- Enquiries for new suppliers from other regions such as Firth South Auckland to supply for runway project. Biosecurity information for aggregate sent to potential suppliers as enquiries made. SPS Biota available to carry out site risk assessments on approach. Any sampling analysis of weed seeds will incur cost to be covered by supplier.

##### Bulk and bagged growing media (no soil), bark and compost

- Advanced Media Supplies - Napier
- Intelligro - Christchurch

(There are likely to be other landscape supplies businesses which are acceptable, but these two seem to feature as suppliers for Chatham Island orders. SPS Biota can inspect/ approve when required.)

##### Bagged potting mix, bark etc from ad-hoc suppliers (garden centres etc)

- Inspection and/or surface treatment prior to loading (evidence of ants inside the bags we will reject as treatment is difficult)

### Rough sawn timber, posts, and poles

- Inspection is undertaken by SPS Biota staff where possible (often this freight is delivered directly to the port) and/or surface treatment prior to loading. Unfortunately, surface spraying of timber does not mitigate against hibernating insects such as overwintering German Wasp Queens who are well protected in nooks and crannies or in the middle of the timber bundle.

### Machinery, equipment, building supplies for project work

- A lot of pre-inspection work and cleaning for the Apollo project was conducted at Brosnan Transport Ltd, 80 Seadown Road, Washdyke, Timaru 7973. Tom Smith from SPS Biota worked closely with our nominated treatment provider Craig Arras, the project team and CISL staff. This alleviated the pressure and space constraints at the CISL depot
- Downer's yard, 130 Kerrs Rd Wiri was site risk assessed and found to be clean and tidy with commercial pest control and regular weed spraying programmes in place. There is a large, sealed area (concrete or bitumen) for inspection and storage of goods cleared prior to transport.
- Where possible all other risk goods are inspected by SPS Biota staff at consolidators/supplier's yards, cleaned and/or treated under supervision of SPS Biota staff before transport to CISL depots or wharf for loading. Anything unable to be inspected or treated is either not shipped or notified to Biosecurity Inspectors on Island.

Other risk-freight (plants, animals, used marine/ aquiculture supplies, used construction supplies etc)

- Hatuma Lime Company Limited – Waipukurau
- Chesterhope Nursery (truffle tree seedlings) – Hastings

## **3.2 Risk assessments of key suppliers and sites**

A total of 16 site risk assessments were carried out in 2020-2021.

Assessment criteria:

- Cargo or freight that is contaminated or could harbour pests
- Ensure an effective pest management programme is in place
- Observe hygiene of facilities, focusing on storage areas
- Note any mitigating additional factors that the supplier takes to reduce the threat of hitch hiker pests especially from North Island suppliers such as pyrethrum spraying of plants prior to shipment

**Table 2. New Zealand supplier/ services - site visit/ risk assessments conducted - July 2020- June 2021**

Region	Visited Y/N	Type	Company Name
Christchurch	Y   Approved	Garden Supplies	Intelligro
Christchurch	Y   Approved	Nursery	Southern Woods
Christchurch	Y   Approved	Nursery	Zealandia Horticulture Ltd
Christchurch	Y   Approved	Nursery	Woodend Nursery
Christchurch	Y   Approved	Nursery	Southern Cypresses
Dannevirke	Y   Approved	Construction Materials, Timber & Posts	Turton Farm Supplies
Hastings	Y   Approved	Nursery	Greenleaf Nurseries
Napier	Y   Approved	Building Supplies	Tumu Timber (ITM)
Timaru	Y   Approved	Garden Supplies & Quarry	Fulton Hogan Landscape and Garden Supplies & Quarry
Timaru	Y   Approved	Timber & Post Suppliers	Goldpine Timaru
Timaru	Y   Approved	Timber & Post Suppliers	Point Lumber (Washdyke)
Timaru	Y   Approved	Stock Feed	The Central Stock Feed Company (subsidiary of DC Turnbull & Co)
Hastings	Y   Approved	Nursery	Chesterhope Nursery
Waipukurau	Y   Approved	Quarry	Hatuma Lime Company Limited
Palmerston North	Y   Approved	Nursery	Awapuni Nursery
Rotorua	Y   Approved	Nursery	Scion

### 3.3 General comments and main findings

All organisations and personnel spoken to this year were cooperative and understood the need for Chatham Island biosecurity.

SPS continues to review risk freight and methods to reduce risk while maintaining the free flow of freight. The German Wasp incursion in 2020 highlights the difficulty in dealing with some hitchhiker pests. Intensive inspection of project equipment by SPS Biota staff with cleaning and treatment as required is ongoing.

## 4.0 Risk pathways – Cargo vessels

Pest management programmes were installed and maintained on all current vessels throughout the year. (*Norfolk Guardian* used periodically as a charter vessel).



All vessels have on-board pest management/ monitoring programmes in place and residual pesticide for killing flying/ crawling insects is applied to some interior surfaces.

No audits using Department of Conservation rodent-detecting dogs were undertaken over the past year due to unavailability and shipping provider uncertainty.

### 4.1 General comments and key findings

Pest programmes for vessels are maintained by an independent company: Pest Control Specialists - Napier.

## 5.0 Awareness for industry and residents – “No Pests Please” programme –

Awareness training and skill checks for key staff handling freight are conducted throughout the year. This work focuses on four fundamental aspects of quarantine:

Clean – Treat - Isolate - Report

Biosecurity awareness checks for freight handlers in:

Auckland – Contractors e.g., Fulton Hogan, Downers & All Cranes & Transporters (Carlton Haulage),  
Timaru – Brosnan Transport

Each on-site assessment is approximately one hour for airfreight and two hours for other freight depots. These freight sites have been supplied with the updated “No Pests Please” fact sheets.

A comprehensive vehicle and machinery cleaning manual is available for freight handlers and sites designated as cleaning locations. This has been updated.

For treated or inspected vehicles and machinery, a ‘passed’ label system is in place to keep track of freight treatment status.

Offered Biosecurity Awareness eLearning for Air NZ Post Team & Air Chathams Team refer to **Appendix A**  
Conducted training with CISL Depot Napier in early July.

In Timaru when cleaning is conducted on the port it is closely monitored by the local SPS Biota staff member.

Cleaning information is provided to project leads and contractors on request.

## 6.0 Pest responses

Pest responses and improved biosecurity systems in 2020-2021 included

- on-going actions to protect the Chatham Islands from *M. Bovis*.
- traps and trapping plans provided to conduct surveillance following the eradication of a German wasp nest at Waitangi.

### 6.1 Wasps

In March 2020, wasp sightings were noted in the Waitangi area indicating the presence of an established nest. SPS Biota commissioned consulting entomologists Entecol to develop a response plan (appended).

The advent of Covid-19 restrictions meant a full delimitation survey was not conducted, but diligent work on behalf of the Chatham Biosecurity team detected the nest. A shipment of Vespex wasp bait was able to be sent and used before the on-set of sub-optimal lower temperatures. The located nest was eliminated.

A full delimitation/ detection survey was initiated in Feb 2021. This will provide confidence that there was only one established wasp nest, which was confirmed.

A 'fresh' supply of Vespex will also be kept in stock on the Chathams in the future to ensure this bait is immediately available for responses.

**Mid May 2021** - Following the delimitation survey in which no wasps were detected, notification was received from the Biosecurity Inspectors on the Island that a German wasp had been found at a private property on the Chatham Islands.

From the photos supplied by the Biosecurity Inspectors it appeared to be an overwintering queen. The owner had imported a lot of building material over the preceding 12 months. We feel this wasp find may have been attributed to the increase in the number of nests about Canterbury and potentially Napier related to the sugar available from the giant willow aphid. An increase in wasp numbers and potentially stowaways to the Chatham Islands may be ongoing.

Advice was provided to the Biosecurity Inspectors on the Island on how to proceed in the short term regarding this wasp find as per below, medium term plans are outlined in the recommendations for next year in Section 8.

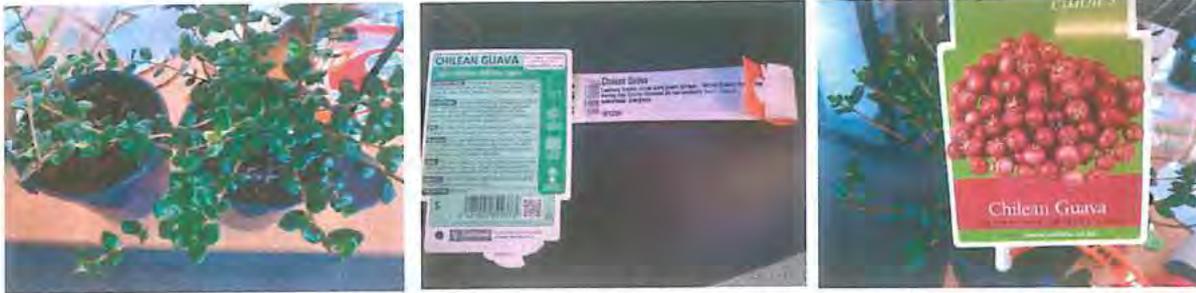


### 6.2 Short term

- Biosecurity Inspector on the island to check the site to make sure there were no wasps flying about and to look at freight (wood etc) that could be the potential source and may have more individual wasps sheltering.
- It was noted that treatment of freight is not very effective in this instance, monitoring and the ability to conduct eradication programmes on the Chathams will be significant means of mitigating the risk.
- All known regular suppliers of building supplies, Project Manager for Apollo, CISL depots and treatment provider staff were contacted by SPS Biota by email, updated and provided a German Wasp Fact sheet to use to brief staff. Refer to **Appendix B**

## 7.0 Pest Plants

Ugni Molinae (Chilean Guava | NZ Cranberry - known on the Chatham Islands as "NZ Guava")



**April 2021** 12 plants carried by a passenger via airfreight were intercepted by Biosecurity Inspectors on the Island

**May 2021** 2 plants in a box on the back of a truck amongst other plants. The SPS Biota Biosecurity Advisor was re-inspecting a truck that had been cleaned when he noticed the box of plants on the back of the truck that had not been there on the previous inspection.

- Emails were sent out to all our known regular suppliers of nursery plants to the Chatham Islands asking them to advise customers where the known intended destination of the plants is the Chatham Islands that they are not permitted and to contact the Biosecurity Inspectors on the Island for current and up to date advice on what is permitted.
- Air Chathams freight and CISL shipping depots were also contacted.

## 8.0 Vehicle and machinery cleaning

Used vehicles continue to be a source of heavy contamination with vehicles presented for shipping often heavily contaminated with grass, soil, rubbish, and insects including German wasps and a Paper wasp building a nest under the deck of a truck (refer to image right).

The No Pests Please pamphlets have been updated, highlighting the need for thorough cleaning before delivery to the CISL depots and providing advice on what areas need particular attention.

CISL Napier has a consented wash facility at their new depot in Leyland St. SPS Biota undertook training with their staff in early July to advise cleaning protocols.

SPS Biota to campaign using Paper Wasp Fact Sheet Appendix C



## 9.0 Recommendations for 2021-2022 Season

### German Wasp Monitoring Medium-Long term

- Begin an annual monitoring programme at selected sites on Chatham and potentially Pitt. This would be using carbohydrate baited traps. (mid-late summer)
- SPS Biota to ensure there is a contingency amount of Vesplex, carbohydrate lure and traps stored on the island to respond to incursions.
- SPS to discuss the detail of where to monitor around the population centres and sites which may have temporary building/imported freight activity (shipping from late summer to May). Noted, the trapping programme completed early 2021 would have been a good exercise to work out how to go about it and what human resource is required.

### Asian Paper Wasp

- SPS Biota to conduct email campaign with our approved suppliers and project leads using Fact Sheet highlighting potential issue as hitch hiker pest

### eLearning Development

- Development of an eLearning modules around awareness for the Chatham Islands biosecurity programme - to be discussed with ECan programme manager and relevant parties. Refer to **Appendix A**

### Monitor Programme Development

Looking at top unwanted pests i.e., Ants, Skinks and/or Wasps

Develop a Monitoring Dashboard

### Cargo Inspection Dashboard Implemented – Appendix E

For Cargo Inspections on site (depots & suppliers' yards)

## APPENDIX A E-LEARNING EXAMPLE

### Biosecurity Awareness Training Example



### Chatham Islands Biosecurity Awareness – concept/development



**Introduction to biosecurity on the Chatham Islands**

- Why is biosecurity important
- Chatham Islands are unique



**No Pest Please**

- Building Supplies
- Import Plants
- Moving to the Island
- Buying Used machinery
- Pets & Livestock



**Pre shipment cleaning requirements**

- Washing
- Inspection
- Treatment



## GERMAN WASP FACT SHEET

### LIFECYCLE

**SPRING:** In spring, queens emerge from hibernation and make a new nest. They feed on small insects, fruit, nectar and honeydew and scavenging on dead fish.

**SUMMER:** Over summer the nest expansion and the number of workers increases.

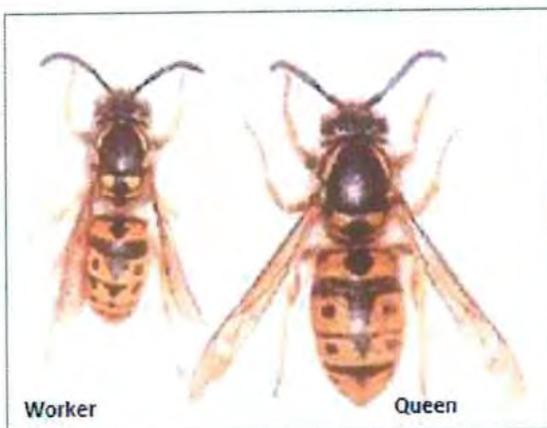
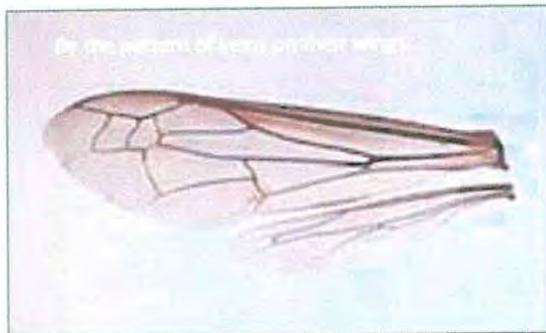
**AUTUMN:** In autumn the nest produces males (drones) and females (new queens) which can reproduce.

Drones that have left the nest tend to gather around trees or prominent objects on high ground. They fly continuously back and forth around such objects, and rush in to mate with any queen that flies into the mating swarm.

**WINTER:** In winter, new queens fly away from the nest and hibernate, and the nest usually dies (sometimes nests can survive winter and thus skip the 'new nest' phase).

### HOW TO IDENTIFY A GERMAN WASP

Worker wasps & queens look similar, although the queen is much larger. Both have a sting





## ASIAN PAPER WASP FACT SHEET

### LIFECYCLE

Wasps have four stages in their life cycle: egg, larva, pupa, and adult.

- Medium sized insects, 13–25 mm long
- Can sting – very painful
- Eats caterpillars, nectar, honeydew and fruit
- Smaller than common and German wasps.
- Have legs which dangle beneath their bodies during flight.
- Asian paper wasps have yellow and black bodies and tan legs.

### Images of Paper Wasps



### Nests



After mating, a new queen flies off to start a new colony, typically in a tree, a shrub, or under a building eave. She finds dead wood such as bark then chews and mixes it with saliva to form paper-like pulp. She attaches pulp to the nest site and forms a hanging stalk. To the stalk she builds an umbrella-like nest that contains six-sided cells. She then captures a caterpillar, chews it, stuffs it into a cell, and lays an egg on it. A few days later, the larvae hatch from the eggs, remain in the cells, and feed on the caterpillars. This first generation of adult workers enlarge the nest and supply it with caterpillars. After the queen lays more eggs, the workers take care of the young.

### Economic and Social Impact



While less aggressive than German and common wasps, they prey on insects and chew weatherboards. They are likely to be impacting on native and introduced invertebrate populations, known to negatively impact monarch butterfly populations.

*For more information, please contact the Biosecurity Officers on 03 305 0013 or email*

*[Kerri.Moir@ecan.govt.nz](mailto:Kerri.Moir@ecan.govt.nz) &*

*[Robin.Seymour@ecan.govt.nz](mailto:Robin.Seymour@ecan.govt.nz)*



**SOP: Sending plants from Scion nursery to Chatham Islands**

Date revised: 22 June 2021

Aim is to ensure plants delivered do not introduce new pests, diseases, or contamination

**Key biosecurity risks identified:**

- Insects/insect cases:
  - leaf miner
  - ants (specifically Argentine ants)
  - wood borer
  - aphids
  - mud wasps
  - other hitch-hiker species
- Reptiles:
  - Skinks
- Other pests/risks:
  - Soil or plant diseases
  - Weed seeds/plants
  - Soil fauna, including nematodes

**Process to be followed:**

Currently looking only at air transportation due to risks to plant health, with probable duration of shipping (>5 days from leaving nursery) and risk of being loaded then the journey being delayed.

Task	Detailed description	Who responsible/timing
<b>Freight arrangements</b>		
Notify Manukau Nursery Ltd (MNL)	Let Susan Thorpe and Maui Solomon know that plants are ready to send, and they will confirm date re flights	Paul Keech - Scion (copy in Elizabeth D), 2 weeks prior
Confirmation of transport details	From Susan/Maui to nursery staff for flights,	Susan/Maui - MNL, 1 week prior to delivery date,
Courier/Freight	Arrange courier service on mainland to connect to booked flights to Chathams	Anita Wylie /Paul Keech - Scion, 5 days in advance
<b>Nursery-based, prior to shipping</b>		
Notify Biosecurity team via Vivienne Cooper	Let Vivienne know of intent and date to transport plants to Chathams (flight number, # plants)	Anita Wylie/Paul Keech – Scion, notify 1 week prior to <a href="mailto:chathams@spsbiota.co.nz">chathams@spsbiota.co.nz</a>
Seedlings	Check seed trays and potted plants - Any plants showing obvious insect infestation will not be sent (no soil used in potting media)	Colin Faulds - Scion, 3-7 days prior to being packed
Inspection	Each plant plug to be visually checked for any evidence of insects as it is removed from the plastic crate and before it is packed	Colin Faulds - Scion, 1-2 days prior
Spraying	Consignments will be sprayed with a pyrethrum insecticide	Colin Faulds - Scion, 4-5 days prior
Packing	Consignment to be packaged in clean packaging (re-usable forestry boxes only with lids, no plastic)	Colin Faulds - Scion, day prior
Paperwork	Fill out a covering letter, check list and demonstrate biosecurity approval, to go with plants	Paul Keech - Scion, with plants

**Checklist template for the delivery of plants from Rotorua to Chatham Islands (Nursery-based tasks only):**

Plant species: Hakapiri

Plant numbers/box numbers: 960, 12 boxes

Flight Details (#, date): Air Chathams XXXX (via YYYY), 24 June 2021, 1 July 2021

**Contact details:** If there are any questions or issues regarding this delivery, please contact P

Paul Keech (Scion) on 021 3850954 or  
Susan Thorpe (Manukau Nursery Ltd) on 03 3050457

Task	Who - signature	Date completed
Notify Biosecurity team via Vivienne Cooper	Paul Keech Signed:	
Seedlings - seed trays checked for insect infestation	Colin Faulds Signed:	
Inspection - each plant plug to be visually checked for insects	Colin Faulds Signed:	
Spaying - plants sprayed with a pyrethrum insecticide	Colin Faulds Signed:	
Packing - packaging (boxes) clean	Colin Faulds Signed:	
Paperwork - emailed and attached to boxes which are clearly marked	Paul Keech Signed:	

This checklist will be emailed to all parties and will accompany the boxes.

### Roles

- o Vivienne Cooper is the Biosecurity inspector and key contact ([vivienne.cooper@spsbiota.co.nz](mailto:vivienne.cooper@spsbiota.co.nz)), but a central email has been set for all deliveries to Chathams: [chathams@spsbiota.co.nz](mailto:chathams@spsbiota.co.nz)
- o Paul Keech is the Operations Manager of the Scion Nursery in Rotorua ([Paul.Keech@scionresearch.com](mailto:Paul.Keech@scionresearch.com) )
- o Anita Wylie is the nursery technician responsible for delivery logistics ([Anita.Wylie@scionresearch.com](mailto:Anita.Wylie@scionresearch.com) )
- o Colin Faulds is the key propagation operator at Scion ([Colin.Faulds@scionresearch.com](mailto:Colin.Faulds@scionresearch.com) )
- o Elizabeth Dunningham is the Scion project manager for this work ([Elizabeth.Dunningham@scionresearch.com](mailto:Elizabeth.Dunningham@scionresearch.com))
- o Susan Thorpe is MNL (Chathams) Science Projects Co-ordinator in Rēkohu ([susanthorpe@xtra.co.nz](mailto:susanthorpe@xtra.co.nz) )
- o Maui Solomon is the Director of MNL (Chathams) in Rēkohu ([mauis@xtra.co.nz](mailto:mauis@xtra.co.nz) )

Manukau Nursery Limited (MNL) is the contracting party for the propagation at Scion (subcontractor)

### Reference:

Email from Vivienne Cooper after nursery inspection (March 2021):

Shipping of plants to the Chatham Islands Colin has agreed to undertake some extra steps to prevent the potential risk of hitch hiker pests making their way to the Chatham Islands.

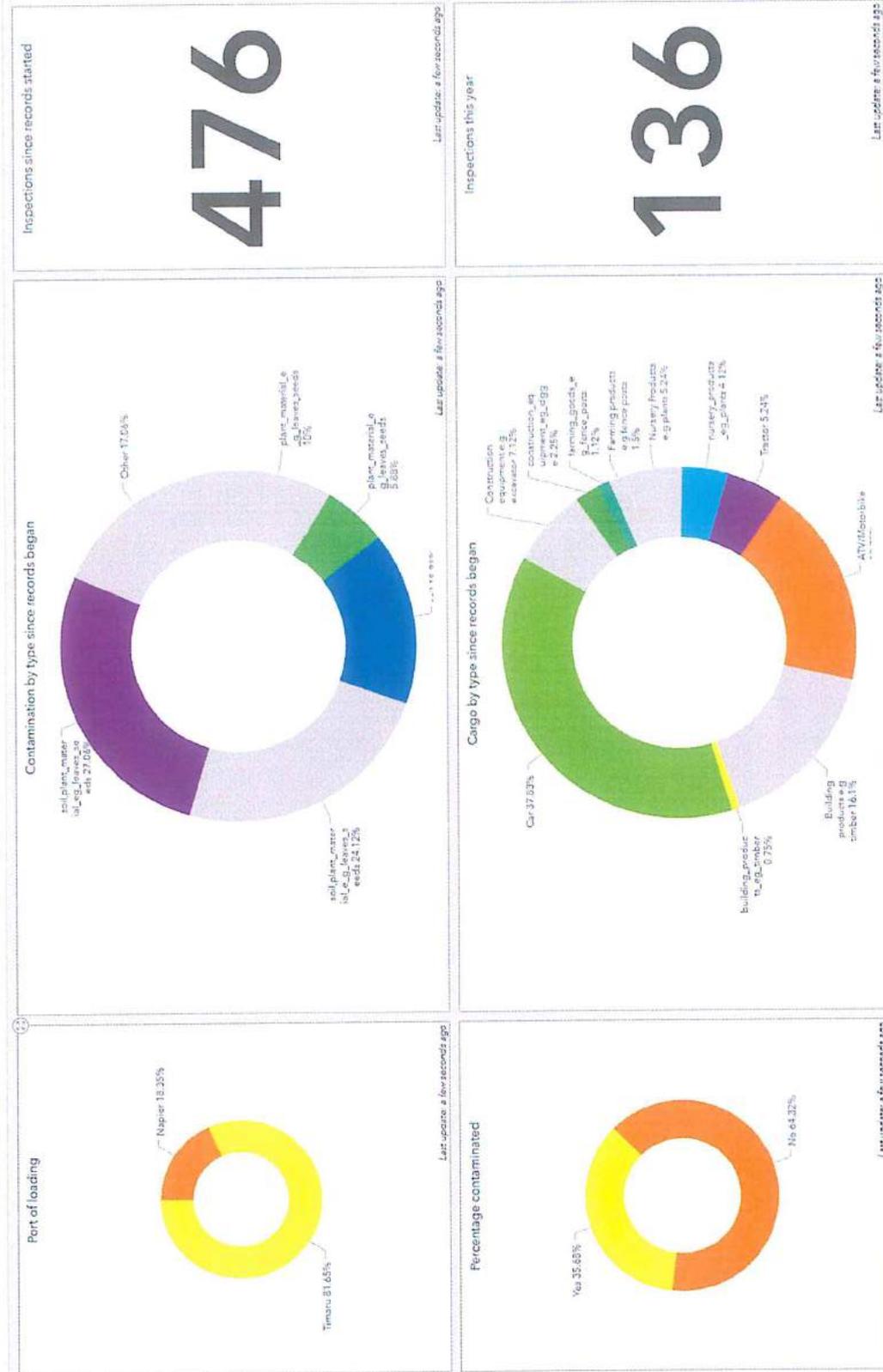
Prior to plants being shipped:

- 1) Any plants showing obvious insect infestation will not be sent – for example we saw 1 plant yesterday with evidence of leaf miner damage to the leaf.
- 2) Consignment/s will be sprayed with a pyrethrum insecticide.
- 3) Each plant plug to be visually checked for any evidence of insects as it is removed from the plastic crate and before it is packed.
- 4) Consignment to be packaged in clean new packaging
- 5) If plants are shipped by sea freight any pallets used must be given an all-over visual check including undersides, and be clean, dry, and free of any leaves, soil, debris, wood boring insects, hitchhiker insects and insect cases (e.g., mud wasps, pupae etc) and also sprayed with pyrethrum.

In regards to ants and skinks there was no evidence of skinks and although there was a nest of ants outside the tearoom (suspected *Iridomyrmex* spp.) there was no evidence of Argentine ants. As observed all plants are up off the ground on the racks and Colin mentioned in his 40 years' experience he has never noticed ants up on the racks/tables.

There was no ant activity around the bark piles – noted no soil is used in the mix. Would you be able to keep me up to date as to when shipments are going out, quantities shipped and method of shipment (flight details or vessel departure) so that I can let the team know to expect them.

# APPENDIX E DASHBOARD EXAMPLE



## 6. Regulatory

### 6.4 Decision – CI Airport Ltd – CIC/2021/009

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	6.4
<b>Author/s</b>	Sharon McGarry (Independent Hearings Commissioner)

#### Purpose

For Council's information.

#### Recommendation

**THAT the report be received.**

#### Background

An application for Resource Consents had been received from Chatham Islands Airport Ltd to extend and upgrade Inia Tuuta Memorial Airport.

The application was considered by Independent Hearing Commissioner Sharon McGarry, on behalf of Chatham Islands Council.

Commissioner McGarry's decision is attached.

## Resource Management Act 1991

### Chatham Islands Council

#### Decision of Independent Hearing Commissioner

#### Application CIC/2021/009 to Chatham Islands Council by Chatham Islands Airport Limited for resource consents to extend and upgrade Inia Tuuta Memorial Airport ('Longer & Stronger Project')

#### Procedural Matters

1. This is the report and decision of independent Hearings Commissioner Sharon McGarry. I was appointed by the Chatham Islands Council (CIC or 'the Council) and delegated powers and functions under section 34A(1) of the Resource Management Act 1991 (RMA or 'the Act') to decide an application by Chatham Island Airport Limited ('the Applicant') to extend and upgrade Inia Tuuta Memorial Airport, referred to as the 'Longer & Stronger Project'.

#### The Application

2. The application is for the following resource consents associated with the extension and upgrade of the Inia Tuuta Memorial Airport:
  - I. Land Use Consent - to use land for industrial and commercial activities (RMA section 9);
  - II. Land Use Consent – to clear vegetation and excavate within a natural wetland area (RMA section 9);
  - III. Water Permit – to take and use water for compaction and dust suppression purposes (RMA section 14); and
  - IV. Discharge Permit – to discharge water and contaminants onto and into land (RMA section 15).
3. A consent duration of five years is sought.
4. The site is located at Air Base Road, Chatham Island, approximately 20 kilometres north-east of the main settlement of Waitangi, on a spit of land protruding into Te Whanga Lagoon ('Te Whanga').
5. The site is zoned Industrial in the Chatham Islands Resource Management Document (CIRMD). Te Whanga is identified as an area of Significant Natural Values in Appendix 1 of the CIRMD.

#### Assessment

6. In assessing the above applications, I have read the application documentation and assessment of environmental effects (AEE) by Beca Limited dated 21 June 2021 and supplementary reports on behalf of the Applicant. I did not undertake a site visit.
7. I have read the s42A Officer's Report dated 31 August 2021 prepared by Mr Nick Reuther, Consents Planner with Canterbury Regional Council, in regard to the resource consent application on behalf of the Chatham Islands Council. Pursuant to s113 (3)(b) of the Resource Management

Act 1991, I accept and adopt the entire report prepared under section 42A and the conclusions reached. The report forms part of this decision.

### Notification Decision

8. Having considered sections 95A to 95C of the Resource Management Act 1991, and under the authority delegated to me by the Council, I have decided that the application does not require notification, for the reasons outlined in the section 42A Report.

### Statutory Assessment

9. In considering the application for resource consents, I have had regard to sections 104, 105, and 107 of the RMA; and consider that this activity will achieve the purpose of the RMA. Section 105 sets out matters relevant to discharge applications; and section 107(1) sets out restrictions on grant of certain discharge permits.
10. On the basis of the evidence before me, I am satisfied that:
  - I. the effects of the activities are likely to be minor, subject to the imposition of consent conditions; and
  - II. the activities are consistent with the objectives and policies of the relevant national environmental standards and regional plans, as set out in the s42A Officer's Report.

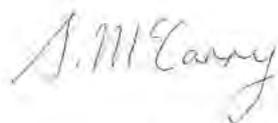
### Consent Term

11. The applicant has requested a consent term of five years to complete the project. I agree with Mr Reuther's recommendation that the consents should be granted for a term of five years as sought.

### Decision

12. It is my decision, under delegated authority on behalf of the Chatham Islands Council pursuant to sections 104, 105, 107, 108 to **GRANT** Chatham Islands Airport Limited the following resource consents:
  - I. Land Use Consent - to use land for industrial and commercial activities;
  - II. Land Use Consent – to clear vegetation and excavate within a natural wetland area;
  - III. Water Permit – to take and use water for compaction and dust suppression purposes; and
  - IV. Discharge Permit – to discharge water and contaminants onto and into land; subject to conditions set out in Appendix 1 and of this decision.

Dated at Christchurch this 6<sup>th</sup> day of September 2021



Sharon McGarry  
Independent Hearing Commissioner

## Appendix 1

### Land Use Consent CIC/2021/009/1

	<b>LIMITS</b>
1.	<p>The activities authorised by this resource consent and associated with the Chatham Islands Airport – Longer &amp; Stronger Project shall be limited to:</p> <ol style="list-style-type: none"> <li>a. The use of rural land for borrow areas and ancillary industrial activities, including stockpiling, crushing and screening of quarry-sourced aggregate and materials excavated from within Borrow Areas 2 and 3, as shown on the attached Plan CIC/2021/009/1-A, which forms part of this resource consent;</li> <li>b. Earthworks, excavation, vegetation clearance within and adjacent to natural wetlands within the airport site, as shown on the attached plan CIC/2021/009/1-B, which forms part of this resource consent; and</li> <li>c. Planting and restoration works to facilitate the restoration of natural wetlands and indigenous vegetation within the wider site.</li> </ol>
2.	<ol style="list-style-type: none"> <li>a. The activities described under Condition (1) shall be carried out in general accordance with the plans and all information, including further information, submitted with the application.</li> <li>b. If there is any conflict between the application documents and the specific conditions which follow, the specific conditions are to prevail.</li> </ol>
<b>DISTRUBANCE AND REMOVAL OF NATURAL INLAND WETLANDS</b>	
3.	<ol style="list-style-type: none"> <li>a. Natural wetland removal and disturbance under Condition (1)(b) must occur only to the extent necessary to facilitate the Runway Extension and Runway End Safety Areas (RESAs) works, as described in the application and shown on the attached Plan CIC/2021/009/1-B. Enhancement and restoration of wetland areas and indigenous vegetation must be made as detailed in the Restoration Plan, which is required to be prepared under this resource consent, to mitigate and remedy the adverse effects of the removal of wetland areas within the Runway Extension and RESAs footprint.</li> <li>b. In areas outside of Runway Extension and RESAs footprint, all practicable measures must be taken to avoid disturbance and temporary or permanent loss of natural wetland areas or areas with higher densities of indigenous vegetation such as speargrass. For this purpose, and where reasonably practicable, works shall occur a minimum of 100 metres from wetland areas and ten metres from any other surface water bodies.</li> <li>c. Disturbance and/or removal of wetland areas within the airport site but outside of the Runway Extension and RESAs footprint that cannot be avoided must:               <ol style="list-style-type: none"> <li>i. Have a demonstrated functional need; and</li> <li>ii. Be offset, remedied and/or mitigated by implementation of the Restoration Plan required to be prepared under this resource consent.</li> </ol> </li> </ol>

	<p>d. For the purpose of offsetting, remedying and/or mitigating adverse effects through the Restoration Plan, the following measures must be implemented:</p> <ul style="list-style-type: none"> <li>i. Where indigenous vegetation is removed in temporary works areas, a salvage and relocation programme, in addition to seed collection (from on site and/or undisturbed vegetation) must be implemented to preserve as much of the impacted population as practicable;</li> <li>ii. Replanting of salvaged plants into offsetting areas shall occur in accordance with the Restoration Plan to enhance and restore existing wetland areas;</li> <li>iii. Following temporary earthworks, land must be recontoured consistent with the surrounding environment to include "humps and hollows" suitable for wetland formation and speargrass establishment. Where possible peaty organic surficial soils from excavations elsewhere on site (runway, borrow areas etc.) shall be re-used for this purpose.</li> </ul>
	<b>BORROW AREAS</b>
4.	<p>The Borrow Areas shall be located in general accordance with the areas shown on the attached Plan CIC/2021/009/1-A, whereas earthworks within:</p> <ul style="list-style-type: none"> <li>a. Borrow Area 2 must be located at least 100 metres from the shore of Te Whanga and at least 10 metres from any surface water body; and</li> <li>b. Borrow Area 3 must not interfere with the stand akeake trees located within this area, as shown on the attached Plan CIC/2021/009/1-A.</li> </ul>
5.	<ul style="list-style-type: none"> <li>a. The Consent Holder must use all reasonable endeavours to obtain material required for the project from Borrow Areas 2 and 3, as shown on the attached Plan CIC/2021/009/1-A, in preference to Borrow Area 1.</li> <li>b. Borrow Area 1 shall only be utilised if the material from Borrow Areas 2 and 3 is not physically available or is not available because of legal constraints.</li> <li>c. If Borrow Area 1 is to be utilised the Chatham Islands Council shall be informed five working days prior to commencing operations and provide: <ul style="list-style-type: none"> <li>i. An explanation of the circumstances for utilising Borrow Area 1;</li> <li>ii. A plan showing the location of the material extraction activities which demonstrates that natural wetland areas and wetland vegetation will be avoided by the works.</li> </ul> </li> <li>d. The operation of Borrow Area 1 shall comply with all the conditions of this resource consent where relevant.</li> </ul>
6.	<p>Prior to any works commencing in Borrow Areas 2 and 3, confirmation of an access agreement between the consent holder and the landowners shall be provided to the Chief executive, Chatham Islands Council, stating that the landowners agree with and understand the proposal and grant access to the Consent Holder for use of the site as borrow areas and ancillary activities detailed in the application.</p>
7.	<p>No works must commence within or near archaeological sites have been identified in the vicinity of the borrow areas prior to obtaining an Archaeological Authority from Heritage New Zealand Pouhere Taonga.</p>

	<b>PRIOR TO COMMENCEMENT OF WORKS</b>
8.	At least 10 working days prior to the commencement of works on site, the Chief Executive, Chatham Islands Council shall be informed of the commencement of works.
9.	<p>Prior to the commencement of the activities described in Condition (1), all personnel working on the site shall be made aware of and have access to:</p> <ul style="list-style-type: none"> <li>a. The contents of this resource consent document and associated documents, including: <ul style="list-style-type: none"> <li>i. The Construction Environmental Management Plan; and</li> <li>ii. The Erosion and Sediment Control Plan; and</li> </ul> </li> <li>b. Resource consents CIC/2021/009/2 and CIC/2021/009/3 and all associated documents relevant to the activity.</li> </ul>
	<b>CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN</b>
10.	<ul style="list-style-type: none"> <li>a. The Consent Holder shall submit a final Construction Environmental Management Plan (CEMP), as contained in the AEE documentation, to the Chatham Islands Council at least ten working days prior to the intended construction start date.</li> <li>b. The purpose of the CEMP is to confirm the project details and to ensure all works are implemented in a manner that avoids, remedies or mitigates actual and potential adverse effects during construction works and adopts the mitigation measures documented and/or otherwise required by the conditions of this resource consent.</li> <li>c. The CEMP shall include the management plans, protocols and/or procedures set out in Schedule 1 of this resource consent, which are deemed to be part of the CEMP.</li> <li>d. Plans may be submitted and certified in a staged manner depending on the nature of the works being undertaken.</li> <li>e. All works shall be carried out in accordance with the CEMP.</li> <li>f. The CEMP and all other management plans required under this consent shall be prepared by suitably qualified and experienced persons.</li> <li>g. If there is any conflict between the CEMP or any of its containing documents and the specific conditions of this resource consent, then the specific conditions prevail.</li> </ul>
11.	<p>The CEMP must, as a minimum, address:</p> <ul style="list-style-type: none"> <li>a. A detailed design and construction methodology for all works;</li> <li>b. Notification of any operator or contractor appointed to carry out the works authorised by this consent, including the contractor's company, address, named representative and their contact details;</li> <li>c. A detailed schedule of construction activities including the expected commencement date and duration of works;</li> <li>d. Biosecurity measures;</li> </ul>

	<ul style="list-style-type: none"> <li>e. Requirements to mitigate ecological and visual effects;</li> <li>f. A staging of works to demonstrate that the area of disturbance will be kept to a minimum;</li> <li>g. Operating hours;</li> <li>h. Evidence that a suitably qualified engineer has been appointed to carry out the overall design, supervision and certification of earthworks (including cut/fill stability and construction of all erosion and sediment controls);</li> <li>i. Detailed design specifications of all earthworks, including disposal sites, and all erosion and sediment control measures to be implemented, including supporting calculations where appropriate;</li> <li>j. Identification of measures to ensure that there is no tracking of mud or earth or unwanted vegetation (e.g., weeds), seeds or contaminants into the site or onto the surrounding road network.</li> <li>k. Induction and environmental training;</li> <li>l. Identification and compliance with environmental requirements, resource consent conditions, risk assessment and controls;</li> <li>m. Disposal of construction waste material;</li> <li>n. Emergency planning and response;</li> <li>o. Environmental incident reporting and investigation;</li> <li>p. Public safety;</li> <li>q. Storage of hazardous substances;</li> <li>r. Communication and records, including liaison with neighbours ; and</li> <li>s. The recommendations of the Environmental Impact Assessment report submitted with the application and the methods by which the recommendations will be implemented, as detailed in the Restoration Plan required to be prepared under this resource consent.</li> </ul>
12.	<ul style="list-style-type: none"> <li>a. Where the management plans, protocols and/or procedures identified in Schedule 1 of this resource consent require updating for a specific stage of work, the Consent Holder shall submit a revised version of the CEMP to the Chief Executive, Chatham Islands Council at least five working days prior to that stage of works commencing on site.</li> <li>b. Any updates or amendments under (a) shall be: <ul style="list-style-type: none"> <li>i. Only for the purpose of maintaining or enhancing the degree and/or extent to which adverse environmental effects attributable to the construction or maintenance of the project are avoided, remedied or mitigated; and</li> <li>ii. For the purpose of applying best practicable measures to avoid, remedy or mitigate adverse effects on the environment; and</li> <li>iii. Consistent with the conditions of this resource consent.</li> </ul> </li> </ul>
13.	<ul style="list-style-type: none"> <li>a. Works shall not commence until the CEMP and all other relevant management plans, protocols and/or procedures have been certified by the Chatham Islands Council.</li> <li>b. If written certification of CEMP and all other relevant management plans, protocols and/or procedures is not provided by the Chatham Islands Council within ten working days of their receipt, the management plans shall be deemed to be certified.</li> </ul>
<b>EROSION AND SEDIMENT CONTROL</b>	

14.	<p>The works authorised under this resource consent shall occur in accordance with the ESCP. The ESCP shall:</p> <ol style="list-style-type: none"> <li>a. Detail best practicable sediment control measures that will be taken to ensure compliance with this resource consent;</li> <li>b. Be prepared by a suitably qualified person with experience in erosion and sediment control in accordance with the procedures detailed in Schedule 1 of this resource consent; and</li> <li>c. Be signed by an engineer with experience in erosion and sediment control, confirming that the erosion and sediment control measures for the site are appropriately sized and located in accordance with the ESCP.</li> </ol>
15.	<p>All erosion and sediment control measures detailed in the ESCP shall be installed prior to the commencement of any individual earthworks stage or stripping of vegetation and topsoil occurring on the site.</p>
<b>BIOSECURITY</b>	
16.	<p>All machinery associated with the works must be free of plants seeds prior to use within the site.</p>
17.	<p>The Consent Holder must ensure that all construction equipment imported onto Chatham Island is inspected in New Zealand by a Chatham Islands Biosecurity Officer or an appointed representative, and if necessary, cleaned prior to dispatch to the islands. This shall include, but not be limited to:</p> <ol style="list-style-type: none"> <li>a. Machinery tracks and the wheel treads of construction equipment that are likely to hold soil or dirt and potentially seeds of plant pest species;</li> <li>b. Any other equipment that may harbour animal pests and predators; and</li> <li>c. Staff recreational equipment.</li> </ol>
18.	<p>To prevent the spread of any aquatic or terrestrial pest, the Consent Holder must ensure that activities authorised by this resource consent are undertaken in accordance with Biosecurity New Zealand's hygiene procedures.</p> <p><i>Advice Note: The most current version of these procedures can be accessed on the Biosecurity New Zealand website (<a href="http://www.biosecurity.govt.nz">http://www.biosecurity.govt.nz</a>).</i></p>
<b>SPILLS</b>	
19.	<p>All practicable measures shall be undertaken to prevent oil and fuel leaks from vehicles and machinery entering waterbodies, including but not limited to:</p> <ol style="list-style-type: none"> <li>a. Construction vehicles to be kept clean, maintained and checked for fluid leaks;</li> <li>b. There shall be no storage of fuel or refuelling of vehicles and machinery within 20 metres of any wetland or waterway; and</li> <li>c. Fuel shall be stored securely or removed from site overnight.</li> </ol>

20.	<p>All practicable measures shall be taken to avoid spills of fuel or any other hazardous substances within the site.</p> <ol style="list-style-type: none"> <li>a. Refuelling of machinery and vehicles shall not occur within 10 metres of open excavations;</li> <li>b. A spill kit shall be kept on site that is capable of absorbing the quantity of oil and petroleum products that may be spilt on site at any one time, remains on site at all times;</li> <li>c. In the event of a spill of fuel or any other hazardous substance, the spill shall be cleaned up as soon as practicable, the stormwater system shall be inspected and, cleaned and measures taken to prevent a recurrence;</li> <li>d. The Chief Executive, Chatham Islands Council shall be informed within 24 hours of a spill event and the following information provided: <ol style="list-style-type: none"> <li>i. The date, time, location and estimated volume of the spill;</li> <li>ii. The cause of the spill;</li> <li>iii. The type of hazardous substance(s) spilled;</li> <li>iv. Clean up procedures undertaken;</li> <li>v. Details of the steps taken to control and remediate the effects of the spill on the receiving environment;</li> <li>vi. An assessment of any potential effects of the spill; and</li> <li>vii. Measures to be undertaken to prevent a recurrence.</li> </ol> </li> </ol>
<b>MANAGEMENT OF CONTAMINATED MATERIAL</b>	
21.	<ol style="list-style-type: none"> <li>a. A detailed site investigation (DSI) report covering the areas of potential firefighting foam use, labelled as "Potential PFAS Use Area" on the attached Plan CIC/2021/009/1-C, which forms part of this resource consent, shall be provided to the Chief Executive, Chatham Islands Council at least ten (10) working days prior to the start of earthworks.</li> <li>b. The DSI shall be prepared by a suitably qualified and experienced contaminated land practitioner (SQEP) and in accordance with the Ministry for the Environment (MfE) <i>Contaminated Land Management Guidelines No. 1 – Reporting on Contaminated Sites in New Zealand (2011)</i> and the MfE <i>Contaminated Land Management Guidelines No. 5 – Site Investigation and Analysis (2011)</i> and meet the criteria of 'Detailed Site Investigation' as defined in those documents.</li> <li>c. The DSI report shall include a Contaminated Land Management Plan, including handling requirements and disposal options of materials and any other matter required to be addressed to ensure contaminated material is managed in a way to avoid, remedy or mitigate adverse effects on the environment.</li> </ol>

	<p>d. All earthworks on sites identified as contaminated in the DSI report shall be undertaken in accordance with the Contaminated Land Management Plan.</p> <p>e. Depending on the findings of the DSI, a Remedial Action Plan, Site Validation Report and a Long-term Site Management Plan shall be submitted, as necessary and in line with the documents referenced under sub-clause (b) of this condition, to the Chief Executive, Chatham Islands Council. The Remedial Action Plan must be submitted for approval prior to remedial works occurring.</p>
22.	<p>a. Any contaminated soils and/or materials removed from the site must not be disposed of at a cleanfill facility and must be disposed of at an authorised facility whose waste acceptance criteria permit the disposal.</p> <p>b. Evidence of waste disposal, including weighbridge receipts or similar confirmation, shall be provided to the Chatham Islands Council within three months of completion of works. If a Site Validation Report is required, the soil disposal and evidence of disposal shall be attached to that report.</p>
23.	<p>In the event that any unexpected, contaminated soil or material is uncovered by the works (e.g., visible staining, odours and/or other conditions that indicate soil contamination), an accidental discovery protocol shall be implemented, including but not limited to the following steps:</p> <p>a. Earthworks within ten metres of unexpected contaminants shall cease immediately;</p> <p>b. All practicable steps shall be taken to prevent the contaminated material becoming entrained in stormwater or otherwise entering the environment. Immediate steps shall include, where practicable:</p> <p>i. Diverting any stormwater runoff from surrounding areas away from the contaminated material; and</p> <p>ii. Minimising the exposure of the contaminated material, including covering the contaminants with an impervious cover;</p> <p>c. Notification of the Chief Executive, Chatham Islands Council within 24 hours of the discovery;</p> <p>d. Earthworks within ten metres of unexpected contaminants shall not recommence until a SQEP confirms to the Chief Executive, Chatham Islands Council that continuing works does not represent a significant risk to the environment;</p> <p>e. Any remedial or management measures required, as directed by the SQEP, must be reported to and approved by the Chief Executive, Chatham Islands Council;</p> <p>f. All records and documentation associated with the discovery shall be kept and copies shall be provided to the Chief Executive, Chatham Islands Council upon request.</p>

	<b>Advice Note:</b> Any material removed from the site during the works that is potentially or confirmed as contaminated, is required to be disposed of at a facility authorised to receive such material.
	<b>ACCIDENTAL DISCOVERY OF ARCHAEOLOGICAL MATERIAL</b>
24.	<p>Should any archaeological material or sites be discovered during the course of work on the site, work in that area of the site shall stop immediately and the appropriate agencies, including Heritage New Zealand Pouhere Taonga and the Mana Whenua, shall be contacted immediately, in accordance with the Accidental Discovery Protocols of Hokotahi Moriori Trust and Ngāti Mutunga o Wharekauri Iwi Trust.</p> <p><b>Advice Note:</b> It is unlawful for any person to destroy, damage, or modify the whole or any part of an archaeological site, as defined in the Heritage New Zealand Pouhere Taonga Act 2014, without the prior authority of Heritage New Zealand Pouhere Taonga, regardless of the legal status of the land on which the site is located, whether the activity is permitted under the District or Regional Plan, or whether a resource or building consent has been granted. The Heritage New Zealand Pouhere Taonga Act 2014 provides for substantial penalties for unauthorised damage or destruction.</p>
	<b>WETLAND RESTORATION WORKS</b>
25.	The Consent Holder shall undertake restoration works in general accordance with the Restoration Plan required to be prepared in accordance with Conditions (26) to (28).
26.	<p>A Restoration Plan shall be prepared suitably qualified ecologist and in general accordance with Schedule 2 (Restoration plans for natural wetlands) of the Resource Management (National Environmental Standards for Freshwater) Regulations 2020, and include the following information:</p> <ol style="list-style-type: none"> <li>a. Details of the activity site and natural wetlands;</li> <li>b. Features and values of the natural wetlands;</li> <li>c. Issues with the natural wetlands;</li> <li>d. Management objectives for the natural wetlands;</li> <li>e. Operational details for achieving the management objectives;</li> <li>f. Review and reporting requirements; and</li> <li>g. Consultation requirements with the Department of Conservation in relation to speargrass relocation, seed collection and planting activities.</li> </ol>
27.	<p>The Restoration Plan shall address the following activities:</p> <ol style="list-style-type: none"> <li>a. Chatham Islands Speargrass (<i>Aciphylla traversii</i>) relocation: <ol style="list-style-type: none"> <li>i. Identify location of speargrass on site;</li> </ol> </li> </ol>

	<ul style="list-style-type: none"> <li>ii. Identify speargrass that are to be relocated and proposed new location(s);</li> <li>iii. Identify method of relocation;</li> <li>iv. Identify maintenance programme;</li> <li>v. A Planting Plan showing location and spacing;</li> <li>vi. Process to facilitate collection of speargrass seeds on airport land and use of seeds for growing speargrass seedlings to be used in restoration efforts of the site; and</li> <li>vii. Timing of relocation/planting.</li> </ul> <p>b. Borrow Area 1, if utilised as a last option:</p> <ul style="list-style-type: none"> <li>i. Identify disturbed area to be “humped and hollowed” to contribute to an environment conducive to wetland formation;</li> <li>ii. Description of “humped and hollowed” process including depth, contours etc;</li> <li>iii. Identify species to be used in planting of disturbed area;</li> <li>iv. Requirements for mulching of areas and any other requirements to manage weeds, including timing;</li> <li>v. Preparation of a Planting Plan; and</li> <li>vi. Timing of planting.</li> </ul> <p>c. Revegetation Programme within airport land:</p> <ul style="list-style-type: none"> <li>i. Identify (1) margins of runway (2) boundaries of airport and (3) south-west area for proposed revegetation of indigenous species;</li> <li>ii. Identify programme for removal of pest plant species in areas (1) to (3);</li> <li>iii. Describe removal of vegetation from extension areas and mulching of vegetation within the areas identified under sub-clause (c)(i) of this condition, including timing;</li> </ul> <p>d. Eastern Wetland area east of eastern RESA:</p> <ul style="list-style-type: none"> <li>i. Describe earthworks to be undertaken to improve hydraulic connectivity within the wetland. Any earthworks shall be in accordance with a plan that is approved by a suitably qualified ecologist.</li> </ul> <p>e. Any animal pest control to be carried out, including:</p> <ul style="list-style-type: none"> <li>i. Which animal pests are present;</li> <li>ii. How often, and for how many years, the animal pest control will be carried out; and</li> <li>iii. The method by which the animal pest control will be carried out.</li> </ul> <p>f. Monitoring of wetland restoration, including measures to be implemented to ensure the success of the above restoration requirements over time.</p>
28.	<p>a. The Restoration Plan shall be submitted to the Chief Executive, Chatham Islands Council at least ten working days prior to restoration works commencing, for certification that it complies with the conditions of this resource consent.</p> <p>b. The works described in Condition (1)(b) of this resource consent shall not commence until certification has been received from the Chief Executive, Chatham Islands Council is acceptable and consistent with the conditions of this resource consent.</p> <p>c. Notwithstanding (b), if the Restoration Plan has not been reviewed and/or certified within ten working days of the Chief Executive,</p>

	Chatham Islands Council receiving the Restoration Plan the activities authorised by Condition (1)(b) of this consent may commence.
29.	<b>COMPLETION OF WORKS</b>
30.	<p>On completion of works:</p> <ol style="list-style-type: none"> <li>a. All exposed surfaces shall be stabilised once works are completed or if they are not to be worked for a period of 14 days or more;</li> <li>b. All debris, spoil and other waste material from the works shall be removed from site within one month of completion of works; and</li> <li>c. Wetland restoration efforts required under this resource consent shall be continued until such time that wetlands have been established and require no further care and maintenance.</li> </ol>
31.	<p>For Borrow Areas 2 and 3, as shown on the attached Plan CIC/2021/009/1-A, the following shall be implemented upon completion of borrow activities:</p> <ol style="list-style-type: none"> <li>a. The excavation walls shall be reshaped to blend in with surrounding land including to minimise erosion and hydrological changes and to avoid ponding areas;</li> <li>b. Any hard standing areas shall be removed and backfilled into borrow excavations;</li> <li>c. Topsoil and overburden stripped from the borrow areas and other areas of works and stockpiled within the site shall be spread evenly over the completed landforms within Borrow Areas 2 and 3;</li> <li>d. Backfilling overburden material into the borrow excavation must occur in a way so that all fill material is placed and compacted so as to minimise any erosion and/or instability of the fill material; and</li> <li>e. Topsoiling and grassing of disturbed and re-established rural landforms shall be carried out as necessary to ensure continuous grass cover that is fit for grazing purposes.</li> </ol>
32.	The Chief Executive, Chatham Islands Council, shall be notified within five working days after the completion of the works authorised by this consent.
33.	<b>ADMINISTRATION</b>
34.	<p>The Chatham Islands Council may annually, on any of the last five days of May or November, serve notice of its intention to review the conditions of this resource consent for the purposes of:</p> <ol style="list-style-type: none"> <li>a. Dealing with any adverse effect on the environment which may arise from the exercise of this resource consent; or</li> <li>b. Requiring the resource consent holder to carry out monitoring and reporting instead of, or in addition to, that required by the resource consent.</li> </ol>

**Schedule 1 – Construction Environmental Management Plan**

<b>Management Plan, Protocol, or Procedure</b>	<b>Specific information to be included in Construction Environmental Plan</b>
General Procedures	<p>A CEMP shall be prepared by a suitably qualified and experienced person that includes the following:</p> <ul style="list-style-type: none"> <li>a) Details of the organisation structure of the contractor, including the project manager, liaison person (see Communications Procedures below) and the person responsible for administration of the conditions of resource consent and their contact details;</li> <li>b) The location of notice boards that clearly identify the name, telephone number and address for service of the site or project manager;</li> <li>c) An outline construction programme of the works, including indicating likely road closures and anticipated traffic diversions;</li> <li>d) Any means of protection of existing services such as pipes and water mains within the road reserve;</li> <li>e) Measures to be adopted to maintain the land in a tidy condition in terms of disposal/storage of rubbish, storage and unloading of building materials and similar construction activities;</li> <li>f) Location of workers' offices and conveniences;</li> <li>g) Procedures for avoiding the deposit of soil debris on public roads, and procedures for the removal of soil debris and demolition and construction materials from public roads and places;</li> <li>h) Location and layout of working areas, including associated buildings, fencing and site access;</li> <li>i) Handling and storage of hazardous materials;</li> <li>j) Contingency measures if contaminated material is encountered; and</li> <li>k) Means of maintaining safety of the general public.</li> </ul> <p>For the duration of the works, the Consent Holder shall maintain the site in good order and shall ensure that all practicable steps are taken to avoid material and debris entering waterways during construction and maintenance of activities.</p>
Communication Procedures	<p>The CEMP shall detail procedures for communicating with the public and the owners in the immediate vicinity of the construction area throughout the construction period. The communications procedures shall include:</p> <ul style="list-style-type: none"> <li>a) Giving notice of the commencement of construction activities;</li> </ul>

Management Plan, Protocol, or Procedure	Specific information to be included in Construction Environmental Plan
	<p>b) Providing information about the expected duration of work, including a programme of works;</p> <p>c) Giving notice of any changes to the programme of works;</p> <p>d) Stakeholder and Iwi/Imi communication protocols;</p> <p>e) Maintenance of a complaint register for all aspects of the operations in relation to construction activities. The register shall detail the following:</p> <ul style="list-style-type: none"> <li>i. The date, time and type of complaint;</li> <li>ii. The cause of the complaint; and</li> <li>iii. The action taken by the Consent Holder in response to the complaint.</li> </ul> <p>f) The register shall be available to the Chatham Islands Council on request.</p> <p>The Consent Holder shall appoint a suitably qualified and experienced liaison person from the construction team for the duration of the project. The liaison person is to be the main and readily accessible point of contact for persons affected by the project and construction works and shall be reasonably available for on-going consultation on all matters of concern to affected persons. The liaison person's name and contact details shall be included in the Communications Procedures.</p>
Erosion and Sediment Control Plan (ESCP)	<p>An ESCP shall be prepared by a suitably qualified and experienced person that includes (where applicable):</p> <ul style="list-style-type: none"> <li>a) Contributing catchment area;</li> <li>b) Retention volume of the structure (dead storage and live storage measured to the top of the primary spillway);</li> <li>c) Shape of structure (dimensions of structure);</li> <li>d) Position of inlets/outlets;</li> <li>e) Stabilisation of structures;</li> <li>f) Mitigation measures if a conspicuous change in colour or visual clarity is observed in accordance with Condition (5);</li> <li>g) Procedures for monitoring the effectiveness of the controls; and</li> <li>h) Inspection and auditing procedures and contingency plans if controls fail.</li> </ul> <p>The ESCP measures for each stage of works shall be installed prior to construction commencing. The measures shall be inspected to ensure</p>

Management Plan, Protocol, or Procedure	Specific information to be included in Construction Environmental Plan
	effective operation on a daily basis or immediately after a significant storm event during construction by the contractor. Regular inspections of the ESCP measures shall be carried out by a suitably qualified person.
Dust procedure	The Consent Holder shall prepare a dust deposition monitoring procedure for inclusion in the CEMP in accordance with the Ministry for the Environment “ <i>Good practice for assessing and managing the environmental effects of dust emissions</i> ”. The monitoring results will be used to determine the effectiveness of the dust management activities. If the appropriate effectiveness cannot be achieved, management protocols (which may include, but not be limited to vehicle speed limits, aggregate quality and water spraying) shall be applied.
Archaeology and sites of cultural significance	<p>The CEMP shall contain procedures to address and respond to all encounters with archaeological evidence or artefacts (for example, shell midden, hāngī, or ovens, pit depressions, waka, or kōiwi) during the construction works. These procedures need to be developed in conjunction with Heritage New Zealand, Hokotehi Moriori Trust, Ngāti Mutunga o Wharekauri and the Project Archaeologist. The procedures shall include an appropriate methodology for:</p> <ol style="list-style-type: none"> <li>a) Identifying the opportunity for archaeological monitoring by Imi/Iwi;</li> <li>b) Obtaining Heritage New Zealand Authorities and complying with their terms and conditions;</li> <li>c) Training contractors and workers in respect to archaeological matters;</li> <li>d) Identifying legal responsibilities under relevant legislation;</li> <li>e) Appointing of a Project Archaeologist;</li> <li>f) Steps to be taken when an artefact is discovered including: <ol style="list-style-type: none"> <li>i. Stop work notices;</li> <li>ii. Delineation of area of interest;</li> <li>iii. Notification procedures, and</li> <li>iv. Reporting.</li> </ol> </li> </ol>
Construction Noise and Vibration Management Plan (CNVMP)	<p>A CNVMP shall be prepared by a suitably qualified and experienced person that:</p> <ol style="list-style-type: none"> <li>a) Identifies the construction programme, construction activities likely to cause significant noise and/or vibration, and any sensitive parties and/or locations potentially affected by construction noise and vibration;</li> <li>b) Outlines baseline noise and vibration monitoring at sensitive locations, and ongoing monitoring and reporting as necessary in response to construction activities;</li> <li>c) Applies appropriate construction noise and vibration limits, including restrictions on operating times and days, where appropriate;</li> <li>d) Specifies measures to be adopted to avoid or minimise adverse construction noise effects, consistent with New Zealand Standard NZS6803: 1999 “Acoustics – Construction Noise”;</li> </ol>

Management Plan, Protocol, or Procedure	Specific information to be included in Construction Environmental Plan
	e) Identifies and adopts construction methods, equipment, plant and frequencies as necessary to avoid or minimise adverse vibration effects on buildings, properties, activities and affected parties adjacent to construction works; and f) Includes a complaints, response and reporting procedure.
Spill Containment Procedure	Procedures as detailed in Conditions 18 and 19 of Land Use Consent CIC/2021/009/1
Contaminated Land Management Plan (CLMP)	A CLMP shall be prepared by a suitably qualified and experienced person in accordance with Conditions 20 to 22 of Land Use Consent CIC/2021/009/1, that includes: <ol style="list-style-type: none"> <li>a) Procedures to identify and manage contaminated land that may exist on the project site; and</li> <li>b) The procedures to identify and manage contaminated land that may be discovered during the project works.</li> <li>c) The CLMP shall as a minimum address the following:               <ol style="list-style-type: none"> <li>i. Implementation and operational procedures;</li> <li>ii. Roles and responsibilities;</li> <li>iii. A programme of works;</li> <li>iv. A contingency action plan for unexpected contaminant discoveries;</li> <li>v. Procedures for handling, stockpiling, containment and removal of contaminated material;</li> <li>vi. The management of materials that are removed from the works areas to only authorised treatment facilities and disposal destinations;</li> <li>vii. Methods for keeping of records of material excavated including location of excavation, removal or disposal locations, quantity of material; and</li> <li>viii. Monitoring requirements and testing and disposal procedures.</li> </ol> </li> </ol>
Construction Traffic Management Plan (CTMP)	A CTMP shall be prepared by a suitably qualified and experienced person that includes, : <ol style="list-style-type: none"> <li>a) Road safety measures;</li> <li>b) Management measures of entrances onto public roads;</li> <li>c) Procedures for regular road safety inspections;</li> <li>d) Intersection and entrance control; and</li> <li>e) Provisions to address the droving of stock.</li> </ol>

Management Plan, Protocol, or Procedure	Specific information to be included in Construction Environmental Plan
Borrow Area Management Plan (BAMP)	<p>The BAMP shall be prepared by a suitably qualified and experienced person and subject to the conditions of Land Use Consent CIC/2021/009/1. It shall include:</p> <p><u>Operation</u></p> <ul style="list-style-type: none"> <li>a) A design and construction methodology for all works;</li> <li>b) A schedule of construction activities including the expected commencement date and duration of works;</li> <li>c) Evidence that a suitably qualified engineer has been appointed to carry out the overall design, supervision and certification of earthworks (including cut/fill stability and construction of all erosion and sediment controls);</li> <li>d) Design specifications of all earthworks, including disposal sites, and all erosion and sediment control measures to be implemented, including supporting calculations where appropriate;</li> <li>e) Monitoring and maintenance schedules for all erosion and sediment control measures on a set frequency (at least weekly), or within 24 hours of any rainstorm event that is likely to impair the function or performance of the control measures;</li> <li>f) Ensuring that temporary stockpiles of materials are adequately bunded to minimise discharge of sediment laden stormwater. Any sediment laden stormwater will be treated before discharge to ground soakage; and</li> <li>g) The requirements of Annex E2 of NZS 6803:1999 Acoustics – Construction Noise.</li> </ul> <p><u>Blasting</u></p> <p>Details of blasting shall include, but not limited to the following:</p> <ul style="list-style-type: none"> <li>a) Type of explosives/firing method;</li> <li>b) Timing/location of blasts;</li> <li>c) Risk assessment and mitigation control;</li> <li>d) Persons responsible/licences/permits required; and</li> <li>e) Record keeping and incident reporting.</li> </ul> <p><u>Rehabilitation</u></p> <p>The Consent Holder shall ensure that the BAMP includes rehabilitation to achieve that:</p>

Management Plan, Protocol, or Procedure	Specific information to be included in Construction Environmental Plan
	<ul style="list-style-type: none"> <li>a) All fill slopes are keyed into the surrounding land, as far as practicable;</li> <li>b) All fill material is placed and compacted so as to minimise any erosion and/or instability of the fill material;</li> <li>c) Final disposal site slope profiles are contoured to merge in with the existing slope, as far as practicable, to minimise erosion and hydrological changes, and to give effect to the conditions of Land Use Consent CIC/2021/009/1;</li> <li>d) Long-term stockpiles of topsoil and excavated material are suitably stabilised to minimise erosion potential;</li> <li>e) Any erosion of fill material is remedied or mitigated as soon as practicable to the satisfaction of the Chatham Islands Council;</li> <li>f) The borrow areas shall be fully rehabilitated in accordance with the requirements of Land Use Consent CIC2021/009/1 within six months of the final extraction of material from the site; and</li> <li>g) Borrow Area 1, if utilised, shall be rehabilitated in accordance with the above and the Restoration Plan identified in Conditions (24) to (27).</li> </ul>



Plan CIC/2021/009/1-B – Land Use Consent



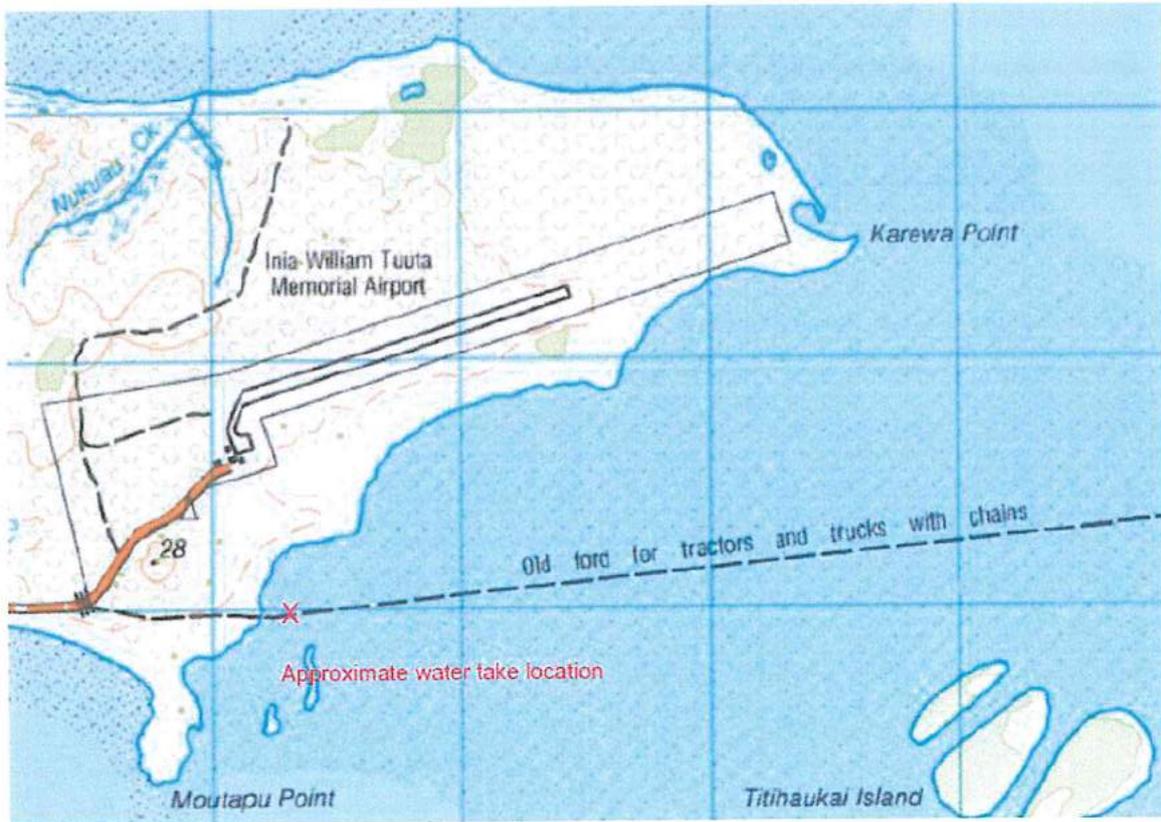


**Water Permit CIC/2021/009/2 – To take and use water**

	<b>LIMITS</b>
1.	Water shall only be taken from Te Whanga at or about map reference NZTM2000 2446807 mE, 5093655 mN, labelled as 'Approximate water take location' on the attached Plan CRC/2021/009-Water Permit, which forms part of this resource consent.
2.	Water shall only be taken: <ul style="list-style-type: none"> <li>a. At volumes not exceeding 50 cubic metres per hour and 500 cubic metres per day; and</li> <li>b. At a rate necessary to facilitate the activities under Condition (3).</li> </ul>
3.	Water shall only be used for dust suppression and compaction purposes during the Chatham Islands Airport Longer & Stronger Project.
4.	All practicable steps must be taken to avoid leakage from pipes and structures.
5.	The intake device shall be fitted with a fish screen with a mesh size of no greater than two millimetres to prevent the entrainment of fish during operation.
	<b>PRIOR TO TAKE</b>
6.	At least five working days prior to the commencement of the water take, the Chief Executive, Chatham Islands Council shall be informed of the commencement of works.
7.	Prior to the commencement of the water take, all personnel working on the site shall be made aware of and have access to: <ul style="list-style-type: none"> <li>a. The contents of this resource consent document; and</li> <li>b. Resource consents CIC/2021/009/1 and CIC/2021/009/3, and all associated documents relevant to the activity.</li> </ul>
	<b>DURING TAKE</b>
8.	During the installation, cleaning and maintenance of the intake device all practical steps shall be taken to minimise the discharge of contaminants and shall be undertaken in accordance with the Construction Environmental Management Plan required to be prepared under the land use consent for the Chatham Islands Airport Longer & Stronger Project.
	<b>AFTER WORKS</b>
9.	Upon completion of the works for the Chatham Islands Airport Longer & Stronger Project, the water intake in Te Whanga and all ancillary pipework, structures and equipment shall be removed.
	<b>ADMINISTRATION</b>
10.	The Chatham Islands Council may annually, on any of the last five days of May or November, serve notice of its intention to review the conditions of this resource consent for the purposes of:

	<ul style="list-style-type: none"><li>a. Dealing with any adverse effect on the environment which may arise from the exercise of this resource consent; or</li><li>b. Requiring the resource consent holder to carry out monitoring and reporting instead of, or in addition to, that required by the resource consent.</li></ul>
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Plan CIC/2021/009 - Water Permit



**Discharge Permit CIC/2021/009/3 – To discharge water and contaminants onto and into land**

	<b>LIMITS</b>
1.	<p>The discharge authorised under this resource consent shall only be:</p> <ol style="list-style-type: none"> <li>a. The discharge of brackish water taken from Te Whanga onto land within the works areas under Resource Consent CRC/2021/009/1 for the purposes of soil compaction and dust suppression; and</li> <li>b. The discharge of contaminated soils and/or material onto or into land as a result of the deposition of that material undertaken in accordance with Land Use Consent CRC/2021/009/1 associated with the Chatham Islands Airport Longer &amp; Stronger Project.</li> </ol> <p><b>Advice Note:</b> For the purpose of this resource consent, 'brackish water' shall be defined as water having a salinity between 0.5 and 30 parts per thousand (PPT).</p>
2.	<p>For brackish water discharged for compaction purposes, the discharge shall only be in a manner that minimises the risk of the discharge resulting in:</p> <ol style="list-style-type: none"> <li>a. Significant percolation; or</li> <li>b. Saturated soils; or</li> <li>c. Runoff to waterbodies or wetlands.</li> </ol>
3.	<p>For brackish water discharged for dust suppression purposes, the discharge shall occur via misting or fine spraying application and shall be undertaken in accordance with the Construction Environmental Management Plan required to be prepared under the Land Use Consent CIC/2021/009/1 for the Chatham Islands Airport Longer &amp; Stronger Project.</p>
4.	<p>The discharge of contaminated soils and/or materials must:</p> <ol style="list-style-type: none"> <li>a. Occur within the area labelled Wider Airport HAIL Area on the attached Plan CIC/2021/009/3, which forms part of this resource consent; and</li> <li>b. Not exceed <i>Resource Management (National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011</i> Soil Contaminant Standards for a 'Commercial/industrial outdoor worker (unpaved)', as determined in the detailed site investigation required to be carried under Land Use Consent CIC/2021/009/1; and</li> <li>c. Occur in accordance with: <ol style="list-style-type: none"> <li>i. The conditions of this resource consent; and</li> <li>ii. The Contaminated Land Management Plan required to be prepared under Land Use Consent CIC/2021/009/1.</li> </ol> </li> </ol>
5.	<p>The discharges authorised under this resource consent shall not give rise to any of the following effects in any receiving water body:</p> <ol style="list-style-type: none"> <li>a. The production of any conspicuous scums or foams on floatable or suspended materials;</li> <li>b. Any conspicuous change in colour or visual clarity;</li> <li>c. Any emission of objectionable odour; or</li> <li>d. The rendering of freshwater unsuitable for consumption by farm animals.</li> </ol>

	<b>PRIOR TO DISCHARGE</b>
6.	At least five working days prior to the commencement of the water take, the Chief Executive, Chatham Islands Council shall be informed of the commencement of works.
7.	Prior to the commencement of the water take, all personnel working on the site shall be made aware of and have access to: <ul style="list-style-type: none"> <li>a. The contents of this resource consent document; and</li> <li>b. Resource consents CIC/2021/009/1 and CIC/2021/009/2, and all associated documents relevant to the activity.</li> </ul>
	<b>MANAGEMENT OF CONTAMINATED SOILS AND/OR MATERIAL</b>
8.	<ul style="list-style-type: none"> <li>a. If contaminated soils and/or materials are to be retained on site, the details of the method of retention and/or remediation, including structures designed to contain contaminated soils or other contaminated materials, if any, must be provided to the Chief Executive, Chatham Islands Council for approval and confirmation that the adverse effects of the discharge of contaminated soils and/or material within the site on the environment are either avoided, remedied or mitigated to an acceptable level.</li> <li>b. A Long-term Site Management Plan (LTSMP) shall be submitted to the Chief Executive, Chatham Islands Council, within 20 working days of the completion of the discharge. The LTSMP shall: <ul style="list-style-type: none"> <li>i. Be prepared by a suitably qualified and experienced contaminated land practitioner (SQEP); and</li> <li>ii. Include details of the nature and volume of the material deposited, the location where the material has been deposited; and</li> <li>iii. Include the as-built design of the structure to contain the material; and</li> <li>iv. Address the required management of on-going and/or long-term risks associated with the discharge of contaminated soils and/or materials into land; and</li> <li>v. Provide measures to ensure adverse effects of the activity on the environment are either avoided, remedied or mitigated to an acceptable level that.</li> </ul> </li> </ul> <p><b>Advice Note:</b> 'Acceptable level' shall be defined as the deposited soils and/or materials posing low risk to the environment and human health, as determined by a suitably qualified and experienced contaminated land practitioner (SQEP) and confirmed by the Chatham Islands Council.</p>
	<b>ADMINISTRATION</b>
9.	The Chatham Islands Council may annually, on any of the last five days of May or November, serve notice of its intention to review the conditions of this resource consent for the purposes of: <ul style="list-style-type: none"> <li>a. Dealing with any adverse effect on the environment which may arise from the exercise of this resource consent; or</li> </ul>

	<p>b. Requiring the resource consent holder to carry out monitoring and reporting instead of, or in addition to, that required by the resource consent.</p>
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## 6. Regulatory

### 6.5 Application for Subdivision – A Sayce & D Shaw – CIC/2021/007

<b>Date of meeting</b>	16 September 2021
<b>Agenda item number</b>	6.5
<b>Author/s</b>	Paul Whyte (Beca)

#### Purpose

Report to Chatham Islands Council on consents and licences issued for the year ending 30 June 2021.

#### Recommendations

**THAT :**

- (i) Pursuant to Section 95A-G the application does not require public notification or limited notification.**
- (ii) That pursuant to Sections 104 and 104C of the Act Council grants consent to:**
  - Subdivide Lot 5 LT 562838 into proposed Lot 5 and proposed Lot 7 submitted with the applications subject to the following conditions:**
    - 1. The proposed activity must be undertaken in general accordance with the information and plans provided with the resource consent application received by the Council on 25 August 2021.**
    - 2. The subdivision shall not occur until LT 562838 is completed and Record of Title 998992 is raised.**
    - 3. Pursuant to 221 of the Resource Management Act 1991 a consent notice shall be imposed on the record of title for Lot 7 advising as follows: -**
      - All future earthworks and building development on Lot 7 shall be consistent with a geotechnical report prepared by a suitably qualified geotechnical engineer that is to be provided at the time of the development on the site.**

#### Background

An application for subdivision has been received from A Sayce and D Shaw. The proposal is to subdivide Lot 5 LT 562838 into two allotments - Lot 5 comprising 42.2380 ha and Lot 7 comprising 1.486 ha. The 43.72ha subject site is located on the western side of North Road, Chatham Island, approximately 2.1km north-east of Tennants Lake and Te Roto, and 2.3km north of the intersection of North Road with Port Hutt Road, in an existing rural area on the Chatham Islands. A report on the application has been provided by Paul Whyte

# Resource Management Report for Chatham Islands Council CIC/2021/007

**Applicant:** Andrea Sayce and Dylan Shaw

**Application:** To subdivide Lot 5 LT 562838 into proposed Lot 5 (comprising 42.2380 ha) and proposed Lot 7 (comprising 1.486 ha).

**Site Description:** North Road, Chatham Island

**Zoning:** Rural Zone of the Chatham Islands Resource Management Document (CIRMD).

**Type of Activity:** Subdivision Consent – Restricted Discretionary Activity

## 1. Introduction

This report is prepared by Paul Whyte, Senior Planner of Beca Ltd for the Chatham Islands Council (the Council) pursuant to section 42A of the Resource Management Act (RMA). The report reviews the application for resource consent and addresses the relevant information and issues raised. It should be emphasised that any conclusions reached, or recommendations made in this report are not binding on the Council.

## 2. The Application

The proposal is to subdivide Lot 5 LT 562838 into two allotments -Lot 5 comprising 42.2380 ha and Lot 7 comprising 1.486 ha. The 43.72ha subject site is located on the western side of North Road, Chatham Island, approximately 2.1km north-east of Tennants Lake and Te Roto, and 2.3km north of the intersection of North Road with Port Hutt Road, in an existing rural area on the Chatham Islands.

The site currently contains a house, farm buildings, and rural land comprising a mixture of farmland, scrub and bush. The house and farm buildings are serviced via on-site means, electricity is off the grid (solar power), stormwater is discharged to ground, and water supply and wastewater are collected / discharged via on-site tanks / effluent field.

The application notes that Lot 5 LT 562838 is approved as to Survey but Record of Title 998992, which is the subject of this application, is yet to be raised. The applicant notes that the previously approved subdivision consent application was made by Baseline Group Ltd in 2020 and is assumed that this subdivision will be completed, and titles raised, in due course. I note this clearly will need to occur before the current subdivision can proceed.

The previous subdivision resulted in a 5 lot subdivision ranging in area from 2 ha to 47 ha. The current proposal will result in the subdivision of Lot 5 which originally comprised 47.15 ha, and which has been further subdivided into Lot 6 (3.7ha) and now proposed Lot 7. The plan of subdivision is shown in Figure 1 below.

Proposed Lot 7 will comprise a 1.4860ha area of rural land (predominantly scrub) in the south-east corner of the site. Proposed Lot 5 will comprise the balance of the subdivision and includes the existing dwelling and farm buildings and a large area of rural land. No earthworks are proposed as part of this subdivision consent and no development of Lot 7 is currently proposed.

In terms of access the applicant notes the following:

Both proposed allotments have legal and physical access from North Road. The site currently has formed vehicle access via a metalled vehicle crossing and gated accessway from North Road. As discussed above, the physical location of North Road does not coincide with the legal boundary. Proposed Lot 7 is able to utilise the existing vehicle access without the need for a Right of Way. It is considered that proposed Lot 7 has direct access from North Road (legal road frontage). Both proposed allotments will be accessed from the vehicle crossing and access gate. Proposed Lot 7 can be accessed via an existing vehicle access track within the legal Road corridor, and proposed Lot 5 will continue to be accessed from the gated accessway.

There is also an existing right-of-way over Lot 5 in favour of existing Lot 2 as shown on Figure 1.

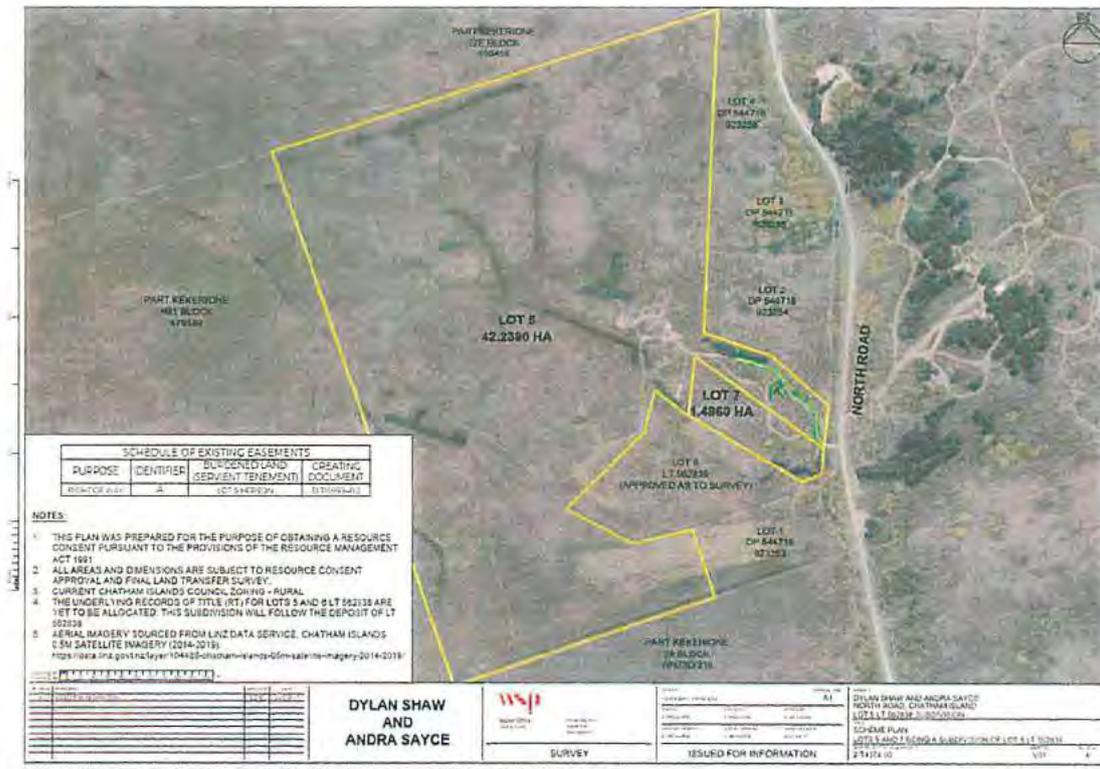


Figure 1: Proposed Subdivision North Road

The applicant also states that both proposed allotments are of sufficient size to accommodate on-site servicing given proposed Lot 5 is already serviced via on-site means and proposed Lot 7 will be serviced at the time of future development. In respect of Lot 5, roof water is collected in tanks for re-use as drinking water and to meet fire-fighting water supply requirements, power is supplied by solar, sewage is discharged onsite to dispersal fields via a septic tank system, and stormwater is discharged to ground.

I agree with the applicant that it is unlikely the site is a HAIL site and accordingly not subject to the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES).

### 3. Resource Consent Required

The site is located in the Rural Zone of the CIRMD.

In the CIRMD, the proposal is a **restricted discretionary activity** as per Rule 5.3.4.12(i) given that the lots can contain a suitable building platform and are more than 100m from the MHWS. Accordingly, sections 104 and 104C of the RMA are particularly relevant.

### 4. Notification/Non-Notification

Changes to the Resource Management Act that came into force on 18 October 2017 have introduced a new, formulaic approach to determining whether applications for resource consent require public or limited notification.

I have reviewed sections 95 and 95A – 95G as amended by the Resource Legislation Amendment Act and am satisfied that the proposal does not require public notification pursuant to these. In particular, I note that:

- The Consent Holder has not requested public notification (section 95A(3)(a));
- Public notification is not required under section 95A (section 95A(3)(b));
- The application does not include a proposal to exchange reserve land (section 95A(3)(c));
- Notification of the application is not required by a rule or national environmental standard (sections 95A(5)(a) and 95A(8)(a));
- The application will not have adverse effects that are more than minor (section 95A(8)(b)); and
- There are no special circumstances that would warrant public notification (section 95A(9));

In respect of limited notification, the effects are considered to be less than minor in terms of Section 95E of the Act and as such there are no affected parties.

### 5. Assessment of Application

The subdivision will result in one additional allotment. Rule 5.3.4.12 of the CIRMD lists the matters Council has restricted its discretion which are listed below in (a) –(j). Overall, I generally concur with the applicant's assessment of effects and note the following in terms of the matters of discretion.

#### (a) The imposition of Development Contributions as provided for in Section 4.13

As the subdivision will utilise an existing vehicle crossing, and the sites will be self-serviced development contributions are not required. While Council could take a reserve contribution in terms of Rule 4.13.2.4 9 (viii) relating to the additional allotment, Council generally does not apply this policy.

#### (b) The design and layout of subdivisions

The lots appear to be of an appropriate size. Lot 7 has sufficient area (1.486ha) for a building platform and disposal of on-site sewage. Lot 5, which is more than 42ha, contains an existing dwelling and it appears will continue to be used for farming purposes and the reduction in an area of approximately 1.4ha is unlikely to affect this activity.

#### (c) Protection of features such as rural amenity, outstanding landscapes, heritage items, significant indigenous vegetation and habitats and Imi/Iwi values .

Generally, I consider the area of Lots 5 and 7 will maintain the amenity of the Rural Zone. Lot 5 is a relatively large area which will continue to be used for rural purposes, and Lot 7 while smaller, is still of a reasonable size, capable of a rural use. As such I concur with the applicant that *“the proposal is consistent with the existing rural amenity which comprises dispersed buildings, gravelled vehicle access and the dominance of open undeveloped farmland.”*

The site is not identified as containing any significant natural areas or heritage items or areas of significance for Imi/Iwi that could be adversely affected by the proposal.

(d) Creation of esplanade reserves/strips

The absence of waterways means this provision is not applicable.

(e) Transfer or amalgamation of parcels

Transfer or amalgamation of parcels is not proposed with the subdivision.

(f) The siting of buildings

There is an existing dwelling on Lot 5 while in respect of Lot 7 no dwelling is proposed at present, but it appears that the relevant bulk and location controls are able to be met given the area of the lot.

(g) The filling and compaction of the land and earthworks.

The application notes that *“No earthworks are proposed at the time of this subdivision consent application. Future earthworks are limited to those required for any future development and access (future driveway) on proposed Lot 7. A condition of consent is requested requiring a geotechnical report to be provided at the time of any future development on this proposed lot. With the imposition of the requested condition, it is considered that any effects resulting from future earthworks will be less than minor and acceptable.”*

I concur with this approach and an appropriate condition is set out in this report which should ensure potential adverse effects are appropriately managed.

(h) The provision of services

As discussed above, Lot 5 is already serviced. The applicant notes that should any new dwelling be built on proposed Lot 7 in future, these will be provided with water supply and stormwater and sewage disposal in accordance with Council requirements and the New Zealand Fire Service Firefighting water supplies Code of Practice SNZ PAS 4509:2008.

In terms of vehicular access both proposed allotments will utilise an existing access from North Road. I concur with the applicant that both legal and physical frontage is provided.

(i) Protection of land from natural hazards

It would appear hazards such as tsunamis, flooding, liquefaction etc are unlikely to be an issue.

(j) Vesting of beds of lakes and rivers

This is not relevant to this application.

Overall, I consider that the adverse effects of the application on the environment are less than minor while there will be positive effects in terms of providing for potential additional housing on Chatham Island.

In terms of the objectives and policies of the CIRMD the most relevant chapters are the Subdivision and Rural Zone Chapters. The subdivision provisions are considered to be met because the proposed lots are appropriate for subsequent uses; adverse effects do not arise in terms of natural features or heritage items or natural hazards and services are not affected (Refer Chapter 4.12).

In terms of the Rural Zone provisions (Chapter 5.3) the proposal will provide for the wellbeing of the community while ensuring a sustainable resource base for future generations. The openness and character of the Rural Zone will generally be maintained, and amenity values protected (Policy 5.3.3.1).

## **5. Conclusion**

Overall, in terms of Section 104(1)(a) any effects of the proposal on the environment are less than minor and the proposal is consistent with the objectives and policies of the CIRMD in respect of Section 104(1)(b). The application is in accordance with Part 2 of the RMA in that the application will enable social and economic well-being for the community without compromising the environment.

Accordingly, the resource consent can be granted subject to conditions. The applicant has viewed the conditions and is in agreement with them.

## **6. Recommendation**

Subdivision Consent (CIC/2021/007)

(i) That pursuant to Section 95A-G the application does not require public notification or limited notification.

(ii) That pursuant to Sections 104 and 104C of the Act Council grants consent to:

Subdivide Lot 5 LT 562838 into proposed Lot 5 and proposed Lot 7 submitted with the application subject to the following conditions:

1. The proposed activity must be undertaken in general accordance with the information and plans provided with the resource consent application received by the Council on 25 August 2021.
2. The subdivision shall not occur until LT 562838 is completed and Record of Title 998992 is raised.
3. Pursuant to 221 of the Resource Management Act 1991 a consent notice shall be imposed on the record of title for Lot 7 advising as follows: -

All future earthworks and building development on Lot 7 shall be consistent with a geotechnical report prepared by a suitably qualified geotechnical engineer that is to be provided at the time of the development on the site.

**Paul Whyte**

**7 September 2021**

**Consultant Planner**

## Public Excluded Agenda

16 September 2021

### Mayor to Move

I move that the public be excluded from the following part of the proceedings of the meeting.

The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter and the specific grounds under Section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

Item No.	Minutes / Report of:	General subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Ground(s) under Section 48(1) for the passing of this resolution
1	Chief Executive Officer	Minutes of In Camera Meeting 12 August 2021	Good reason to withhold exists under Section 7	Section 48(1)(a)
2	Chief Executive Officer	Deed of Lease – Water Tanks on Prendeville Land	Good reason to withhold exists under Section 7	Section 48(1)(a)

This resolution is made in reliance on Section 48(1)(a) of the Local Government Official Information and Meetings Act 1987, and the particular interest or interests protected by Section 6 or Section 7 of that Act which would be prejudiced by holding the whole or relevant part of the proceedings of the meeting in public, are as follows:

Item Nos	
1.	Would be likely to prejudice the commercial position of the person or persons who are the subject of the information. 7(2)(b)(ii) To maintain legal professional privilege. 7(2)(h) To enable the Council holding the information to carry out, without prejudice or disadvantage, commercial activities. 7(2)(i)
2.	Would be likely to prejudice the commercial position of the person or persons who are the subject of the information. 7(2)(b)(ii)