CENTRAL HAWKE'S BAY
DISTRICT COUNCIL

Inflow and Infiltration Management Plan

Porangahau and
Te Paerahi

July 2021

Prepared for Central Hawke's Bay District Council

Prepared by Beca

Revision History

Revision Nº	Prepared By	Description	Date
1	Logan Thomson	Draft for client review	25/06/2021
2	Ben Severinsen	Formatting & Content	30/06/2021
3	Ben Severinsen	Formatting & Content	30/08/2021
4	Ben Severinsen/Logan Thomson	Content Update	06/09/2021

Contents

1 Introduction 3
1.1 Preface 3
1.2 Background 3
1.3 Resource Consents 3
1.4 Purpose 4
2 Inflow and Infiltration Explained 4
3 Investigation Options 5
3.1 Surface inspections of properties. 5
3.2 Integrity testing 5
3.3 Dye testing 5
3.4 Private sewers 5
3.5 Network inspections 5
3.6 CCTV inspection 5
3.7 Flow monitoring 5
4 Remediation Options 6
4.1 Notice to rectify for faults in private systems. 6
4.2 Repair of faults in public system. 6
4.3 Stormwater improvements 6
5 The Wastewater Asset 6
5.1 Porangahau 6
5.2 Te Paerahi 7
6 Extent of Inflow and Infiltration 8
7 Wastewater Flows 2020-2021 9
8 Reduction Strategy 12
8.1 Generally 12
8.2 Inspection 12
8.3 Investigation 12
8.4 Testing 12
8.5 Analysis 12
8.6 Follow-up testing 12
9 Current Status 12
10 Programme of Works 13
11 Funding Allocated 14

1 Introduction

1.1 Preface

This report presents a management plan for the reduction of inflow and infiltration (I&I) of stormwater and groundwater to the Porangahau and Te Paerahi wastewater systems.

Inflow and infiltration of stormwater and groundwater into the sewerage reticulation increases the volumes of effluent arriving at the wastewater treatment plants. This extra volume can:

- Affect the quality of effluent leaving the treatment plants
- Lead to higher capital and operating costs due to the extra volumes of effluent that have to be processed
- Increase the frequency of controlled and uncontrolled overflows from the wastewater reticulation
- Lead to breach of resource consent by exceeding discharge limits on flows and/or water quality standards

Existing resource consents for the discharge of treated wastewater from the Wastewater Treatment Plants (WWTPs) at Porangahau and Te Paerahi require I&I Management Plans to be prepared and submitted to the Hawkes Bay Regional Council (HBRC). A management plan for Porangahau and Te Paerahi was previously issued in February 2010.

1.2 Background

The sewerage system in Porangahau and Te Paerahi were constructed in the late 1980s. Some inflow and infiltration is inevitable in any aging sewerage network. However, it is a major problem in Porangahau; where both inflow and infiltration of stormwater and groundwater are causing violation of discharge consent conditions. Some I&I is also evident at Te Paerahi. In general, I&I greatly increases the volumes of effluent that need to be processed through the network and at the WWTPs.

These extra volumes of effluent due to I&I will necessitate a greater hydraulic capacity for any new or upgraded treatment facilities and downstream pipes, greater operational costs, greater buffer storage requirements and a reduction in spare network capacity, reducing the networks ability to support growth.

CHBDC are currently evaluating options for upgrades to the wastewater treatment plants for Te Paerahi and Porangahau. It is likely that Te Paerahi and Porangahau will be combined into one WWTP with discharge of treated effluent to land.

The current consents for these plants have lapsed for both Porangahau and Te Paerahi respectively. New consents for Te Paerahi and Porangahau have been submitted and are under regional council review

CHBDC has set aside budgets in the Long Term Plan (LTP) specifically for I&I investigations and reduction, as well as for sewer renewals which will have the added benefit of reducing I&I.

1.3 Resource Consents

Porangahau and Te Paerahi WWTPs have historical resource consents allowing discharge of treated effluent by the Hawke's Bay Regional Council (HBRC). The discharges are covered by the consents listed in Table 1.

Table 1: Resource consents to discharge treated effluent

Location	Consent Number	Consented Activity
Porangahau	DP030233W	To discharge treated domestic effluent into the Porangahau River.
Te Paerahi	DP030234La	To discharge treated domestic effluent into or onto land (via soakage) from the existing Te Paerahi (Porangahau Beach) Oxidation Pond in circumstances where that contaminant may enter water.

The wastewater resource consents from HBRC for Porangahau and Te Paerahi WWTPs have a limit on the outflow from the treatment systems. There is also a requirement in the wastewater resource consents for Porangahau and Te Paerahi to submit a Stormwater Infiltration Management Plan to HBRC within 3 months of consent conditions being granted. These are listed under conditions 6 and 5, respectively. The consents require such plans to contain the following:

a) The incidence of stormwater infiltration into the reticulated wastewater system and measures available to reduce such infiltration as far as practicable;

b) A strategy for reducing stormwater infiltration into the reticulated wastewater system and an implementation plan for achieving the strategy to be reported as the Stormwater Infiltration Management Plan;

c) Any proposed works or methods to address sources of stormwater infiltration into the reticulated wastewater system where those sources have been identified as part of the Stormwater Infiltration Management Plan.

1.4 Purpose

The purpose of this report is to satisfy the conditions of the resource consents detailed above. A stormwater infiltration management plan was previously submitted in February 2010 for Porangahau and Te Paerahi. Given the activity around renewing the resource consents, upgrading WWTPs, I&I reduction works and sewer renewals, this document updates the previous plans to provide an update to HBRC.

2 Inflow and Infiltration Explained

Sewerage networks and sewage treatment processes are designed allowing for extra flows recognising that some stormwater will find its way into the sewerage network. However excess volumes of stormwater entering the sewerage network cause two main problems – pipe sizes need to be increased to allow for the excessive flow or conversely overflows of sewage from the reticulation will occur, and treatment processes may need to be designed to process the peak flows with consequential extra capital and operating costs.

Two means of ingress of water are recognised:

1. **Inflow**, which is stormwater gaining access to the reticulation through openings in the sewers. Examples are: stormwater downpipes discharging into gully traps, gully traps being inundated by surface flooding, deliberate stormwater connections into the sewer. Inflow is usually identified by increased inflow of sewage to the oxidation ponds corresponding with rainfall events.

2. **Infiltration**, which is groundwater leaking into the sewers. This is most often due to cracked pipes and manholes, or poor or deteriorated joints where the network is below the groundwater table. Infiltration is usually identified by continuing inflow to the network well after rain events have finished, and high night time flows (in the absence of wet industrial users with 24hr operation).

3 Investigation Options

A number of processes are available to identify inflow and infiltration problems. These include the following:

3.1 Surface inspections of properties.

A systematic inspection of each property connected to the sewerage network is carried out. The inspection is looking for: downpipes discharging into gully traps, gully traps with low or no surround allowing surface flows into the gully trap, gully traps sited at low points so that they become the stormwater drain, and gully traps likely to be inundated with flood waters in times of high rainfall.

3.2 Integrity testing

Sewers can be tested to find any leaks and illegal connections. Most commonly used is smoke testing where smoke is pumped into the sewers and comes out of the ground where the sewer is leaking, or comes out of downpipes where these are connected directly to the sewer. Sewers can also be tested with inflatable “sausages” which seal of lengths of the sewer and apply a pressure test. Loss of pressure indicates leaks or connections.

3.3 Dye testing

Dye can be introduced to suspect connections to see whether they discharge into a stormwater or sewerage system.

3.4 Private sewers

Private sewers (“laterals”) typically make up at least half of the length of sewers in a sewerage network. Pressure testing of private sewers is difficult because of the small pipe sizes involved and the extent of the private sewers. However they are often a major source of inflow and infiltration.

3.5 Network inspections

Inspection of manholes will reveal leaking manholes, which are then sealed or renewed. Inspection also allows an assessment of the amount of clear water flowing in the sewers, indicating where stormwater maybe entering the sewer network. The flows can be followed up the sewers to pinpoint the source, which can then be addressed.

3.6 CCTV inspection

Inspection can also be done with video cameras (CCTV). The inside of sewers can be seen, and defects noted and rectified.

3.7 Flow monitoring

To determine the extent and magnitude of inflow and infiltration problems, flow in the sewers can be measured with flow monitors installed in key manholes. From the flows and particularly their correlation with rainfall, efforts at reducing inflow and infiltration can be targeted at the worst branches of the network to get best results for the effort applied.

4 Remediation Options

A number of processes are available to rectify what is found. These include the following:

4.1 Notice to rectify for faults in private systems.

For faults found in private properties from inspections, testing and investigation, notices are sent to all non-complying properties asking for faults to be rectified. A follow up inspection is then made to ensure faults have been rectified. After three defect notices are issued, Council will instruct a contractor to remediate the defect and recover the cost from the land owner. This approach was supported by Council at the Finance and Infrastructure meeting on 12 August 2021. If necessary, and as a last resort, prosecution against the defect owner can be instigated.

It has been found that some properties, after having had their rectification approved, revert back to the original configuration. This requires a continuing inspection programme to be followed.

In some cases a larger problem is identified; in that no suitable stormwater system exists to divert the stormwater flows away from the sewers. In Porangahau and Te Paerahi reticulated stormwater is limited.

4.2 Repair of faults in public system.

Where faults are found in the public sewer reticulation, repairs or replacement are either carried out immediately, or included in the longer-term plan for improvements to the system.

Leaking manholes are sealed or renewed, damaged sewers are either repaired, replaced, or relined.

4.3 Stormwater improvements

In some cases the removal of stormwater connections to the sewers is complicated by not having a suitable stormwater system available. In these cases, a new stormwater network may have to be constructed to provide an outlet other than the public sewer. Where there is large scale inundation of gully traps by surface water, the flooding of a large area may have to be addressed and a stormwater system installed to alleviate the flooding.

5 The Wastewater Asset

Central Hawke's Bay District Council operates six sewerage schemes, at Otane, Waipawa, Waipukurau, Takapau, Porangahau and Te Paerahi. All have I&I problems. An assessment of the inflow and infiltration problems in the Porangahau and Te Paerahi systems is as follows:

5.1 Porangahau

Wastewater treatment and disposal in Porangahau was originally by private septic tanks. These tanks were connected directly into the new wastewater reticulation when it was built in 1988. The old private sewers and septic tanks were never removed. These are suspected to be the main cause of infiltration.

The wastewater system collects wastewater from Porangahau and carries it to the nearby treatment facility off Jones Street, via Jones Street pump station. Effluent is treated in an oxidation pond, before directly discharging to a stream which feeds into the Porangahau River. There are 105 connections in the network, with one pump station, across 4 kilometres of PVC pipe

5.2 Te Paerahi

The wastewater system collects wastewater from Te Paerahi and carries it to the treatment facility off the end of Te Paerahi Road. Waste is pumped to the facility via the Makaramu Crescent and Te Paerahi Road pump stations.

Effluent is treated in an oxidation pond, before being directly applied to land via irrigation.

There are 124 connections in the network, with two pump stations, across 5.4 kilometres of PVC pipe.

Total pipe lengths by diameter, at each location are summarised in Table 2, while Figure 1 and Figure 2 show pipe material and age.

Table 2: Total length of pipe by diameter for Te Paerahi and Porangahau (laterals, gravity and rising mains)

Pipe Diameter	Porangahau (km)	Te Paerahi (km)
50	0.815	1.369
100	0.521	1.416
150	2.683	2.603
Unknown		0.044
TOTAL	**4.0**	**5.4**

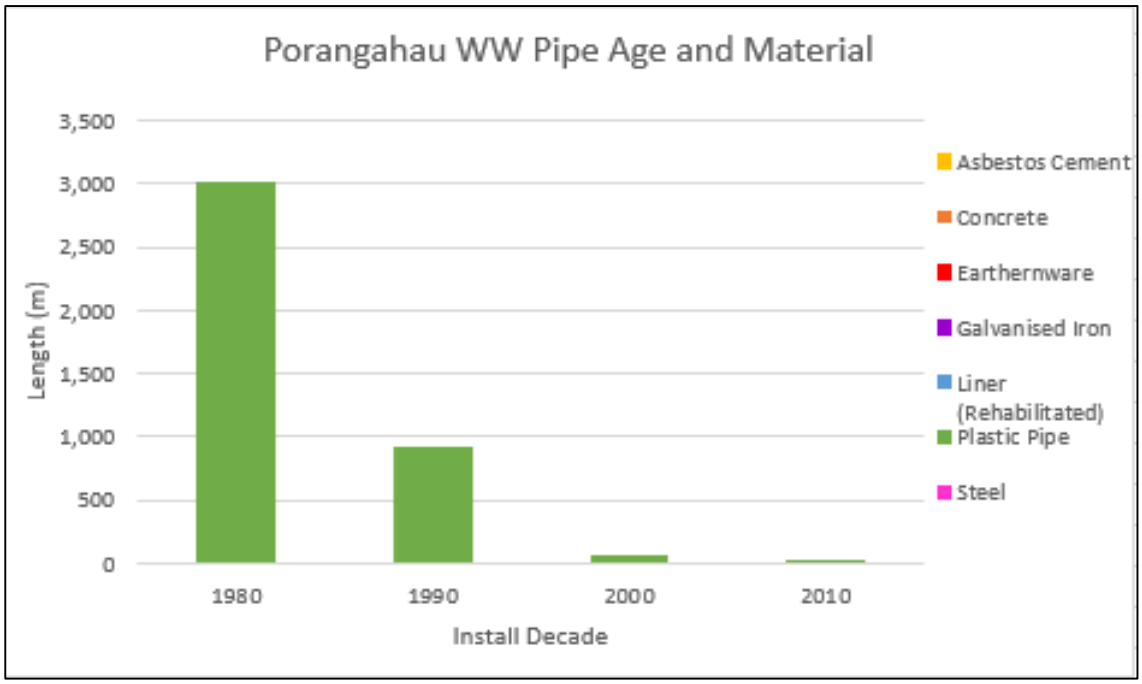


Figure 1: Wastewater pipes in Porangahau by age and material (includes laterals)

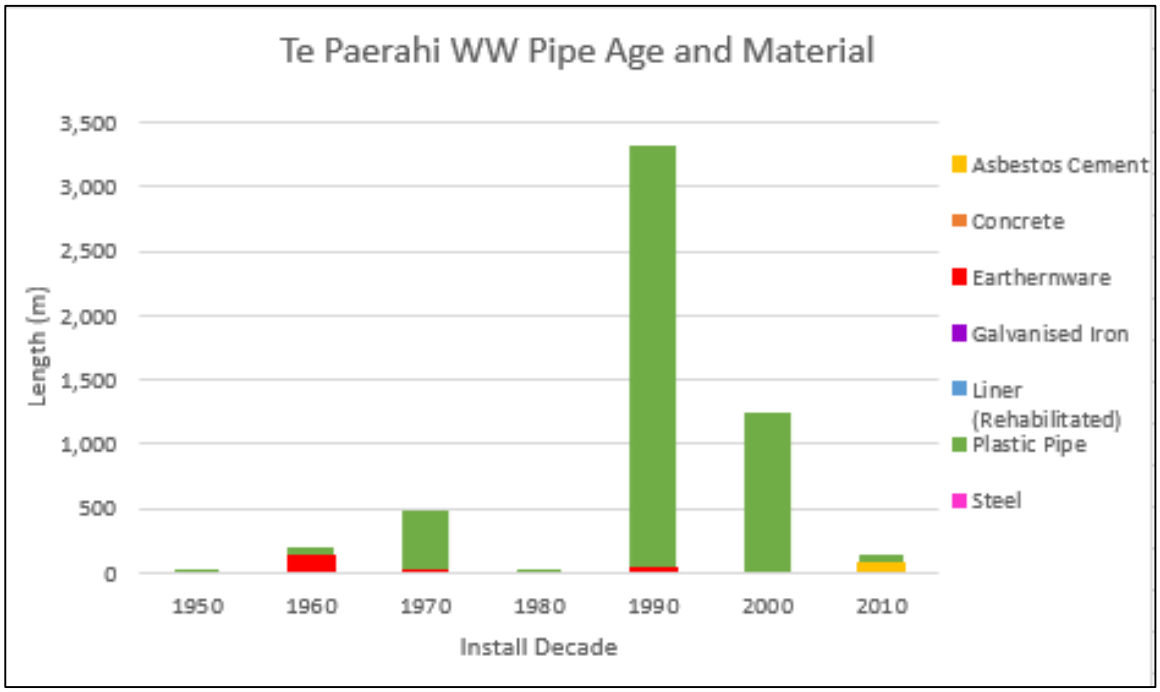


Figure 2: Wastewater pipes in Porangahau by age and material (includes laterals)

6 Extent of Inflow and Infiltration

SCADA data from outflow meters from the WWTPs at Porangahau and Te Paerahi is available from January 2017.

High flows were identified from the SCADA data to identify the peak wet weather (PWWF) event. Rainfall during the PWWF event was analysed on the HBRC website to put context to the PWWF event. Groundwater monitoring data was not available at Porangahau or Te Paerahi to make a comparison of average dry weather flows during low and high groundwater periods.

To put context to the peak wet weather flows and subsequent peaking factor, an equivalent ARI was estimated by comparing the rainfall depth and storm duration to storms from HIRDS V4. Note that HIRDS does not provide storms with an Average Recurrence Interval (ARI) of less than 1.58 due to inaccuracies in the calculation of ARI for smaller events, therefore smaller events have been reported as being less than 1.58 ARI.

Peak wet weather flows for Porangahau and Te Paerahi are shown in Tables 3-4.

Table 3: Historical flows for Porangahau network dating back to January 2017, as measured at outlet from WWTP

Period	Event	Flow(m^3/day)	Peaking Factor	ARI Equivalent
5th April 2017	Peak wet weather	1711	12.8	1 in 2 (113mm)
1st Jan 2017 – 28th June 2021	Average dry weather	134		

*No groundwater data available

Table 4: Historical flows for Te Paerahi network dating back to January 2017, as measured at outlet from WWTP

Period	Event	Flow(m^3/day)	Peaking Factor	ARI Equivalent
9th March 2018	Peak wet weather	407	5.9	1 in 10 (145mm)
1st Jan 2017 – 28th June 2021	Average dry weather	69		

*No groundwater data available

The flows presented in Tables 3-4 show relatively high peaking factors at both sites, indicating significant inflow during wet weather events.

Porangahau has a very high per capita average dry weather flow at 525l/person/day (based on a 2019 population of 255 people). Per capita flows of less than 170l/p/d are indicative of exfiltration, while flows of greater than 270l/p/d are indicative of significant groundwater infiltration (Infiltration and Inflow Control Manual Water NZ, March 2015), indicating Porangahau has a significant groundwater infiltration problem. This may be exacerbated or caused by the direct connection of septic tanks to the sewer system when the system was installed in 1988.

Note that the recurrence interval of the rainstorm and rainfall depth do not directly correlate with wastewater flows received at the WWTPs, as antecedent conditions, ground saturation, groundwater levels, storm duration and nested or back to back storms all also contribute to peak flow events. For a typical wastewater network, events beyond a 1 in 2 year ARI event won't have much additional effect on PWWF received at the WWTP as overflows will occur in the network.

All of the figures presented above show outflows from the WWTP, as there are no inflow meters at Porangahau and Te Paerahi. Measuring outflow will result in differences to inflow from the network due to:

- Direct rainfall on the ponds, effectively adding to I&I volume
- Buffering effect of ponds, helping to reduce peak flows from the network

7 Wastewater Flows 2020-2021

Porangahau and Te Paerahi have limits on daily outflows, specified in the respective discharge consent conditions. These limits are displayed in Table 5.

Table 5: Discharge flow limits from the Te Paerahi, and Porangahau WWTPs

Plant	Consent Condition Number	Lower Limit		Allowable Exceedance Frequency	Upper Limit		Allowable Exceedance Frequency
Porangahau	3	1.5	L/s	50%	4.8	L/s	5%
	4	130	m^3/d	50%	415	m^3/d	5%
Te Paerahi	3	87	m^3/d	50%	190	m^3/d	5%

Conditions 24(c), 22(c) of the Porangahau and Te Paerahi consents respectively require a review of consent compliance every 12 months. Measured flow data from the last 12 months of the current consents (28 June 2020 – 28 June 2021) has been compared against the flow consent conditions (in m^3/d) at the various plants. This comparison is shown in Table 6 below.

Table 6: Frequency of exceedance of consent conditions over previous year (28th June 2020 to 28th June 2021).

Plant	Lower Limit Exceedance Frequency	Compliant	Lower Limit Exceedance Frequency	Compliant
Porangahau	64%	No	2.7%	Yes
Te Paerahi	10%	Yes	0%	Yes

Porangahau flows breach the lower limit exceedance frequency, which is indicative of a high baseflow due to groundwater infiltration. This is likely due to the disused septic tanks still being connected to the network.

Te Paerahi is currently compliant with the discharge consent conditions, however the relatively high peaking factor shown in Table 4 suggests I&I is still an issue.

Figure 3 and **Error! Reference source not found.** show the discharge from the Porangahau and Te Paerahi WWTPs with consent limits. Figure 5 shows daily rainfall at Porangahau. The figures show a direct correlation between rainfall and increased discharge from the WWTPs.

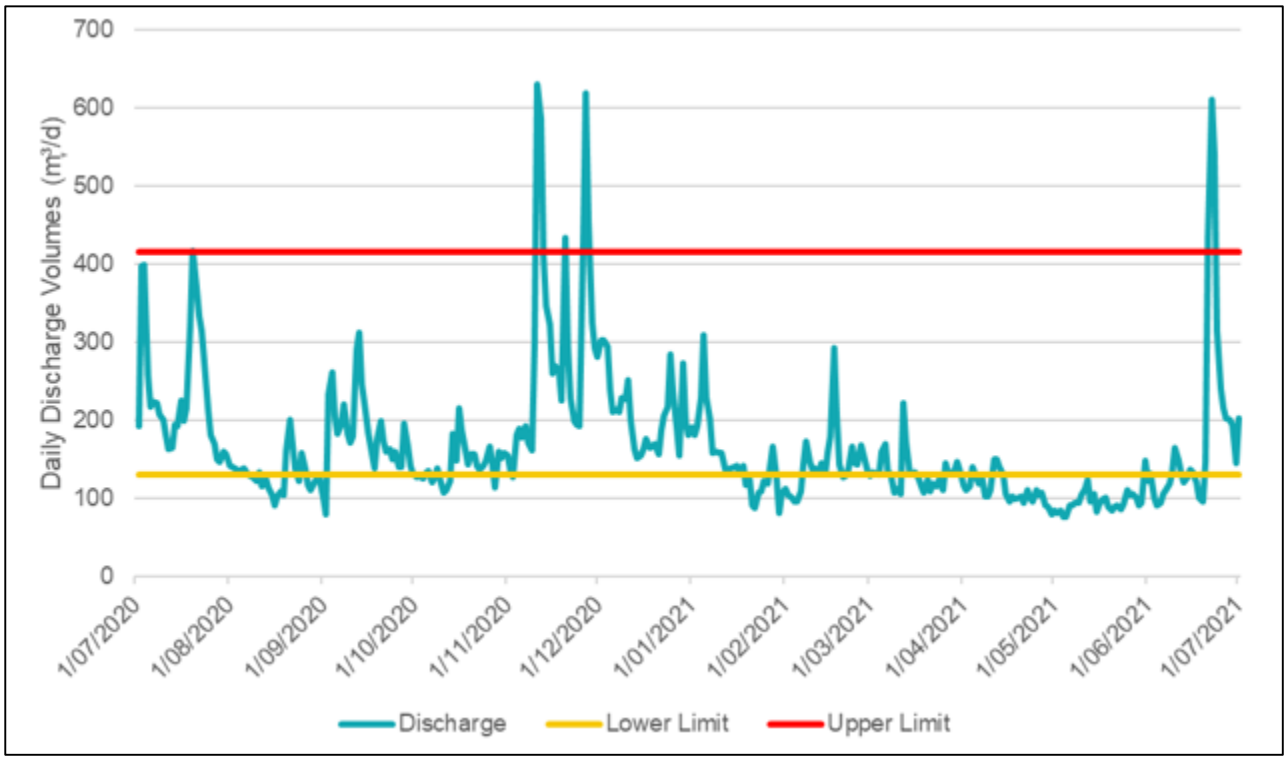


Figure 3: Daily discharge volumes over the 2020/21 monitoring period (with consent limits shown) from Porangahau WWTP

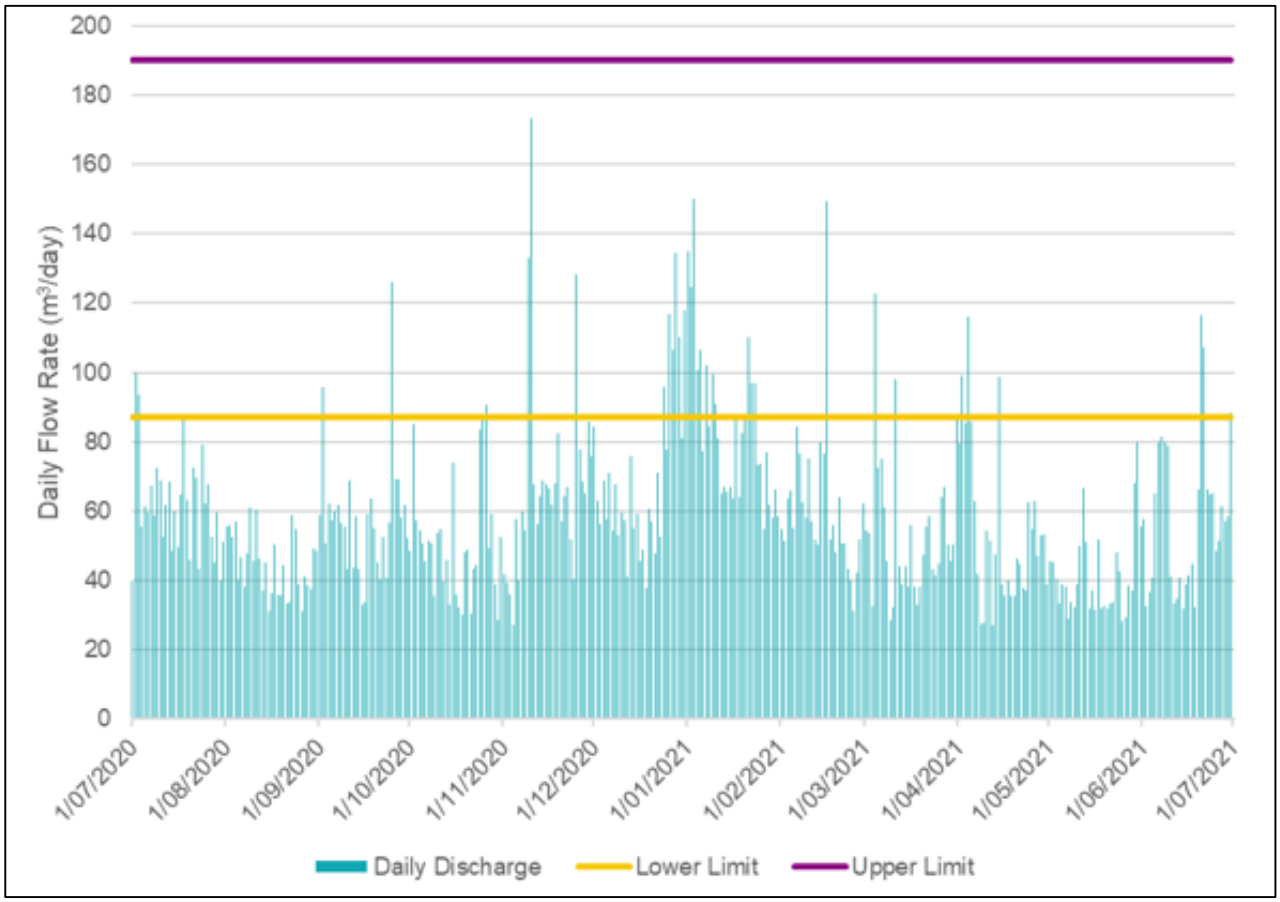


Figure 4: Daily effluent discharge flow rate for Te Paerahi WWTP from 1 July 2020 to 30 June 2021 monitoring period

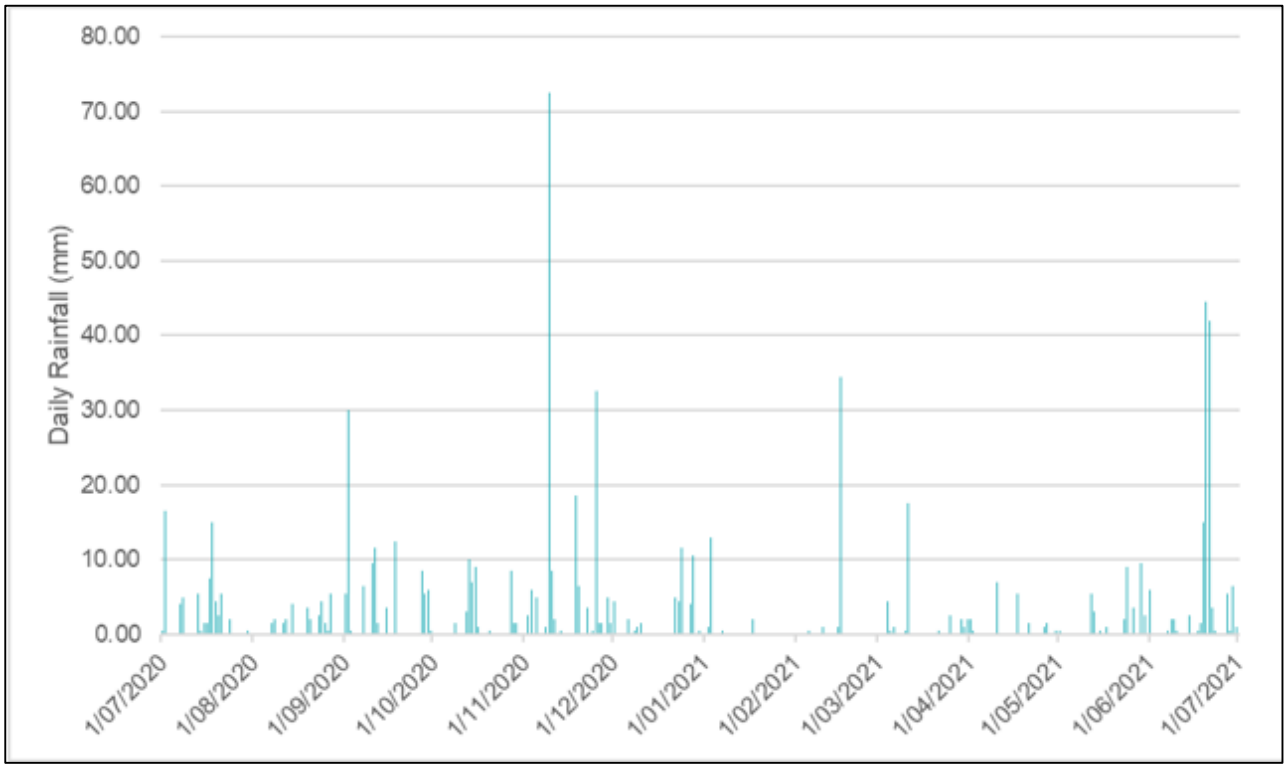


Figure 5: Rainfall measurements for Pōrangahau during the 2020/21 monitoring period.

8 Reduction Strategy

The strategy being implemented is:

8.1 Generally

Identify priority areas for investigations, work through the various investigations and follow up with physical works to remediate and replace.

8.2 Inspection

1. Within each sewerage system inspect properties connected to the reticulation for stormwater connections or ingress to the sewerage reticulation.
2. Specifically inspect septic tanks at Porangahau, potentially with dye testing
3. Serve notices to rectify faults wherever faults are found.
4. Follow up the notices until all rectification has been done.

8.3 Investigation

1. Open manholes on the sewerage reticulation and check for unusual volumes of clean water, obvious defects and sources of infiltration (i.e. broken corbels, missing manhole steps, root intrusion).
2. Follow the clean water flow to find its source.
3. Carry out appropriate remedial action to eliminate the clean water flow into the reticulation.
4. Repair defects or replace infrastructure that is leaking.

8.4 Testing

1. CCTV inspect sewers that are suspect for leaking.
2. Carry out appropriate remedial action depending on the condition of the sewers inspected. This will consist of spot repairs, replacement or relining of pipes.

8.5 Analysis

1. Review SCADA data from permanent flow meter sites to determine effectiveness of repairs (pending adequate rainfall events post repair)
2. Undertake specific flow monitoring on branches or sub-catchments if required
3. Remedy faults or undertake further targeted investigations found from the investigation.

8.6 Follow-up testing

1. Smoke test and/or dye test sewers where there is still significant inflow occurring.
2. Carry out appropriate remedial action depending on the results of the testing.

9 Current Status

The current status of the I&I management project is:

- CHBDC currently in process of engaging contractors to undertake investigations district wide.
- Currently updating district wide I&I management strategy and management plans.
- Implementation plan for private side defects under development.

The I&I investigation contractor will undertake physical investigations and testing and may suggest remediation options. The investigations will target the areas with the worst I&I identified in the strategy and management plans, with the intention to address the “low hanging fruit” first. The investigations will also be used to inform the renewals programme (being undertaken as separate projects parallel to the I&I management project). If a single pipe has too many defects, it may be more suitable to renew the entire pipeline under that programme of works.

10 Programme of Works

Key programme dates are as follows:

- Investigation contract Award 20th September 2021
- Engage Contractor(s): 6th August 2021
- Investigations commence: 30th September 2021
- Council supports private defect methodology 6th October 2021

The current project programme is in Appendix B.

11 Funding Allocated

The following funding has been allocated to I&I management across the district in the current Long Term Plan (LTP). Note the allocation presented below is to cover total project costs (i.e. consultant, contractor and council's costs):

Table 9: Funding allocated to I&I management

Source	Financial Year Ending	Total Allocation
Department of Internal Affairs (DIA) Water Reform funding	2022	$300,000
Long Term Plan (LTP) budget	2021-2031 ($300,000 per year)	$3,000,000
TOTAL		$3,300,000

In addition to the funding above, the council has allocated budgets for wastewater renewals in the LTP. Wastewater renewals will help reduce I&I. Renewals budgets are summarised in Table 10:

Table 10: Sewer renewals budgets in LTP

Financial Year	Renewals Budget	Allocated to projects
2021/22	$1,381,000	Yes
2022/23	$1,422,430	Yes
2023/24	$1,465,103	Yes
2024/25	$1,509,056	Yes
2025/26	$588,649	No
2026/27	$605,131	No
2027/28	$623,285	No
2028/29	$641,984	No
2029/30	$661,243	No
2030/31	$679,758	No
TOTAL	**$9,577,639**	

Finally, funding allocated to Stormwater can help reduce I&I. Stormwater budgets are outlined in Table 11:

Table 11: Stormwater budgets in LTP

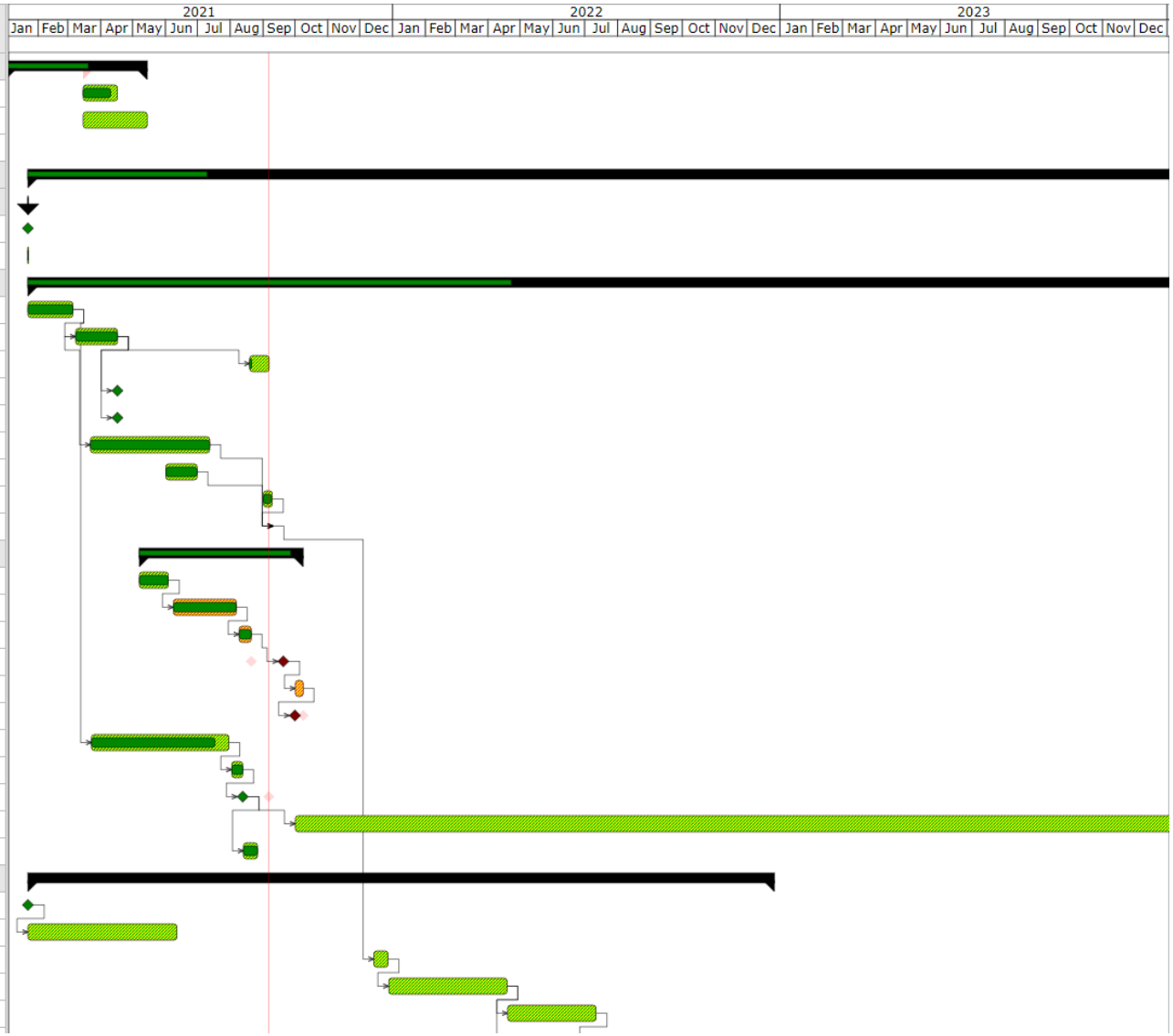
Stormwater	2021/22	2022/23	2023/24
To meet additional demand.	$245,000	$885,800	$763,849
To improve the level of service	$140,000	$309,000	$583,495
To replace existing assets	$773,500	$796,705	$820,607

Appendix A: Network Plans


Te Paerahi
Legend
Wastewater Mains:
AC
Liner
Concrete
Earthenware
GI
HDPE
MDPE
PVC
Steel
Plant Main
This map contains data derived in part or wholly from sources other than Beca, and therefore, no representations or warranties are made by Beca as to the accuracy or completeness of this information.
Map intended for distribution as a PDF document.
Scale may be incorrect when printed.
Contains data from Central Hawkes Bay District Council, Creative Commons v4.0.
Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 4.0 New Zealand licence

Appendix B: Programme

Ref	Title	Start	End	Effort	Duration	Progress
Resourc		**01/01/2021**	**14/05/2021**	**33.50 days**	**96.00 days**	**58.51%**
1	Pre Construction Stage	15/03/2021	16/04/2021	24.50 days	25.00 days	80.00%
2	Tender and Post Contract	15/03/2021	14/05/2021	9.00 days	45.00 days	0.00%
3	Project Closure	01/01/2021	31/12/2020	0:00	0:00	0.00%
WBS	**20210601 INI Milestone Schedu**	**22/01/2021**	**28/05/2031**	**9775.00 day**	**2699.00 day**	**4.47%**
1	**Initiation**	**22/01/2021**	**22/01/2021**	**8:00**	**8:00**	**100.00%**
1.1	Project Mandate Approved (ELT/		22/01/2021			100.00%
1.2		22/01/2021	22/01/2021	8:00	8:00	100.00%
2	**Planning**	**22/01/2021**	**28/05/2031**	**2896.00 day**	**2699.00 day**	**12.06%**
2.1	Stakeholder Framework	22/01/2021	05/03/2021	31.00 days	31.00 days	100.00%
2.2	I&I Strategy - DRAFT ISSUEI	08/03/2021	16/04/2021	30.00 days	30.00 days	100.00%
2.3	Comms Strategy - DRAFTED	19/08/2021	06/09/2021	13.00 days	13.00 days	10.00%
2.4	Project Brief - COMPLETED		16/04/2021			100.00%
2.5	Procurement Plan - COMPLETEI		16/04/2021			100.00%
2.6	Remaining I&I Reduction M	22/03/2021	12/07/2021	81.00 days	81.00 days	100.00%
2.7	WPA/WPK INI Management Plan	01/06/2021	30/06/2021	22.00 days	22.00 days	100.00%
2.8	I&I Management Strategy -	01/09/2021	09/09/2021	7.00 days	7.00 days	90.00%
2.9	Remaining I&I Reduction PI	10/09/2021	10/09/2021	0:00	0:00	90.00%
2.10	**CONTRACTOR TENDER S1. Stud**	**07/05/2021**	**08/10/2021**	**80.00 days**	**111.00 days**	**92.50%**
2.10.1	Prepare RFT	07/05/2021	03/06/2021	20.00 days	20.00 days	100.00%
2.10.2	Tender Period	08/06/2021	06/08/2021	44.00 days	44.00 days	100.00%
2.10.3	Tender Analysis	09/08/2021	20/08/2021	10.00 days	10.00 days	100.00%
2.10.4	Contract Award		20/09/2021			0.00%
2.10.5	Mobalisation	01/10/2021	08/10/2021	6.00 days	6.00 days	0.00%
2.10.6	Investigations and Repairs Start		01/10/2021			0.00%
2.11	Private Landowner (Carrot/Stick)	23/03/2021	30/07/2021	94.00 days	94.00 days	90.00%
2.12	F&I Committee Paper Comp	02/08/2021	12/08/2021	9.00 days	9.00 days	100.00%
2.13	F&I COMMITTEE DECISION		12/08/2021			100.00%
2.14	Comms and Engagment Messag	01/10/2021	28/05/2031	2519.00 day	2519.00 day	0.00%
2.15	Updated Project Brief to a Plan i	13/08/2021	26/08/2021	10.00 days	10.00 days	100.00%
3	**CONTRACTOR INVESTIGATIONS**	**22/01/2021**	**26/12/2022**	**511.00 days**	**502.00 days**	**0.00%**
3.1	S1 - Investigation - Otane 1.21 P		22/01/2021			100.00%
3.2	S1 - Concept design / Options ar	22/01/2021	11/06/2021	101.00 days	101.00 days	0.00%
3.3	S1 - Completion of Planning	14/12/2021	27/12/2021	10.00 days	10.00 days	0.00%
3.4	S2 - Investigation - Waipawa 1.1	28/12/2021	18/04/2022	80.00 days	80.00 days	0.00%
3.5	S2 - Concept design / Options ar	19/04/2022	11/07/2022	60.00 days	60.00 days	0.00%



3.6	S2 - Completion of Planning		11/07/2022			0.00%
3.7	STBC - Investgation - Waipukura	19/04/2022	08/08/2022	80.00 days	80.00 days	0.00%
3.8	STBC - Concept design / Options	09/08/2022	31/10/2022	60.00 days	60.00 days	0.00%
3.9	STBC - Completion of Planning		31/10/2022			0.00%
3.10	S4 - Investigation - Porangahau '	09/08/2022	03/10/2022	40.00 days	40.00 days	0.00%
3.11	S4 - Concept design / Options ar	04/10/2022	31/10/2022	20.00 days	20.00 days	0.00%
3.12	S4 - Completion of Planning		31/10/2022			0.00%
3.13	S5 - Investigation - Takapau 1.7 F	04/10/2022	28/11/2022	40.00 days	40.00 days	0.00%
3.14	S5 - Concept design / Options ar	29/11/2022	26/12/2022	20.00 days	20.00 days	0.00%
3.15	S5 - Completion of Planning		26/12/2022			0.00%
4	**Execution**	22/01/2021	12/06/2023	1116.00 day	622.00 days	7.80%
4.1	S1 - Otane - Procurement Plan C		22/01/2021			100.00%
4.2	S1 - Procurement Maintenance (	22/01/2021	04/03/2021	30.00 days	30.00 days	100.00%
4.3	S1 - Otane stage 1 initial physica	05/03/2021	09/04/2021	26.00 days	26.00 days	100.00%
4.4	S1 - Otane stage 1 manhole rene	05/03/2021	16/04/2021	31.00 days	31.00 days	100.00%
4.5	S1 - Contract Document Release		05/03/2021			100.00%
4.6	S1 - Otane remainder	05/10/2021	24/06/2022	189.00 days	189.00 days	0.00%
4.7	S2 - Waipawa - Consents Comple	12/07/2022	22/08/2022	30.00 days	30.00 days	0.00%
4.8	S2 - Physical works - Waipawa - (	23/08/2022	26/12/2022	90.00 days	90.00 days	0.00%
4.9	S2 - Physical works - Waipawa -	23/08/2022	26/12/2022	90.00 days	90.00 days	0.00%
4.10	S3 - Waipukaru - Consents Comp	01/11/2022	12/12/2022	30.00 days	30.00 days	0.00%
4.11	S3 - Physical works - Waipukurau	13/12/2022	17/04/2023	90.00 days	90.00 days	0.00%
4.12	S3 - Physical works - Waipukurau	13/12/2022	17/04/2023	90.00 days	90.00 days	0.00%
4.13	S4 - Porangahau - Consents Con	01/11/2022	12/12/2022	30.00 days	30.00 days	0.00%
4.14	S4 - Physical works - Porangahau	13/12/2022	17/04/2023	90.00 days	90.00 days	0.00%
4.15	S4 - Physical works - Porangahau	13/12/2022	17/04/2023	90.00 days	90.00 days	0.00%
4.16	S5 - Takapau - Consents Comple	27/12/2022	06/02/2023	30.00 days	30.00 days	0.00%
4.17	S5 - Physical works - Takapau - C	07/02/2023	12/06/2023	90.00 days	90.00 days	0.00%
4.18	S5 - Physical works - Takapau - P	07/02/2023	12/06/2023	90.00 days	90.00 days	0.00%
5	**Monitoring**	10/09/2021	28/05/2031	5251.01 day	2533.00 day	0.00%
5.1	Monthly Psoda PMO Reports	13/09/2021	28/05/2031	2533.00 day	2533.00 day	0.00%
5.2	Data Management	13/09/2021	28/05/2031	2533.00 day	2533.00 day	0.00%
5.3	External Report – PGF	13/09/2021	27/05/2022	185.00 days	185.00 days	0.00%
5.4	Project Engagement & Con		10/09/2021			0.00%
6	**Closure**	26/06/2023	26/06/2023	0:00	0:00	0.00%