WAIMAKARIRI
DISTRICT COUNCIL

Activity Management Plan 2021

Garrymere 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
	Simon Collin	Infrastructure Strategy Manager		04/02/2021
	Chris Bacon	Network Planning Team Leader		17/02/2021
Reviewed by	Kalley Simpson	3 Waters Manager		17/02/2021
Approved by	Gerard Cleary	Manager Utilities and Roading		17/02/2021
Adopted by	Council			

Contents

Tables

Figures

1 Executive Summary

The following table provides a summary of the key asset management components that have been assessed for the Garrymere 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.
Levels of Service	With the 2020 treatment plant upgrade most levels of service are now being met. Those that don't relate to flow, losses and usage. Flow for restricted connections does not meet the LoS because of insufficient data, which the restrictor inspection programme will address with time. For the losses, and usage LoS, implementation of actions within the Water Conservation Strategy is required before LOS can be met.
Capacity & Performance	The capacity of the well supply, treatment works and storage has been assessed as being capable of meeting current and future demand. Theoretically the headworks is under capacity if only one of the two pumps is operating alone, but in practice this has not been an issue, and will be monitored. The model indicates that the reticulation also cannot meet full demand, but there is no customer response confirming this as an issue.
	The scheme is not currently included in a Gazetted Fire District, and there are currently no plans to alter this.
Asset Condition	The majority of the scheme is in good condition, with only minor renewals required over the next 50 years.
Risk Assessment	There are no remaining high risks on this scheme identified through the risk assessment.
Disaster Resilience	The headworks pose a moderate hazard in a large earthquake. Headworks assessments for earthquake resilience are required.
Growth Projections	The scheme has no spare capacity but it is assumed that it will be a requirement of any development within the scheme boundary that the existing semi-restricted connection at the parent block will have to be relinquished, and all subdivided sections would only be permitted a fully restricted supply. This may not be a safe assumption and will be monitored during the term of the 2021-2031 LTP

2 Introduction

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

- Provide an overview of the Garrymere 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 Garrymere 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 (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)

4 Scheme Description (What Do We Have?)

The Garrymere water supply scheme is a rural water supply delivering water to a mixture of fully resetricted and semi-resticted connections. The fully restricted connections supply 2-units (2,000 L) per property per day, while the semi-restricted connections supply 13 litres per minute per connection (19 units per day per property).

The water is sourced from a shallow groundwater well. The raw water requires chlorine disinfection and pH correction treatment, and in 2020 had a cartridge filtration and ultra-violet (UV) disinfection treatment system installed. This 2020 treatment upgrade has meant that the scheme now complies

with both the bacterial and protozoal requirements of the Drinking-water Standards for New Zealand (DWSNZ).

No back-up supply is available but a generator plug has been installed for a portable generator set in the event of a power outage.

Some key statistics (2019/20 year) of the scheme are in Table 2 to 5. The extent of the currently serviced area and comprehensive flow data records are presented in Figure 13 and Figure 14.

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	Source
Type of Supply	Restricted and Semi-restricted	
Principal Source	Single well (non-secure groundwater)	
Back-up Source	None	
Treatment	Chlorine disinfection, pH correction, cartridge filtration and UV disinfection.	
Nominal Storage Capacity	Total capacity of 80,000 litres	
Length of Reticulation	4.8 km	Water Asset Valuation Tables 7-4 and 7-5, pages 53 - 55.
Total Replacement Value	$730,000	
Depreciated Replacement Value	$546,000	
Number of Connections	42	2019/20 Rates Strike
Number of Rating Charges	532 units	
Average Daily Flow (5 year average)	136 m^3/day	Flow Data Analysis - Water
Peak Daily Flow (5 year average)	247 m^3/day	
Resource Consent Abstraction Limit	389 m^3/day (expires 2/04/2032)	CRC971822
Average Daily Flow per Connection (5 year average)	3,242 L/day/conn.	Flow Data Analysis - Water
Peak Daily Flow per Connection (5 year average)	5,899 L/day/conn.	

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**	**Total**
Asbestos cement	0m	0m	0m	0m
PE	0m	611m	0m	611m
PVC	0m	4,150m	35m	4,185m
Steel	0m	0m	0m	0m
Other	0m	0m	0m	0m
Total	**0m**	**4,761m**	**35m**	**4,796m**

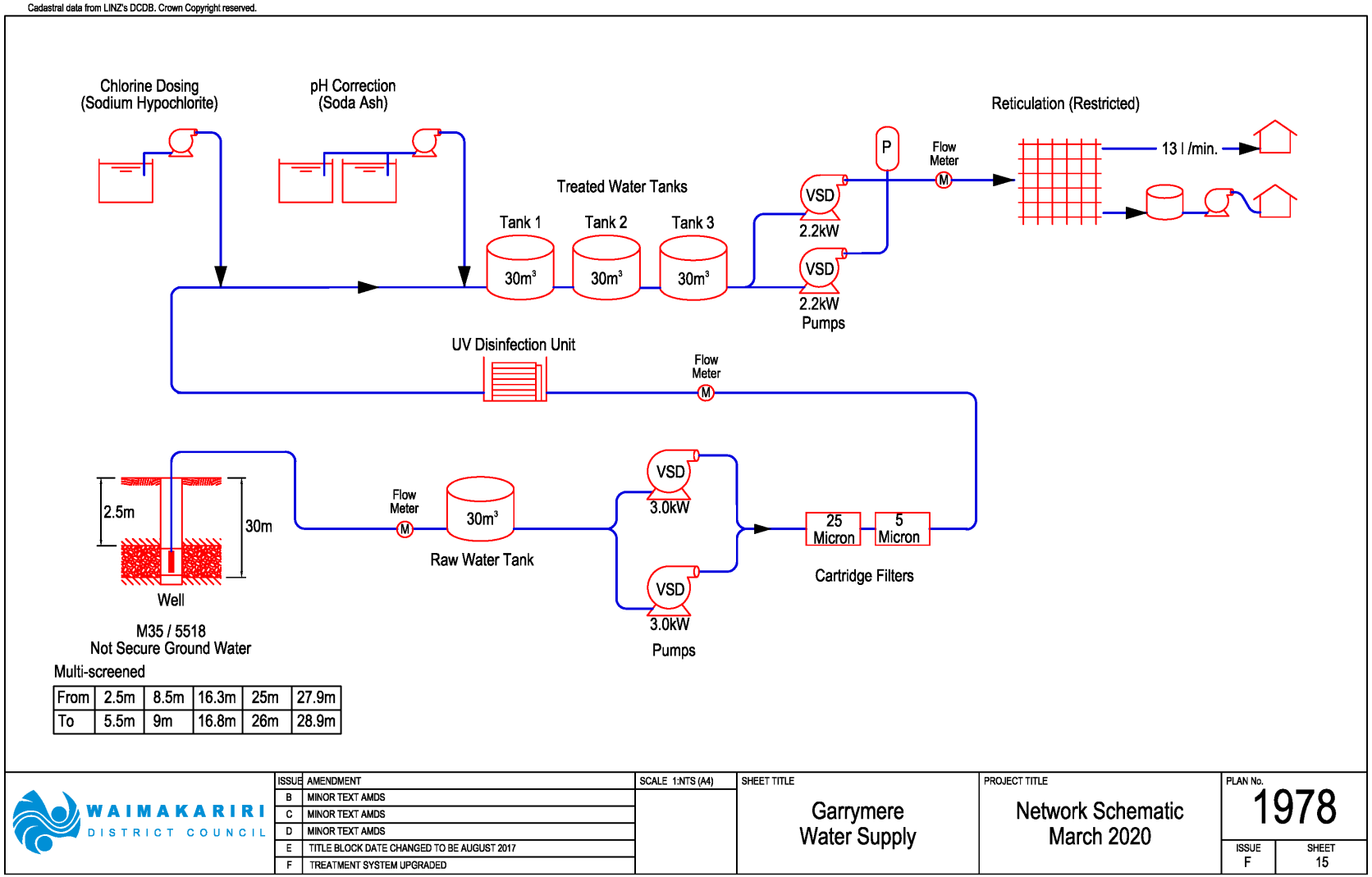
Table 4: Water Supply Valve Data Summary

Water Valves	
Diameter (mm)	**Count**
< 50	0
50	2
100	1
Total Valves	3
Fire Hydrants	0

Table 5: Data References

Data Reference	Trim Reference
Flow Data Analysis – Water	121108078783
2020 3 Waters Asset Valuation	200824109857
2020 Water Conservation Strategy	200501050668
2020 50 Year Water and Sewer Growth Forecast	200224024348
2018 Garrymere Water Safety Plan	
2018 Garrymere System Assessment	
2013 Public Health Risk Management Plan	130829069222
2013 Garrymere System Assessment	130829069310
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 Garrymere 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 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 "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	N	N	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	Doesn't comply	New UV and filtration plant constructed in June 2020, so compliance will be achieved for 2020/21 onwards.	Not achieved	Project completed at end of 19/20.	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
	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
Water Flow	Flow Allocated Units	Water flow at the point of supply in Restricted or Semi Restricted schemes, excluding outages, as demonstrated by programmed restrictor audits, that tests restrictors at not less than 5 yearly intervals.	>0.69 L/min/unit	Insuf. Data	Restrictor checks are programmed to be undertaken every 4 years. However, there is currently insufficient data.	Not achieved	Implement Phase 2 of AMIS project, to allow adequate data collection and analysis.	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	1035	Actual losses estimated at 1035 L/conn./day based on night flow monitoring	Not achieved	Implement actions as identified in Water Conservation Strategy.	Y	Y	Y	No Data
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	N	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.	>150kPa for 100% of the time	Complies	Validated by water model, running scheme at target demand and ensuring target pressure is achieved.	Achieved	NA	Y	Y	Y	N
Scheme Capacity	Scheme Capacity - On Demand	Actual peak capacity of the scheme for domestic use - On Demand	>1150 litres/ allocated unit/ 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	14.6 hours	Required storage calculated based on resiliency and redundancy	Achieved	NA	N	N	N	N
Water Usage	Usage - Average Day	Actual usage on average day	Maintain the average daily water use below 100% of the assessed reasonable water use	149%	Refer to Water Conservation Strategy (200501050668)	Not achieved	Implement actions as identified in Water Conservation Strategy.	N	N	N	NA

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 - Peak Day	Actual usage on Peak Day	Reduce the peak daily usage to below 110% of the assessed reasonable water use	208%	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.

"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

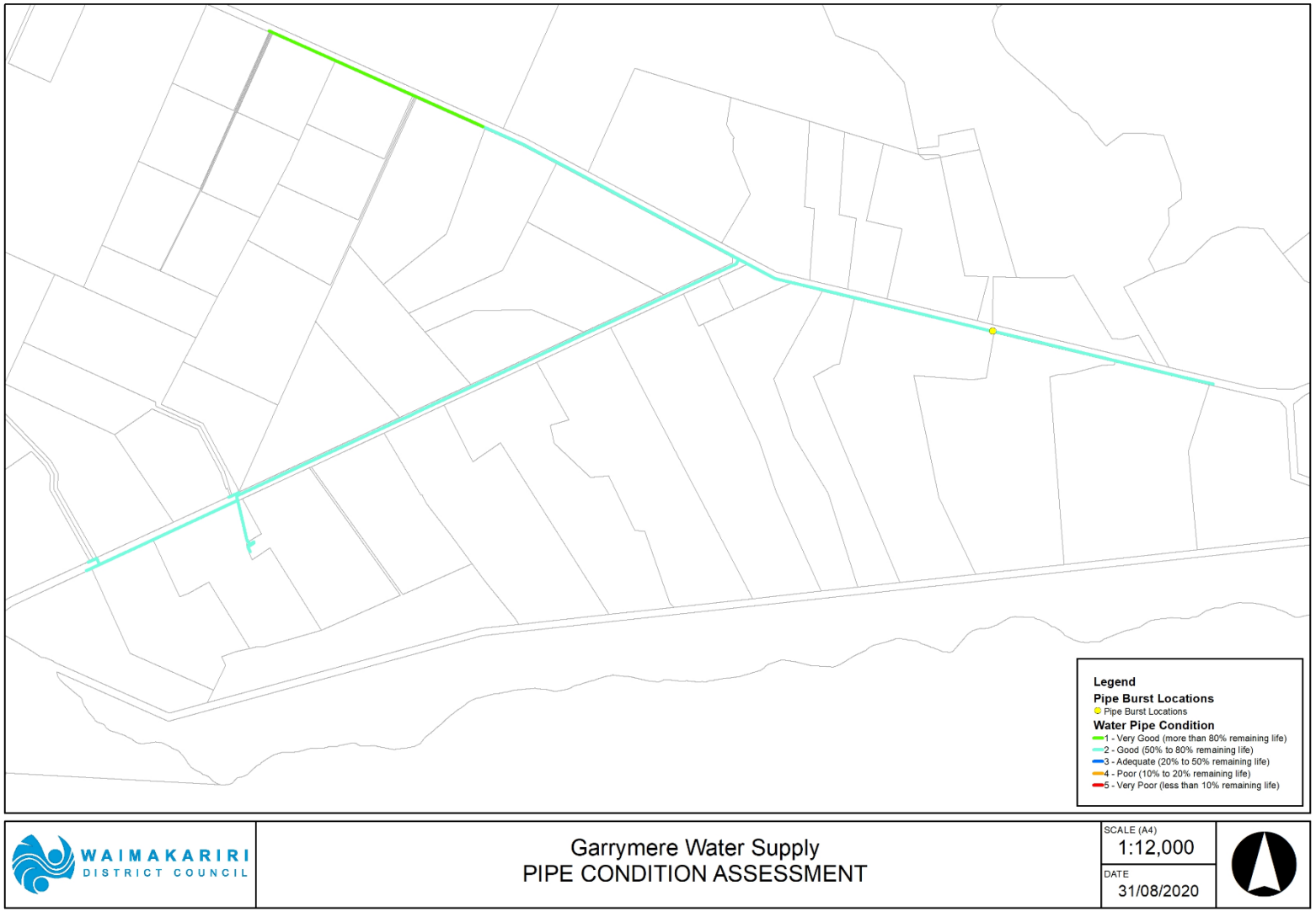


Figure 3: Asset Condition Summary

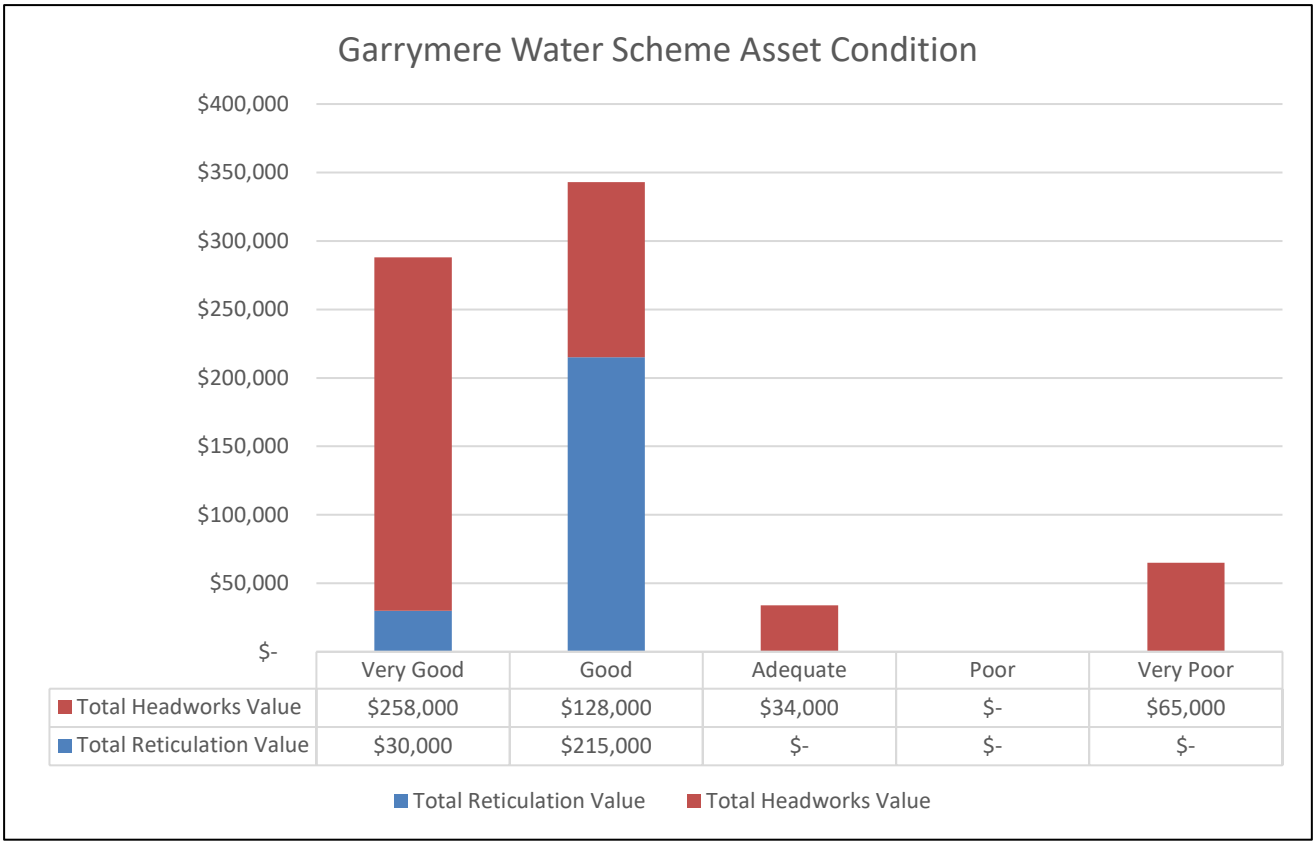


Table 8: Pipe Condition Summary

Condition Grade	Definition	Pipeline Quantity	Total Reticulation Value	Total Headworks Value	Total Value
1	Very Good *More than 80% of life remaining*	0.6 km *13%*	$ 30,000 *12%*	$ 258,000 *53%*	$ 288,000 *39%*
2	Good *Between 50% and 80% of life remaining*	4.2 km *87%*	$ 215,000 *88%*	$ 128,000 *26%*	$ 343,000 *47%*
3	Adequate *Between 20% and 50% of life remaining*	0.0 km *0%*	$ 0 *0%*	$ 34,000 *7%*	$ 34,000 *5%*
4	Poor *Between 10% and 20% of life remaining*	0.0 km *0%*	$ 0 *0%*	$ 0 *0%*	$ 0 *0%*
5	Very Poor *Less than 10% of life remaining*	0.0 km *0%*	$ 0 *0%*	$ 65,000 *13%*	$ 65,000 *9%*
Total		**4.8 km**	**$245,000**	**$485,000**	**$730,000**

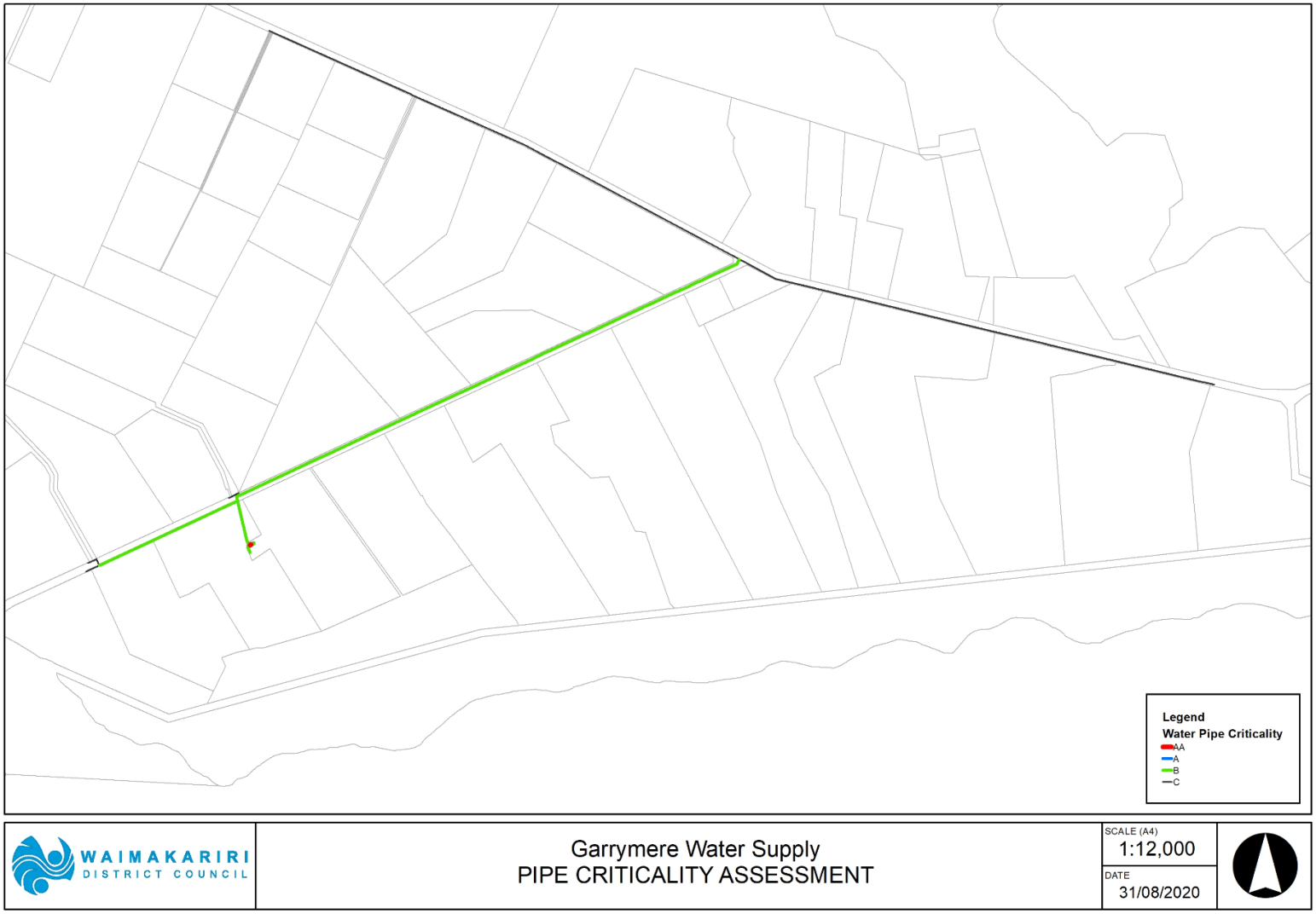
5.3 Asset Criticality

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 Garrymere Water Supply Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review. The last two reviews have revealed no extreme or high risks for the Garrymere 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 Garrymere 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	6	5	5
Moderate risks	22	23	25	19
Low risks	19	18	20	26
Not applicable	8	8	8	8
Total	***55***	***55***	***58***	***58***

Table 6 summarises the high risks for this scheme. The high risks were associated with the source and treatment for this scheme. This has since been addressed with the construction and commissioning of new filtration and ultra-violet disinfection plant. There are no high risks associated with the distribution network. There is a remaining redundancy risk, arising from the scheme only having one water source. A backup well is planned for FY22/23 to resolve this.

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

5.5 Water Safety Plan

Water safety plans provides a summary of how the scheme is operated, include 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 Garrymere WSP was last approved in 2018, but the recent improvements in treatment and disinfection equipment triggered the requirement for an updated plan to be submitted to the Ministry of Health in 2020, which was done in July 2020. 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 Garrymere. 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.

5.6 Disaster Resilience Assessment

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

Risk from natural hazard events on below ground infrastructure is managed using a reticulation vulnerability score which is assessed as part of the (risk based) renewals framework. 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 10) 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 10: Risks to Above Ground Facilities

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

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

The Councils 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

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

It is projected that there will be an increase in connections by 23%, by the end of the 2021-31 Long Term Plan (LTP) period. This projection is based on the New Projections for LTP 2021-2031 (TRIM200908117997), more specifically the rural growth profile.

The number of restricted (two units per day) connections are projected to increase by 6 over the 2021-31 LTP period (Table 11).

Table 11: Growth Projections

Garrymere	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	42	46	52	59	66	78
Projected Rating Units	532	532	532	532	532	532
Projected increase in Connections		10%	23%	41%	58%	86%
Projected Average Daily Flow (m3/day)	141	141	141	141	141	141
Projected Peak Daily Flow (m3/day)	251	251	251	251	251	251

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

Demand over the next 50 years is projected to increase by 86% for connections.

This long term projection is higher than the 2017 growth projection, 64% (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. This connection projection used the rural profile, from the New Projections for LTP 2021-2031 (TRIM2009081179970).

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

It has previously been assumed that this growth would only occur within the existing scheme boundary via properties subdividing and converting the original 13 L/min connection to a number of fully restricted connections. This assumption would mean that the water demand would remain the same, or reduce, as the number of connections increased. More recently it has been thought that this may not be a safe assumption, and some growth projects have now been included in the budget at the end of the 10 year 2021-2031 LTP period. This will allow the situation to be monitored in the medium term.

Projections

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

Figure 5: Population Projections

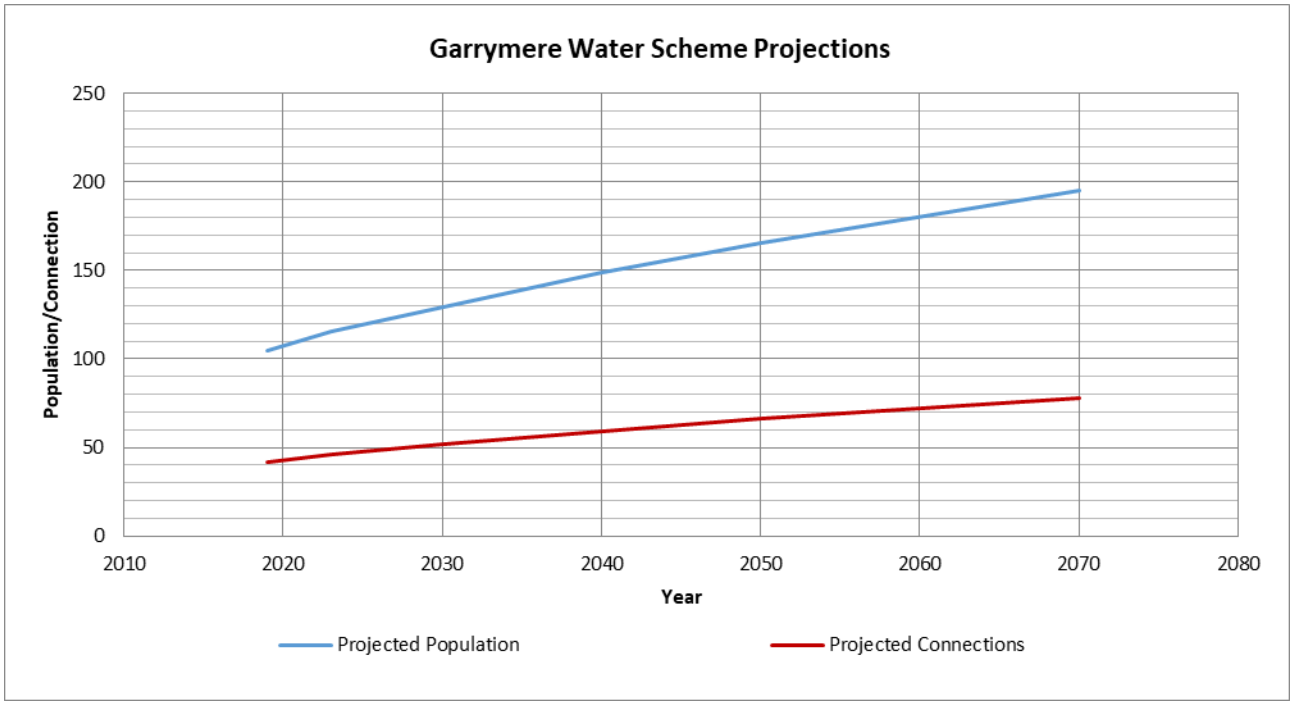
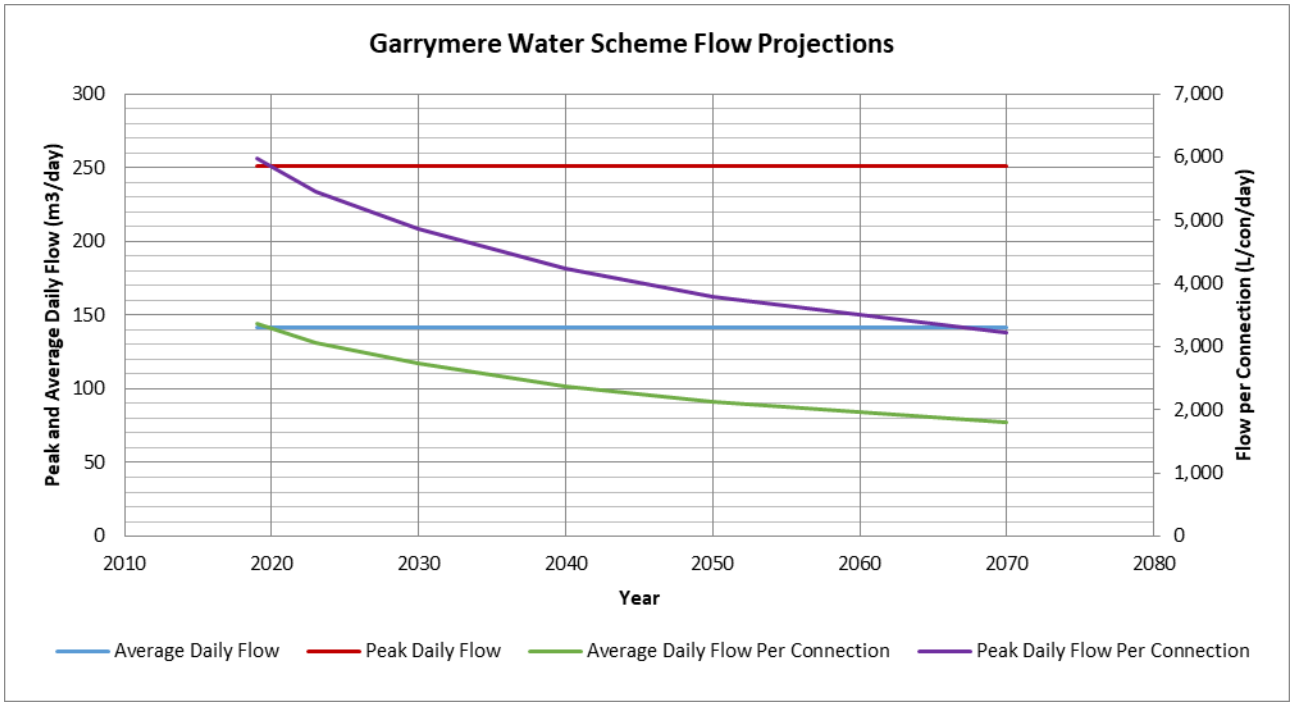


Figure 6: Flow Projections



5.8 Capacity & Performance

This section of the AMP looks at the capacity and performance of the Garrymere Water Supply. 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 sections

Source

The Garrymere Water Supply draws water from the following source (Table 12).

Table 12: Scheme Sources

Well name	Well No.	Diameter (mm)	Depth (m)
Garrymere	M34/5518	150	30

The resource consent (CR971822) conditions for the current well limit the allowable abstraction to 389 cubic metres per day at a maximum rate of 4.5 L/s.

The existing Garrymere well pump was installed in 2020 and has calculated maximum capacity of 5.4 L/s or 463 cubic metres per day.

The following table presents the projected water demand and associated required source capacity for the Garrymere supply.

Table 13: Project Demand and Required Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Projected Peak Daily Flow (L/s)	2.9	2.9	2.9	2.9	2.9
Required Source Capacity (L/s)	3.2	3.2	3.2	3.2	3.2

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. As Garrymere has only one well, another well is schedule to be drilled in 2024/25.

In the short term it is assumed that only the number of connections will increase and the rating units will remain constant, and therefore the peak daily flow will remain constant. This assumption needs monitoring over the period of the 2021-31 LTP

Treatment

The original treatment system for the supply comprises pH correction using soda ash and chlorine disinfection. While the scheme historically achieved compliance with the microbiological requirements of the Drinking Water Standards, the treatment system did not provide any treatment for protozoa.

In 2020, an upgrade to achieve full compliance with the drinking water standards was completed. The scheme now has cartridge filtration and UV disinfection in addition to pH correction, and chlorine disinfection. A Water Safety Plan has been prepared on this basis, and submitted to the Drinking Water Assessor for approval, which will confirm compliance with the standards has been achieved.

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 Garrymere scheme has a total storage capacity of 108 cubic metres made up from four 27 cubic metre tanks.

Emergency storage requirements for Garrymere are 11.3 hours of Average Daily Flow, based on work carried out in Water Supply Source Resilience Analysis (170623064893). Note that no storage is required for operational requirements for this scheme as both the well pump and supply pumps exceed the current and projected future peak daily flow.

Table 14 presents the required storage capacity.

Table 14: Required Storage Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Required Storage Volume (m3)	95	95	95	95	95
Planned Storage Volume (m3)	108	108	108	108	108

There is sufficient capacity to meet the emergency storage requirements at Garrymere, if the assumption of no actual increase in demand is correct.

Headworks

The existing Garrymere headworks consist of two supply pumps connected to a pressure tank. The pumps operate as duty-assist and have an estimated combined capacity of 4.6 L/s based on flow meter records. For redundancy, it is assumed that one of the main pumps is unavailable, therefore the total assessed capacity is currently 2.3L/s.

Table 15 presents the projected peak hourly flows for the Garrymere supply. This peak hourly flow is based on current demand figures, for the current number of connections and units.

Table 15: Projected Peak Hourly Flows for Surface Pumps in Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Hourly Flow (L/s)	3	3	3	3	3

On this basis, there is insufficient capacity to meet peak demand, taking into account redundancy requirements. A surface pump upgrade has been scheduled for 2031/32, which can be brought forward if growth does occur and adequate capacity is compromised, or to improve the resilience of the scheme.

Reticulation

The capacity of the headworks and reticulation has been assessed using a hydraulic reticulation model. The model has indicated that the existing reticulation system should not have the capacity for the existing demands if all properties were to draw their full allocated amount of water simultaneously. In practice, this is unlikely to occur and consequently the model may be overestimating the demand and underestimating the capacity. The capacity of the reticulation can be reassessed now that reliable flow data is available from the new flowmeter.

For the purposes of assessing the future capacity of the scheme in the short term, it has been assumed that all new connections within the current scheme boundary will draw a peak daily flow of 2,000 litres per property per day and that the existing 13 L/min connections will be changed to fully restricted if the parent block is subdivided. This assumption will be monitored over the period of the 2021-31 LTP

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

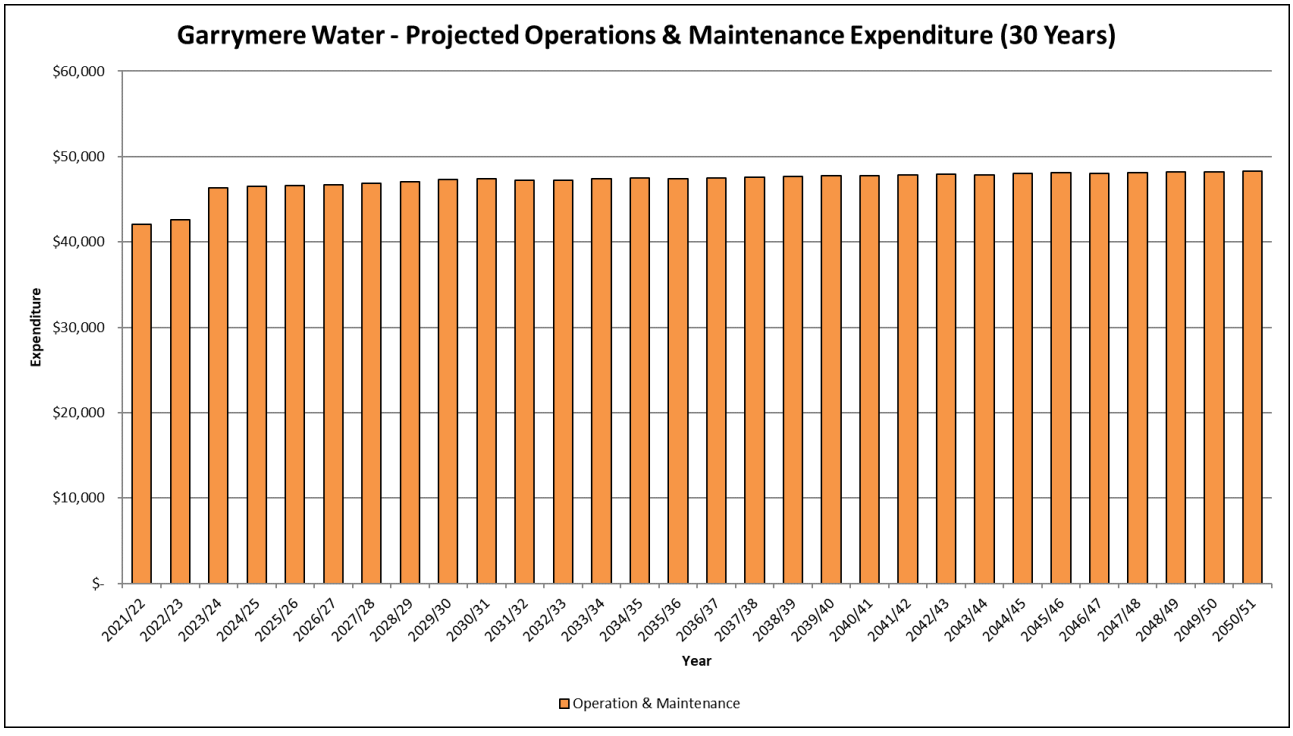
6.1 Operation & Maintenance

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



The primary reasons for the increase in the operation and maintenance budget in 23/24 is related to some depreciation increases, related to a second primary well.

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

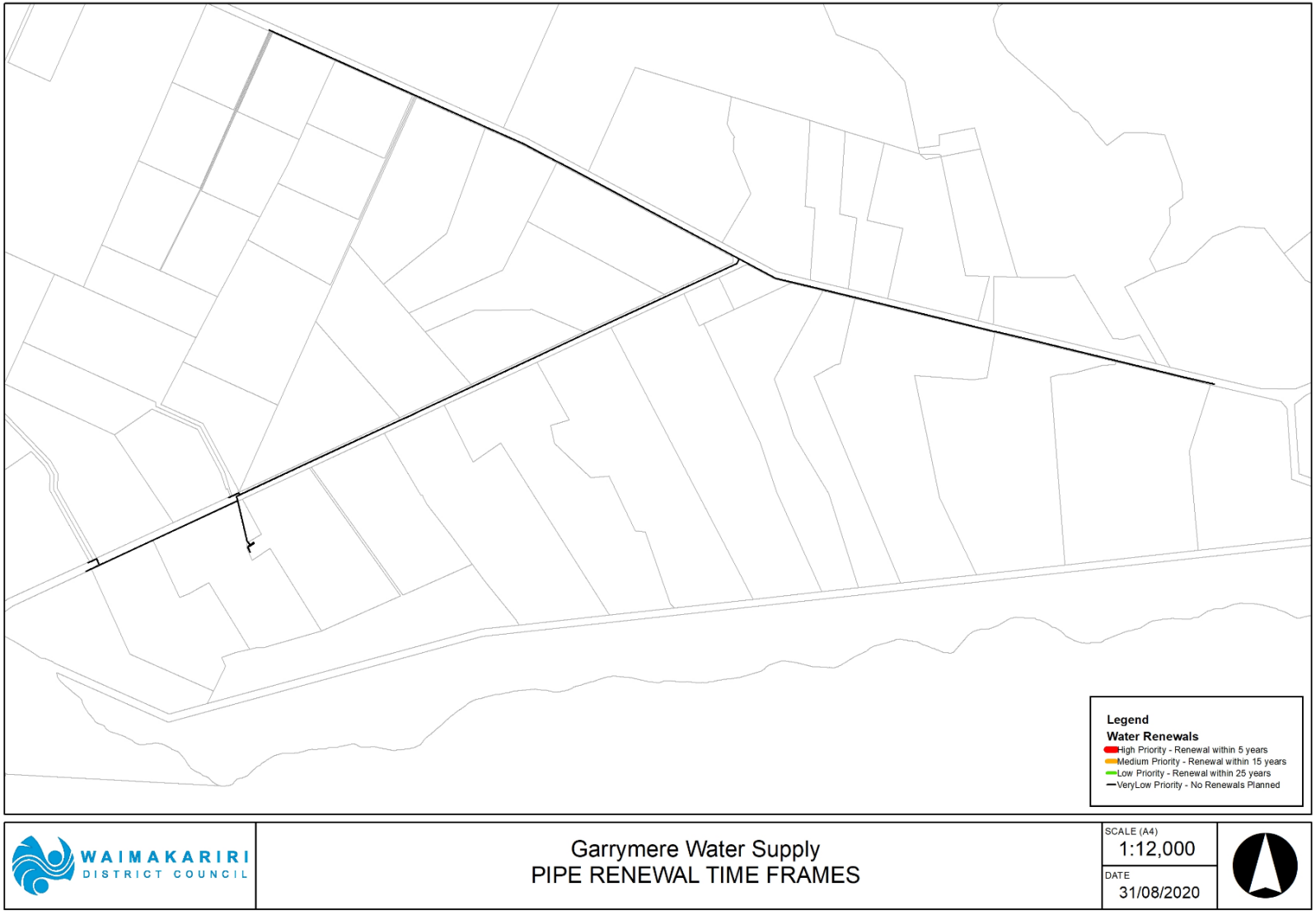
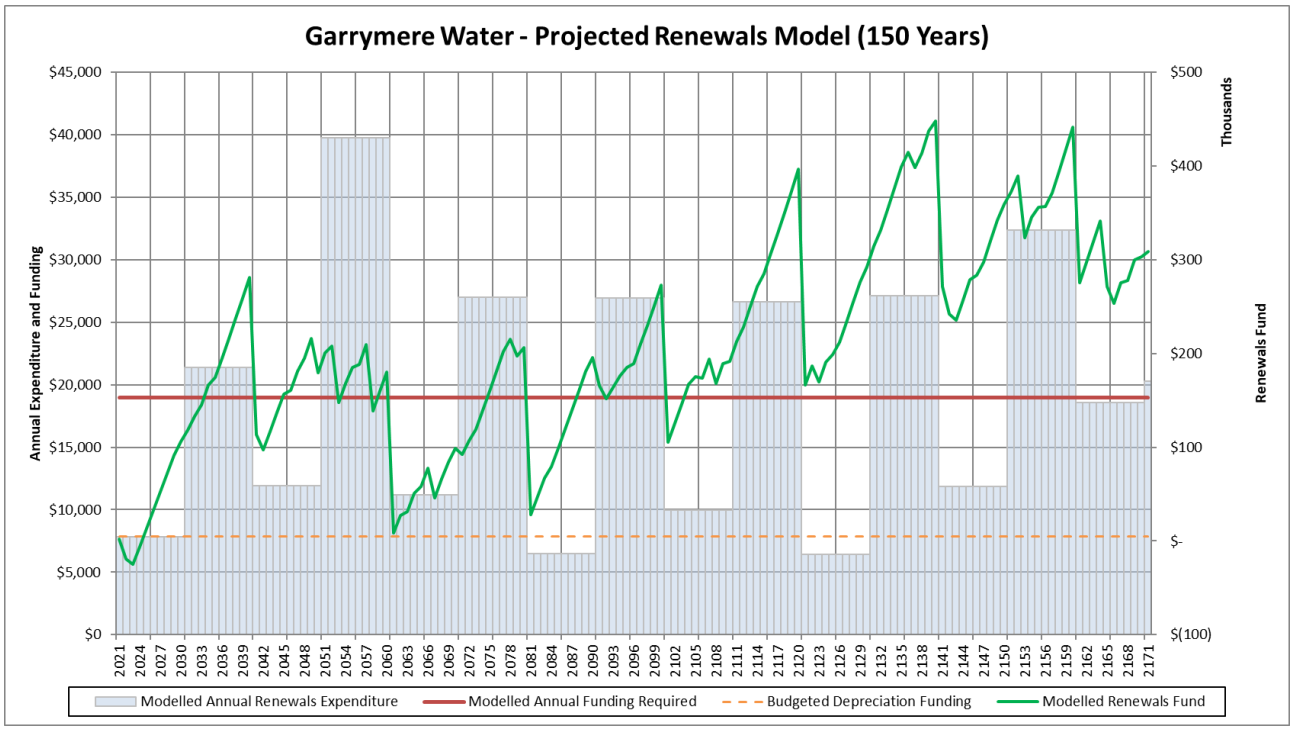


Figure 9 below shows the financial output from the model alone. Over a 150 year period it shows the projected expenditure; the value in the renewals fund; the level of funding required to ensure the fund can meet the required renewals programme, and the annual depreciation.

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. The final renewals budget put forward into the draft LTP, is included in the capital works graph, Figure 10 . There are no deferred renewals.

Figure 9: Annual 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, not the model output.

Figure 10: Projected Capital Works Expenditure

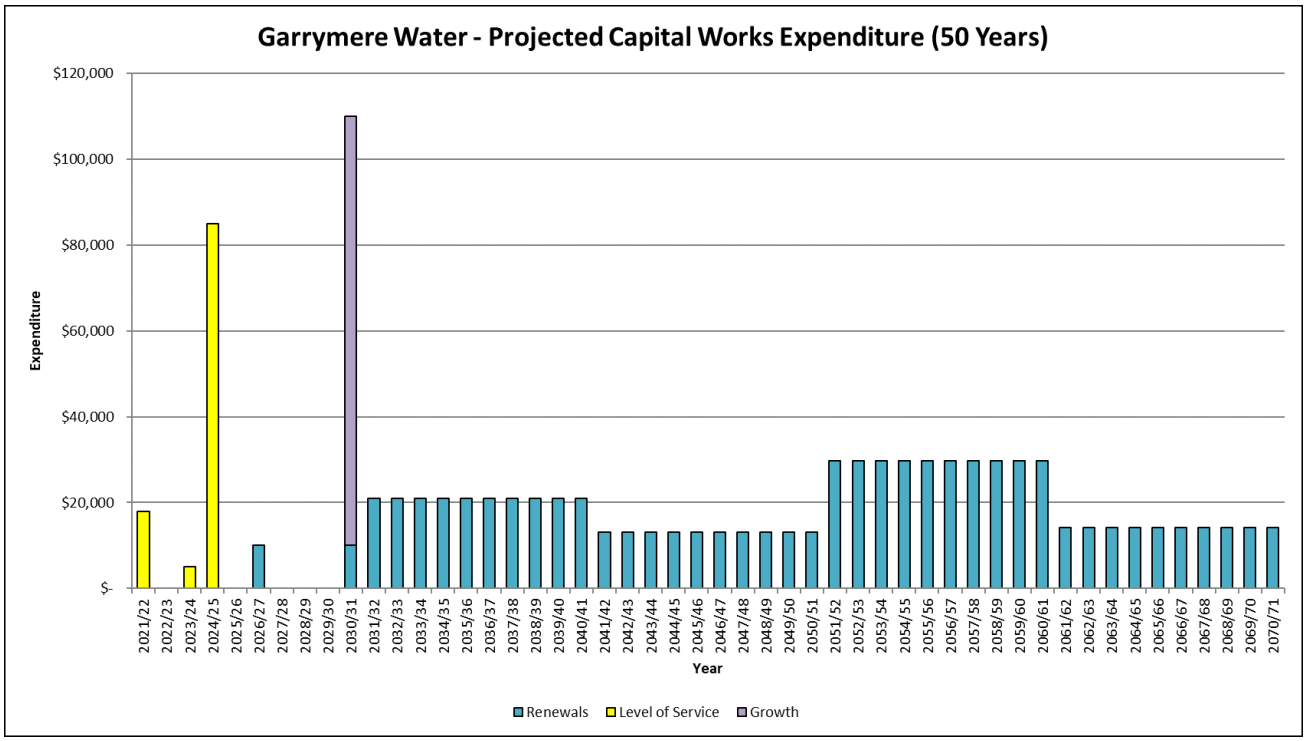


Table 16 summarises the projected capital works for the next 50 years, including renewals. Figure 11 shows the corresponding location of the projected capital upgrade works.

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.

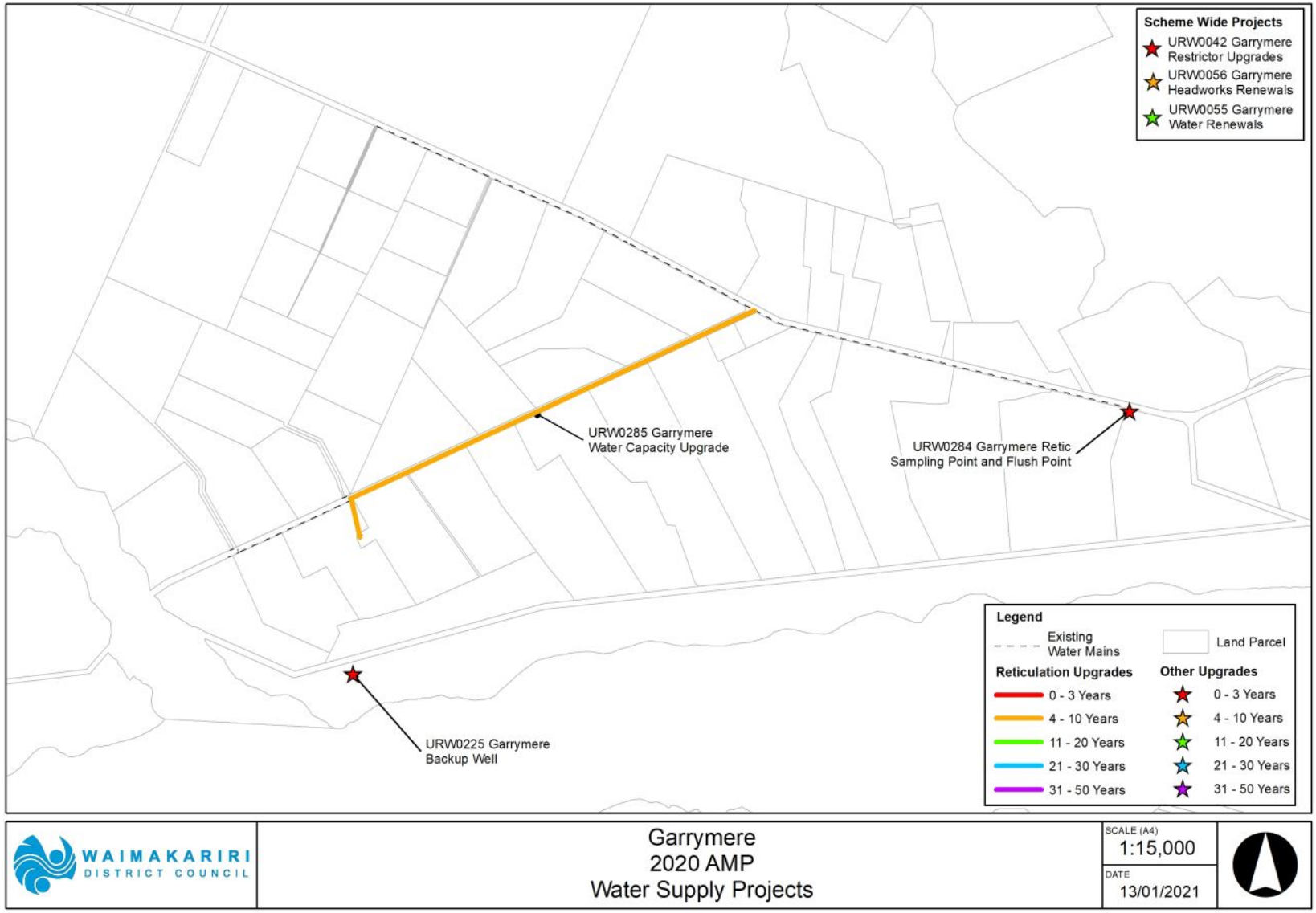
Any programme or project that occurs over a number of years, such as the renewals programme, is only shown within the table for the first year in which it occurs. The Project Value indicates the projected full total cost of the project over the number of years it occurs.

The $90k expenditure in 2024/25 is for a back up well, and the growth related $100k in 2030/31 is for the potential growth related projects referenced in the growth section

Table 16: 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	**URW0042**	Garrymere Restrictor Upgrades	**5 - Medium**	**$ 11,000**	**$ 11,000**	**$ -**	**$ -**
2022	**URW0284**	Garrymere Retic Sampling Point and Flush Point	**5 - Medium**	**$ 7,000**	**$ 7,000**	**$ -**	**$ -**
2024	**URW0225**	Garrymere Backup Well	**3 - Low**	**$ 90,000**	**$ 90,000**	**$ -**	**$ -**
2027	**URW0056**	Garrymere Headworks Renewals	**3 - Low**	**$ 613,485**	**$ -**	**$ 613,485**	**$ -**
2031	**URW0285**	Garrymere Water Capacity Upgrade	**3 - Low**	**$ 100,000**	**$ -**	**$ -**	**$ 100,000**
Year 11 - 20							
2032	**URW0055**	Garrymere Water Renewals	**3 - Low**	**$ 185,620**	**$ -**	**$ 185,620**	**$ -**
Grand Total				**$ 1,007,105**	**$ 108,000**	**$ 799,105**	**$ 100,000**

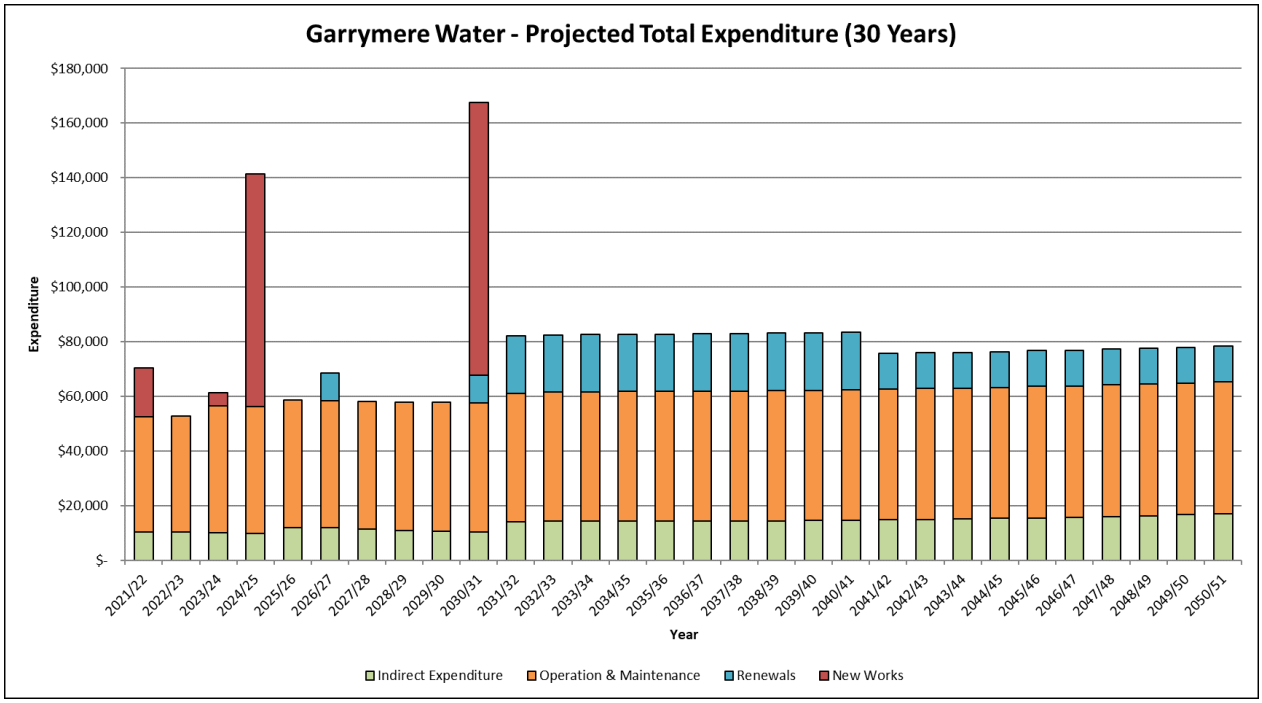
Figure 11: Projected Capital Upgrade Works (not to scale)



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 Total Expenditure



6.5 Valuation

A full peer reviewed valuation of assets is carried out on a three yearly cycle, using the asset data in our asset management information system. Table 17 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme

Table 17: Asset Valuation

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
Valve	No.	3	$7,700	$5,779	$77
Main	m	4,796	$196,376	$146,468	$1,964
Hydrant	No.	0	$-	$-	$-
Service Line	Properties	38	$40,479	$30,823	$405
Facilities			**$485,505**	**$362,813**	**$16,084**
Total			**$730,059**	**$545,882**	**$18,530**

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 18 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.

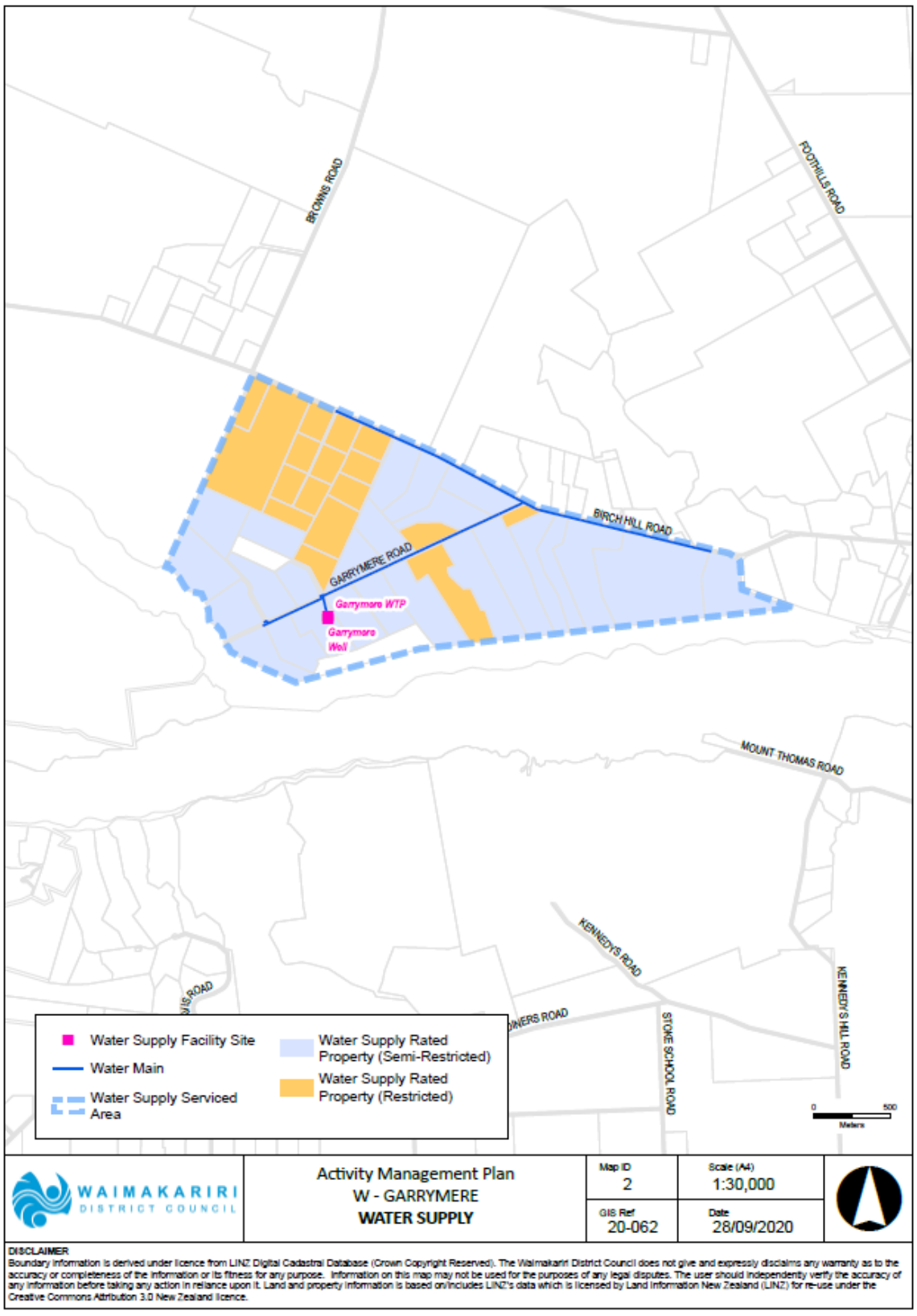
If the table is empty, this indicates that all improvements required are either district wide improvements (covered by the Overview AMP), or covered by a capital project or projects, covered in the Capital Works section.

Table 18: 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



This scheme is not included in a Fire District

Figure 14: Garrymere Water Supply Statistics

Garrymere Water Supply Statistics

Garrymere | 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	-	-	-	-	-	-	-	-	0.17	0.62	-	0.40	0.40
Average Daily Flow	m^3/day	104	130	112	114	106	141	136	141	140	119	141	136	128
Peak Daily Flow	m^3/day	206	214	204	218	203	251	245	234	233	232	288	247	232
Peak Weekly Flow	m^3/day	191	195	179	201	187	233	229	222	223	213	265	230	215
Peak Monthly Flow	m^3/day	156	185	159	189	179	227	217	200	200	198	239	211	199
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	4.7	-	-	4.7	4.7
Peak Month		Feb	Dec	Feb	Feb	Feb	Jan	Dec	Feb	Dec	Feb	Jan		
Peak Week		Week 2	Week 3	Week 4	Week 1	Week 8	Week 5	Week 1	Week 1	Week 50	Week 8	Week 6		
Peak Day		7/02/2010	18/01/2011	1/02/2012	31/12/2012	19/02/2014	25/01/2015	4/12/2015	6/03/2017	8/12/2017	14/02/2019	1/02/2020		
Peaking Factor		2.0	1.6	1.8	1.9	1.9	1.8	1.8	1.7	1.7	2.0	2.0		
Total Annual Volume	m^3	38,293	47,839	41,230	41,850	38,995	51,845	50,009	43,673	33,704	43,712	51,731	44,566	44,459
Resource Consent	m^3/day	389	389	389	389	389	389	389	389	389	389	389	389	389
Well Pump Capacity	m^3/day	328	328	328	328	328	467	467	467	467	467	467	467	411
Surface Pump Capacity	m^3/day	311	311	311	311	311	648	648	648	648	648	648	648	513
On-Demand Connections		-	-	-	-	-	-	-	-	-	-	-		
Restricted Connections		30	30	30	30	44	42	41	42	42	42	42		
Total Connections		30	30	30	30	44	42	41	42	42	42	42		
Average Daily Demand	L/con/day	3,478	4,345	3,745	3,801	2,415	3,364	3,324	3,365	3,330	2,836	3,356	3,242	3,388
Peak Daily Demand	L/con/day	6,867	7,133	6,800	7,262	4,608	5,985	5,984	5,582	5,549	5,533	6,845	5,899	6,128
Allocated Water Units	m^3/day	505	505	505	570	531	529	529	532	532	532	532		
Average Daily Flow per Unit	L/unit/day	207	258	222	200	200	267	258	266	263	224	265	255	242
Peak Daily Flow per Unit	L/unit/day	408	424	404	382	382	475	464	441	438	437	540	464	439
On-Demand Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Restricted Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Total Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Data Quality		very high	very high	very high	very high	very high	very high	high	high	high	high	high		