

Activity Management Plan 2021 Rangiora Wastewater Scheme

3 Waters | July 2021



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1 Executive Summary

The following table provides a summary of the key asset management issues of the Rangiora Wastewater Scheme identified through consideration of the levels of service, consents, asset condition, risk analysis, disaster resilience, growth projections, and capacity assessment:

Table 1: Ke	v Asset	Manaaement	Components
TUDIC I. NC	y AJJCI	management	components

Resource Consents	The overall Eastern Districts Sewer Scheme is operating well and is compliant with the resource consent conditions.
Levels of Service	The scheme network is not quite achieving its service level. Programmed upgrades are designed to assist the scheme meet service level. The current programme will be complete in 2023/24
Capacity & Performance	The existing reticulation system does not have capacity for the peak wet weather flow, resulting in a potential frequency of overflows that do not meet the levels of service. Upgrades have been completed to reduce the frequency of overflows, but further works are required, programmed over the period 2021 to 2024.
Asset condition	The majority of the scheme is in moderate to good condition, although a reasonable length of reticulation is reaching its design age. This is programmed for CCTV inspection to confirm condition prior to programming for renewal. Earthquake damage to the reticulation has been repaired.
Risk Assessment	The high risks associated with the scheme identified through the Risk Assessment are the insufficient reticulation capacity and poor condition of some catchments, resulting in occasional blockages. This is being addressed through programmed upgrades and the implementation of InfoAsset manager to analysis pipe inspection data to identify serviceability issues.
	The Disaster Resilience Assessment revealed that the Wastewater Treatment Plant, the Treatment Plant Pump Station and Northbrook Road & Northbrook Waters pump stations appear to be at a high risk during earthquakes. Further assessment is required.
Disaster Resilience	Flood (both localised and from an outbreak from the Ashley River) and wildfire are also high hazards to the WWTP and WWTP pump stations.
	Further work to understand the options on how to increase the resilience of high risk sites will be carried out.
	The scheme is predicted to increase by approximately 121% over the next 50 years.
Growth Projections	A number of growth related projects are programmed for the scheme including new and upsized mains and pump stations in the east Rangiora Structure Plan area, the Todds Road industrial area and the central Rangiora (growth component) upgrade area.
	The WWTP has been upgraded to accommodate growth on the scheme. Further upgrades are scheduled for 2026/27.
Fernside	Longstanding issues with I and I and meeting treatment plant consent conditions have resulted in a potential project to connect the scheme to the Eastern Districts Scheme. The Covid-19 stimulus grant has enabled this to be accelerated, so Fernside assets are now included in the Rangiora AMP

2 Introduction

The purpose of this Activity Management Plan (AMP) is to outline the significant issues associated with the Council's assets and to show how the Council proposes to manage the schemes in the future.

This plan summarises the various components of the Rangiora wastewater scheme, its condition and performance, and identifies future funding requirements including upgrades where necessary.

The data that has been relied upon to produce this document was taken at the end of the 19/20 financial year. i.e. 30 June 2020. More up to date scheme statistics are available on document TRIM 121108078891 which is to be updated quarterly.

Further details of the asset management practices used by Council to manage this scheme are summarised in the District Wastewater AMP Overview document.

Projects identified to improve asset management processes for this scheme will also benefit the performance of other 3 waters schemes and are managed at a District level for efficiency.

Projects are also identified within this AMP that will maintain or improve levels of service.

Repair of wastewater supply asset damage from the Canterbury earthquake sequence has now been completed. No significant legacy effects are expected.

All figures within this AMP exclude inflation.

3 Related Documents

The following related documents have been used as reference documents or for guidance in the development of some of the sections in this Activity Management Plan

- Waimakariri District Plan
- Population in the Waimakariri District (TRIM 170328030077)
- New Projections for LTP 2021-2031 (TRIM 200908117997
- WDC Asset Management Policy (TRIM 180605062091)
- 2019 Customer satisfaction Survey (TRIM 200313034937)
- Development Contributions Policy 2021/22 (TRIM 200729095963)

4 Scheme Description (What Do We Have?)

The Rangiora Wastewater Scheme is part of the Eastern Districts Sewer Scheme. It is generally a gravity reticulation scheme, but there are three pump stations that also deliver wastewater to the Wastewater Treatment Plant at Southbrook (Northbrook Rd PS, Southbrook PS and Bradleys Road PS).

The Treatment Plant consists of an inlet structure that removes solids and grit followed by an aeration basin. This is followed by two facultative ponds with mechanical aeration, two small maturation ponds. Effluent from the final maturation pond is transferred to the wetlands at the Kaiapoi Wastewater Treatment Plant via a gravity pumping main. Currently, the effluent is transferred by gravity during the day with a short pump cycle at night time to flush the main.

Some key statistics (2019/20 year) of the scheme are shown in Table 2 to 5. The extent of the currently serviced area and comprehensive flow data records are presented in Figure 14 and Figure 15.

A schematic view of the treatment system is presented in Figure 1. Refer to the Overview AMP for a plan of how the Rangiora system fits within the overall scheme.

Longstanding issues with I and I and meeting the treatment plant consent conditions for the Fernside scheme have resulted in a potential project to connect the scheme to the Eastern Districts Scheme. The Covid-19 stimulus grant has enabled this to be accelerated, so Fernside assets are now included in the Rangiora AMP

Table 2: Scheme Statistics for 2019/2020

Scheme Parameter	Statistics	Source		
Type of Supply	Urban Gravity			
Treatment	Aeration Basin and oxidation ponds			
Length of Reticulation	109.6 km	Wastewater Asset Valuation		
Total Replacement Value	\$123,166,504	Tables 8-5 and 8-6, pages 59 to		
Depreciated Replacement Value	\$89,596,164	62		
Number of Connections	7,400	2019/20 Rating Query		
Number of Rating Charges	9,370			
Average Daily Flow (5 year average)	6,763 m3/day	Flow Data Analysis – Sewer		
Average Daily Flow/connection (5 year average)	953 l/day/con	Note: the Rangiora flow		
Peak Daily Flow (5 year average)	24,923 m3/day	records have been calculated		
Peak Daily Flow/connection (5 year average)	3,519 l/day/con	pump station flow from Mandeville.		

Table 3: Wastewater Gravity Pipe Data Summary

Wastewater Gravity pipe length (m) by diameter and pipe material													
Pipe Material		Pipe Diameter (mm)											
Pipe Material	50	100	150	200	225	250	300	375	400	450	>600	Total	
Asbestos cement	0m	1m	5,634m	0m	255m	0m	884m	0m	0m	0m	0m	6,774m	
Concrete	0m	5m	12,418m	175m	7,100m	60m	437m	1,001m	0m	358m	3,640m	25,194m	
Earthenware	0m	0m	8,256m	0m	2,127m	0m	0m	0m	0m	0m	0m	10,383m	
PE	41m	0m	0m	43m	0m	0m	87m	0m	0m	0m	0m	171m	
PVC	0m	123m	40,104m	1,524m	5,948m	868m	4,459m	362m	0m	663m	1,321m	55,373m	
Other	0m	0m	4,518m	0m	348m	0m	6m	0m	3m	0m	0m	4,876m	
Total	41m	129m	70,931m	1,743m	15,779m	928m	5,872m	1,363m	3m	1,021m	4,960m	102,770m	

Table 4: Wastewater Pressure Pipe Data Summary

Wastewater Pressure pipe length (m) by diameter and pipe material										
		Pipe Diameter (mm)								
Pipe Material	50	100	150	200	250	300	375	450	600	Total
Ре	985m	1,046m	0m	0m	56m	107m	0m	0m	0m	2,194m
Pvc	25m	367m	59m	649m	0m	3,284m	0m	0m	0m	4,384m
Other	15m	10m	1m	0m	0m	9m	0m	0m	102m	138m
Total	1,025m	1,422m	60m	649m	56m	3,401m	0m	0m	102m	6,716m

Table 5: Wastewater Valve Data Summary

Wastewater Valves					
Diameter (mm)	Count				
50	7				
100	10				
150	1				
200	4				
250	0				
300	7				
Total	29				

Table 6: Wastewater Manhole Data summary

Wastewater Manholes					
Diameter (mm)	Count				
900	772				
1050	886				
1200	15				
1500	9				
>1500	11				
Total	1693				

Table 7: Data References

Data Reference	Trim Reference
Sewer flow data analysis	<u>121108078891</u>
2020 3 Waters Asset Valuation	200824109857
2020 50 Year Water and Sewer Growth Forecast	<u>200224024348</u>

Figure 1: Network Schematic



5 Scheme Management Issues (What Do We Need to Consider?)

There are a number of key aspects to consider when managing a wastewater scheme, these include:

- Target & actual levels of service
- Asset condition & criticality
- Capacity & performance of the supply
- Risks associated with the supply
- Growth predictions for the scheme

These issues have been assessed in detail and are explained in the following sections.

5.1 Levels of Service

Table 8 sets out the performance measures and targets for the scheme, and records achievement against targets since 2008.

Mandatory performance measures are measured at the district wide level and are not included in the individual wastewater scheme AMPs. They are located in the District Overview Wastewater Activity Management Plan. However there is considerable overlap between the measures at Scheme and District levels. Mandatory measures cover overflows, consent compliance, time to respond to faults, and complaints. The Scheme LOS measures include more detail, and cover complaints, consent compliance, overflows and outages, but not response times, which are only measured at scheme level.

None of the WDC targets are planned to change over the 10 year LTP period, so only the one target value has been shown in this document

Performance in Table 8 is measured against the performance measures set in 2018, as part of the 2018-28 Long Term Plan process. Going forward from 2021 onwards, performance will be against the modified set of performance measures that were presented to the Council's Utilities and Roading Committee in 2020 (refer report 200406043184[v2]), and subsequently approved by Council. These revised levels and targets are detailed in the District Overview Water Supply Activity Management Plan.

Table 8: Elective (non-mandatory) Levels of Service Targets and Performance Measures as Assessed in 2020

* Note A "Y" indicates that the LOS has been met, and an "N" indicates it has not been met

* Details of performance measures may have been modified between various revisions of the AMP. The Previous Results reported are as assessed against the most relevant performance measure at the time of assessment.

			2018 2021 2		2020			Previous Results [#]				
Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	Result	Commentary	Status	Action to Address	2017	2014	2011	2008	
	Complaints - Midges & Insects - Treatment	Number of events that lead to complaints about midges and insects at treatment plants	Nil per Year	Nil	There were no complaints regarding midges or insects.	Achieved	N/A	Y	Y	Y	Y	
Customer Complaints	Complaints - Odour - Reticulation	Number of events that lead to complaints about odour from the reticulation	Less than 5 per year	1	There was one complaint1about odour related to theAreticulation system.		N/A	Y	Y	Y	Y	
	Complaints - Odour - Treatment	Number of events that lead to complaints about odour at treatment plants	Less than 5 per year	1	There was one complaint about odour.	Achieved	N/A	Y	N	Y	Y	
Resource Consents	Consent Breach - Action required	Number breaches of consent conditions that result in an ECan report that identifies compliance issues.	Nil per Year	Nil	Nil No notices of consent breach were received.		N/A	Y	Y	Y	Y	
Outages	Outages - Events >8 hours	Number of events that cause a loss of service to any property for >8 hrs (does not include private laterals)	Nil per year	Nil	There were no losses of service greater than 8 hours.	Achieved	N/A	Y	Y	Y	Y	
Overflows	Overflows - Existing Reticulation	Minimum return period of rainfall event that can be accommodated in network components	1 in 2 year	Nil	Nil The Central Rangiora Sewer Upgrade is currently under construction. This will provide additional		Central Rangiora Sewer Upgrade	N	N	N	N	

	Level of	2018 2021	2019 2021		2020			Previous Results#					
Section	Service	Performance Measure	2018 – 2021 Target	Result	Commentary	Status	Action to Address	2017	2014	2011	2008		
		designed prior to May 1999 without overflows occurring			capacity in the reticulation system and is expected to address all the remaining level of service issues in Rangiora. This project is programmed to be complete in 2028 when Stage 9 is undertaken.		stage 5 - 9 will address increase network capacity to meet the LOS.						
	Overflows - New Reticulation	Minimum return period of rainfall event that can be accommodated in network components designed after May 1999 without overflows occurring	1 in 5 year	Nil	This level of service is met.	Achieved	N/A	Y	Y	Y	Y		
Overflows	Overflows - Private Property	Number of recorded overflows on private property found to be the result of (a) blockage in the main (b) Insufficient capacity in the reticulation system for any rainfall up to a 1 in 2 year event, for areas designed prior to 1999. (c) Insufficient capacity in the reticulation system for any rainfall up to a 1 in 5 year event for areas designed after 1999.	Nil per year	1	This level of service was not met.	Not Achieved	Purchase and implementa tion of InfoAsset Manager software that identify pipe faults which result in blockages,	Ν	Data	Y	Ν		

5.2 Asset Condition

The current assessment of asset condition is based on theoretical remaining useful life derived from component age and adopted useful life. Adjustments to the remaining life are made to individual components where information is available to suggest the theoretical remaining life is inappropriate.

A rolling wastewater CCTV programme was started in 2008 to survey the reticulation network and assign evidence based condition ratings. District wide, these surveys have identified a number of mains faults that have led to remedial actions including immediate or scheduled repair, decreased remaining useful life and increased renewal priority. However analysis of this survey information has not been well managed due to the lack of appropriate software. The purchase of the widely used InfoAsset Manager software for this purpose will significantly improve this situation, and enable better determination of asset condition and remaining useful life.

The CCTV condition information is complemented with maintenance activity records from the field recording wastewater mains blockage and overflow records.

Figure 2 below, shows the assessed pipe condition for all pipes within the scheme. Figure 3 summarises the theoretical asset condition for both the network and headworks in a graph, while Table 9 provides more detail about the value of the assets within different asset condition categories





Figure 3-Asset Condition Summary



"Headworks" is inclusive of all above ground assets associated with the wastewater supply scheme e.g. buildings, pump sets.

Condition Grade	Definition	Pipeline Quantity	Total Reticulation Value	Total Headworks Value	Total Value
1	Very Good More than 80% of life remaining	57.7 km <i>52%</i>	\$ 60,197,000 <i>53%</i>	\$ 12,703,000 <i>79%</i>	\$ 72,900,000 <i>56%</i>
2	Good Between 50% and 80% of life remaining	25.6 km <i>23%</i>	\$ 28,277,000 25%	\$ 1,532,000 <i>10%</i>	\$ 29,809,000 <i>23%</i>
3	Adequate Between 20% and 50% of life remaining	16.0 km <i>15%</i>	\$ 13,972,000 <i>12%</i>	\$ 862,000 <i>5%</i>	\$ 14,834,000 <i>11%</i>
4	Poor Between 10% and 20% of life remaining	1.3 km <i>1%</i>	\$ 1,021,000 <i>1%</i>	\$ 7,000 <i>0%</i>	\$ 1,028,000 <i>1%</i>
5	Very Poor Less than 10% of life remaining	9.9 km <i>9%</i>	\$ 10,415,000 <i>9%</i>	\$ 896,000 <i>6%</i>	\$ 11,311,000 <i>9%</i>
Total		110.6 km	\$113,882,000	\$16,000,000	\$129,882,000

5.3 Asset Criticality

Asset criticality provides an indication of the importance of an individual asset and the corresponding impact on the service delivery should the asset fail for any reason. Criticality is used in risk based investment decisions to help decide when an asset should be replaced to avoid the consequences of failure. The Council has developed an assessment process which scores assets from most critical 'AA' to least critical 'C'. Further details of the criticality assessment methodology is covered in the Wastewater Overview AMP.

The pipe criticality scoring process has been significantly improved through automation and dynamic links to GIS data layers.

Figure 5 provides a spatial view of asset criticality for the scheme.





5.4 Risk Assessment

An Operational Risk Assessment was first undertaken for the Rangiora Wastewater Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review. At the last review two high risks remained for the Rangiora wastewater scheme.

The District Wide Overview details the risk events considered and includes a summary of the risk assessment results for all the wastewater supply schemes and is useful in indicating overall wastewater network priorities.

Table 10 summarises the number of events at each level of risk for the Rangiora Wastewater Scheme.

Risk Level	2004	2008	2011	2014
Extreme risks	0	0	0	0
High risks	4	2	2	2
Moderate risks	20	26	16	14
Low risks	12	19 30		28
Total	36	47	48	44

 Table 10: Number of Possible Events per Level of Risk

The two high risks identified in the 2014 assessment both relate to potential overflow or discharge of raw sewerage from gravity reticulation. These issues are expected to be resolved with the completion of the current reticulation upgrade works programmed to be completed in 2027.

District wide, moderate risks are being deferred until extreme and high risks have been addressed.

Table 11: Summary of High and Extreme Risks

Risk Event & Cause	Reasoning	Solution	Project Details	2011	2014
Overflow or discharge of raw sewerage from gravity reticulation due to insufficient reticulation capacity	Known areas where overflows occur resulting from high I&I with ARI<1yr.	Mitigation includes increasing pipeline sizes in identified areas during renewals	Central Rangiora Wastewater Capacity Upgrade Projects	н	Н
Overflow or discharge of raw sewerage from gravity reticulation due to poor reticulation condition (blockages)	Some problem areas	The implementation of InfoAsset Manager to undertake assessment of CCTV data will allow targeting and programing of pipes with poor serviceability ratings.	InfoAsset Manager softeware implementation	Н	Н

5.5 Disaster Resilience Assessment

The 2009 Disaster Resilience Assessment (DRA) is a desk top study that primarily considered the risks to above ground structures presented by natural hazard events across all Council operated 3 Waters schemes. The original assessment was updated in 2012 using revised hazard and asset behaviour information captured during the 2010-11 Canterbury earthquake sequence.

Risk from earthquake events that could induce liquefaction on brittle pipes (AC and earthenware) is managed using a reticulation vulnerability score. This is used as an input to the risk based renewals assessment.

Above Ground Facilities

The above ground facilities were assessed for risk of failure against 13 natural and 2 manmade hazard scenarios. The following risk profile (Table 12) reflects the likelihood of the event occurring and the consequence on the community of the facility failing. Hazards classified as having 'No Known Risk' have been omitted from the table.

Table 12: Risks to Above Ground Facilities

Threat	Northbrook Road PS	Northbrook Waters PS	Rangiora WWTP	Rangiora WWTP Outfall PS	Southbrook PS
100 yr Local Flooding	L	L	Н	Н	-
475 yr Earthquake Induced Slope Hazard	L	L	L	L	L
100 Yr Ashley Flood	-	L	Н	Н	L
500 Yr Ashley Flood	L	L	L	L	L
Earthquake (50 yr)	Н	Н	Н	Н	М
150 Yr Earthquake	М	М	М	М	L
475 Yr Earthquake	М	L	L	L	L
Wildfire	L	L	Н	Н	L
Snow 150 Yr	L	L	L	L	L
Wind 100 Yr	L	L	М	М	L
Lightning	М	М	М	М	М
Pandemic	М	М	М	М	М
Terrorism / Sabotage	L	L	М	М	L
	E = Extreme, H	= High, M = Moc	lerate, L = Low	V	

Rangiora is located outside the zone of mapped liquefaction susceptibility however additional mapping is proposed to assess the susceptibility of soils in the east of Rangiora. Northbrook Road and Northbrook Waters pump stations have been identified as having low resilience to earthquake activity.

The treatment plant and WWTP pump station are considered to be at high risk from flooding. Inundation of up to 0.4 metres is expected at all pump stations.

All wastewater sites in the District have been identified as at moderate risk from lightning and pandemic. Currently only extreme and high risks are being addressed.

The Councils response to some of these risks is being managed at a district level via the DRA Action Plan and related projects. Refer to the District level AMP for details. Since there is some overlap of the DRA and Operational Risk Assessment, a review and potential integration of the risk assessment methodologies is planned, prior to risk assessments next being carried out.

5.6 Growth Projections

Situation

Residential growth is expected to occur both within the existing town boundary and through expansion of the residential zone.

Significant industrial growth is also expected in Rangiora. The upgrade of reticulated sewer in the Southbrook area in 2005 has opened the area for rapid growth over the next 10 to 20 years.

The overall district population growth scenario used for the 2021 AMP update was supplied by Council's Development Planning Unit, broken into towns and rural areas. Wastewater growth projections were calculated using the New Projections for LTP 2021-2031 (TRIM 200908117997), which was the basis for infrastructure planning.

Due to issues that have occurred with the Census 2018, the population projections that would normally be used as a basis for updating the work previously developed by the Council's Development Planning Unit have not been released by Stats NZ in time for the development of this assessment.

However, based on the historical growth patterns of new dwelling Building Consents over the last three years (636 in 2017/18, 661 in 2018/19 and 615 in 2019/20), the projections used for the previous LTP/infrastructure strategy remain valid to be used for infrastructure planning. As the timeframe for this infrastructure planning is for the thirty years between 2021 to 2051, the previous population projections have been extended out a further three years, as documented in New Projections for LTP 2021-2031 (TRIM200908117997)

It is important to provide a brief comment on COVID19 and the impact it could have on population projections. At the time of writing this paragraph (August 2020), New Zealand is currently in Level 3 restrictions in Auckland and Level 2 restrictions in the remainder of the country. While international migration is currently low arising from the COVID19 travel restrictions, a significant number of New Zealanders are returning home due to the impact of COVID19 on overseas countries. This has contributed to a high level of population growth nationally over the last six months, which has had a flow on effect to growth in the Greater Christchurch and Waimakariri Districts. How long this might continue for and when international migration (from other countries) might return to pre COVID levels is still to be determined. However the existing population projections remained the most appropriate to use for infrastructure planning at this time.

Demand

Demand on the Rangiora wastewater scheme is expected to increase by 31% by year ten of the 2021-31 Long Term Plan (LTP). This projection is based on four main factors:

- 1. Population Increase an average of 182 new dwellings and connections per year are projected on the basis of predicted development led growth, to follow the projected wastewater connection growth.
- 2. Southbrook Industrial Land 19 new connections per year are projected as a result of developing 62 Ha of industrial land in Southbrook area over 20 years.

Note that the Mandeville/Ohoka sewer scheme is connected into the Rangiora WWTP, and therefore into the EDSS. This has been considered in a separate Mandeville AMP document and is therefore not included in the Rangiora growth projections.

The number of connections is projected to increase by an average of 204 per year during the 2021-31 LTP period, as shown in Table 13.

	Rates Strike July 2019	Years 1 - 3	Years 4 - 10	Years 11 - 20	Years 21 - 30	Years 31 - 50
Rangiora	2019/20	2021/22 to 2023/24	2024/25 to 2030/31	2031/32 to 2040/41	2041-42 to 2050/51	2051/52 to 2070/71
Projected Connections	7,285	8,209	9,560	11,319	12,705	15,135
Projected Rating Units	9,209	10,284	11,925	13,966	15,352	17,782
Projected increase in Connections		13%	31%	55%	74%	108%
Projected Average Dry Weather Flow (m3/day)	8,977	9,546	10,355	11,441	12,376	14,017
Projected Peak Wet Weather Flow (m3/day)	136,251	139,098	143,140	148,572	153,249	161,451

Table 13: Growth Projections

Note that the time frames have been chosen to reflect the periods 3, 10, 20 and 30 years from the AMP release date, however due to the time it takes to complete the analysis the base rates strike data used was from 2019/20.

Demand, as measured by connection numbers, over the next 50 years (to 2070/71) is projected to increase by 108%. This long term growth trend is similar to the 2017 Activity Management Plan 50 year projection of 121%, which was also based on the 2013 Statistics New Zealand Population Projection figures.

Average Dry Weather Flow (ADWF) and Peak Wet Weather Flow (PWWF) projections have been based on the assumptions that for future development areas the Engineering Code of Practice (ECOP) ADWF or PWWF per person is added to the existing flow.

The assumptions made to calculate the future ADWF were based on the ECOP, with residential flows of 0.675m3/prop/day and non-residential of 0.2m3/Ha/day; and the future PWWF was based on ECOP design flows of residential 3.375m3/prop/day and non-residential 1m3/Ha/day.

Projections

Figure 6 and Figure 7 present the projected growth and corresponding demand trends for the Rangiora wastewater scheme.

Figure 5- Population Projections



Figure 6- Flow Projections



5.7 Capacity & Performance

This section of the AMP considers the capacity and performance of the Rangiora Wastewater Scheme. The specific aspects of the scheme that have been considered are the treatment plant and the reticulation system. These are discussed in more detail in the following sections.

Treatment

The existing Treatment Plant comprises an inlet structure that contains centre flow band screens and grit removal. An aeration basin reduces the organic loading before two facultative ponds with

mechanical aeration to further reduce the load. This is followed by two maturation ponds with mechanical aeration. Effluent from plant is transferred to the wetlands at the Kaiapoi Wastewater Treatment Plant via a gravity pumping main. Currently, the effluent is transferred by gravity during the day with a short pump cycle at night time to flush the main.

The aeration basin is currently scheduled to be upgraded in 2026/27 to increase the organic loading capacity. Desludging of Pond 1A and Pond 2 was undertaken in 2014, with Pond 1B and Pond 3 programmed for 2028.

There were two assessments undertaken to confirm the remaining capacity of the Eastern Districts Sewer Scheme treatment plants, and the Ocean Outfall wastewater network. The findings of these assessments is documented in the following reports:

- A Review of the Eastern District WWTP BOD Removal Assessment (TRIM 200214019932)
- Ocean Outfall Wastewater Network Model Capacity Assessment (TRIM 200214019934)

Reticulation

The capacity of the sewer reticulation was assessed using a calibrated hydraulic model in 2002/03. The reticulation was re-modelled and calibrated in 2009/10. Regular model updates are ongoing. The model has been used to assess the upgrades necessary to accommodate growth and to provide sufficient capacity to achieve the following LoS relating to overflows:

- A LoS of a 5 year period between wet weather overflows in new development areas as per the Council Engineering Code of Practice. The calibrated hydraulic model shows the network is currently achieving the 5 year LoS in new development areas.
- A LoS of a 2 year average recurrence interval between wet weather flows for the existing network. The 2014 modelling showed the old network was not able to achieve this LoS, which prompted the development of the programme of works now under construction to rectify this situation. These include the central Rangiora capacity upgrades (non-growth project components).

Document <u>TRIM 150323044514</u> provides a summary of the options considered and preferred option chosen, to upgrade the network to meet the agreed Level of service.

6 Future Works & Financial Projections (What Do We Need To Do?)

This section covers the future works required to meet the target levels of service, maintain the asset in an acceptable condition, reduce the risks to an acceptable level and accommodate growth.

Financial forecasts do not include inflation

6.1 Operation & Maintenance

Operation and maintenance (O&M) expenditure incorporates the day to day running of the wastewater network and allows the system to carry on functioning to deliver the agreed levels of service.

The O&M programme includes a combination of reactive and planned tasks. Examples of the differing nature of these tasks is summarised within the Overview document.

While there are no known deferred maintenance items, it is expected that the recent implementation of an Asset Management Information System (AMIS) will enable improved planned maintenance regimes. For example the new system will allow analysis of blockages that will identify where a pre-emptive regular cleaning programme should prevent blockages from occurring.

O&M budgets are set based on a combination of past expenditure (for reactive tasks), cost estimates for planned works, and adjustments going forward to account for growth, inflation, depreciation and any significant new works planned. Further detail of this process is provided in the Overview document. The end result of this is shown in Figure 8.



Figure 7- Annual Operation & Maintenance 30-Year Budget

The increase in 2028/29 is for the desludging of two ponds at the Rangiora WWTP.

6.2 Renewals Programme

The renewals programme is determined in two stages. The renewals model, details of which are provided in the overview document, provides a long term view of both expenditure and the depreciation funding required to ensure that a renewals fund is sufficient to enable future asset renewals, without needing to borrow.

For wastewater, for those schemes connected to it the model is operated at the Eastern Districts Sewer Scheme level. It provides Asset Managers, at a scheme level, prioritised candidates based on criticality, risk, and expected asset life on for consideration for inclusion in the LTP. Asset Managers then consider factors such as other works that may be planned in the area, as well as local asset history, in determining final projects for the first ten years of the LTP.

Figure 9 below shows the output from the model only and provides a broad brush spatial view of the likely timeframe for renewals.





Figure 10 below shows the renewals expenditure from the model only. Budgeted depreciation funding, modelled annual funding required, and the modelled renewals fund are not shown on this graph, but are shown on the equivalent graph in the Overview AMP. This is because all properties that are connected to the Eastern District Wastewater Scheme (EDWS) are charged using the same set of (differential) rates.

The figure only shows the output from the model, so expenditure shown in the graph for the first ten years may be different from the expenditure shown in the final budget, as adjustments may have been made by the Asset Manager from the direct renewals model outputs. The final renewals budget put forward into the draft LTP, is included in the capital works graph, Figure 10. There are no deferred renewals.



Figure 9 - Annual Renewals Expenditure, 150 Year Budget

6.3 Capital Works

The following graph shows the 50 year budget for capital works, including projects driven by growth and levels of service (Figure 11). Renewals expenditure showing in the first ten years of the graph, includes the actual planned programme, not the model output. The graph does not include capital projects funded outside of the scheme rates, i.e. the stimulus grant funded projects

Figure 10 - Projected Capital Works Expenditure



The high expenditure in the early years is due to the Central Rangiora capacity upgrade, largely for growth, and the Rangiora Septage facility projects. The \$3.7M shown in 2040/41 is for an upgrade to PS 3 and 4, and a shared rising main, again to manage growth.

Table 14 on the following page summarises the projected capital works for the next 50 years, including renewals. Figure 12 shows the corresponding location of the projected capital upgrade works. Both the table and Figure 11 include stimulus grant funded work

The level of confidence in the budget for the works (High / Medium / Low) is presented in the table. For a more complete discussion on the level of optimisation, refer to the introductory chapter of the AMP. The figures in the table are not adjusted for inflation.

Any programme or project that occurs over a number of years, such as the renewals programme, is only shown within the table for the first year in which it occurs. The Project Value indicates the projected full total cost of the project over the number of years it occurs.

Table 14: Summary of Capital Works (Includes Renewals)

Year	Project ID	Project Name	Level of Confidence	Project Value LOS Compone		Component	Renewals Component		Co	Growth omponent	
Year 1 - 10											
2022	URS0003	Rangiora - Central Rangiora Capacity Upgrade Stage 5	6 - Above Medium	\$	1,665,000	\$	1,015,000	\$	650,000	\$	-
2022	URS0007	Rangiora - Central Rangiora Capacity Upgrade Stage 8	6 - Above Medium	\$	1,059,000	\$	1,059,000	\$	-	\$	-
2022	URS0009	Rangiora - Pipeline replacement program	3 - Low	\$	30,951,797	\$	-	\$	30,951,799	\$	
2022	URS0010	Rangiora - WWTP Inlet Works - septage disposal facility	6 - Above Medium	\$	940,000	\$	940,000	\$	-	\$	-
2022	URS0037	Rangiora - Electrical repairs at pump stations and treatment plant	7 - High	\$	43,000	\$	-	\$	43,000	\$	-
2022	URS0102	Fernside sewer connection to Eastern Districts scheme -STIMULUS GRANT FUNDED	5 - Medium	\$	755,000	\$	650,000			\$	125,000
2023	URS0005	Rangiora - Central Rangiora Capacity Upgrade Stage 6	6 - Above Medium	\$	794,000	\$	351,000	\$	443,000	\$	-
2023	URS0091	Improvements to Rangiora WWTP Inlet Screens	6 - Above Medium	\$	20,000	\$	20,000	\$	-	\$	-
2023	URS0101	Rangiora - Church Street Extension	5 - Medium	\$	65,000	\$	45,000	\$	20,000	\$	-
2023	URS0108	Townsends Fields E/O	5 - Medium	\$	35,000	\$	-	\$	-	\$	35,000
2025	URS0008	Rangiora - Central Rangiora Capacity Upgrade Stage 9	6 - Above Medium	\$	1,129,000	\$	-	\$	-	\$	1,129,000
2025	URS0011	Rangiora - Additional Aeration WWTP Ponds	6 - Above Medium	\$	500,000	\$	-	\$	-	\$	500,000
2026	URS0013	Rangiora - Aeration Basin Upgrade	6 - Above Medium	\$	3,500,000	\$	-	\$	-	\$	3,500,000
2026	URS0034	Rangiora - East Pumpstation and Rising Main	1 - Coarse	\$	1,644,000	\$	-	\$		\$	1,644,000
2026	URS0067	Rangiora - Wastewater Headworks Renewals Program	2 - Very Low	\$	10,277,046	\$		\$	10,433,248	\$	-
2029	URS0012	Rangiora - Todds Road Pump Station	6 - Above Medium	\$	2,700,844	\$	-	\$	-	\$	2,700,844
Year 11 - 20											
2033	URS0109	West Rangiora, RA04 E/O	5 - Medium	\$	45,000	\$	-	\$	-	\$	45,000
2041	URS0107	Rangiora - East Development	5 - Medium	\$	3,745,000	\$	-	\$	-	\$	3,745,000
Year 21 - 30											
2048	URS0110	West Rangiora, RA03 E/O	6 - Above Medium	\$	105,750	\$	-	\$	-	\$	105,750

2051	URS0016	Rangiora - Central Rangiora Capacity Upgrade Stage 11	1 - Coarse	\$ 787,000	\$	\$ -	\$ 787,000
Year 31 - 50							
2037	URS0111	West Rangiora, RA02 E/O	5 - Medium	\$ 106,050	\$ -	\$ -	\$ 106,050
		Rangiora - Central Rangiora Capacity Upgrade Stage					
2052	URS0025	12	1 - Coarse	\$ 415,000	\$ -	\$ 69,000	\$ 346,000
Grand Total				\$ 61,282,487	\$ 4,080,000	\$ 42,610,047	\$ 14,768,644

Figure 11 shows the proposed new works, where sufficient detail for the project has been determined.





6.4 Financial Projections

The following graph summarises the breakdown of projected total expenditure over a 30 year time horizon. It includes both operational and capital expenditure. Operational costs include operations and maintenance, but not indirect expenditure.

Indirect expenditure includes interest, rating collection costs, costs associated with maintaining the Asset Register, and other internal overhead costs. For systems connected to the Eastern District Wastewater Scheme, these costs are aggregated within the Eastern District Scheme budget.

Capital includes expenditure for growth, levels of service and renewals. The graph does not include stimulus grant funded works.



Figure 12 - Projected Total Expenditure

6.5 Valuation

A full peer reviewed valuation of assets is carried out on a three yearly cycle, using the asset data in our asset management information system. Table 15 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation		
Manhole	No.	1,737	\$19,795,303	\$14,682,450	\$159,084		
Valve	No.	44	\$158,102	\$138,428	\$1,820		
Main	m	109,612	\$63,461,940	\$45,218,672	\$678,159		
Service Line	properties	5,909	\$23,750,966	\$15,881,715	\$257,472		
Facilities			\$16,000,193	\$13,674,899	\$319,090		
	Total		\$123,166,504	\$89,596,164	\$1,415,625		

6.6 Revenue Sources

Revenue is provided from two key sources; targeted rates and Development Contributions. Development contributions are calculated in accordance with Council's Development Contributions Policy (TRIM <u>191129168016</u>), while targeted rates are charged in accordance with Council's Revenue and Financing Policy (TRIM 180522056008).

An additional source of funding has become available on a one off basis for this AMP, in the form of the governments Covid-19 stimulus package funding.

7 Improvement Plan

7.1 2021 Improvement Plan

Table 16 details the scheme specific improvements and relevant district wide improvements recommended to address the management issues identified in Section 3. Each improvement item has been tagged to either a capital project or, a process improvement project to help manage and track Councils response. Short term indicates within the first three years of the LTP, long term, out beyond 2021.

If the table is empty, this indicates that all improvements required are either district wide improvements (covered by the Overview AMP), or covered by a capital project or projects, covered in the Capital Works section.

Table 16: 2021 AMP Improvement Plan

Project Ref	AMP Section	Project Description	Priority	Status	Estimated Cost	
NA	NA	NA	NA	NA	NA	

APPENDIX 'A'.







Figure 14 - Plan of Serviced Area (Rangiora Fernside)

Figure 15 - Rangiora Wastewater Statistics

<u>Rangiora</u>	Wastev	vater Sta	<u>tistics</u>		Rangiora		•		19/20		•			Updated: Jun-20
Note that shading indicates the relative quantity measured for the ten year period (i.e. the lowest value has no shading, the highest has complete shading.)														
		July '09 -	July '10 -	July '11 -	July '12 -	July '13 -	July '14 -	July '15 -	July '16 -	July '17 -	July '18 -	July '19 -	5 yr	10 yr
		June '10	June '11	June '12	June '13	June '14	June '15	June '16	June '17	June '18	June '19	June '20	Average	Average
Average Daily Flow	m³/day	5,075	5,655	5,267	5,982	6,521	5,349	5,194	6,558	8,968	7,248	5,847	6,763	6,259
Average Dry Weather Flow	m³/day	5,015	5,437	5,221	5,558	5,726	5,082	3,638	5,912	8,175	6,632	5,617	5,995	5,700
Peak Daily Flow	m³/day	8,214	9,496	7,294	10,888	11,712	11,352	14,535	12,272	68,024	16,235	13,551	24,923	17,536
Peak Weekly Flow	m³/day	8,214	9,069	7,294	10,444	11,074	9,456	8,205	10,641	26,140	12,140	8,053	13,036	11,251
Peak Monthly Flow	m ³ /day	7,482	7,007	6,545	8,098	9,450	6,477	6,609	8,894	11,181	8,975	6,595	8,451	7,983
Peak Instantaneous Flow	L/s	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Month		May	Aug	Jun	Jun	Jun	Jul	Jan	Apr	Feb	Jun	Jul		
Peak Week		Week 21	Week 31	Week 44	Week 26	Week 27	Week 9	Week 2	Week 16	Week 9	Week 24	Week 34		
Peak Day		8/05/2010	24/07/2010	19/10/2011	19/06/2013	29/06/2014	21/02/2015	5/01/2016	16/04/2017	21/02/2018	9/06/2019	10/12/2019		
Peak Day Rainfall	mm	0	11	19.4	0	0	0	0	5.8	124.2	0	0		
Peak Day Weather		Dry	Storm	Storm	Storm	Dry	Dry	Wet	Wet	Storm	Wet	Dry		
Total Annual Volume	m³	1,862,661	2,075,464	1,932,810	2,195,399	2,393,375	1,963,237	1,599,607	2,406,666	3,291,089	2,659,889	2,145,917	2,420,633	2,266,345
Rating Connections		5,630	5,627	5,766	6,177	6,459	6,641	6,812	6,924	7,069	7,258	7,400		
Rating Charges		6,604	6,533	6,791	-	7,602	7,948	8,199	8,647	8,851	9,168	9,370		
Average Daily Flow per Connection	L/con/day	901	1,005	913	968	1,010	806	762	947	1,269	999	790	953	947
Peak Daily Flow per Connection	L/con/day	1,459	1,688	1,265	1,763	1,813	1,709	2,134	1,772	9,623	2,237	1,831	3,519	2,583
Data Quality		low	low	low	low	very high								