WAIMAKARIRI
DISTRICT COUNCIL

Activity Management Plan 2021

Rangiora Water Supply Scheme

3 Waters | July 2021

Prepared by

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Document Acceptance

Action	Name		Signed	Date
Prepared by	Colin Roxburgh	Water Asset Manager		17/02/2021
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1 Executive Summary

The following table provides a summary of the key asset management components that have been assessed for the Rangiora Water Supply Scheme. These have been identified through consideration of the levels of service, consents, asset condition, risk analysis, disaster resilience, growth projections, and capacity assessment:

Table 1: Key Asset Management Components

Resource Consents	The scheme continues to comply with its resource consent conditions. A fault was noted by Environment Canterbury (ECan) regarding a flowmeter temporarily giving erroneous data in the 16/17 year, which resulted in a non-compliance. This has since been rectified.
Levels of Service	The level of service for placement of hydrants from the Code of Practice is not achieved for a small percentage of the network, with additional hydrants required to meet the target maximum separation distance of 135m. Capital budgets have been put in place to address this.
	Current peak water demand is able to be met for reticulation and storage capacity, however an additional source within the current well field is requiring within the first three years of the LTP period to achieve the required source capacity. Future upgrades are planned and budgeted for, to enable additional growth demand to be met.
	The water quality from the new source at the Smith Street borefield is compliant with the health and aesthetic requirements of the Drinking Water Standards for New Zealand (DWSNZ). The scheme currently complies with all requirements of the DWSNZ.
Capacity & Performance	Capacity of the water supply system has been assessed as being capable of meeting current demand. Future upgrades of various components are programmed to ensure supply continues to be able to meet demand
Asset Condition	The majority of the scheme is in good condition, but requires an ongoing annual renewals programme to maintain to current standard of infrastructure.
Operational Risk Assessment	There are no extreme or high risks in the Rangiora water supply scheme as part of the Operational Risk Assessment.
Disaster Resilience	The headworks facilities and Smith Street wells appear vulnerable to a number of disaster scenario events including a large earthquake, localised flooding or flood from an Ashley River breakout. The Ayers Street and Dudley Park headworks are a high security risk from terrorism or sabotage. Further assessments are required to address these issues.
Growth Projections	The connections on the scheme are predicted to increase by 103% over the next 50 years. Upgrades of the source, storage capacity and distribution system will be required to accommodate this growth.

2 Introduction

The purpose of this Activity Management Plan (AMP) is to:

- Provide an overview of the Rangiora water supply scheme and the assets that make up the scheme;
- Outline any significant issues associated with the assets, and show how the Council will manage these.

This plan summarises the various components of the Rangiora water supply 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 2019/20 financial year (i.e. 30 June 2020). There are more up to date scheme statistics available on document 121108078783 which is intended to be updated quarterly.

Further details of the asset management practices used by Council to manage this scheme are summarised in the District Water Supply AMP Overview document (200120006283).

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 specific to the Rangiora scheme are also identified within this AMP that will maintain or improve levels of service.

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 (https://www.waimakariri.govt.nz/your-council/council-documents/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)
- Waimakariri District Council Water Supply 50 Year Growth Modelling Assessment 2021 (TRIM 201102146327).

4 Scheme Description (What Do We Have?)

The Rangiora Water Supply Scheme is an urban water supply with firefighting capacity. There are two primary headworks in Rangiora; South Belt and Ayers Street.

The water is sourced from the Smith Street Wells in Kaiapoi, with the original wells in this well field developed in 2011. From Smith Street the water is pumped approximately 9km to Rangiora. Originally three wells were drilled at Smith Street. A fourth well was added in 2016, and a fifth in

2020. The additional wells were both to keep up with demand on the growing scheme, and to ensure sufficient levels of redundancy were maintained.

The Smith Street source contains deep bores with secure groundwater certification and complies with both the bacterial and protozoal requirements of the Drinking-water Standards for New Zealand (DWSNZ). The water is supplied with no treatment, although there are standby chlorine systems available for use in an emergency.

A back-up supply is available from the Ayers Street, Dudley Park and Western Wells, although they have insufficient capacity to supply the whole township at times of peak demand. These backup sources are also not fully compliant with the DWSNZ, with no treatment provided for protozoa.

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 13 and Figure 16.

A schematic view of the principal source, treatment, and distribution system is presented in Figure 1.

Table 2: Scheme Statistics for 2019/2020

Scheme Parameter	Statistics	Data Source
Type of Supply	Urban (on demand) with fire flows	
Principal Source	Smith Street wells (4 secure wells), and a fifth well undergoing security certification process at the time this document was drafted.	
Back-up Source	Ayers Street wells (2 non secure wells) Dudley Park wells (2 non-secure wells)	
Emergency Back-up	Western wells (intake from Ashley River that is physically disconnected but can be re-commissioned in an emergency).	
Treatment	Secure groundwater with no treatment Backup chlorination systems available for emergency use	
Nominal Storage Capacity	4,300,000 litres South Belt Headworks, 4,300,000 litres Ayers Street Headworks,	200121007544
Length of Reticulation	222.3 km	Water Asset Valuation Tables 7-4 and 7-5, pages 53 - 55.
Total Replacement Value	$86.1 mil	
Depreciated Replacement Value	$63.6 mil	
Number of Connections	7,687	2019/20 Rates Strike
Number of Rating Charges	8,497	
Average Daily Flow (5 year average)	6,924 m^3/day	Flow Data Analysis - Water
Peak Daily Flow (5 day average)	15,721 m^3/day	
Resource Consent Abstraction Limit (Principal Source)	30,100 m^3/day (Smith Street wells) (expires 2/10/2044)	CRC081320
Average Daily Flow per Connection (5 year average)	934 l/day/con	Flow Data Analysis - Water
Peak Daily Flow per Connection (5 year average)	2,118 l/day/con	

Table 3: Water Supply Pipe Data Summary

Water Supply pipe length (m) by diameter and pipe material											
Pipe Material	**Pipe Diameter (mm)**										
	< 50	**50**	**100**	**150**	**200**	**250**	**300**	**375**	**450**	**> 500**	**Total**
Asbestos cement	0m	4,565m	14,095m	9,982m	172m	70m	477m	502m	2,835m	0m	32,697m
PE	674m	55,891m	473m	223m	74m	352m	136m	0m	49m	0m	57,873m
PVC	357m	38,389m	37,918m	28,398m	9,939m	96m	2,566m	4,517m	7m	8,613m	130,800m
Steel	19m	36m	7m	9m	0m	0m	0m	0m	22m	123m	216m
Other	0m	0m	0m	26m	681m	0m	4m	0m	0m	0m	711m
Total	**1,051m**	**98,880m**	**52,493m**	**38,638m**	**10,866m**	**518m**	**3,183m**	**5,019m**	**2,914m**	**8,736m**	**222,297m**

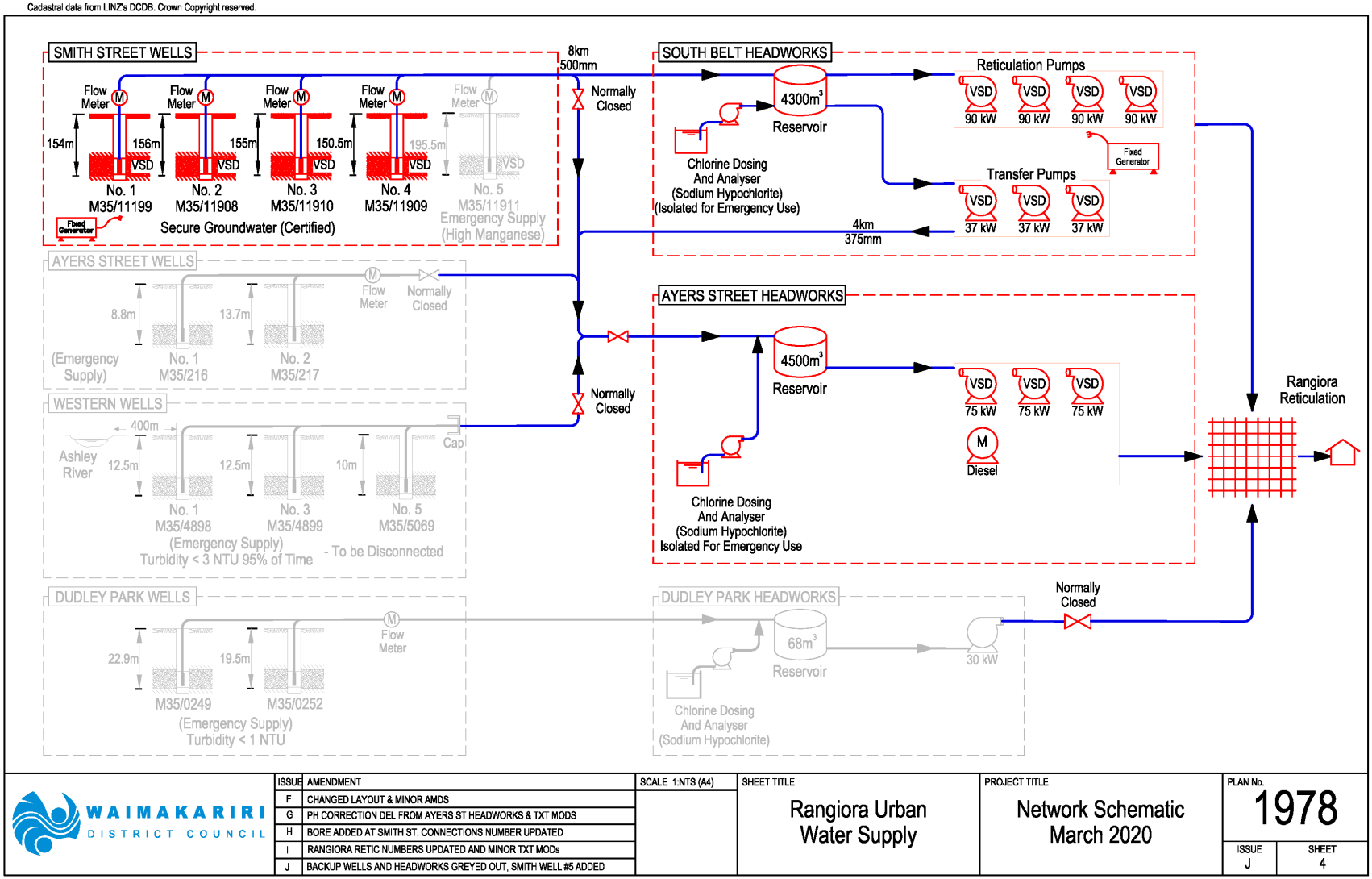
Table 4: Water Supply Valve Data Summary

Water Valves	
Diameter (mm)	**Count**
< 50	122
50	997
100	500
150	271
200	78
250	8
300	26
350	0
375	11
400	0
450	3
500	4
Total Valves	**2,020**
Fire Hydrants	**925**

Table 5: Data References

Data Reference	Trim Reference
Smith Street Bore No. 4.	130110001647
Ayers Street Reservoir Importance Level Assessment	121108078937
Ayers Street Reservoir sealing and strengthening	180912104761
Water supply flow data analysis	121108078783
2020 3 Waters Asset Valuation	200824109857
2020 Water Conservation Strategy	200501050668
2020 50 Year Water and Sewer Growth Forecast	200224024348
2018 Rangiora Water Safety Plan	180424044421
2018 Rangiora System Assessment	180424044420
2013 Public Health Risk Management Plan	130214010892
2012 Water Supply System Assessment	120730048231
2020 Fire Fighting Code of Practice Compliance Update	200904117110

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 water supply; these include:

- Target and actual Levels of Service
- Asset condition & criticality
- Capacity and 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 6 sets out the performance measures and targets specific to the Rangiora scheme, and performance achievement against targets since 2008.

Mandatory performance measures are measured at the district wide level and are not included in the individual water supply scheme AMPs. They are located in the District Overview Water Supply Activity Management Plan. However there is considerable overlap between the measures at Scheme and District levels. Mandatory measures cover drinking-water standard compliance, water losses, time to respond to faults, and complaints. The scheme LOS measures also include drinking-water standard compliance, water losses and outages, among other measures. Within the scheme AMP, these are assessed at the scheme level rather than at a district level. These scheme level results then feed into the district level results in the overview document.

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 6 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 6: Elective (non-mandatory) Levels of Service Targets and Performance Measures as Assessed in 2020

** Note for previous results "Y" indicates that the LOS has been met, and "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.

Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results#			
				Result	Commentary	Status	Action to Address	2017	2014	2011	2008
Resource Consents	Consent Breach – Action Required	Number breaches of consent conditions that result in an ECan report that identifies compliance issues.	Nil/yr	Nil	No non-compliance reports from ECan.	Achieved	NA	N	Y	Y	Y
DWSNZ	DWSNZ - Aesthetic Compliance	Water supply delivers water that complies to a standard suitable for compliance with the aesthetic requirements of DWSNZ	Complies	Complies	Turbidity < 2.5 NTU, pH in range of 7 - 8.5	Achieved	NA	Y	Y	N	N
	DWSNZ – E. Coli Presence	Number of instances where the presence of E coli was detected at the headworks or within the reticulation	Nil/yr	Nil	No E. coli detected	Achieved	NA	Y	Y	Y	Y
	DWSNZ - Protozoa Compliance	Water supply delivers water that achieves a standard suitable for compliance with the health requirements of DWSNZ	Complies	Complies	Secure groundwater status	Achieved	NA	Y	Y	N	N
	DWSNZ - Sampling Non-compliance	Number of instances where sampling programme did not comply with DWSNZ, as demonstrated by Water Information NZ (WINZ) database	Nil/yr	Nil	All samples taken in accordance with DWSNZ	Achieved	NA	Y	Y	Y	N
Fire Fighting	Fire CoP - Hydrant Placement - Urban	Percentage of properties within a Fire District serviced by a reticulated system that complies with the Fire Service Code of Practice for placement of hydrants	100%	99%	Isolated areas where standards are not met in older parts of network.	Not achieved	Capital budget to install fire hydrants to address.	N	N	N	N

Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results#			
				Result	Commentary	Status	Action to Address	2017	2014	2011	2008
Fire Fighting	Fire CoP – System Flow - Urban	Percentage of properties within a Fire District serviced by a reticulated system that complies with the Fire Service Code of Practice for flow from system	95%	100%	Flow able to be delivered, as calculated by hydraulic model of reticulation network	Achieved	NA	Y	Y	Y	Y
Water Losses	Water losses as determined by measured or calculated minimum flow for On Demand schemes	Water losses as determined by measured or calculated minimum flow for On Demand schemes	< 240 litres/connection/day	212	Data as per Water Conservation Strategy (200501050668).	Achieved	NA	Y	Y	N	Y
Service Outages	Outages - Events >8 hours	Number of events that cause water not to be available to any connection for >8 hours	Nil/yr	1	There was one event > 8 hours during the 19/20 period in Rangiora. Minimal customer impact however.	Not achieved	Review processes for carrying out repairs on larger diameter mains to address in a timely manner.	Y	N	Y	Y
Water Pressure	Pressure - Point of Supply - On Demand	Water pressure at the point of supply in On Demand and Semi-Restricted schemes, excluding outages, as demonstrated by a reticulation model or audits.	>250kPa for 100% of the time >300kPa for 99% of the time	Complies	Validated by water model to ensure target pressure is achieved.	Achieved	NA	Y	Y	Y	Y

Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results#			
				Result	Commentary	Status	Action to Address	2017	2014	2011	2008
Scheme Capacity	Scheme Capacity - On Demand	Actual peak capacity of the scheme for domestic use - On Demand	>2500 litres/connection/day	Complies	Validated by water model to ensure target pressure is achieved.	Achieved	NA	Y	Y	Y	Y
Storage Volume	Storage - On Demand	Volume of available and usable storage for On Demand and Semi-Restricted schemes (dependant on source type)	7.3 Hours	7.6 hours	Required storage calculated based on resiliency and redundancy	Achieved	Future project for additional reservoir, as a result of growth.	Y	N	Y	Y
Water Usage	Usage - Average Day	Actual usage on average day	Maintain the average daily water use below 100% of the assessed reasonable water use	71%	Refer to Water Conservation Strategy (200501050668)	Achieved	NA	Y	Y	Y	NA
Water Usage	Usage - Peak Day	Actual usage on Peak Day	Reduce the peak daily usage to below 110% of the assessed reasonable water use	103%	Refer to Water Conservation Strategy (200501050668)	Achieved	NA	Y	N	Y	N

5.2 Asset Condition

The asset condition for the reticulation has been determined based on criteria set out in the International Infrastructure Management Manual (IIMM), published by the Institute of Public Works Engineering Australasia (IPWEA), combined with updated calculations of base lives for the pipeline asset types.

The IIMM sets out criteria for converting remaining useful life as a percentage to a Condition Grade from 1 (Very Poor) to 5 (Very Good). This is a relatively simple conversion. However the process for determining the base lives, which in turn gives the condition grading is more complex. The details of this process are outlined in the Water Overview AMP. The following expected asset lives have been adopted:

Table 7: Adopted Reticulation Asset Base Lives for Pressure Pipes

Pipe Category and Definition	Calculated Asset Life (years)
PVC Modern (PVC pipe installed post 1997)	100
PVC Old (PVC pipe installed prior to 1997)	60
PE Modern (PE pipe installed post 1990)	100
PE Old (PE pipe installed prior to 1990).	35
AC Small (AC pipe with diameter < 100mm)	55
AC Medium (AC pipe with diameter 100mm to 150mm)	60
AC Large (AC pipe with diameter >= 200mm)	90

Asset Condition Calculation

With the asset base lives calculated, and the condition defined as a function of remaining useful life, the remaining data required to calculate the condition of each asset is the year of installation of the asset. This information is held for each asset within the Council's TechOne asset database. Thus, through a combination of expected asset life, year of installation, remaining useful life of asset, the condition grade for each asset is able to be assigned.

Figure 2 below has been generated using the above process, to show the assessed condition of all the pipe assets on the scheme. Also included within this figure is the pipe burst data held against each asset.

Figure 3 shows this same information graphically, and also includes headworks assets, and Table 8 presents this information is tabular format.

It is noted that "Headworks" is inclusive of all above ground assets associated with the water supply scheme (e.g. reservoirs, buildings, pump sets). "Reticulation" covers the remainder of the assets, which are typically below ground pipework related assets.

Figure 2: Pipe Condition Assessment Plan

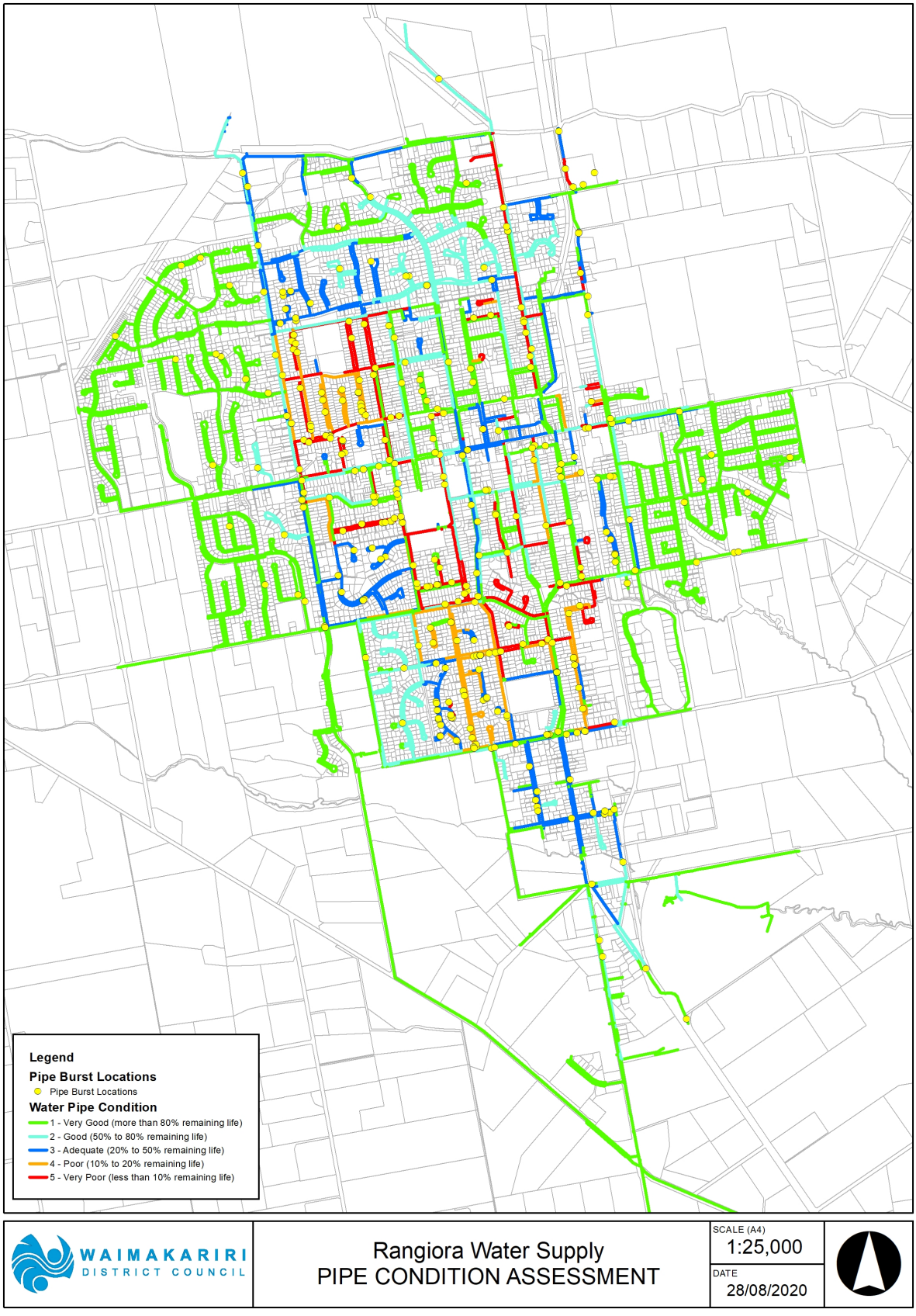


Figure 3*: *Asset Condition Summary

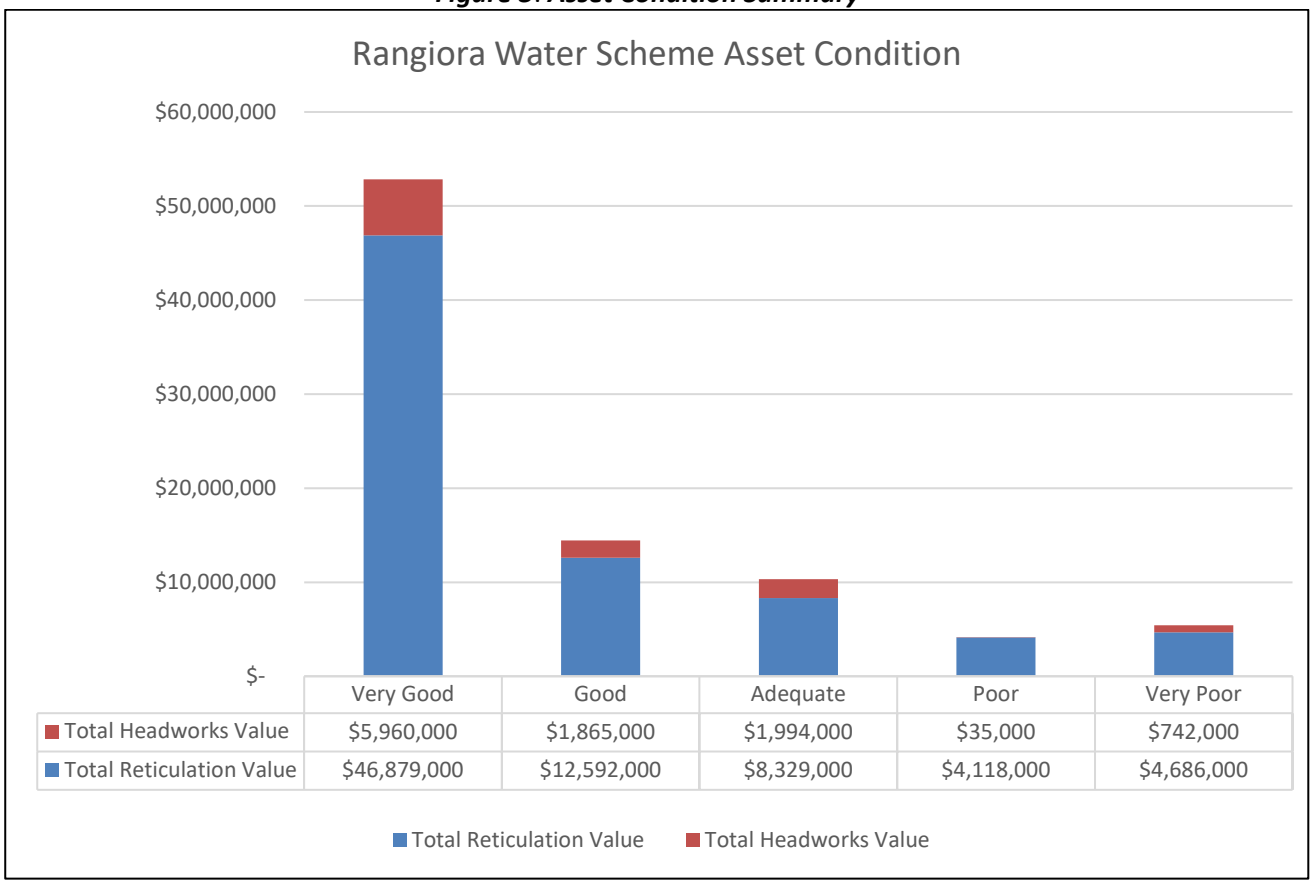


Table 8: Pipe Condition Summary

Condition Grade	Definition	Pipeline Quantity	Total Reticulation Value	Total Headworks Value	Total Value
1	Very Good *More than 80% of life remaining*	132.0 km *59%*	$ 46,879,000 *61%*	$ 5,960,000 *56%*	$ 52,839,000 *61%*
2	Good *Between 50% and 80% of life remaining*	35.4 km *16%*	$ 12,592,000 *16%*	$ 1,865,000 *18%*	$ 14,457,000 *17%*
3	Adequate *Between 20% and 50% of life remaining*	25.9 km *12%*	$ 8,329,000 *11%*	$ 1,994,000 *19%*	$ 10,323,000 *12%*
4	Poor *Between 10% and 20% of life remaining*	13.3 km *6%*	$ 4,118,000 *5%*	$ 35,000 *0%*	$ 4,153,000 *5%*
5	Very Poor *Less than 10% of life remaining*	15.5 km *7%*	$ 4,686,000 *6%*	$ 742,000 *7%*	$ 5,428,000 *6%*
Total		**222.1 km**	**$ 76,604,000**	**$ 10,596,000**	**$ 87,200,000**

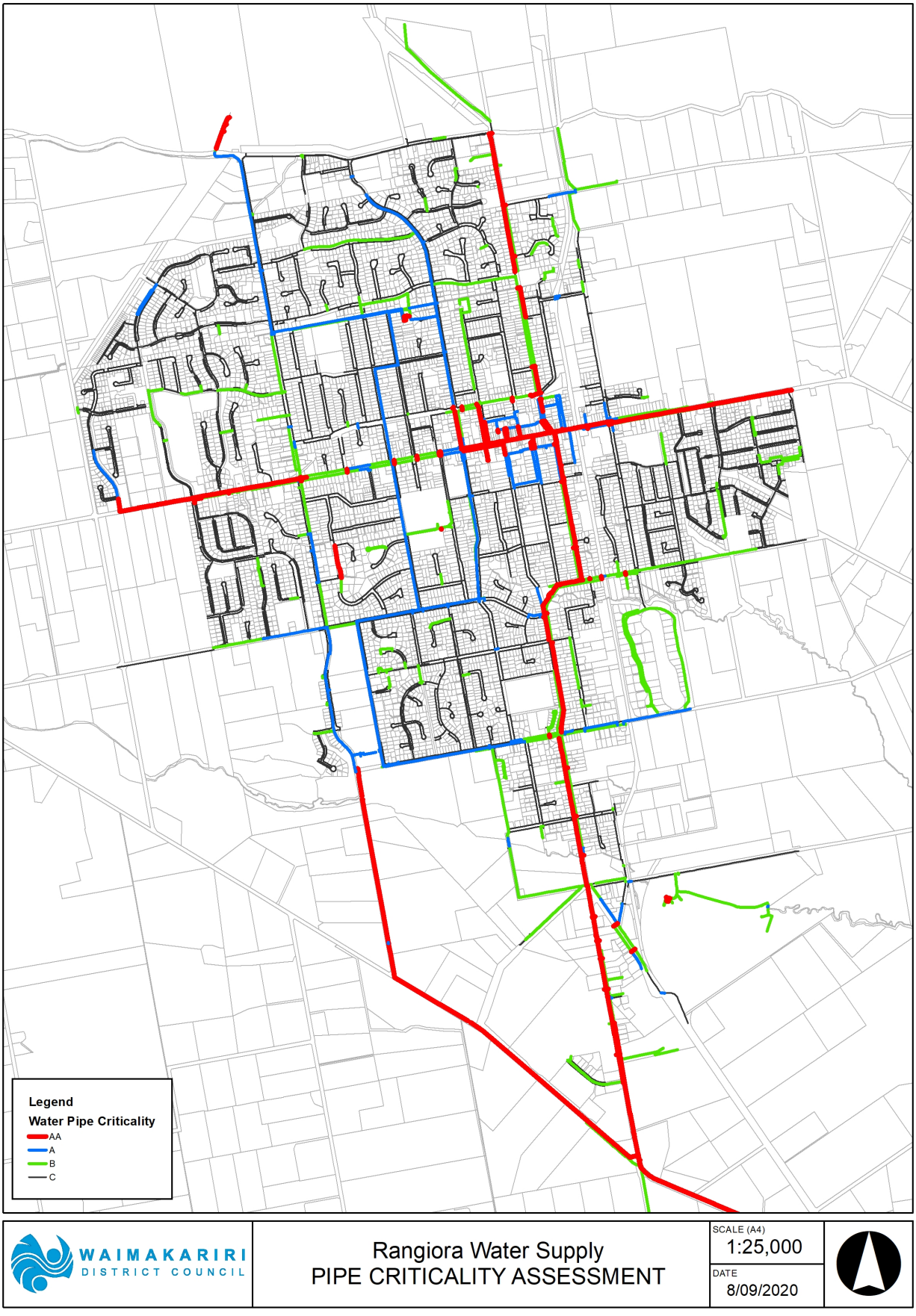
5.3 Asset Criticality

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 WS Overview AMP.

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

Figure 4 provides a spatial view of asset criticality for the scheme.

Figure 4: Pipe and Facilities Criticality



5.4 Risk Assessment

An Operational Risk Assessment was first undertaken for the Rangiora Water Supply Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review, in 2014. The last two reviews revealed no extreme or high risks for the Rangiora water supply scheme.

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

Table 9 below shows a summary of the number of events at each level of risk for the Rangiora water supply scheme.

Table 9: Number of Events per Level of Risk

Risk Level	2004	2008	2011	2014
Extreme risks	0	0	0	0
High risks	4	4	0	0
Moderate risks	25	26	15	13
Low risks	21	20	32	31
Not applicable	5	5	11	14
Total	**55**	**55**	**58**	**58**

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

The 13 moderate risks identified in the 2014 assessment are detailed below

Table 10: Risk Assessment Results Summary

Process	Event	Cause	Comments	Mitigation
Source	Natural Disaster	Earthquake	Bore could be damaged or aquifer affected. Potential for pipe failure. Back-up bores reduces consequences.	
Source	Natural Disaster	Flood/Tsunami	Ashley river bank break could affect back-up sources	Not an issue for primary source.
Source	Natural Disaster	Vandalism / Terrorism	Not a known problem in this area	Sites locked.
Treatment	Natural Disaster	Vandalism / Terrorism	Not a known problem in this area	Sites locked.
Distribution	Pipeline or reservoir breakages causing contamination or loss of supply	Third party damage	Damage from diggers etc.	Procedures for locating pipes before digging.
Distribution	Pipeline deterioration resulting in contamination	Ageing watermains (e.g. galv, lead, copper)	Only a moderate problem	Proactive renewals programme in place.
Distribution	Contamination from backflow	Loss of system pressure	Scheme relies on pumps	Generator in place at primary headworks to reduce likelihood of a system pressure loss.
Distribution	Contamination from backflow	No or inoperative backflow prevention device	Backflow prevention policy in place All new connections require minimum of non-testable check valves	
Distribution	Natural Disaster	Earthquake	Most critical pipe is delivery main from Smith St wells. This is a new pipe in good condition.	Spare parts are held at Water Unit to ensure break can be fixed in timely manner.
Distribution	Natural Disaster	Vandalism/ Terrorism	Not a known problem in this area	
General	Operations / management failures	Operator or management error	Currently employ competent and trained staff. Minimum C-Grade for operators. Minimum qualification requirements for reticulation workers outlined in Hygiene Code of Practice for Work on Public Water Supplies.	
General	Operations / management failures	Incorrect or no data - Demand Flows - Chlorine residual (if emergency chlorination implemented) - Maintenance history - Sample & testing record	Adequate monitoring equipment in place	
General	Operations / management failures	Inappropriate work planning & management		

5.5 Water Safety Plan

Rangiora has an approved Water Safety Plan (WSP). This provides a summary of how the scheme is operated, undertakes a risk assessment for the scheme, identifies preventative measures, and recommends any upgrades to address unacceptable risks. Under the Health Act, these are required to be renewed every 5 years. The Rangiora WSP was last approved in 2018, which means it will be due for renewal next in 2023.

Budgetary requirements arising from the plan are incorporated into the draft LTP.

When the Water Services Bill comes into effect, which is expected to be in mid-2021, the requirement for WSPs to be produced will be transferred from the Health Act to the Water Services Bill. The plans will then be submitted to Taumata Arowai, rather than the current Drinking-water Assessors which operate under the Ministry of Health.

5.6 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 to above ground assets 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 11) 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 11: Risks to Above Ground Facilities

Threat	Ayers St Headworks	Dudley Park Headworks	Smith St Wells	South Belt Headworks
100 yr Local Flooding	M	L	H	H
475 yr Earthquake Induced Slope Hazard	L	L	L	L
Ashley Flood (100 yr)	N	L	N	L
Ashley Flood (500 yr)	N	L	M	L
Earthquake (50 yr)	H	L	H	H
Earthquake (150 yr)	M	L	H	M
Earthquake (475 yr)	L	L	L	L
Wildfire (threat based)	M	L	M	H
Snow (150 yr)	L	L	L	L
Wind (150 yr)	L	L	L	M
Lightning (100 yr)	L	L	L	L
Pandemic (50 yr)	M	M	M	M
Terrorism (100 yr)	H	L	M	M
E = Extreme, H = High, M = Moderate, L = Low.				

The scheme is located outside the zone of mapped liquefaction susceptibility however additional mapping is proposed to assess the land to the east of Rangiora. The Smith Street and South Belt facilities are newly constructed and are considered highly resilient to seismic events.

The Smith Street wells and the South Belt headworks are considered to be at high risk from local flooding which modelling shows may be subject to up to 0.8 metres of water. It is however noted that the newest wells (Well 4 and Well 5) in this borefield have been constructed at an increased elevation, above modelled flood levels.

The risk from wildfire is significant at the South Belt Headworks site due to the large population served by the facility. It is noted however that the South Belt headworks can be bypassed completed with the water delivered directly from Smith Street to Ayers Street in an emergency situation.

The Council's response to 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 integration of the risk assessment methodologies is planned, prior to risk assessments next being carried out.

5.7 Growth Projections

Situation

Residential growth is expected to occur both within the existing town boundary and through expansion of the residential zone. Additionally, it is anticipated that there will be extensions of the water supply beyond the urban scheme boundary.

Significant industrial growth is also expected in Rangiora.

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. Water supply 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 (TRIM 200908117997)

It is important to provide a brief comment on COVID-19 and the impact it could have on population projections. At the time of writing this paragraph (August 2020), there are currently Level 3 restrictions in Auckland and Level 2 restrictions in the remainder of the country. While international migration is currently low arising from the COVID-19 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 water supply scheme is expected to increase by 30%, by the end of the 2021-31 Long Term Plan (LTP) period. The projection is based on two main factors:

1. Residential Connection Increase – an average of 182 new dwellings per year are projected on the basis of preliminary WDC Growth Model population projection for Rangiora.
2. Southbrook Industrial Area – 19 new connections per year are projected as a result of developing 62 Ha of industrial land in Southbrook over 20 years. This is based on the assumption of approximately 6.1 non-residential water connections per Ha of non-residential land. The Southbrook Industrial Area represents the bulk of the total of 25 new commercial connections expected per year.

The number of on-demand connections is forecast to increase by an average of 206 per year during the 2021-31 LTP period to accommodate this demand. The number of properties supplied by a restricted (2 units per day) connection is projected to increase by 10 in total, from 2019/20 to 2030/31 (Table 12). Demand beyond the 2021-31 LTP period is forecast to transition to a lower growth profile resulting in an average of 139 new connections per year, to 2070/71 (Table 12).

Table 12: Growth Projections

Rangiora	Rates Strike July 2019	Years 1 - 3	Years 4 - 10	Years 11 - 20	Years 21 - 30	Years 31 - 50

	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	7,574	8,503	9,847	11,589	12,969	15,399
Projected Rating Units	8,286	9,251	10,661	12,469	13,856	16,299
Projected Increase in Connections		12%	30%	53%	71%	103%
Projected Average Daily Flow (m^3/day)	7,454	8,448	9,916	11,779	13,161	15,595
Projected Peak Daily Flow (m^3/day)	16,810	19,291	22,956	27,606	31,054	37,127

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.

Longer term growth over the next 50 years is projected to increase by 103%. This long term growth trend is similar to the 2017 Activity Management Plan 50 year projection of 110%, which was also based on the 2013 Statistics New Zealand Population Projection figures.

Water use predictions for the Rangiora water supply scheme have been based on the standard assumption used when modelling the future water demands within the water distribution models. These are an average and peak daily water use per day per on demand connection of 1,000 litres and 2,500 litres respectively (including losses).

Projections

Figure 5 & Figure 6 present the projected growth and corresponding demand trends for the Rangiora Water Supply.

Figure 5: Population Projections

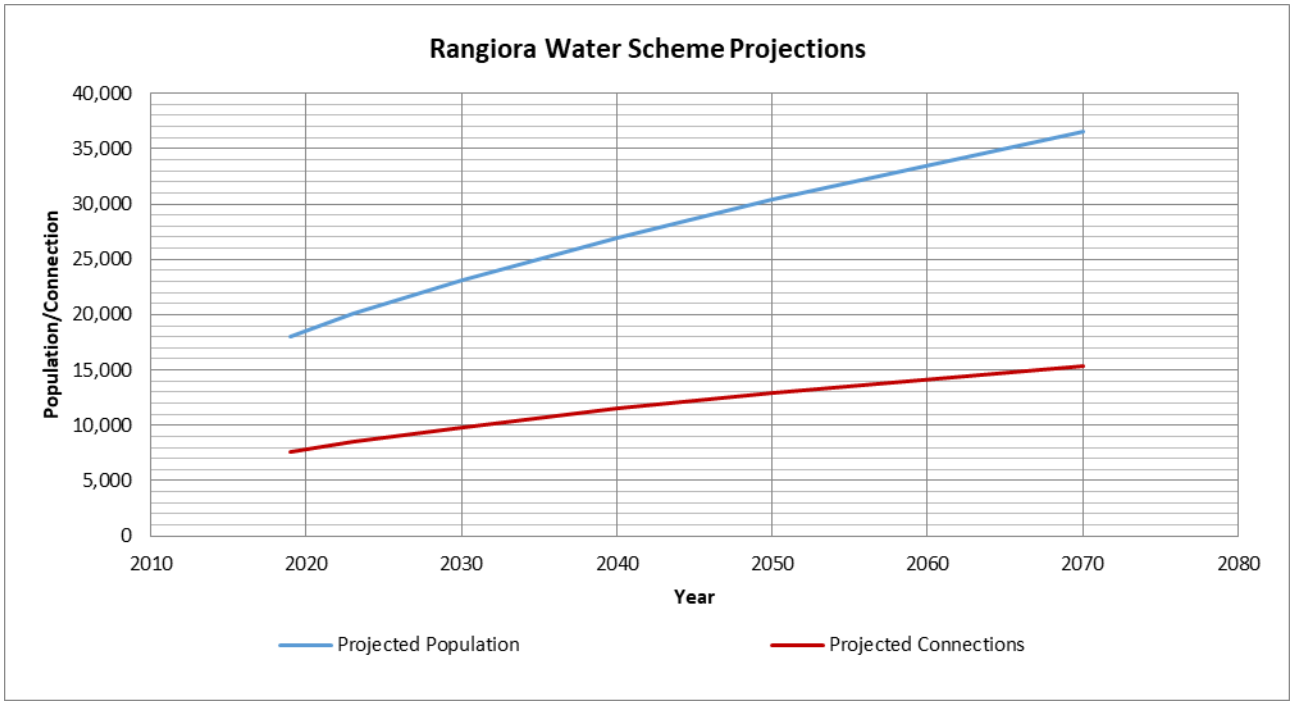
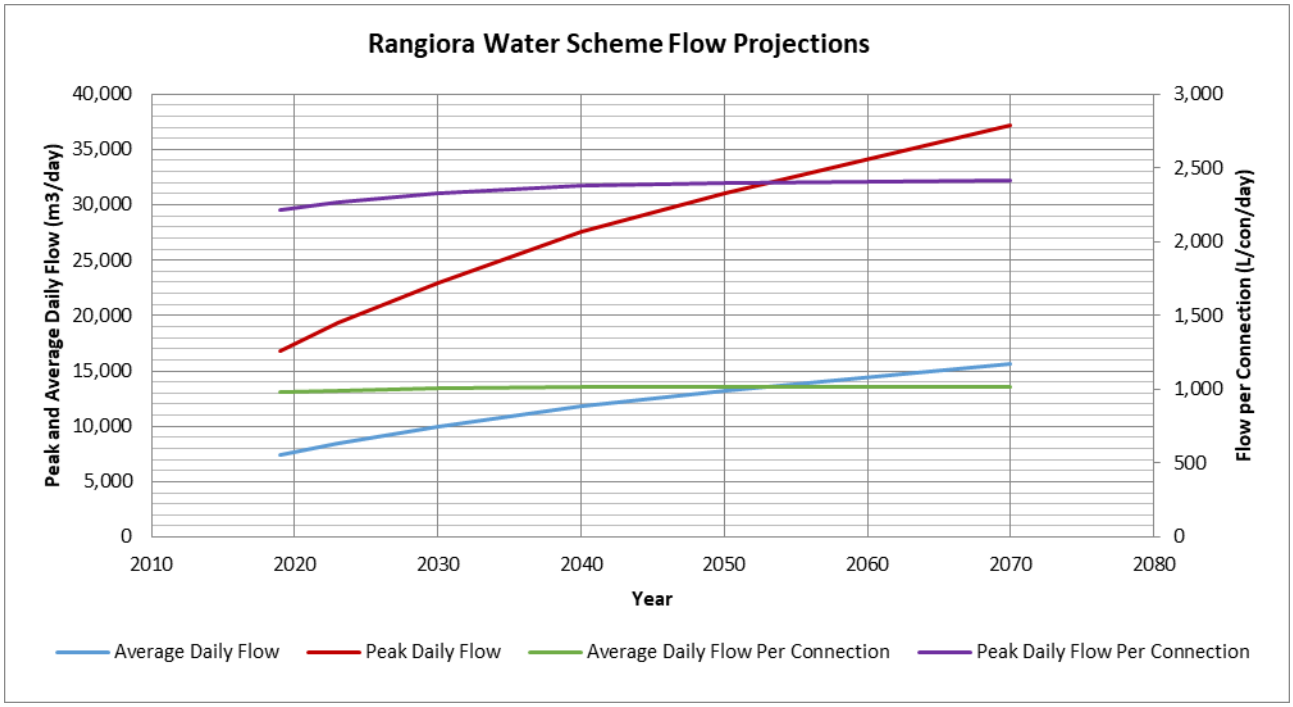


Figure 6: Flow Projections



5.8 Capacity & Performance

This section of the AMP considers the capacity and performance of the Rangiora Water Supply, both given the current demand, and also taking into account the forecast growth. The specific aspects of the scheme that have been considered are the source, treatment, storage, headworks, and

reticulation system. These are discussed in more detail in the following sub-sections. All of the upgrades mentioned in the following sections necessary to maintain capacity for growth have been included in the Long Term Plan budgets.

Source

The primary source for the Rangiora water scheme consists of four certified secure groundwater wells adjacent to Smith Street in Kaiapoi (Smith Street wells). In addition, there is a fifth well (Smith St No. 5) that has been drilled which was undergoing its security assessment as the time this document was being prepared. Water is pumped from the source to the South Belt reservoir in Rangiora.

Back up supply is available from two wells at the Rangiora Ayers Street Headworks (the Ayers Street wells) and two wells at Dudley Park also in Rangiora (the Dudley Park wells). The three shallow wells near the Ashley River (the Western Wells) are an emergency source that can be utilised if required.

The Smith Street wells pump to South Belt headworks and then the South Belt transfer pumps pump to the Ayers Street headworks. If required, the Western Wells and Ayers Street Wells pump to the Ayers Street headworks and the Dudley Park wells pump to the Dudley Park Headworks.

Primary sources are summarised in Table 13 below.

Table 13: Scheme Sources

Well name	Well No.	Diameter (mm)	Depth (m)
Smith St No. 1	M35/11199	300	154.4
Smith St No. 2	M35/11908	300	155.8
Smith St No. 3	M35/11910	300	155
Smith St No. 4	M35/11909	300	150.5
Smith St No.5	M35/11911	300	195.5

The following sources are available as an emergency back-up supply (Table 14).

Table 14: Back Up Supply

Well name	Well No.	Diameter (mm)	Depth (m)
Ayers St No. 1	M35/0216	100	8.8
Ayers St No. 2	M35/0217	356	13.7
Western well No. 1	M35/5069	150	10
Western well No. 3	M35/4899	375	12.5
Western well No. 5	M35/4898	375	12.5
Dudley Park No. 1	M35/0249	203	22.9
Dudley Park No. 2	M35/0252	152	19.5

The resource consent (CRC081320) conditions for the Smith Street wells limit the allowable abstraction to 30,100 cubic metres per day or a maximum rate of 350 L/s and 6,328,400 cubic metres in any year. The consent expires in 2044.

The resource consent (CRC160704) conditions for the current Ayers St wells, as well as the Western wells and Dudley Park limit the combined allowable abstraction to 25,920 cubic metres per day or a maximum rate of 300 L/s. The consent expires in 2032.

The Smith Street wells are the primary source for Rangiora. The capacity of the five wells is shown in Table 15.

Table 15: Smith Street Capacity

Well	Capacity (l/sec)	Comments
Smith St No. 1	70	Determined from commissioning tests
Smith St No. 2	90	Determined from SCADA records
Smith St No. 3	50	Determined from commissioning tests
Smith St No. 4	80	Determined from SCADA records
Smith St No. 5	30	Determined from commissioning tests
Total Combined Capacity	320	
Assessed Combined Capacity	270	Assuming median capacity well from above (Smith St No. 3) is unavailable, to ensure sufficient redundancy. Refer 200121007544 and 201015138457.

The Dudley Park No.1 and 2 wells provide emergency back-up supply at the Dudley Park headworks, with also the Ayers St No. 1 and No. 2 wells providing emergency back-up to the Ayers St headworks. The capacity of these four wells is shown in Table 16.

Table 16: Dudley Park Capacity

Well	Capacity (l/sec)	Comments
Ayers St No. 1	23	Determined from modelling data
Ayers St No. 2	23	Determined from modelling data
Dudley Park No.1	20	Determined from modelling data
Dudley Park No.2	20	Estimated
Total Dudley Park and Ayers Street	**86**	

The Western Wells are now an emergency back-up source to pump into the Ayers Street headworks if additional capacity is required during an emergency event where the Smith Street wells are not available. The estimated capacity of these three wells is shown in Table 17.

Table 17: Western Well Capacity

Well	Capacity (l/sec)	Comments
Western well No. 1	39	Estimated from historic modelling data
Western well No. 3	39	Estimated from historic modelling data
Western well No. 5	39	Estimated from historic modelling data

Council plans capacity for its water supplies on the basis that one of the primary wells is out of operation at any given time. This concept was used in deciding when source capacity upgrades would be required. This ensures that each scheme has an acceptable level of redundancy.

To calculate the required source capacity, further contingency is introduced through assuming 10% down time, which increases required source capacity above the Peak Daily Flow.

Table 18 presents the projected water demand and associated required source capacity for the Rangiora supply. This only takes the Smith Street wells into account as they are the principal source.

Table 18: Project Demand and Required Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Daily Flow (L/s)	234	309	354	388	445
Required Source Capacity (L/s)	260	343	393	431	495

If all wells are operative the existing sources have sufficient capacity to meet the current demand. However, in order to ensure sufficient redundancy, it is assumed that the median capacity well is not available. Therefore, the assessed capacity of the primary wells is 270 l/s which is only marginally greater than the target capacity of 260 l/s. Budget has been allowed for in 2022/23 to upgrade the Smith Street source by drilling a sixth well in this well field to meet the projected demand for the next 20 years.

Treatment

The Smith Street wells provide secure groundwater which complies with the bacterial and protozoal requirements of the Drinking Water Standards for New Zealand (DWSNZ). The supply is not

chlorinated, as chlorination is not currently a requirement of the Drinking Water Standards. The decision not to chlorinate was made following community consultation in 2012 which indicated a preference to discontinue the previous chlorination which was required for the previous source (before the Smith Street source was established).

Chlorination equipment is however still installed at the two primary headworks sites such that chlorine could be implemented if required in an emergency water contamination event.

A placeholder budget has been included in the draft LTP in 2022/23 in anticipation of the outcome from the Havelock North Water Supply Inquiry being that the category of a "secure" water supply will no longer exist. It is assumed that this change will require the installation of UV treatment plant, and possibly permanent chlorination equipment. The final decision regarding the treatment requirements will be made following review of the next revision of the Drinking-water Standards (expected to be released in 2021) and also after gaining a better understanding about potential requirements for mandatory chlorination and the exemption process under the new drinking-water regulator (Taumata Arowai).

Certain water supplies have a risk of being plumbosolvent. The definition of plumbosolvent water is water that is able to dissolve lead easily. Water that has low pH and alkalinity tends to be slightly corrosive and therefore plumbosolvent. The Council complies with the requirements of the Drinking Water Standards for plumbosolvency by advertising twice per year advising customers to flush the first 500 mls of water before taking water for drinking purposes. Adverts are district wide and do not distinguish between water supplies.

Storage

Storage is supplied to meet the level of service target, which specifically considers all redundancy within the water supply. The emergency storage target for Rangiora is calculated to be 7.3 hours at average daily flow.

The South Belt headworks has a 4,300 m^3 reservoir, Ayers Street headworks has a 4,300 m^3 reservoir and the Dudley Park headworks has an assessed volume of 68 m^3. It is noted that the Dudley Park tanks are not usually utilised and would only be used of the Dudley Park source was required to be utilised (under emergency circumstances), so the Dudley Park volume is not considered to contribute to the overall storage volume of the scheme.

An additional 4,300 m^3 reservoir will be required at the South Belt headworks in 2026/27 to accommodate continued growth on the scheme. In the 50 year projection an additional reservoir is also required in 2064/65.

Table 19 presents the required storage capacity required to meet the level of service, versus the projected increases in available storage over the coming 50 years, taking into account planned storage upgrades.

Table 19: Required Storage Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Required Storage Volume (m^3)	5,945	9,703	10,376	10,835	13,762
Projected Total Storage Volume (m^3)	8,600	12,900[1]	12,900	12,900	17,400[2]

Note 1: Storage upgrade planned for Year 6, to increase from 8,600 to 12,900m^3.

Note 2: Additional storage upgrade planned for Year 43 to increase total storage volume to 17,400m^3.

Note 3: Source upgrades in Years 11 and 27 decrease total amount of storage required, as they lower amount of operating storage, thereby increasing amount of available emergency storage.

Headworks

The Rangiora scheme has three headworks located at South Belt, Ayers Street and Dudley Park. Both South Belt and Ayers Street are the primary headworks, running in tandem. Dudley Park is a much smaller headworks and is only used as an emergency back-up source.

The South Belt headworks features four large pumps with variable speed drives that pump directly into reticulation and three smaller transfer pumps all with variable speed drives that pump water to Ayers Street headworks. The Ayers Street headworks features 3 large supply pumps that operate as duty, assist, standby plus a fourth diesel backup pump for use during a potential power outage. The three electric pumps are connected to variable speed drives. The Dudley Park headworks features a single fixed speed pump.

The delivery capacity of the South Belt headworks is 400 L/s, the Ayers Street headworks is 300 L/s and the Dudley Park headworks is 30 L/s (this is an emergency backup pump set only). For redundancy it is assumed that one of the main pumps is unavailable, therefore the total assessed capacity is currently 600L/s.

Table 20 presents the projected peak hourly flows for the Rangiora supply.

Table 20: Projected Peak Hourly Flows for Surface Pumps in Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Hourly Flow (L/s)	467	613	701	779	903

Note: An Ayers Street pump upgrade to 400 L/s is projected to be required in year 2029/30 and would replace the diesel pump, which by this time will have been replaced by a generator. There are upgrades planned in 2039/40 and 2054/55 scheduled for Ayers and South Belt respectively, increasing the capacity (including a 1 pump redundancy) to 900 L/s combined, which meets the 50 year demand for both firefighting and peak hourly flow.

Reticulation

The capacity of the water supply headworks and reticulation has been assessed using a calibrated reticulation model. The model and associated monitoring has confirmed that the existing reticulation system has adequate capacity for the existing demands. However, substantial reticulation upgrades will be required to accommodate future growth on the scheme.

The reticulation upgrades have been modelled, cost estimates undertaken and the projects have been included in the 2021-31 LTP. For further information refer to Section 6.3 of this document.

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 assets in an acceptable condition, reduce the risks to an acceptable level and accommodate growth.

Financial forecasts do not include inflation

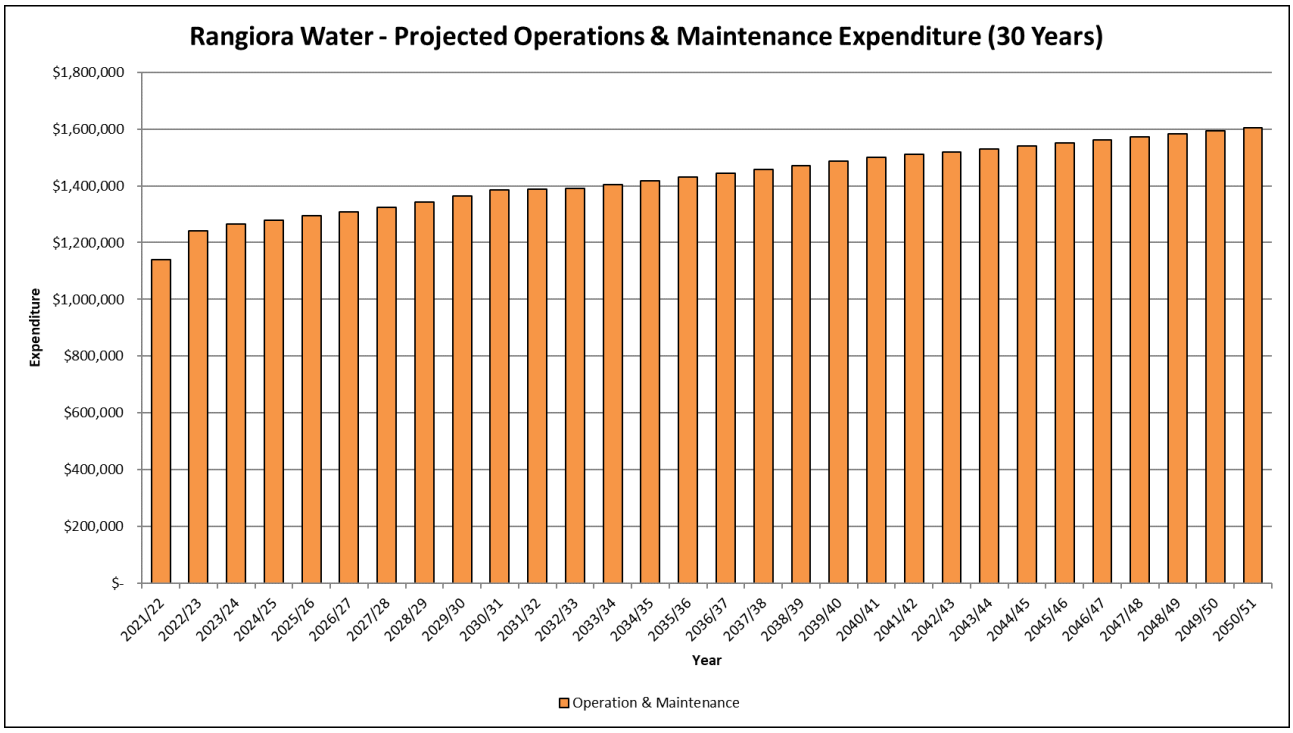
6.1 Operation & Maintenance

Operation and maintenance (O&M) expenditure incorporates the day to day running of the water supply 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.

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 7.

Figure 7: Annual Water Operation & Maintenance 30-Year Budget



It is noted that there is a step increase in O&M costs shown going from 2021/22 to 2022/23. This shows the allowance made for chlorination of the supply, assuming that this will become mandatory. It is however acknowledged that there is some uncertainty in this assumption as the Water Services Bill had not yet been adopted by Government at the time this AMP was being published, and further information would be required on what may be involved to gain an exemption from chlorination under the proposed new bill.

6.2 Renewals Programme

A renewals model is used to generate renewal timeframes for each reticulation asset on each scheme. This model takes into account the remaining life from the asset condition data, and the

criticality of each asset, and recommends an acceptable renewals window for each pipe. More information on the model is provided in the Overview document.

Renewal of pipework assets are then programmed on an annual basis, taking into account the outputs from the renewals model, but also being informed by other works that may be planned in the area, as well as local burst history for the cases where a particular asset may be performing differently than its base life suggests.

The outputs from the renewals model are summarised in Figure 8 below, with category bands depicting how soon renewal is required of each asset. This data is available to staff for analysis on the Council's GIS mapping system (Waimap).

The first ten years of the programme are based on the above assessments by the Asset Manager, but from year 11 forward expenditure is taken directly from the model.

Figure 8: Pipe Renewal Timeframes

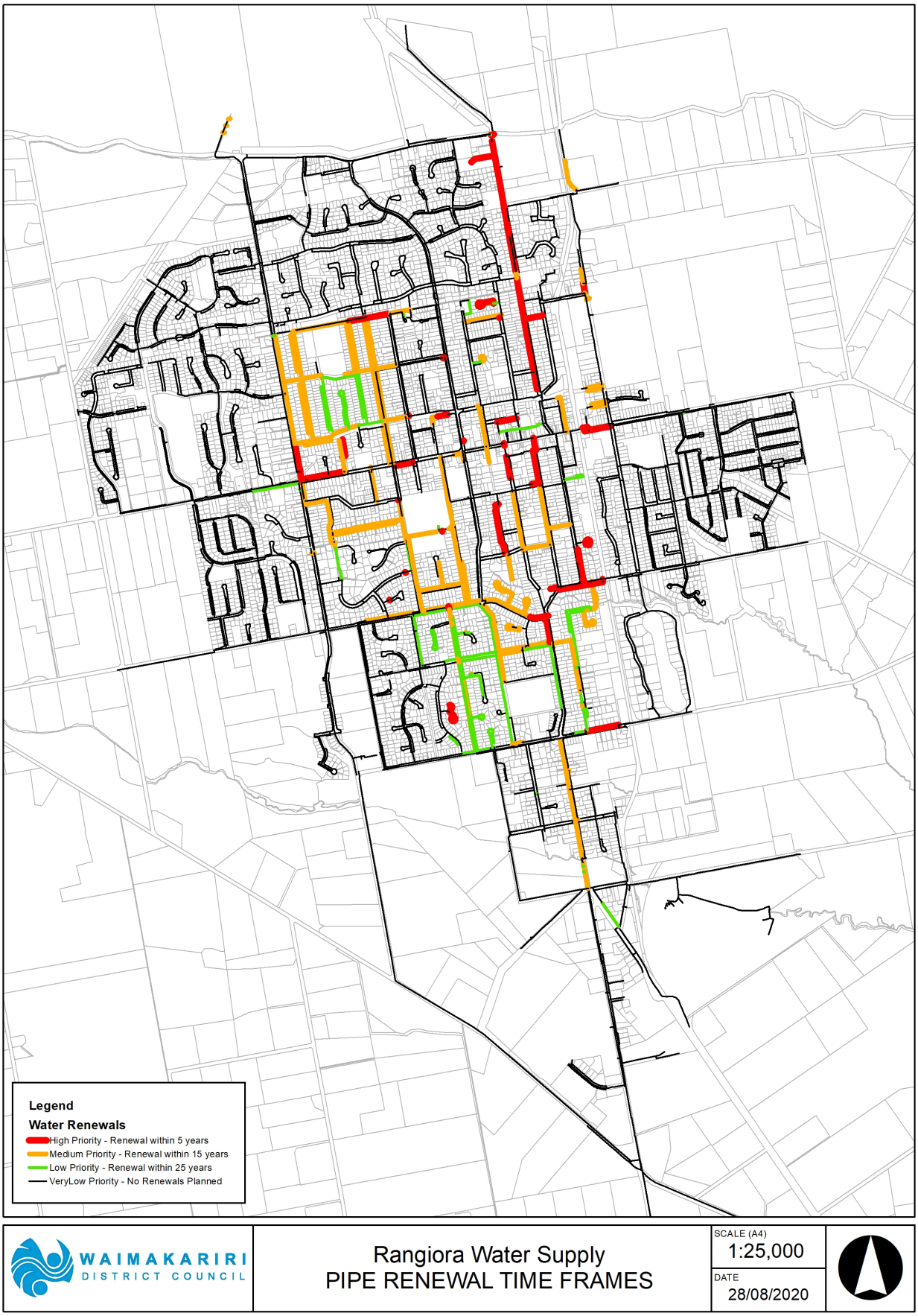
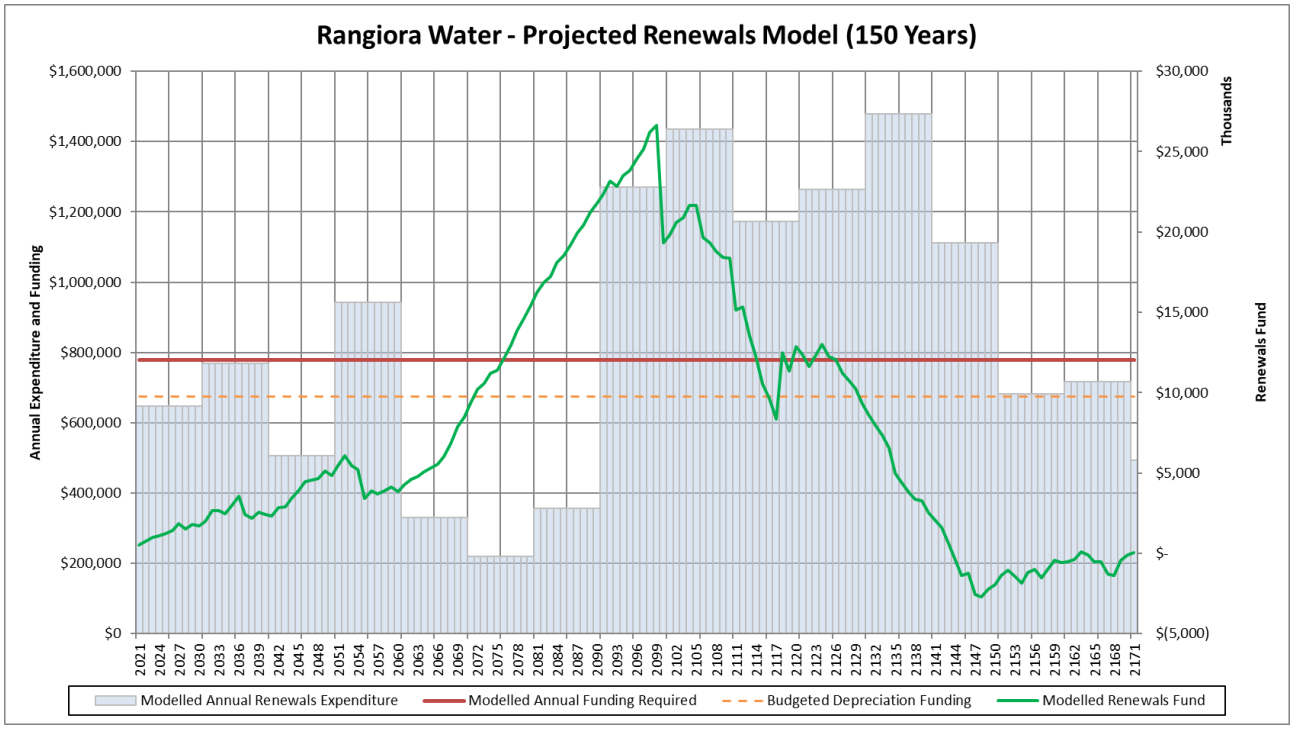


Figure 9 below shows the financial output from the model alone. Over a 150 year period it shows the projected expenditure; the value in the renewals fund; the level of funding required to ensure the fund can meet the required renewals programme, and the annual depreciation.

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 LTP, as adjustments may have been made by the Asset Manager from the direct renewals model outputs. Individual scheme AMPs detail the actual planned renewals budgets for the first ten years. There are no deferred renewals.

Figure 9: Annual Water Renewals 150-Year Budget



The key parameters in the figure above are explained below:

- **Modelled Annual Renewals Expenditure:** This is the direct output from the renewals model, recommending the annual investment to be made in renewals each year.
- **Modelled Annual Funding Required:** This is the amount of annual renewals funding required, to ensure there are sufficient funds available to carry out the recommended annual renewals each year.
- **Budgeted Depreciation Funding:** This is the actual amount of depreciation being collected, which is extracted from the Council's budgets.
- **Modelled Renewals Fund:** This is the modelled balance in the renewals account, assuming the annual funding and annual expenditure is completed as per the recommendations from the renewals model.

The key point to note is that the Budgeted Depreciation Funding is less than the Modelled Annual Funding Required. The reason for this discrepancy is twofold:

- **Depreciation Discount Factor:** Council's financing of future renewals incorporates the expectation that depreciation funding can be invested at a higher rate of return over the life of the assets than the rate of inflation. Further information regarding this approach is

provided in the Finance Policy. This concept is embodied in the scheme budgets in the form of a discount rate (referred to in the budgets as the 'Depreciation Discount Factor'). This reduces the annual depreciation funding required from rates, while still ensuring that there will be sufficient funding available to renew assets at the end of their useful life. The renewals model takes a simpler and more conservative approach to the way this effect is calculated, which accounts for some of the difference shown in Figure 9.

- **Improvement in Asset Base Lives:** The second, and more significant, factor explaining this difference particular to this LTP, is a consequence of recent analysis work carried out on the base lives of all water pressure pipe (refer 200508053285 for a record of this analysis, or refer to the Asset Condition section). A significant difference from the previous base lives to the updated ones is that the previous 100 year life for old PVC (defined as pre-1997 installation) pipe, should be reduced to 60 years. This reduced life for this particular pipe class increases the depreciation rate, and therefore increases the annual renewals funding required for schemes with a high proportion of old PVC mains. The analysis was undertaken after asset lives were finalised for the three yearly valuation update, so the updated depreciation rates from the pipe burst analysis work were not able to be incorporated into the 2020 valuation work. However they have been incorporated into the renewals model, which is the primary cause of the difference shown in Figure 9. This will be self-correcting at the next LTP, as a common life for old PVC pipes will be used for both the valuation and the renewals modelling work. Going forward this improved understanding of the expected base lives of pressure pipes will ensure that the required amount of depreciation funding is allowed for.

6.3 Capital Works

The following graph shows the 50 year budget for all capital works, including projects driven by growth and levels of service (Figure 10). Renewals expenditure showing in the first ten years of the graph, includes the actual planned programme, which may differ from the direct modelled output.

Figure 10: Projected Capital works Expenditure

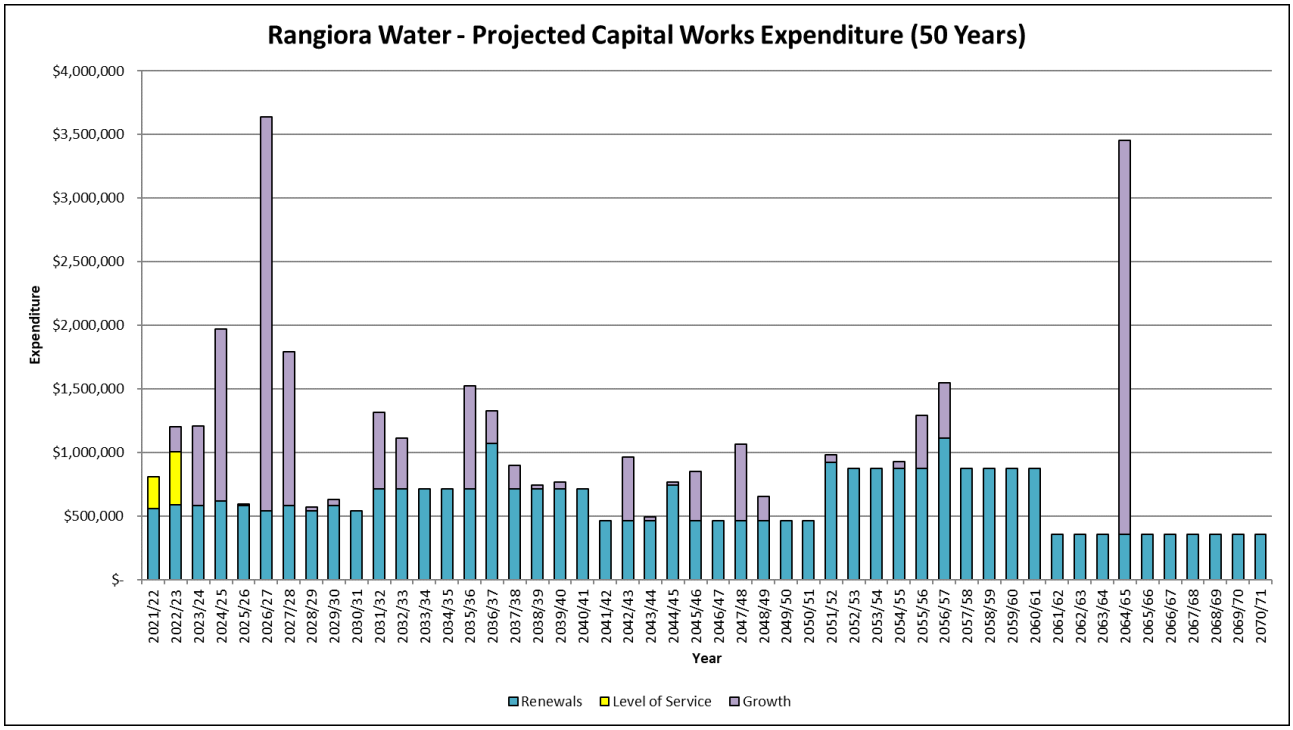


Table 21 summarises the projected capital works for the next 50 years, including renewals. Figure 11 shows the corresponding location of the projected capital works.

The level of confidence in the budget for the works 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 presented in the table exclude inflation for ease of comparison across years.

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.

It can be seen from above that over time, renewals are the most significant capital works type required. The driver, and process for identifying these are discussed in detail in Section 6.2. There are some level of service works required in initial years, to address identified deficiencies. Beyond that, the remaining works required are to accommodate growth, which have been identified from the reticulation model, taking into account expected growth on the scheme.

The two most significant growth related projects planned are additional reservoirs, with an approximately value of $3.0 million per new reservoir. The need for these new reservoirs had been projected when the South Belt source was established, and the land is already set aside at the current headworks site. There are minimal alternative options that could be considered, as the need for new reservoirs is a direct result of growth occurring, in order to maintain required levels of storage on the scheme.

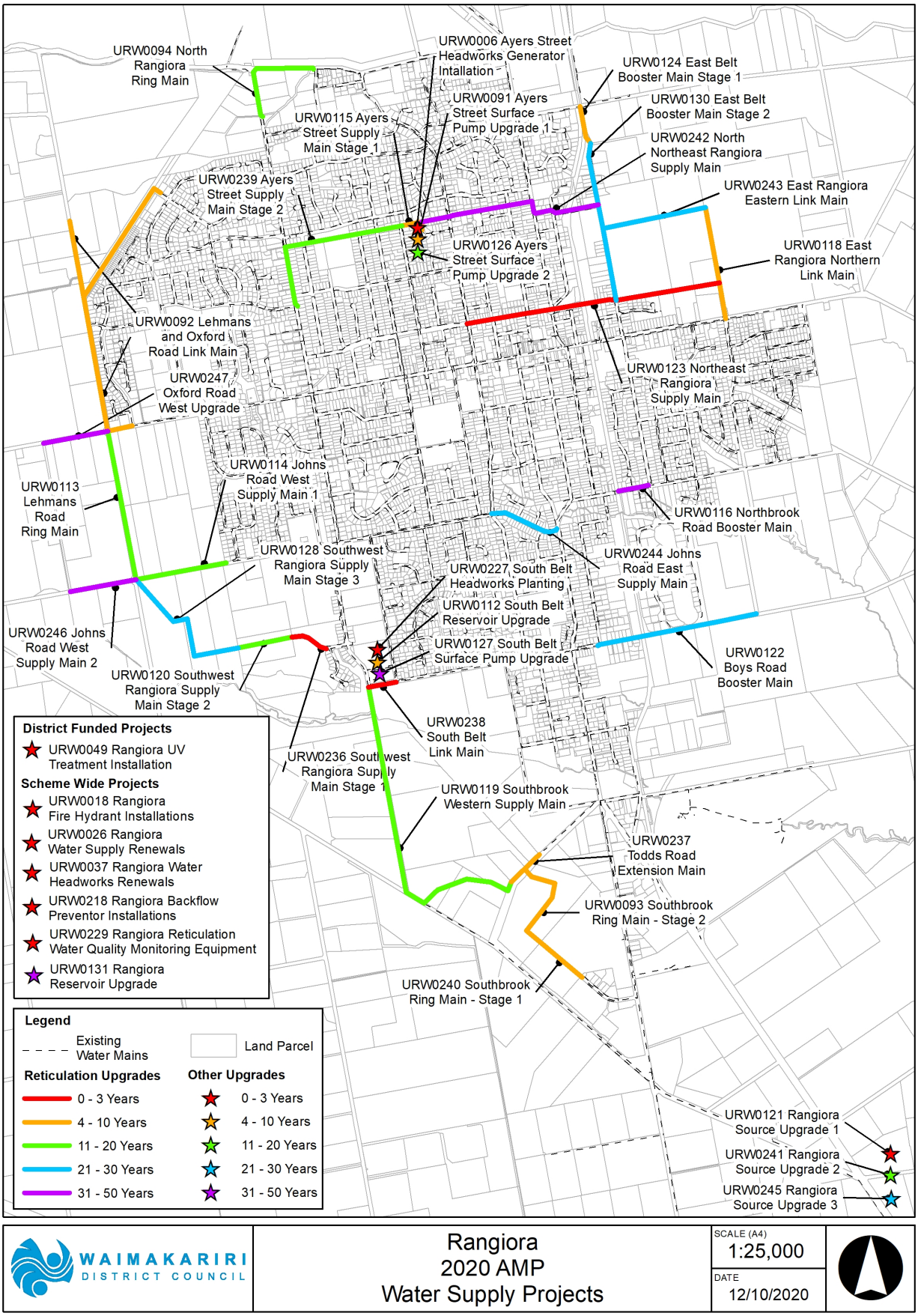
Table 21: Summary of Capital Works (Includes Renewals)

Year	Project ID	Project Name	Level of Confidence	Project Value	LOS Component	Renewals Component	Growth Component
Year 1 - 10							
2022	**URW0006**	Ayers Street Headworks Generator Installation	**5 - Medium**	**$ 260,000**	**$ 210,000**	**$ 50,000**	**$ -**
2022	**URW0018**	Rangiora Fire Hydrant Installations	**1 - Coarse**	**$ 60,000**	**$ 60,000**	**$ -**	**$ -**
2022	**URW0026**	Rangiora Water Supply Renewals	**3 - Low**	**$ 24,563,132**	**$ -**	**$ 24,563,134**	**$ -**
2022	**URW0037**	Rangiora Water Headworks Renewals	**3 - Low**	**$ 5,098,714**	**$ -**	**$ 5,098,714**	**$ -**
2022	**URW0218**	Rangiora Backflow Preventer Installations	**0**	**$ 253,500**	**$ 253,500**	**$ -**	**$ -**
2022	**URW0227**	South Belt Headworks Planting	**0**	**$ 60,000**	**$ 60,000**	**$ -**	**$ -**
2022	**URW0229**	Rangiora Reticulation Water Quality Monitoring Equipment	**0**	**$ 75,000**	**$ 75,000**	**$ -**	**$ -**
2023	**URW0121**	Rangiora Source Upgrade 1	**5 - Medium**	**$ 600,000**	**$ -**	**$ -**	**$ 600,000**
2023	**URW0236**	Southwest Rangiora Supply Main Stage 1	**3 - Low**	**$ 61,100**	**$ -**	**$ -**	**$ 61,100**
2023	**URW0238**	South Belt Link Main	**3 - Low**	**$ 120,000**	**$ -**	**$ -**	**$ 120,000**
2024	**URW0123**	Northeast Rangiora Supply Main	**3 - Low**	**$ 1,195,000**	**$ -**	**$ -**	**$ 1,195,000**
2025	**URW0115**	Ayers Street Supply Main Stage 1	**3 - Low**	**$ 127,000**	**$ -**	**$ 77,000**	**$ 50,000**
2025	**URW0118**	East Rangiora Northern Link Main	**3 - Low**	**$ 32,000**	**$ -**	**$ -**	**$ 32,000**
2025	**URW0124**	East Belt Booster Main Stage 1	**2 - Very Low**	**$ 118,000**	**$ -**	**$ -**	**$ 118,000**
2025	**URW0237**	Todds Road Extension Main	**3 - Low**	**$ 11,000**	**$ -**	**$ -**	**$ 11,000**
2026	**URW0240**	Southbrook Ring Main - Stage 1	**3 - Low**	**$ 16,000**	**$ -**	**$ -**	**$ 16,000**
2027	**URW0112**	South Belt Reservoir Upgrade	**3 - Low**	**$ 3,100,000**	**$ -**	**$ -**	**$ 3,100,000**
2028	**URW0092**	Lehmans and Oxford Road Link Main	**3 - Low**	**$ 1,214,000**	**$ -**	**$ -**	**$ 1,214,000**
2029	**URW0093**	Southbrook Ring Main - Stage 2	**3 - Low**	**$ 33,000**	**$ -**	**$ -**	**$ 33,000**
2030	**URW0091**	Ayers Street Surface Pump Upgrade 1	**3 - Low**	**$ 50,000**	**$ -**	**$ -**	**$ 50,000**
Year 11 - 20							
2032	**URW0241**	Rangiora Source Upgrade 2	**3 - Low**	**$ 600,000**	**$ -**	**$ -**	**$ 600,000**
2033	**URW0094**	North Rangiora ring main	**3 - Low**	**$ 328,000**	**$ -**	**$ -**	**$ 328,000**
2033	**URW0120**	Southwest Rangiora Supply Main Stage 2	**3 - Low**	**$ 67,000**	**$ -**	**$ -**	**$ 67,000**
2036	**URW0119**	Southbrook Western Supply Main	**3 - Low**	**$ 808,000**	**$ -**	**$ -**	**$ 808,000**
2038	**URW0113**	Lehmans Road Ring Main	**3 - Low**	**$ 186,000**	**$ -**	**$ -**	**$ 186,000**

2039	**URW0114**	Johns Road West Supply Main 1	**3 - Low**	**$ 26,000**	**$ -**	**$ -**	**$ 26,000**
2040	**URW0126**	Ayers Street Surface Pump Upgrade 2	**3 - Low**	**$ 50,000**	**$ -**	**$ -**	**$ 50,000**
Year 21 - 30							
2044	**URW0243**	East Rangiora Eastern Link Main	**3 - Low**	**$ 29,000**	**$ -**	**$ -**	**$ 29,000**
2045	**URW0244**	Johns Road East Supply Main	**3 - Low**	**$ 302,000**	**$ -**	**$ 276,000**	**$ 26,000**
2046	**URW0122**	Boys Road Booster Main	**3 - Low**	**$ 384,000**	**$ -**	**$ -**	**$ 384,000**
2048	**URW0245**	Rangiora Source Upgrade 3	**3 - Low**	**$ 600,000**	**$ -**	**$ -**	**$ 600,000**
2049	**URW0128**	Southwest Rangiora Supply Main Stage 3	**3 - Low**	**$ 188,000**	**$ -**	**$ -**	**$ 188,000**
Year 31 - 50							
2037	**URW0239**	Ayers Street Supply Main Stage 2	**3 - Low**	**$ 615,000**	**$ -**	**$ 358,000**	**$ 257,000**
2043	**URW0130**	East Belt Booster Main Stage 2	**3 - Low**	**$ 497,000**	**$ -**	**$ -**	**$ 497,000**
2052	**URW0116**	Northbrook Road Booster Main	**3 - Low**	**$ 106,000**	**$ -**	**$ 46,000**	**$ 60,000**
2055	**URW0127**	South Belt Surface Pump Upgrade	**3 - Low**	**$ 50,000**	**$ -**	**$ -**	**$ 50,000**
2056	**URW0246**	Johns Road West Supply Main 2	**3 - Low**	**$ 199,000**	**$ -**	**$ -**	**$ 199,000**
2056	**URW0247**	Oxford Road West Upgrde	**3 - Low**	**$ 217,000**	**$ -**	**$ -**	**$ 217,000**
2057	**URW0242**	North Northeast Rangiora Supply Main	**3 - Low**	**$ 670,000**	**$ -**	**$ 233,000**	**$ 437,000**
2065	**URW0131**	Rangiora Reservoir Upgrade	**3 - Low**	**$ 3,100,000**	**$ -**	**$ -**	**$ 3,100,000**
Grand Total				**$ 46,069,446**	**$ 658,500**	**$ 30,701,848**	**$ 14,709,100**
2024	**URW0049**	**Rangiora UV treatment Installation**	**6-Above medium**	**$ 1,300,000**	**$ 1,300,000**	**$ -**	**$ -**

Note that the Rangiora UV treatment project is below the grand total because it is funded from the district wide targeted rate, rather than the scheme targeted rate

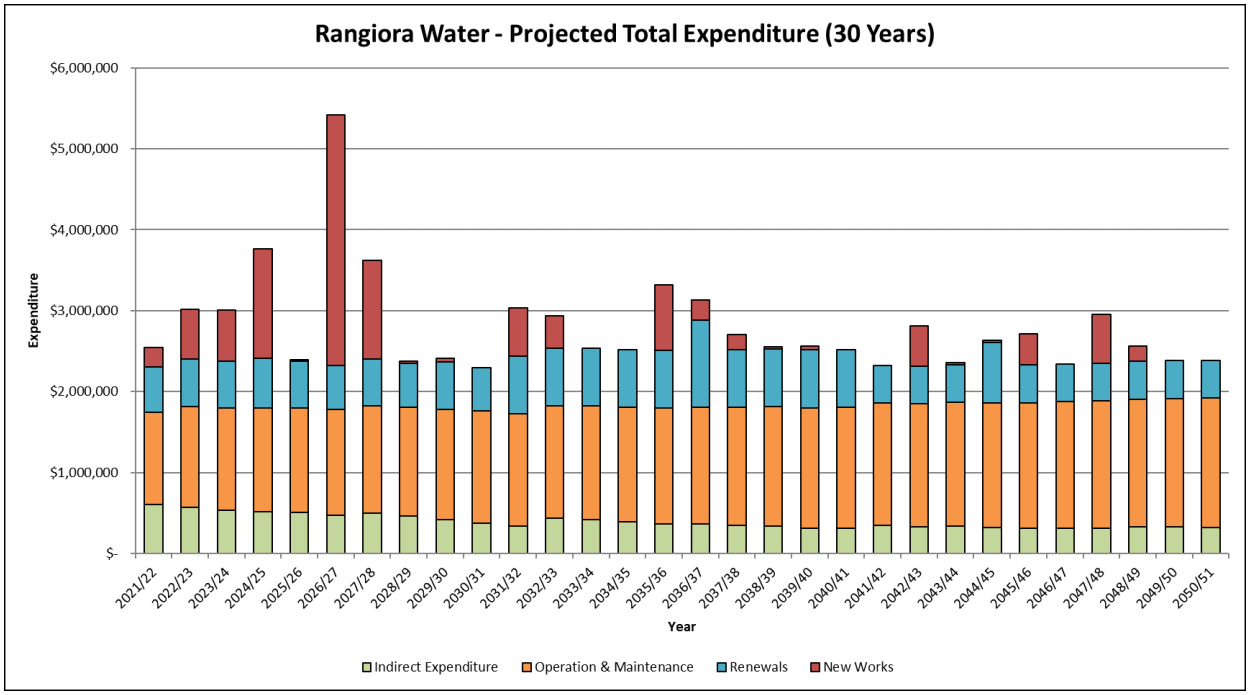
Figure 11: Projected Capital Upgrade Works (not to scale)



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, and indirect expenditure. Indirect expenditure includes interest, rating collection costs, costs associated with maintaining the Asset Register, and internal overhead costs. Capital includes expenditure for growth, levels of service and renewals.

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 the Council's asset management information system. Table 22 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme. Refer 191104153166 for the valuation report.

Table 22: Asset Valuation

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
Valve	No.	2,020	$5,918,324	$4,664,581	$63,442
Main	m	222,349	$60,955,930	$45,361,962	$675,602
Hydrant	No.	939	$2,613,751	$1,836,139	$29,963
Service Line	Properties	6,994	$5,997,942	$4,221,590	$66,424
Facilities			$10,595,522	$7,515,541	$181,327
Total			**$86,081,470**	**$63,599,813**	**$1,016,758**

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 191129168016), while targeted rates are charged in accordance with Council's Revenue and Financing Policy (TRIM 180522056008).

A further revenue source is the district wide rate that has been set up specifically to fund installation of UV disinfection at all schemes that do not already have it, although it is noted this is simply an alternative type of targeted rate, rather than a separate type of funding source.

7 Improvement Plan

7.1 2021 Improvement Plan

Table 23 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 that timeframe.

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 23: 2021 AMP Improvement Plan

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

APPENDIX 'A'. PLANS

Figure 13: A1 - Plan of Serviced Area – Rangiora

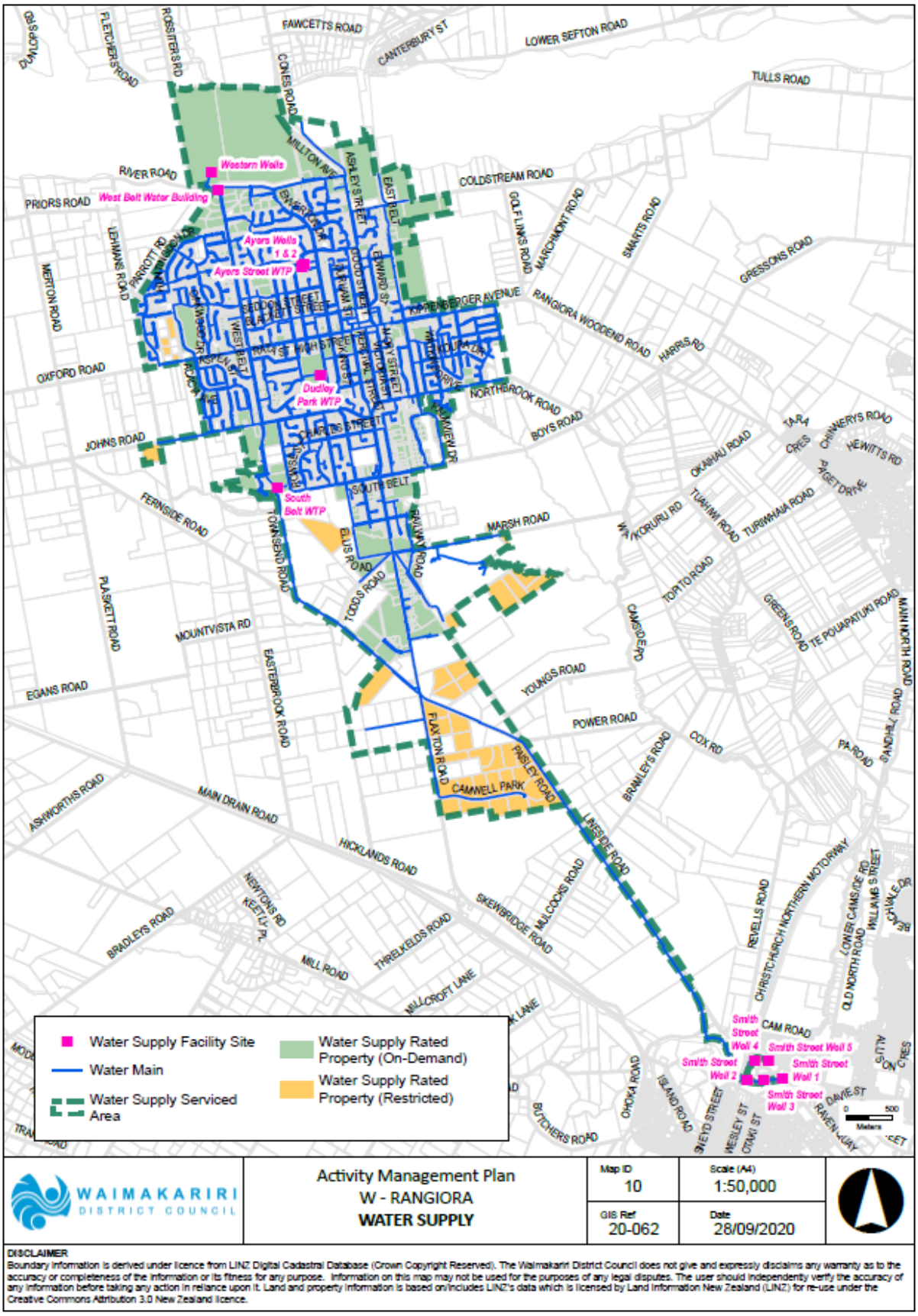


Figure 14: A1 - Plan of Serviced Area - Rangiora (Restricted)

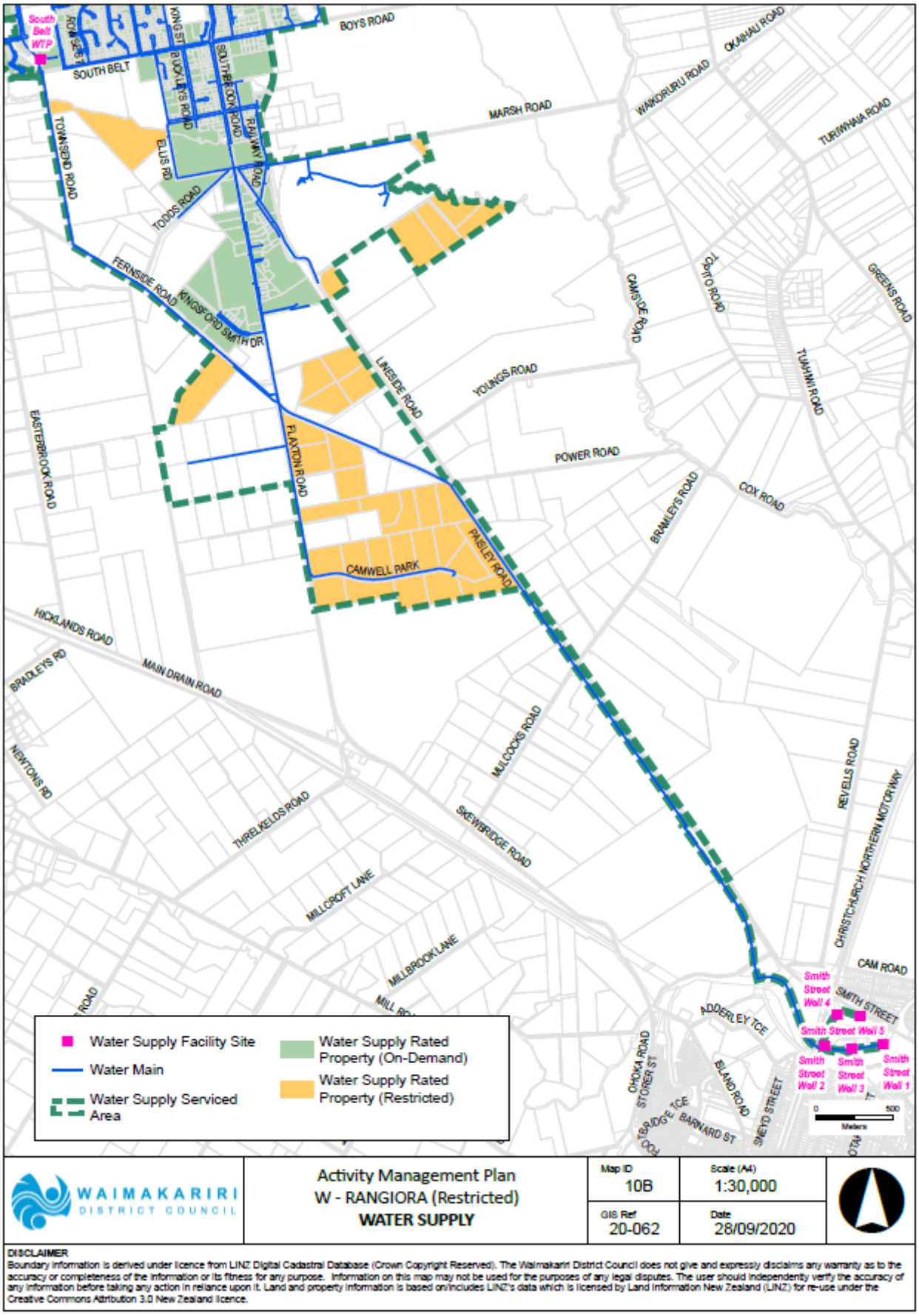


Figure 15: A2 - Plan of Fire District & Extent of Fire Mains

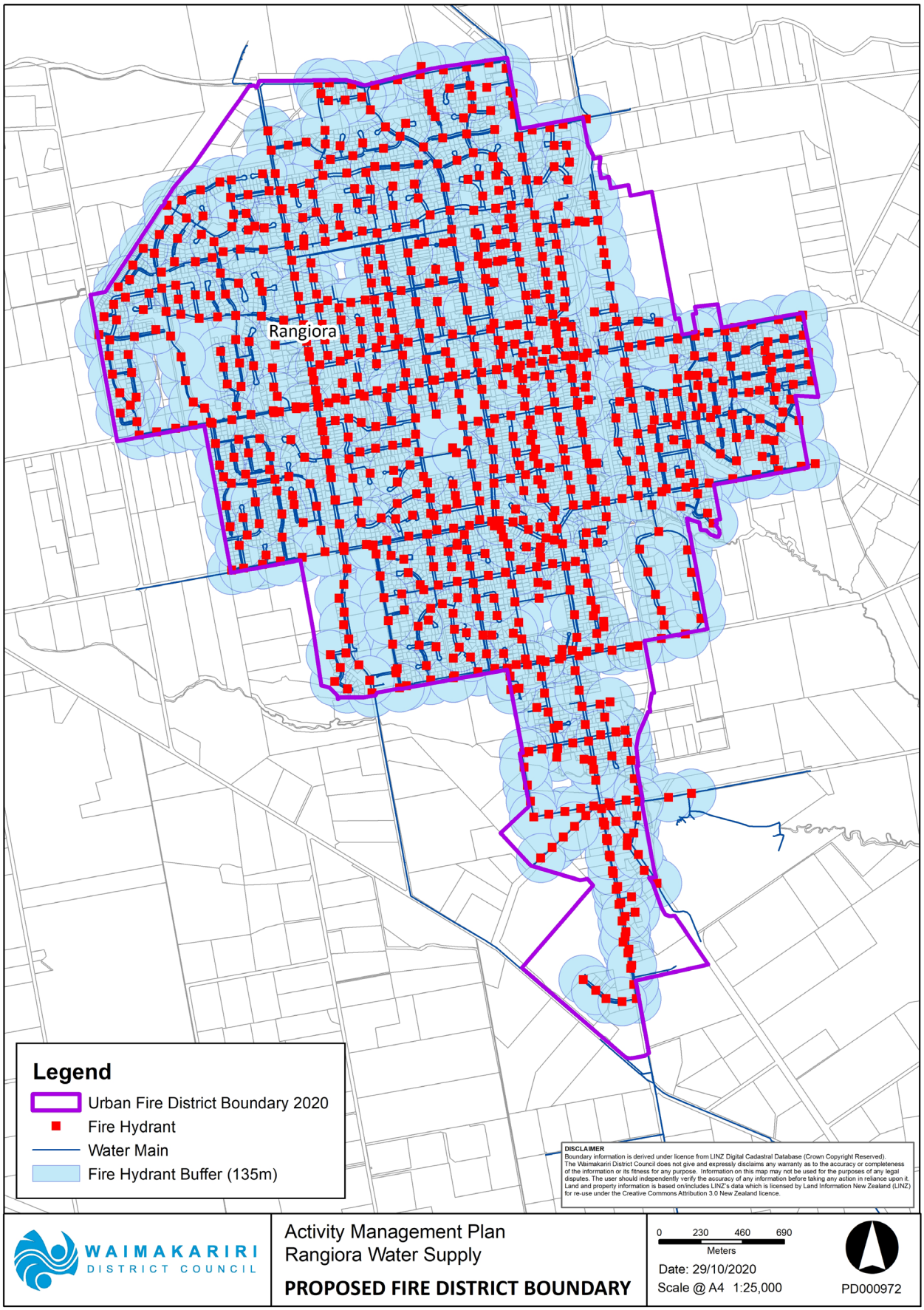


Figure 16: Rangiora Water Supply Statistics

Rangiora Water Supply Statistics

Rangiora | 19/20 | Last Update 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 - June '10	July '10 - June '11	July '11 - June '12	July '12 - June '13	July '13 - June '14	July '14 - June '15	July '15 - June '16	July '16 - June '17	July '17 - June '18	July '18 - June '19	July '19 - June '20	5 yr Average	10 yr Average
Nightly Flow	L/s	-	-	-	-	-	-	-	-	-	24.00	-	24.00	24.00
Average Daily Flow	m^3/day	6,239	6,757	6,465	6,515	6,862	7,454	7,265	6,653	6,883	6,575	7,242	6,924	6,867
Peak Daily Flow	m^3/day	11,582	13,171	10,883	15,578	14,994	15,729	15,607	13,970	16,810	14,715	17,504	15,721	14,896
Peak Weekly Flow	m^3/day	10,427	11,333	10,312	12,666	10,544	13,098	12,560	11,694	14,803	12,314	14,168	13,108	12,349
Peak Monthly Flow	m^3/day	8,195	9,577	8,203	10,592	9,640	11,300	10,725	10,326	11,016	10,357	12,322	10,949	10,406
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	387.5	-	-	387.5	387.5
Peak Month		Feb	Dec	Jan	Jan	Jan	Jan	Dec	Feb	Dec	Feb	Jan		
Peak Week		Week 2	Week 52	Week 4	Week 3	Week 5	Week 2	Week 49	Week 6	Week 50	Week 7	Week 5		
Peak Day		8/01/2010	17/01/2011	19/01/2012	12/01/2013	19/01/2014	4/01/2015	21/12/2015	6/02/2017	10/12/2017	10/02/2019	2/02/2020		
Peaking Factor		1.9	1.9	1.7	2.4	2.2	2.1	2.1	2.1	2.4	2.2	2.4		
Total Annual Volume	m^3	2,289,550	2,479,887	2,372,574	2,391,123	2,518,504	2,735,515	2,666,237	2,441,734	2,525,924	2,413,071	2,657,671	2,540,927	2,520,224
Resource Consent	m^3/day	25,920	25,920	25,920	25,920	25,920	30,100	30,100	30,100	30,100	30,100	30,100	30,100	28,428
Well Pump Capacity	m^3/day	19,388	19,388	19,388	19,388	19,388	24,192	24,192	24,192	24,192	24,192	24,192	24,192	22,270
Surface Pump Capacity	m^3/day	43,718	43,718	43,718	43,718	43,718	59,616	59,616	59,616	59,616	59,616	59,616	59,616	53,257
On-Demand Connections		5,947	5,963	6,074	6,699	6,870	7,021	7,135	7,243	7,365	7,537	7,648		
Restricted Connections		25	25	25	28	31	31	32	37	37	37	39		
Total Connections		5,972	5,988	6,099	6,727	6,901	7,052	7,167	7,280	7,402	7,574	7,687		
Average Daily Demand	L/con/day	1,045	1,128	1,060	969	994	1,057	1,014	914	930	868	942	934	988
Peak Daily Demand	L/con/day	1,939	2,200	1,784	2,316	2,173	2,230	2,178	1,919	2,271	1,943	2,277	2,118	2,129
Allocated Water Units	m^3/day	-	-	-	-	-	-	-	-	-	-	-		
Average Daily Flow per Unit	L/unit/day	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Daily Flow per Unit	L/unit/day	-	-	-	-	-	-	-	-	-	-	-	-	-
On-Demand Rating Charges		6,235	6,238	6,373	6,800	7,227	7,382	7,510	7,806	7,948	8,211	8,415		
Restricted Rating Charges		50	50	50	60	62	62	64	74	74	74	82		
Total Rating Charges		6,285	6,288	6,423	6,860	7,289	7,444	7,574	7,880	8,022	8,285	8,497		
Data Quality		high	high	high	high	high	high	high	high	high	high	high		