WAIMAKARIRI
DISTRICT COUNCIL

Activity Management Plan 2021

Cust 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 issues of the Cust Water Supply Scheme 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.
Levels of Service	Most of the scheme Levels of Service are being met, those that don't relate to hydrant placement, fire flow availability, storage and water usage. Upgrading the network to meet the Fire Service Code of Practice is reasonably costly, and will have a noticeable effect on the scheme water rates. While these upgrades have been programmed (FY28/29), the community will need to be consulted before a decision is made to proceed with the work. Additional storage is planned to be installed in FY 2021/22 Implementation of actions within the Water Conservation Strategy is required before the usage LOS can be met.
Capacity & Performance	Assessment of the water supply system has identified that the scheme does not meet redundancy requirements for headworks pumping capacity, storage requirements, or the Fire Service Code of Practice for firefighting. An additional headworks pump and additional storage are planned for FY 2021/22 Future upgrades of various components are programmed that would enable supply to meet fire demand requirements, but this is subject to community consultation
	The scheme provides water to the Springbank Community Private Supply. The Springbank private community is supplied with water from the back-up well (Springbank No.1), and there is sufficient capacity for this well to provide water to this community.
Asset Condition	The majority of the scheme is in good condition, with only minor renewals required over the next 50 years. The headworks is considered to be in poor condition, and is being renewed in 2021.
Risk Assessment	The principle risks associated with the scheme identified through the Risk Assessment relate to the lack of firefighting capacity and insufficient storage. Planned capital works will mitigate these risks The backflow risk previously identified is being mitigated through the implementation of the Backflow Prevention Policy
Disaster Resilience	There are some assets that appear to be vulnerable to a natural disaster, particularly a large earthquake identified through the Disaster Resilience Assessment. Further headwork's resilience assessments are required.
	The Disaster Resilience Assessment revealed the security of the headworks needs to be evaluated and managed as there is a high risk from potential public interference with the supply.
Growth Projections	The population served by this scheme is predicted to increase in size by 38% by 2065. Upgrades will be required to accommodate this growth.

2 Introduction

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

- Provide an overview of the Cust 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 Cust 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 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
- 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 Cust Water Supply Scheme is an urban water supply with some limited firefighting capacity.

The water supply is presently sourced from one primary well located at Springbank (Springbank Well No. 2), with a second well available to provide back-up (Springbank Well No.1). These sources are certified as secure under the Drinking-water Standards for New Zealand (DWSNZ). As such, this scheme complies with both the protozoal and bacterial requirements of the DWSNZ with no treatment required.

E. coli however was detected in late 2020, which means for the 2020/21 compliance period, the scheme will not achieve bacterial compliance. This has been attributed to the age and condition of the storage reservoirs and associated pipework at the headworks site.

The Springbank No.1 well also supplies water for domestic use and irrigation to the private Springbank scheme with a small number of users.

As a result of the damage to Springbank No.1, an upgrade was carried out in 2016/17. This included:

- Connection of the existing Springbank No. 2 well to the Cust supply to operate as a primary source and also to provide additional capacity;
- Decommissioning of the Springbank surface pumps, and relegation of the Springbank No.1 well to a backup source.

Due to the age and condition of the existing headworks, the need to increase storage, and the likely need to accommodate further treatment in the future, the headworks is to be renewed to a more modern facility, with increased storage and future treatment provision in 2021. This was decided following community consultation in early 2020, and the need reinforced following the detection of E. coli in late 2020.

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 15.

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

Table 2: Scheme Statistics for 2019/2020

Scheme Parameter	Statistics	Source
Type of Supply	Urban (on demand) with limited firefighting capacity	
Principal Source	Springbank Well No. 2 (secure)	160701063393 & 180606062679 (Secure status documentation)
Back-up Source	Springbank Well No. 1 (secure)	
Treatment	No treatment Backup chlorination available for emergency use	
Nominal Storage Capacity	Total of 92,000 litres combined in 4 tanks at the Cust Headworks	
Length of Reticulation	108.9 km	Water Asset Valuation Tables 7-4 and 7-5, pages 53 - 55.
Total Replacement Value	$2.57 mil	
Depreciated Replacement Value	$1.76 mil	
Number of Connections	142	2019/20 Rates Strike
Number of Rating Charges	155	
Average Daily Flow (5 year average)	156 m^3/day	Flow Data Analysis – Water
Peak Daily Flow (5 year average)	490 m^3/day	
Resource Consent Abstraction Limit (Combined source-Springbank No. 1 & 2 wells)	1,900 m^3/day (expires 27/08/2034)	CRC990930.1
Average Daily Flow per Connection (5 year average)	1,099 l/day/con	Flow Data Analysis – Water
Peak Daily Flow per Connection (5 year average)	3,444 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**	**Total**
PE	163m	830m	0m	0m	993m
PVC	13m	4,288m	5,556m	35m	9,893m
Total	**177m**	**5,118m**	**5,556m**	**35m**	**10,886m**

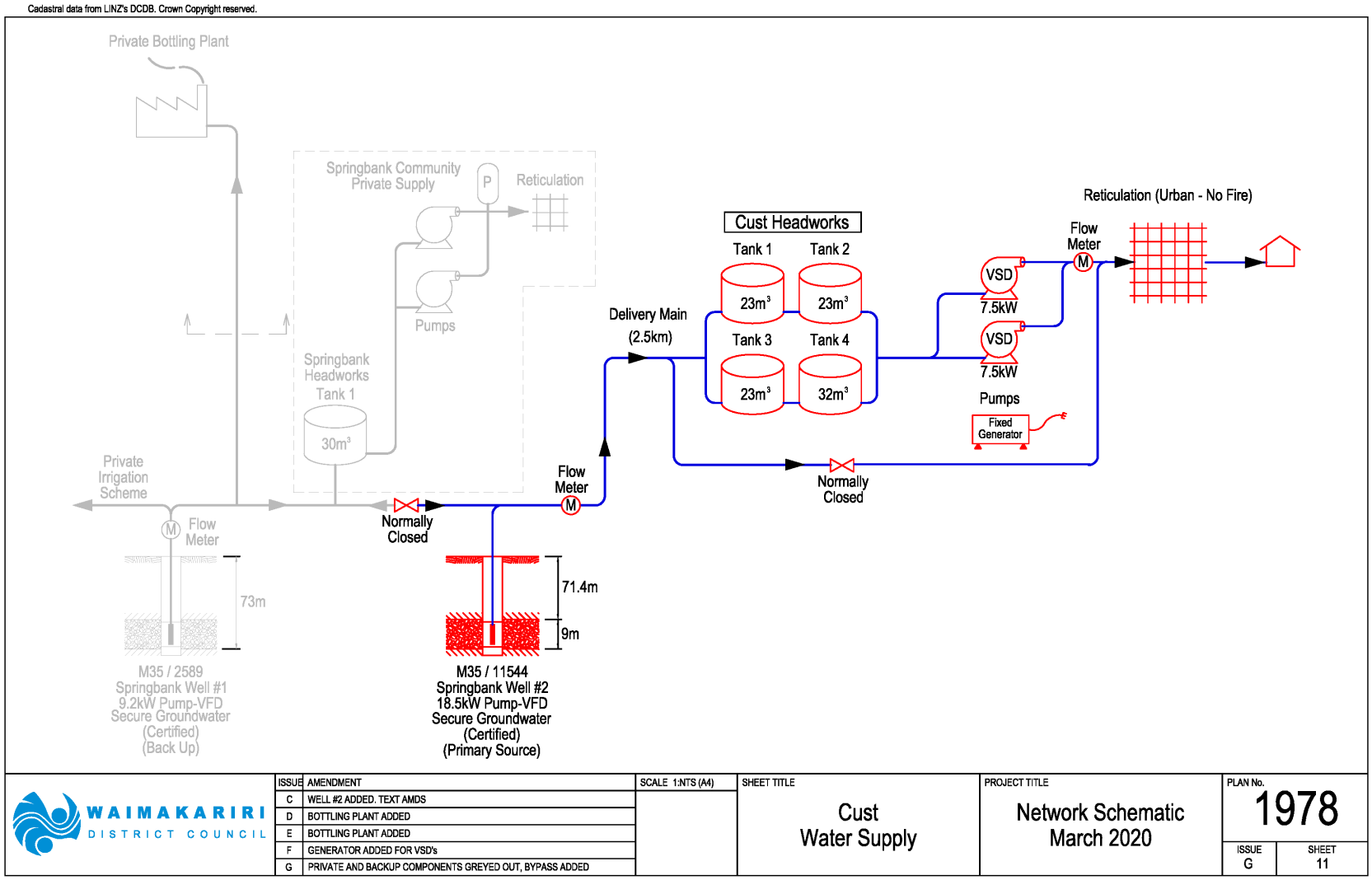
Table 4: Water Supply Valve Data Summary

Water Valves	
Diameter (mm)	**Count**
< 50	2
50	11
100	8
150	3
Total Valves	24
Fire Hydrants	6

Table 5: Data References

Data Reference	Trim Reference
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
Cust Water Safety Plan - 2015	150528085304
Cust System Assessment	150528085300
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 & 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 6 sets out the performance measures and targets specific to the Cust water 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 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. However, 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 expected 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 "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	Y	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	Y	y
	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	N	N	Y	y
	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	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
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%	25%	Significant improvements in Cust are required to meet firefighting requirements.	Not achieved	Consult with community on options of investing in upgrades, or opting not to be a gazetted firefighting zone.	N	N	N	N
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%	0%	Significant improvements in Cust are required to meet firefighting requirements.	Not achieved	Consult with community on options of investing in upgrades, or opting not to be a gazetted firefighting zone.	N	N	N	N
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	117	Data as per Water Conservation Strategy (200501050668).	Achieved	NA	Y	Y	Y	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	Nil	No events > 8 hours during 19/20 period	Achieved	NA	Y	Insuf. Data	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
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, running scheme at target demand and ensuring target pressure is achieved.	Achieved	NA	Y	Y	Y	Y
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, running scheme at target demand and ensuring 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)	Source and demand dependent.	8.6 hours	Deficiency identified.	Not achieved	Headworks renewal underway in 2020/21. This will increase emergency storage to ensure compliance.	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
Water Usage	Usage - Average Day	Actual usage on average day	Maintain the average daily water use below 100% of the assessed reasonable water use	68%	Refer to Water Conservation Strategy (200501050668)	Achieved	NA	Y	Y	N	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	135%	Refer to Water Conservation Strategy (200501050668)	Not achieved	Implement actions as identified in Water Conservation Strategy.	N	N	N	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 as per the process described above, 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 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

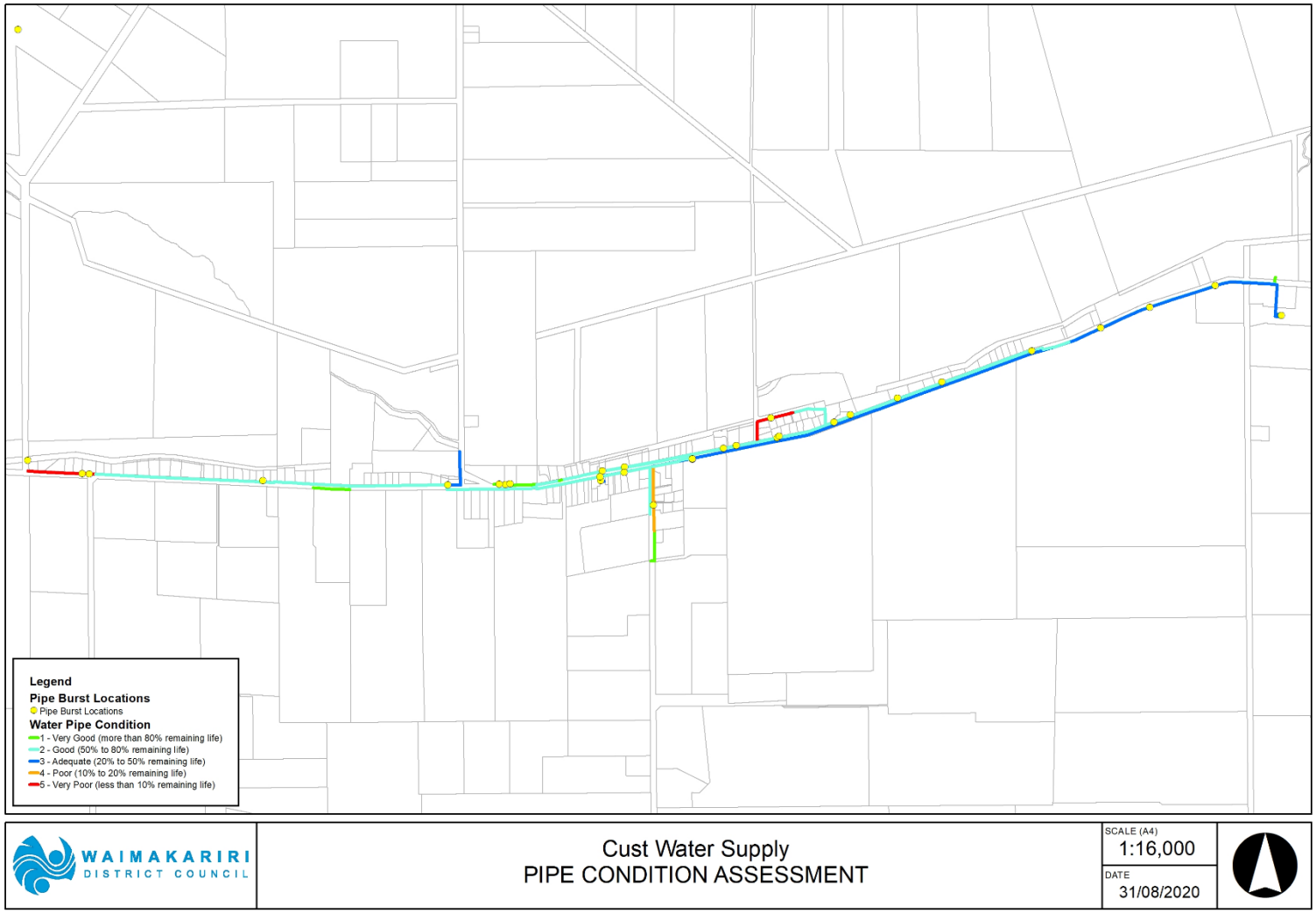


Figure 3: Asset Condition Summary

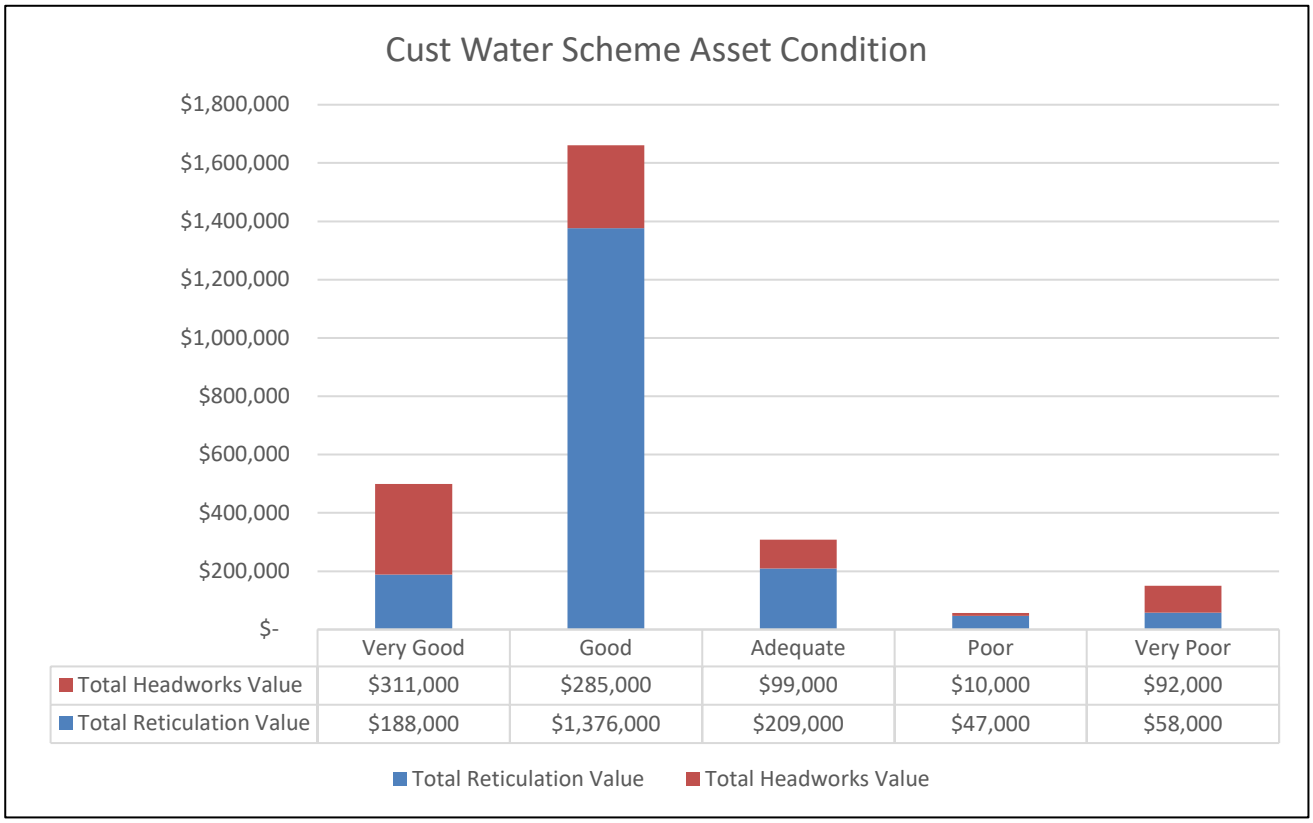


Table 8: Pipe Condition Summary

Condition Grade	Definition	Pipeline Quantity	Total Reticulation Value	Total Headworks Value	Total Value
1	Very Good *More than 80% of life remaining*	0.5 km *5%*	$ 188,000 *10%*	$ 311,000 *39%*	$ 499,000 *19%*
2	Good *Between 50% and 80% of life remaining*	6.9 km *63%*	$ 1,376,000 *73%*	$ 285,000 *36%*	$ 1,661,000 *62%*
3	Adequate *Between 20% and 50% of life remaining*	2.9 km *26%*	$ 209,000 *11%*	$ 99,000 *12%*	$ 308,000 *12%*
4	Poor *Between 10% and 20% of life remaining*	0.2 km *2%*	$ 47,000 *3%*	$ 10,000 *1%*	$ 57,000 *2%*
5	Very Poor *Less than 10% of life remaining*	0.4 km *4%*	$ 58,000 *3%*	$ 92,000 *12%*	$ 150,000 *6%*
Total		**11.0 km**	**$1,878,000**	**$797,000**	**$2,675,000**

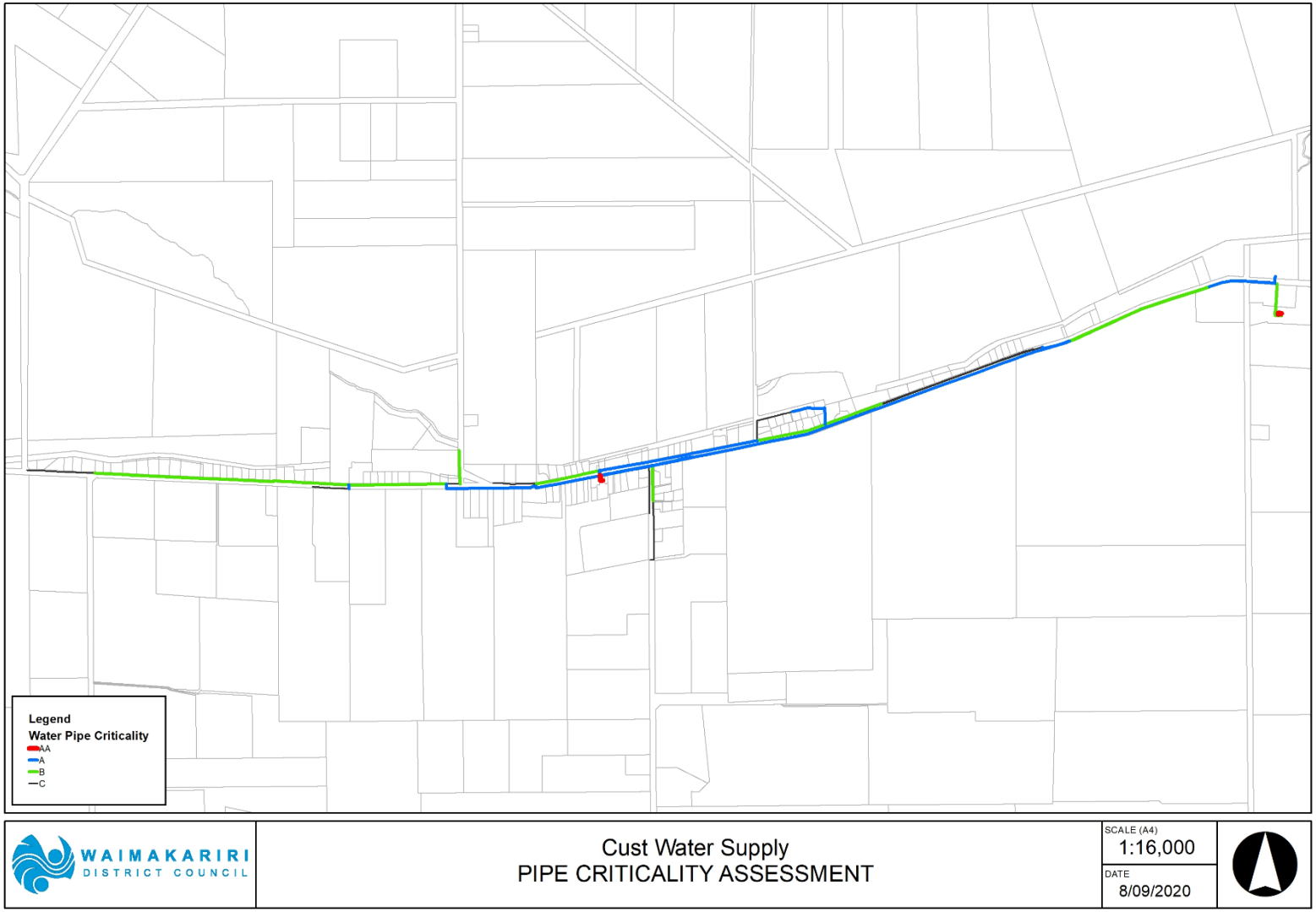
5.3 Asset Criticality

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 Cust Water Supply Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review. The 2014 review have identified 3 high risks for the Cust 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 Cust 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	6	5	4	3
Moderate risks	16	17	17	20
Low risks	11	16	23	21
Not applicable	22	17	14	14
Total	**55**	**55**	**58**	**58**

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

There have been minor improvements in the High Risk category since 2004. The following Table 10 summarises the Extreme and High risks for this scheme. All of the high risks for the Cust scheme are associated with the distribution network. There are no high risks associated with the source or treatment process.

Table 10: Summary of High & Extreme Risks

Risk Event & Cause	Reasoning	Response	Project Details	Project Ref	2011	2014
DISTRIBUTION						
Inadequate supply **due to** insufficient reservoir capacity	Reservoir storage currently marginal	Additional storage required	Cust Water Supply Storage Upgrade, planned to be carried out FY2021/22	URW0003	H	H
Contamination from backflow **due to** no or inoperable backflow prevention device	Risk reduced through backflow prevention policy implementation	Risk has been mitigated through the development and implementation of a backflow prevention policy	Implement backflow prevention policy	N/A	H	M
Insufficient firefighting supply **due to** inadequate storage capacity	Inadequate fire storage and no standby generation for distribution pumps	Additional storage required Generator installed in 2016	Cust Water Supply Storage Upgrade, planned to be carried out FY2021/22	URW0003	H	H
Insufficient firefighting supply **due to** inadequately sized water mains	Insufficient fire hydrants installed and limited mains capacity	Larger water supply main (DN 150mm) from source to headworks, and reticulation upgrades throughout the township.	Cust Supply and Fire Main Upgrade planned for FY 2028/29	URW0078	H	H
			Cust Road Central Fire Flow Main, Mill Rd Fire Flow Main and Cust Rd Fire Flow Main, planned from 2033-2038	URW0079		

5.5 Water Safety Plan

Water Safety Plans provide a summary of how the scheme is operated, undertakes a risk assessment for the scheme, identify preventative measures, and recommend any upgrades to address unacceptable risks. Under the Health Act, these are required to be renewed every 5 years. The Cust WSP was last approved in 2015, and an updated plan was submitted to the Ministry of Health in July 2020. As at the time of this AMP being written approval had not been received.

Throughout 2020, there have been significant challenges gaining approved WSPs, with only one WSP having been approved across the country by late October 2020. Staff are continuing to provide the necessary updates and information to gain approval of the WSPs that are currently outstanding, including for Cust. It is expected that when this AMP is approved by Council in June 2021 that the WSP will have been approved.

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. It is expected that when this AMP is approved by Council in June 2021 that the WSP will have been approved.

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	Cust Headworks	Springbank Headworks
475 yr Earthquake Induced Slope Hazard	L	L
Earthquake (50 yr)	M	M
Earthquake (150 yr)	M	M
Earthquake (475 yr)	L	L
Wildfire (threat based)	L	L
Snow (150 yr)	L	L
Wind (150 yr)	L	L
Lightning (100 yr)	L	L
Pandemic (50 yr)	M	M
Terrorism (100 yr)	H	H
E = Extreme, H = High, M = Moderate, L = Low		

The most significant potential hazard is the risk resulting from an act of terrorism. These sites are considered moderately resilient to this hazard; Cust headworks is not fenced however the reservoir lids are locked. The new headworks which will be built in 2021 will include security fencing, and locked reservoir hatches.

The scheme is located outside the zone of liquefaction susceptibility thereby limiting the potential impact and asset damage from an earthquake event.

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

It is anticipated that the majority of the growth will be along the main road continuing the existing ribbon development pattern, and mostly being infill subdivision of existing properties.

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 (TRIM200908117997), 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 Cust water supply scheme is expected to increase by 14%, by the end of the 2021-31 Long Term Plan (LTP) period.

This projection is based on 19 new dwellings and connections being established from 2019/20 to 2030/31, identified in the 2020 50 Year Water and Sewer Growth Forecast Report (TRIM reference number 200224024348).

The number of connections will be increased by an average of 2 per year during the 2021-31 LTP period to accommodate this demand. Demand beyond the 2021-31 LTP period (2030/31 to 2070/71) is forecast to transition to a slightly lower growth profile resulting in an average of 1 new connections per year (Table 12).

Table 12: Growth Projections

Cust	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	141	149	160	171	179	195
Projected Rating Units	152	160	172	182	191	207
Projected increase in Connections	NA	6%	14%	21%	27%	38%
Projected Average Daily Flow (m3/day)	184	192	203	214	222	238
Projected Peak Daily Flow (m3/day)	552	572	600	626	646	686

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, connections are projected to increase by 38%. This long term projection is lower than the 2017 growth projection, 46% (used for the 2017 AMP). Both projections utilised the best data and information available to project the connections for the water schemes at the time. The base population projections given to PDU for 2019 infrastructure planning were more area specific than the 2017 projections, and has given a better projection for the Cust area.

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

Projections

Figure 5 and Figure 6 present the projected growth and corresponding demand trends for the Cust Water Supply Scheme.

Figure 5: Population Projections

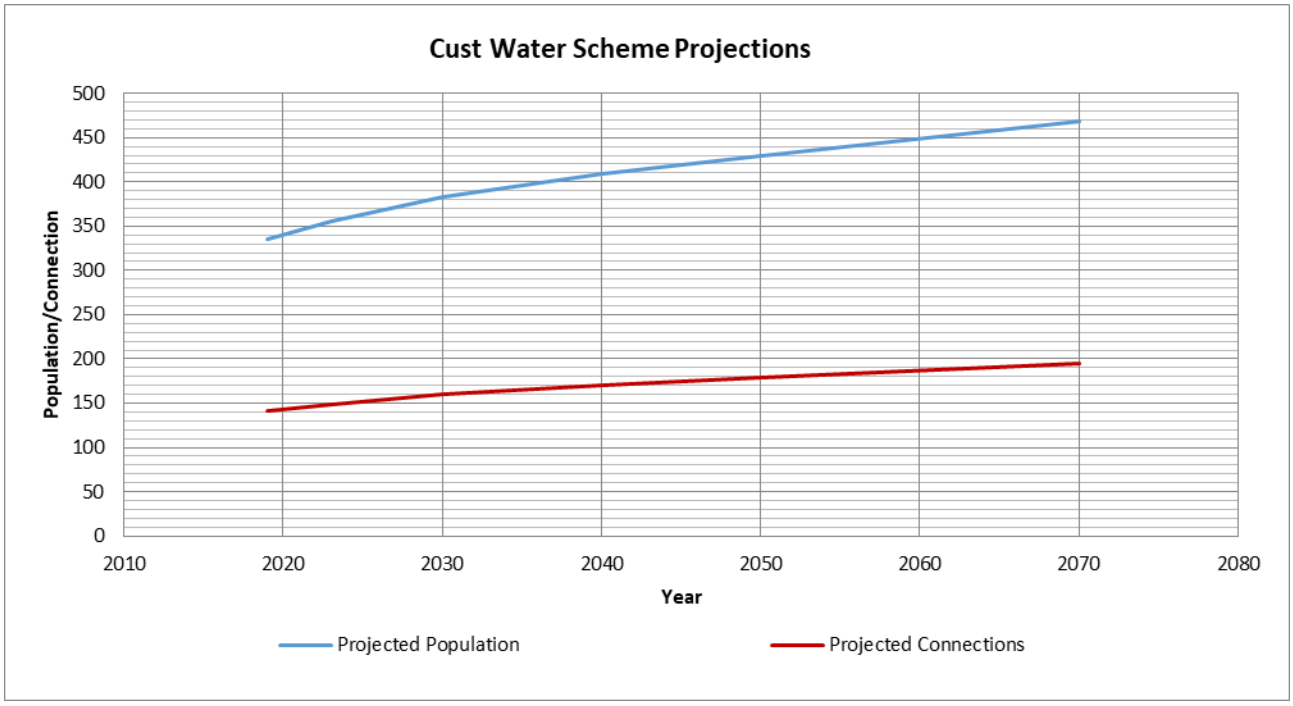
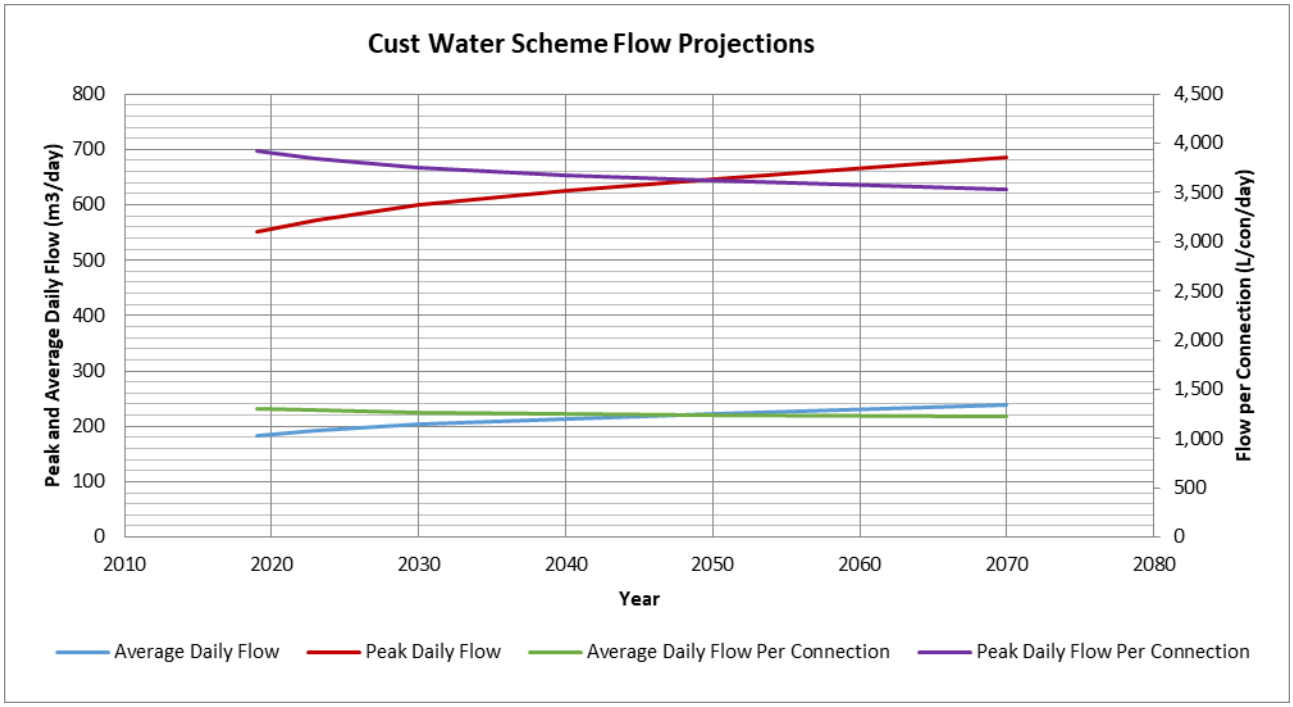


Figure 6: Flow Projections



5.8 Capacity & Performance

This section of the AMP considers the capacity and performance of the Cust 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 Cust Water Supply Scheme draws water from the following source (Table 13).

Table 13: Scheme Sources

Well name	Well No.	Diameter (mm)	Depth (m)
Springbank No. 1	M35/2589	150	73
Springbank No. 2	M35/11544	200	80

The resource consent (CRC990930.1) permits a combined flow of 22 litres per second, 1,900 m3/day or 338,000 cubic metres between 1 July each year and 30 June the following year, from Springbank No.1 and 2 wells, which is expected to be sufficient for the next 50 years.

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. Therefore with Springbank well No. 1 capable of 6.1L/s and No. 2 capable of 8.5L/s (due to the supply pipes capacity), the source capacity for this scheme is usually 8.5 L/s when the primary well is available, but only 6.1 L/s when it is not available. In effect, this means to achieve a source capacity of 8.5 L/s with full redundancy, another higher capacity primary well would be required. Given the relatively high cost of doing this, only for situations where the primary source was unavailable, it is accepted that if the primary source was unavailable during a time of high demand, there may need to be some level of water restrictions in place until the primary source is reinstated.

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 14 presents the projected water demand and associated required source capacity for the Cust supply:

Table 14: Projected Demand and Required Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Daily Flow (L/s)	5.2	9.1	9.6	10.0	10.7
Required Source Capacity (L/s)	5.8	10.1	10.7	11.1	11.9

A trunk main upgrade of the pipe from the source to the headworks is scheduled for 2028/29, which will increase source flow from Springbank from 8.5 L/s to 18 L/s and meet source capacity requirements for the full 50 year period.

The scheme also provides water to the Springbank Community Private Supply. The Springbank private community is supplied with water from the back-up well (Springbank No.1), and there is sufficient capacity for this well to provide water to this community.

Treatment

Both wells have been assessed as meeting the requirements for secure groundwater, meaning that the scheme meets the bacterial and protozoal requirements of the Drinking Water Standards for New Zealand without any treatment. Staff have submitted information to the Drinking Water Assessor and are awaiting confirmation of the secure status of the wells.

However, in late 2020, E. coli was detected within the reticulation, and the subsequent investigation traced this back to being likely to have been introduced at the headworks site. The age and condition of the reservoirs at this site had already been part of the case for initiating the project to renew this headworks entirely, which would mean that the infrastructure suspected to been the weak point allowing contamination to enter the system will be abandoned. This has meant that bacterial compliance will not be achieved for 2020/21, and that chlorination has been introduced from when the contamination was detected at least until the headworks upgrade is completed.

Following the headworks renewal, under the current standards, chlorine treatment would then no longer be required. However, given what is drafted in the Water Services Bill, and the expected 2021 revision of the Drinking water Standards for New Zealand, it is likely that chlorination may need to continue for longer. This may either be indefinitely, or until an exemption to the mandatory chlorination requirement can be obtained from Taumata Arowai. It is possible that UV disinfection may be required either instead of, or as well as chlorination, and as such budgetary provision has been made for this.

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

The Cust scheme has a total storage capacity of 92 cubic metres made up from four 23,000 litre tanks.

Emergency storage requirements for Cust are 9.15 hours of Average Daily Flow, based on a 2020 update of the work carried out in the Water Supply Source Resilience Analysis (170623064893).

Table 15 presents the required storage capacity compared to the planned storage capacity.

Table 15: Required Storage Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Required Total Storage Volume (m3)	96	143 [1]	151	157	169
Planned Storage Volume (m3)	92	180[1]	180	180	180

Note No. 1: Upgrades in the first 10 year period include installing six new 30 cubic metre tanks to replace the existing tanks and upgrading the source rising main (which increases the source capacity, and therefore lowers the working volume component of storage requirements).

The existing storage capacity is less than the current level of service required for the existing demands. Consequently, additional storage is required both to address the existing deficit and to cater for future growth. As noted previously, there is an upgrade planned to renew the existing Cust water headworks including increasing storage within 2021. This will include installing six new 30 cubic metre tanks to replace the existing tanks.

Headworks

The existing Cust headworks consist of two supply pumps connected to VSD's (variable speed drives). For redundancy it is assumed that one of the main pumps is unavailable, therefore the total assessed capacity is currently 8.5L/s.

Table 16 presents the projected peak hourly flows for the Cust supply.

Table 16: Projected Peak Hourly Flows for Surface Pumps in Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Hourly Flow (L/s)	9.0	13.7	14.5	15.0	16.2

Due to the pump redundancy requirement, an additional surface pump is scheduled to be installed in 2021/22 as part of the headworks renewal and upgrade project, bringing the total pump capacity to 17L/s (including 1 pump redundancy). Additionally, this upgrade will improve the firefighting provisions, although will still not fully meet the Firefighting Code of Practice until the source main and reticulation upgrades scheduled for later years are completed.

Reticulation

The capacity of the headworks and reticulation has been assessed using an uncalibrated but verified reticulation model. The model indicates that the existing reticulation system has adequate capacity for the existing demands without fire flows.

The existing rising main (50mm and 80mm rising mains from Springbank to the Cust headworks) currently limit the flow that can be supplied by the primary well, and limit what can be sent to the headworks to assist with firefighting. An upgrade to a DN150mm pipe is currently programmed to reduce head loss and provide additional flows to assist with firefighting provisions. Once the delivery main from the wells to the headworks is upgraded, the next step required is to undertake reticulation upgrades to ensure the reticulation mains also have the capacity required for firefighting. Prior to these significant works to achieve full fire flows, community consultation will be required. The Firefighting Code of Practice is a voluntary code, and given the substantial rating impact forecast for these works, consideration is required as to whether the benefits justify the costs.

It is noted that partial firefighting flows are currently provided in the central part Cust from the Summerhill supply main and the Cust reticulation mains near the Cust headworks.

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.

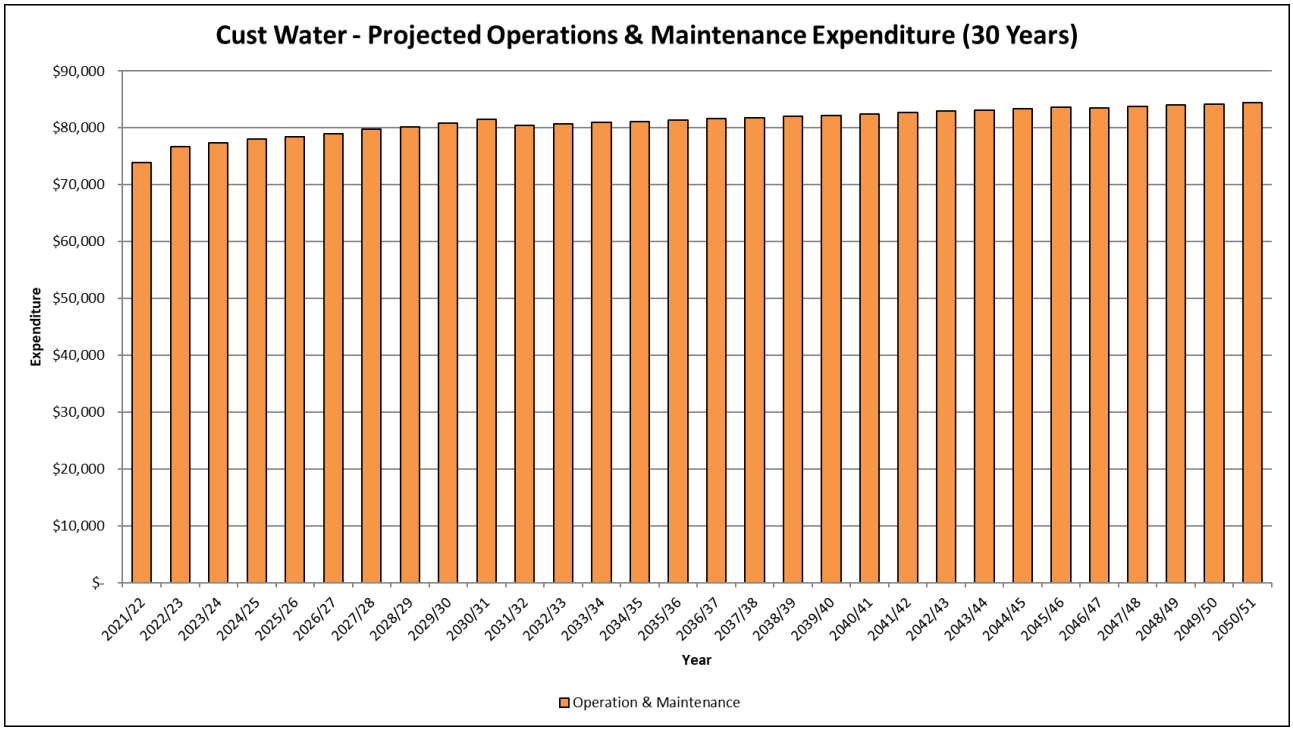
6.1 Operation & Maintenance

Operation and maintenance (O&M) expenditure incorporates the day to day running of the 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. There are no known deferred maintenance items.

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



There is a small 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, once enacted.

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 Time Frames

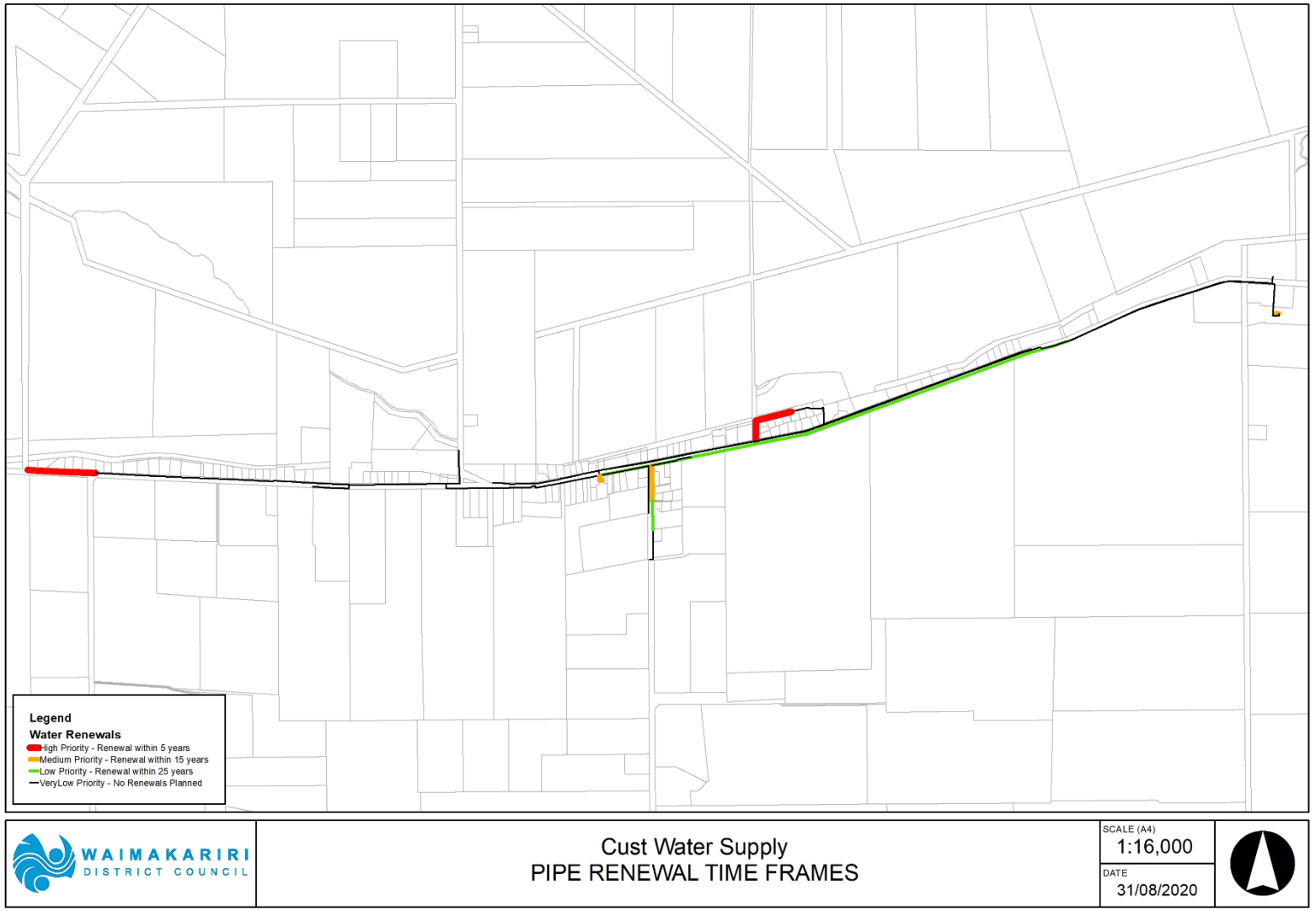
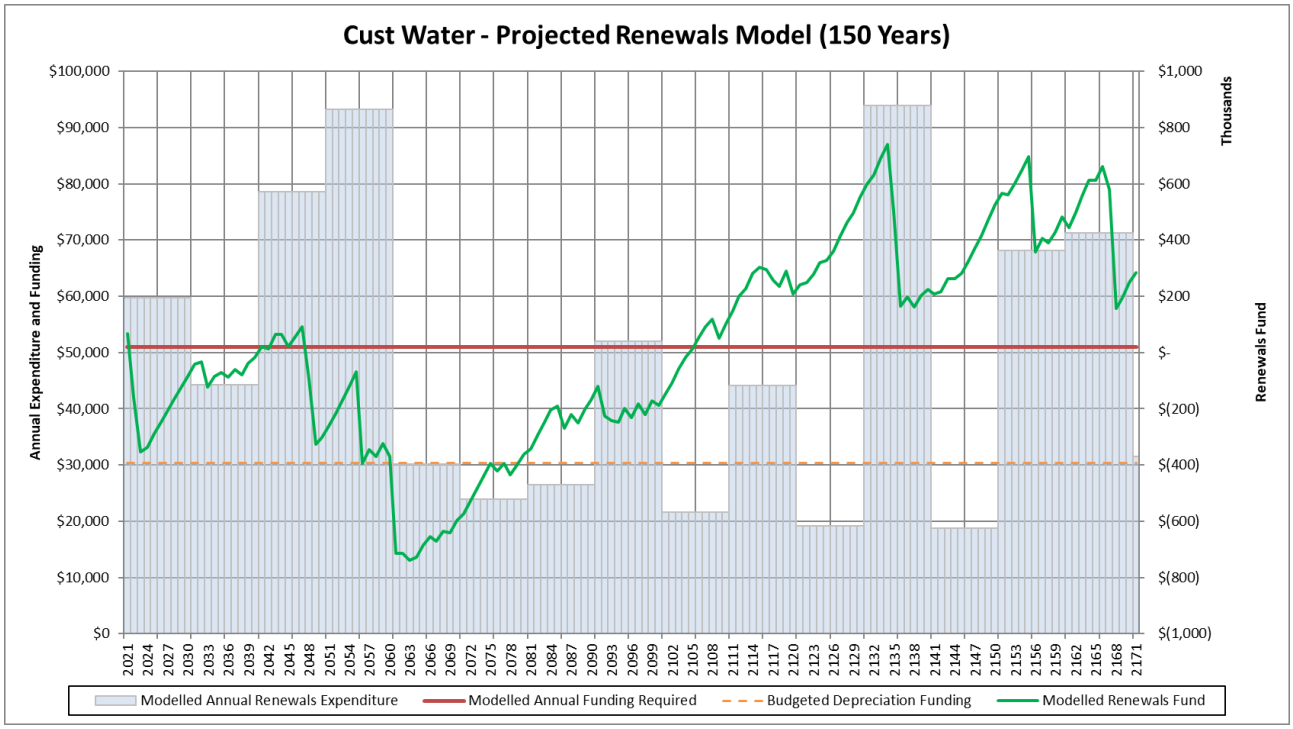


Figure 8 below shows the financial output from the model alone. Over a 150 year period it shows the projected expenditure; the value in the renewals fund; the level of funding required to ensure the fund can meet the required renewals programme, and the annual depreciation.

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 new work motivated by consideration of growth and levels of service (Figure 10). Renewals expenditure showing in the first ten years of the graph, includes the actual planned programme, not the model output. It does not include projects funded from district wide rating.

Figure 10: Projected Capital Works Expenditure

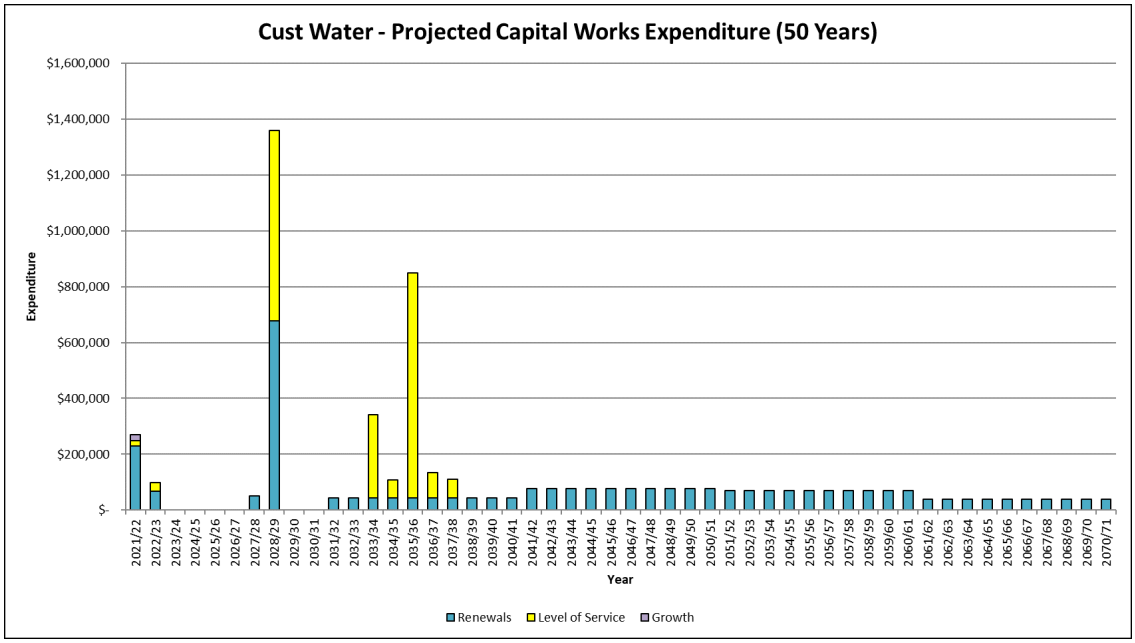


Table 17 summarises the projected capital works for the next 50 years, including renewals. Figure 11 shows the corresponding location of the projected capital works. The table does not include the $440,000 planned for 2021/22 for installation of UV disinfectant capability, that is funded by district wide rating. That is shown in Figure 11

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.

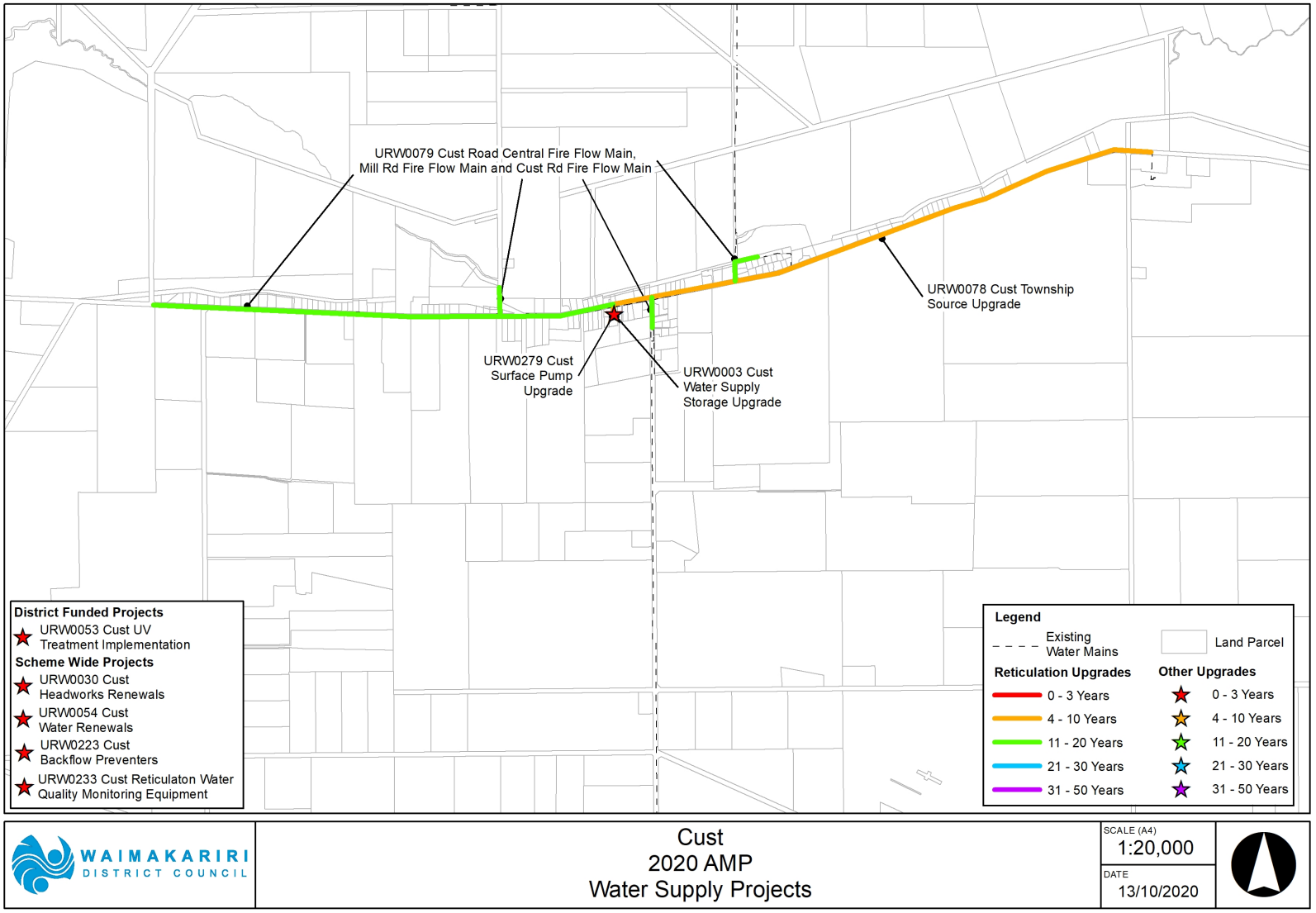
For the purposes of preparing the forward works programme, the initial upgrades to the Cust water supply scheme have been spread over a number of years.

Table 17 includes the capital works required to achieve the target levels of service, including upgrading the reticulation to provide full fire protection. The upgrades will provide ongoing improvements to fire flows, through construction of a large (DN 150mm) water supply main and new fire hydrants to be located in the east of the town – programmed for FY 28/29. Fire flow and hydrant placement requirements from the Fire Service Code of Practice will be met through progressive upgrades over the longer term – FY 33/34 to 37/38. As noted earlier this work to upgrade the reticulation for firefighting purposes is subject to consultation with the community as the costs would have a significant effect on rates.

Table 17: 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	URW0003	Cust Water Supply Storage Upgrade	4 - Below Medium	$ 40,000	$ 10,000	$ 30,000	$ -
2022	URW0030	Cust Headworks Renewals	3 - Low	$ 1,142,725	$ -	$ 1,142,725	$ -
2022	URW0223	Cust Backflow Preventers	2 - Very Low	$ 9,000	$ 9,000	$ -	$ -
2022	URW0279	Cust Surface Pump Upgrade	3 - Low	$ 20,000	$ -	$ -	$ 20,000
2023	URW0054	Cust Water Renewals	3 - Low	$ 1,495,140	$ -	$ 1,495,140	$ -
2023	URW0233	Cust Reticulation Water Quality Monitoring Equipment	0	$ 30,000	$ 30,000	$ -	$ -
2029	URW0078	Cust Township Source Upgrade	5 - Medium	$ 1,360,000	$ 682,000	$ 678,000	$ -
Year 11 - 20							
2034	URW0079	Cust Road Central Fire Flow Main, Mill Rd Fire Flow Main and Cust Rd Fire Flow Main	3 - Low	$ 1,320,000	$ 1,320,000	$ -	$ -
Grand Total				$ 5,416,865	$ 2,051,000	$ 3,345,865	$ 20,000

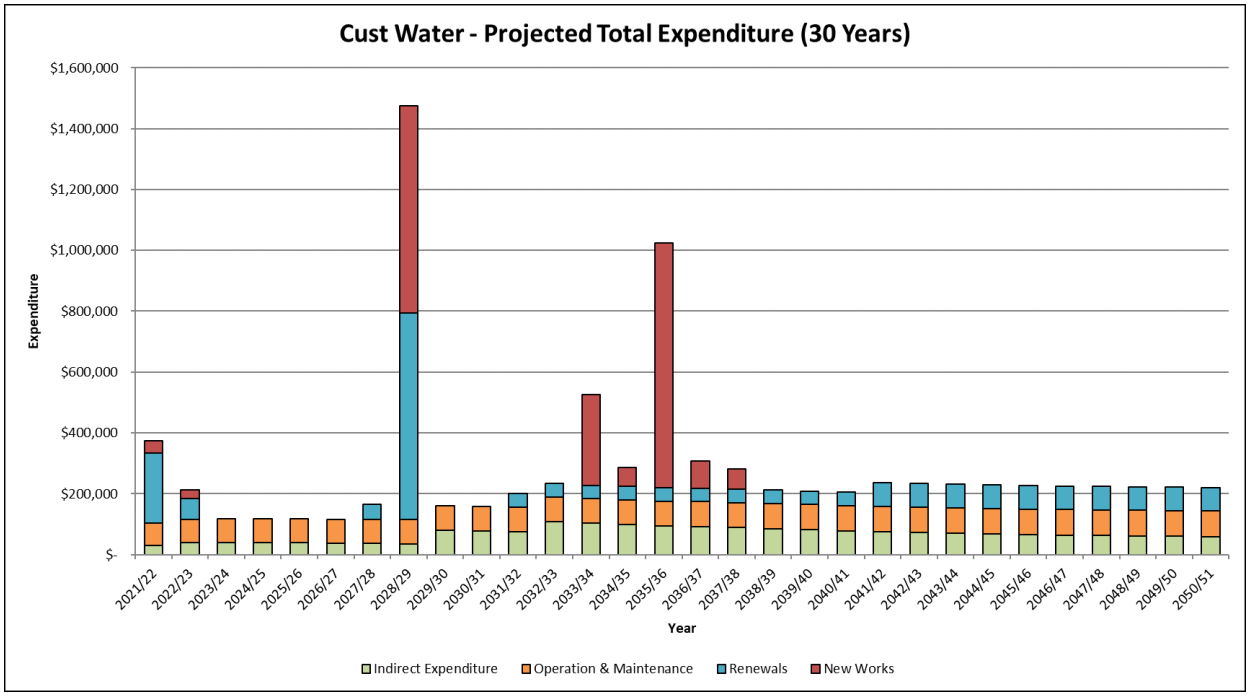
Figure 11: Projected Capital Upgrade Works (not to scale)



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 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 18 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme

Table 18: Asset Valuation

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
Valve	No.	24	$66,858	$46,198	$765
Main	m	10,886	$1,541,137	$1,077,518	$16,325
Hydrant	No.	6	$16,362	$13,244	$164
Service Line	Properties	147	$126,065	$86,398	$1,381
Facilities			**$816,127**	**$536,343**	**$24,045**
Total			**$2,566,549**	**$1,759,700**	**$42,680**

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

Error! Reference source not found. details the scheme specific 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 Council's 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 19: 2021 AMP Improvement Plan

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

8 Changes to AMP as a result of Long Term Plan consultation

Some changes to budgets have arisen as a consequence of a staff submission report to Council during LTP hearings 25-26 May (TRIM 210420063358). Projects themselves have not changed, but budgets have been modified as a consequence of detailed designs progressing. The table below provides a summary of the changes to capital budgets for this scheme

Budget Name	Draft 2021-31 LTP (2021/22)	Proposed Revised Budget (2021/22)	Difference	Notes
Cust UV Treatment Implementation	$ 110,000	$ 10,000	-$100,000	Stimulus funding reduced District Water funded portion
Cust Headworks Renewal	$ 200,000	$ 100,000	-$100,000	Stimulus funding reduced Cust scheme funded portion.

APPENDIX 'A'. PLANS

Figure 13: A1 - Plan of Serviced Area

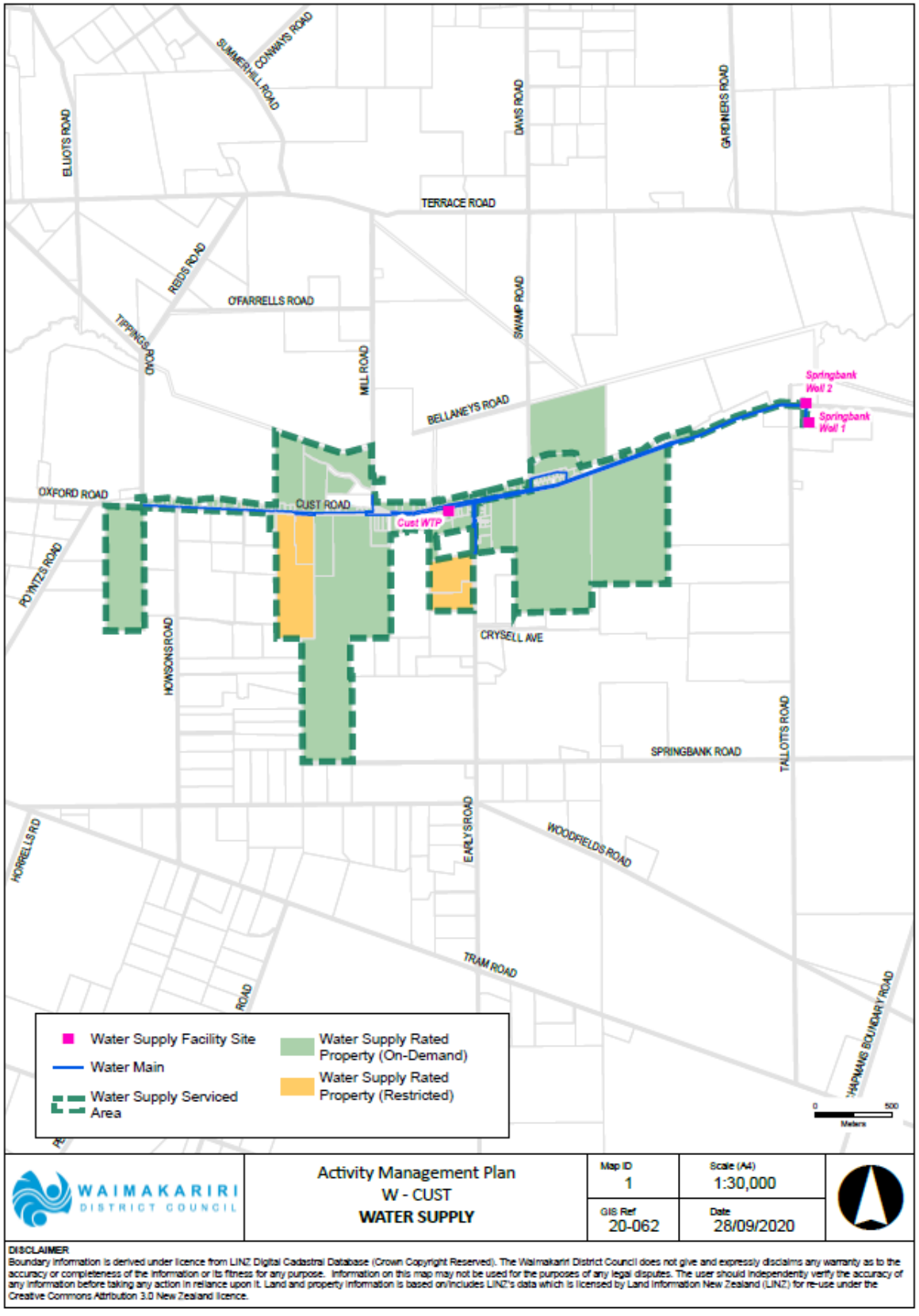


Figure 14: A2 - Plan of Fire District & Extent of Fire Mains

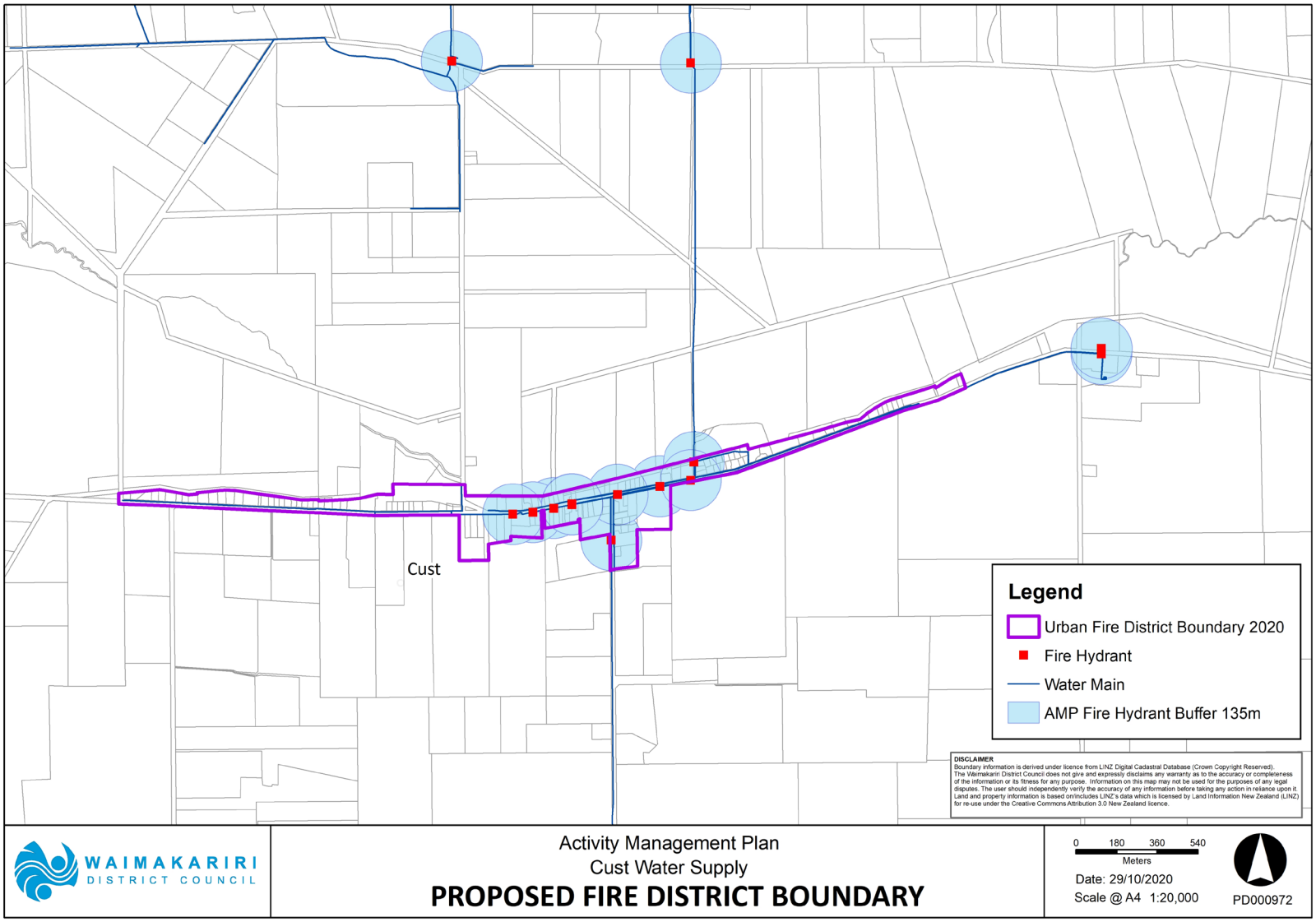


Figure 15: Cust Water Supply Statistics

Cust Water Supply Statistics

Cust | 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	-	-	-	-	-	-	-	-	0.36	0.27	-	0.32	0.32
Average Daily Flow	m^3/day	154	164	117	143	120	184	167	150	158	138	169	156	151
Peak Daily Flow	m^3/day	377	411	339	405	330	525	480	437	552	412	570	490	446
Peak Weekly Flow	m^3/day	303	291	255	317	253	413	366	335	459	339	487	397	351
Peak Monthly Flow	m^3/day	242	289	182	263	210	337	295	313	347	280	382	323	290
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	10.8	-	-	10.8	10.8
Peak Month		Feb	Dec	Jan	Jan	Feb	Jan	Dec	Feb	Dec	Feb	Jan		
Peak Week		Week 11	Week 52	Week 4	Week 3	Week 6	Week 2	Week 49	Week 8	Week 50	Week 7	Week 5		
Peak Day		9/01/2010	18/01/2011	6/12/2011	13/01/2013	2/02/2014	4/01/2015	25/11/2015	6/02/2017	9/12/2017	12/02/2019	27/01/2020		
Peaking Factor		2.4	2.5	2.9	2.8	2.7	2.9	2.9	2.9	3.5	3.0	3.4		
Total Annual Volume	m^3	56,592	60,255	42,994	52,616	44,104	67,503	61,338	55,124	57,957	50,819	61,889	57,425	55,460
Resource Consent	m^3/day	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900	1,900
Well Pump Capacity	m^3/day	1,028	1,028	1,028	778	778	778	778	752	752	752	752	757	817
Surface Pump Capacity	m^3/day	2,816	2,816	2,816	1,452	1,452	1,452	1,452	1,452	N/A	N/A	N/A	1,452	1,841
On-Demand Connections		133	133	137	138	141	144	143	142	137	137	137		
Restricted Connections		-	-	-	-	-	-	1	3	3	4	5		
Total Connections		133	133	137	138	141	144	144	145	140	141	142		
Average Daily Demand	L/con/day	1,159	1,234	855	1,039	852	1,277	1,161	1,036	1,128	982	1,188	1,099	1,075
Peak Daily Demand	L/con/day	2,835	3,090	2,474	2,938	2,339	3,642	3,330	3,012	3,945	2,920	4,014	3,444	3,170
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		135	135	137	-	143	149	148	148	149	143	145		
Restricted Rating Charges		-	-	-	-	-	-	2	6	7	9	10		
Total Rating Charges		135	135	137	-	143	149	150	154	156	152	155		
Data Quality		very high	very high	very high	very high	very high	very high	high	very high	very high	very high	very high		