WAIMAKARIRI
DISTRICT COUNCIL

Activity Management Plan 2021

Ohoka 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 issues of the Ohoka 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 storage, flow and usage. The previous planned additional storage has been brought forward as a consequence of the Covid-19 stimulus grant. Flow for restricted connections does not meet the LoS because of insufficient data, which the restrictor inspection programme will address with time, while for the usage LoS, implementation of actions within the Water Conservation Strategy is required before LOS can be met.
Capacity & Performance	Assessed capacity for the source, consents, treatment and reticulation meets current demand and future expected growth. Future storage is not sufficient, but additional storage will be in place by 2021/22. There is insufficient redundancy in the headworks supply pumps which will need to be addressed at the next LTP
Asset Condition	The majority of the scheme is in good condition, with only minor renewals required over the next 50 years.
Risk Assessment	The Risk Assessment previously revealed high contamination risks to the supply from livestock access or agricultural contaminants. The source upgrade has addressed these risks.
Disaster Resilience	The Disaster Resilience Assessment identified terrorism as the highest risk for the Ohoka headworks. An earthquake resilience assessment of the headworks is also required.
Growth Projections	Growth projections show 95 new connections being added to the scheme over the next 50 years Capacity assessments indicate that the system capacity is sufficient to accommodate these growth projections

2 Introduction

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

- Provide an overview of the Ohoka 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 Ohoka 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 Ohoka Water Supply Scheme is a predominantly semi-restricted water supply providing a maximum of 13 litres per minute to each property (referred to as 19-unit connections), with a small number of fully restricted (2-unit) connections. The supply includes some hydrants that would provide some benefit during a fire event, but is not within a gazetted fire-fighting zone.

The water is sourced from a deep well drilled near the existing headworks and commissioned in 2016, which has secure status as assessed against the Drinking Water Standards for New Zealand (DWSNZ). This well supplies water that is compliant with the bacterial and protozoal requirements of the DWSNZ.

The original shallow well, which is a non-secure groundwater source, has been retained as an emergency backup source.

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

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.

Table 2: Scheme Statistics for 2019/2020

Scheme Parameter	Statistics	Source
Type of Supply	Flow semi-restricted (13 l/min) and some fully restricted with hydrants providing limited fire fighting.	
Principal Source	Ohoka Well No. 2 (secure status)	
Back-up Source	Ohoka Well No.1 (non-secure groundwater)	
Treatment	Chlorine disinfection for primary source and backup source pH correction is required for backup source only.	
Nominal Storage Capacity	Total of 69,000 litres (3 x 23,000 litres)	
Length of Reticulation	6.7 km	Water Asset Valuation Tables 7-4 and 7-5, pages 53 - 55.
Total Replacement Value	$2.05 mil	
Depreciated Replacement Value	$1.60 mil	
Number of Connections	118	Rates Strike 2019/20
Number of Rating Charges	1,766	
Average Daily Flow (5 year average)	143 m^3/day	Flow Data Analysis – Water
Peak Daily Flow (5 year average)	503 m^3/day	
Resource Consent Abstraction Limit	1,555 m^3/day	CRC166054 (exp. 17/03/2051) CRC990932 (exp. 31/03/2041)
Average Daily Flow per Connection (5 year average)	1,408 l/day/con	Flow Data Analysis – Water
Peak Daily Flow per Connection (5 year average)	4,397 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	5m	586m	1,452m	154m	2,197m
PVC	188m	1,999m	2,333m	0m	4,520m
Steel	0m	0m	10m	0m	10m
Total	**193m**	**2,586m**	**3,796m**	**154m**	**6,728m**

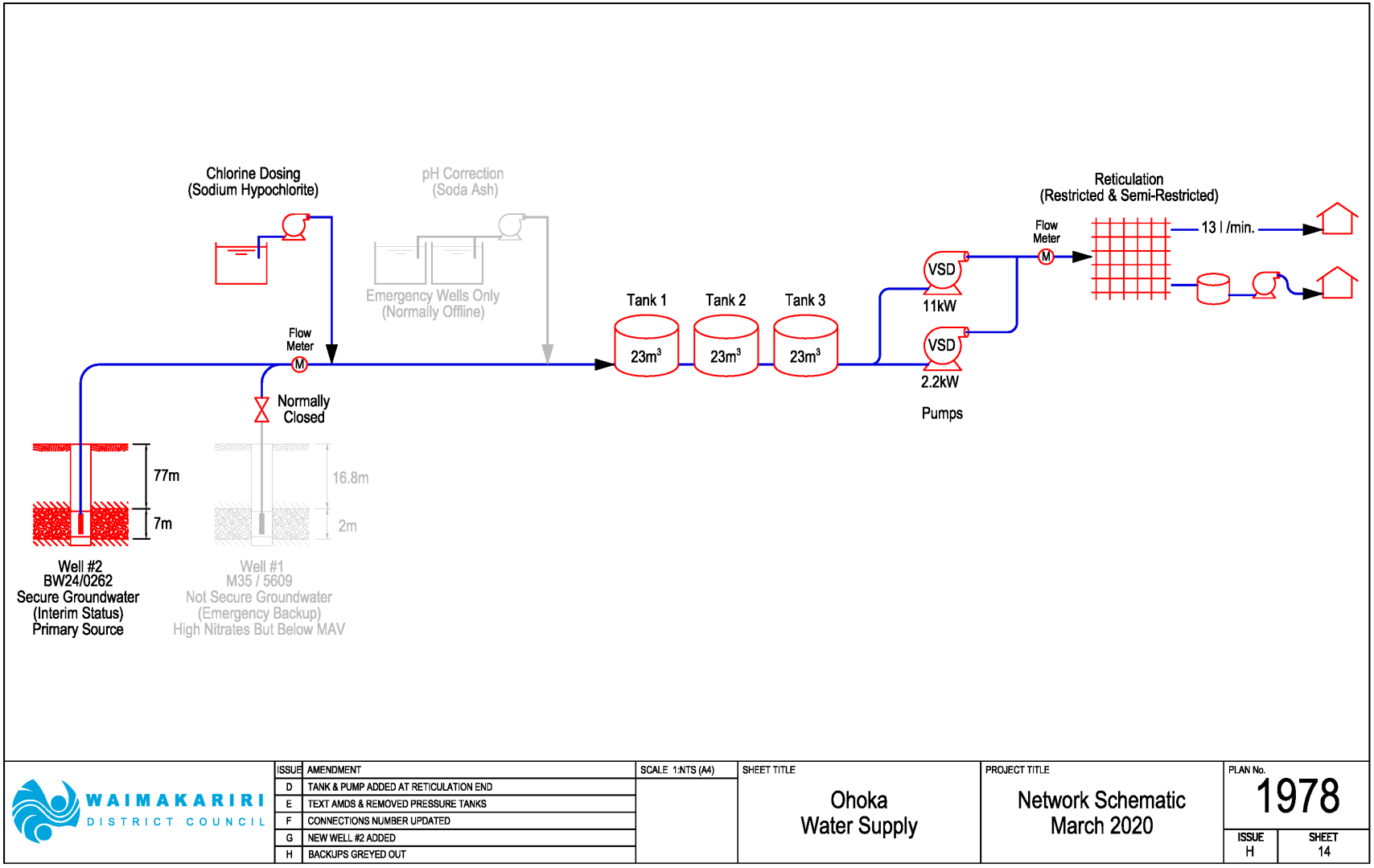
Table 4: Water Supply Valve Data Summary

Water Valves	
Diameter (mm)	**Count**
< 50	0
50	23
100	11
150	1
Total Valves	**35**
Fire Hydrants	**24**

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
Ohoka Water Safety Plan	150729113651
Ohoka System Assessment	150729113644
2020 Fire Fighting Code of Practice Compliance Update	200904117110

Figure 1: Network Schematic



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

There are a number of key aspects to consider when managing a water supply; these include:

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

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

5.1 Levels of Service

Table 6 sets out the performance measures and targets specific to the Ohoka 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	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	Y	N	N	N
	DWSNZ - Sampling Non-compliance	Number of instances where sampling programme did not comply with DWSNZ, as demonstrated by Water Information NZ (WINZ) database	Nil/yr	Nil	All samples taken in accordance with DWSNZ	Achieved	NA	Y	Y	Y	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 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.	Insuf. Data	-		
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	150	Actual losses estimated at 150 L/conn./day based on night flow monitoring	Achieved	NA	Y	Insuf. Data	Insuf. Data	Insuf. 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	Y	Insuf. Data	Y	Y
Water Pressure	Pressure - Point of Supply - On Demand	Water pressure at the point of supply in On Demand and Semi-Restricted schemes, excluding outages, as demonstrated by a reticulation model or audits.	>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	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
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	Volume of available and usable storage for On Demand and Semi-Restricted schemes (dependant on source type)	Source and demand dependent	3.1 hours	Deficiency identified.	Not achieved	Storage upgrade programmed in to address.	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	68%	Refer to Water Conservation Strategy (200501050668)	Achieved	NA	N	Y	Y	NA
Water Usage	Usage - Peak Day	Actual usage on Peak Day	Reduce the peak daily usage to below 110% of the assessed reasonable water use	190%	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: Pipe Condition Assessment Plan 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

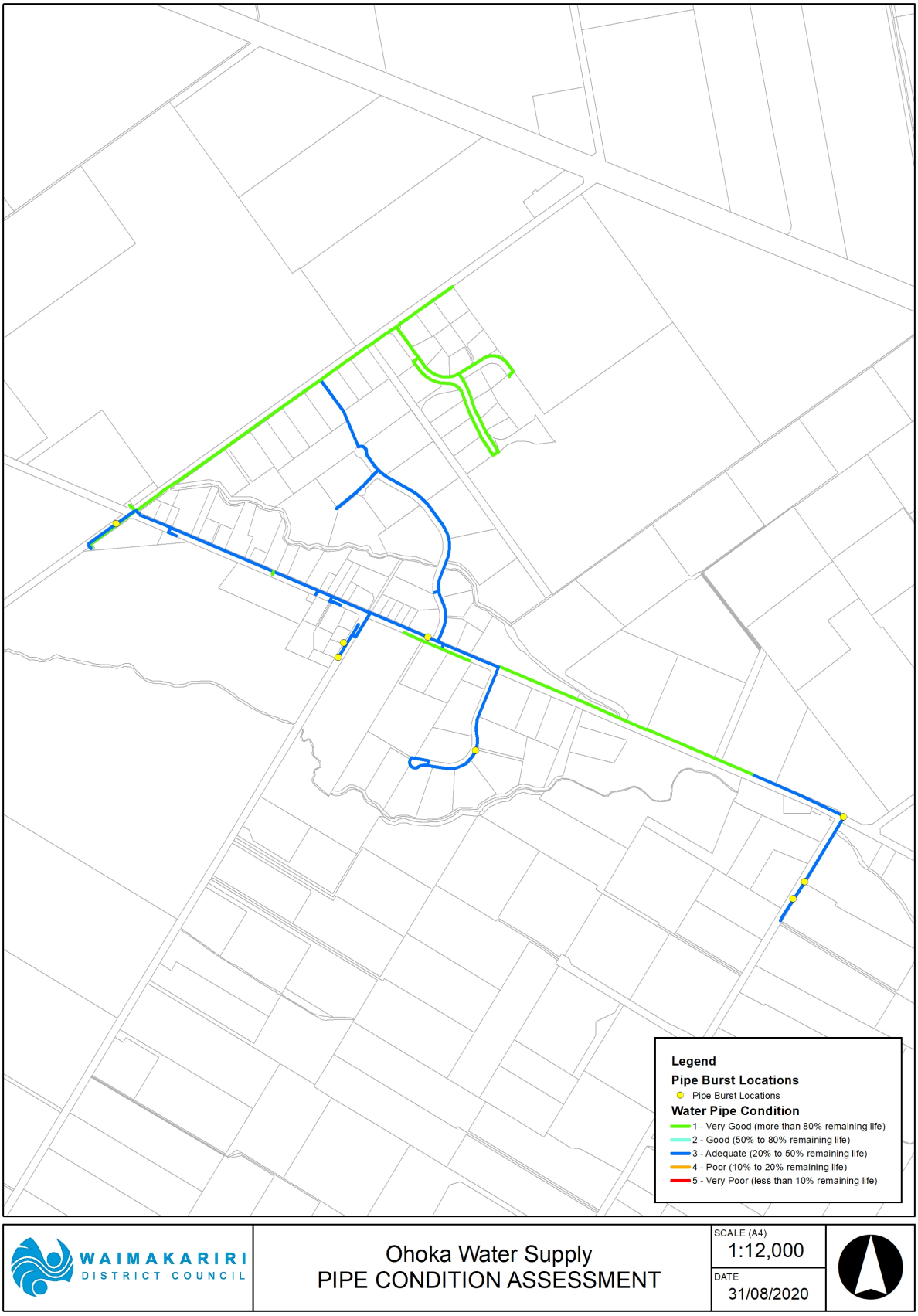


Figure 3: Asset Condition Summary

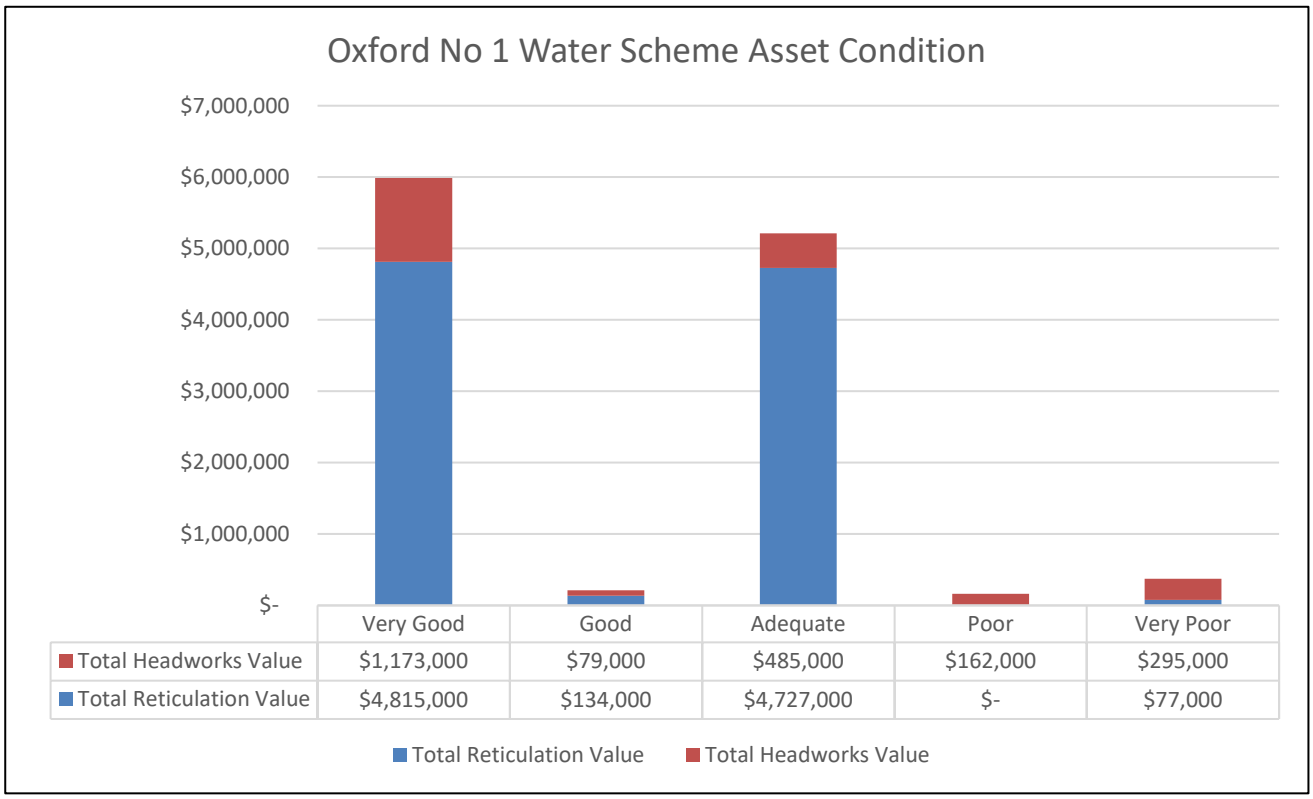


Table 8: Pipe Condition Summary

Condition Grade	Definition	Pipeline Quantity	Total Reticulation Value	Total Headworks Value	Total Value
1	Very Good *More than 80% of life remaining*	3.2 km *47%*	$ 483,000 *42%*	$ 507,000 *56%*	$ 990,000 *48%*
2	Good *Between 50% and 80% of life remaining*	0.0 km *0%*	$ - *0%*	$ 198,000 *22%*	$ 198,000 *10%*
3	Adequate *Between 20% and 50% of life remaining*	3.6 km *53%*	$ 656,000 *58%*	$ 83,000 *9%*	$ 739,000 *36%*
4	Poor *Between 10% and 20% of life remaining*	0.0 km *0%*	$ - *0%*	$ 11,000 *1%*	$ 11,000 *1%*
5	Very Poor *Less than 10% of life remaining*	0.0 km *0%*	$ - *0%*	$ 107,000 *12%*	$ 107,000 *5%*
Total		**6.7 km**	**$1,139,000**	**$906,000**	**$2,045,000**

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 Ohoka Water Supply Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review. However the three identified high risks (contamination of the non-secure source, and inadequate treatment against bacterial contamination and protozoa) have been removed following the source upgrade, therefore there are now no high or extreme risks on the 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 Ohoka water supply scheme when last assessed.

Table 9: Number of Events per Level of Risk

Risk Level	2004	2008	2011	2014
Extreme risks	0	0	0	0
High risks	4	4	3	3
Moderate risks	24	24	24	19
Low risks	19	19	23	28
Not applicable	8	8	8	8
Total	**55**	**55**	**58**	**58**

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

5.5 Water Safety Plan

Water safety plans provide 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 Ohoka WSP was last approved in 2015, and a new plan was submitted to the Ministry of Health in Sept 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 Ohoka. 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) 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 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	Ohoka Headworks
100 yr Local Flooding	L
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)	H
E = Extreme, H = High, M = Moderate, L = Low	

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

The scheme is rated at high risk from terrorism however, the site is considered moderately resilient to this hazard.

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

Any future additional connections on this scheme will need to be restricted to 2,000 litres per connection per day. The existing 13 L/min connections will be changed to fully restricted if the parent block is subdivided. This has the effect of capping, or reducing the overall water demand to its current level for growth that occurs within the current scheme boundaries.

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 Ohoka water supply scheme is expected to increase by 24%, by the end of the 2021-31 Long Term Plan (LTP) period.

This projection is based on 29 new dwellings and connections being established from 2019/20 to 2030/31. The number of restricted connections will be increased by an average of 3 per year during the 2021-31 LTP period to accommodate this demand. Demand beyond the 2021-31 LTP period is forecast to transition to a slightly lower growth profile resulting in an average of 2 new connections per year, to 2070/71 (Table 11).

Table 11: Growth Projections

Ohoka	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	118	130	147	171	193	225
Projected Rating Units	1,770	1,794	1,827	1,876	1,920	1,984
Projected increase in Connections		10%	24%	45%	64%	91%
Projected Average Daily Flow (m3/day)	170	185	207	238	268	309
Projected Peak Daily Flow (m3/day)	561	589	627	682	734	807

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 91%. This long term projection is much lower than the 2017 growth projection, 200% (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 more accurate Ohoka profile, from the New Projections for LTP 2021-2031 (TRIM2009081179970), whereas the 2017 connection growth was based off a general projection grouping, of small town/beach.

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

Projections

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

Figure 5: Population Projections

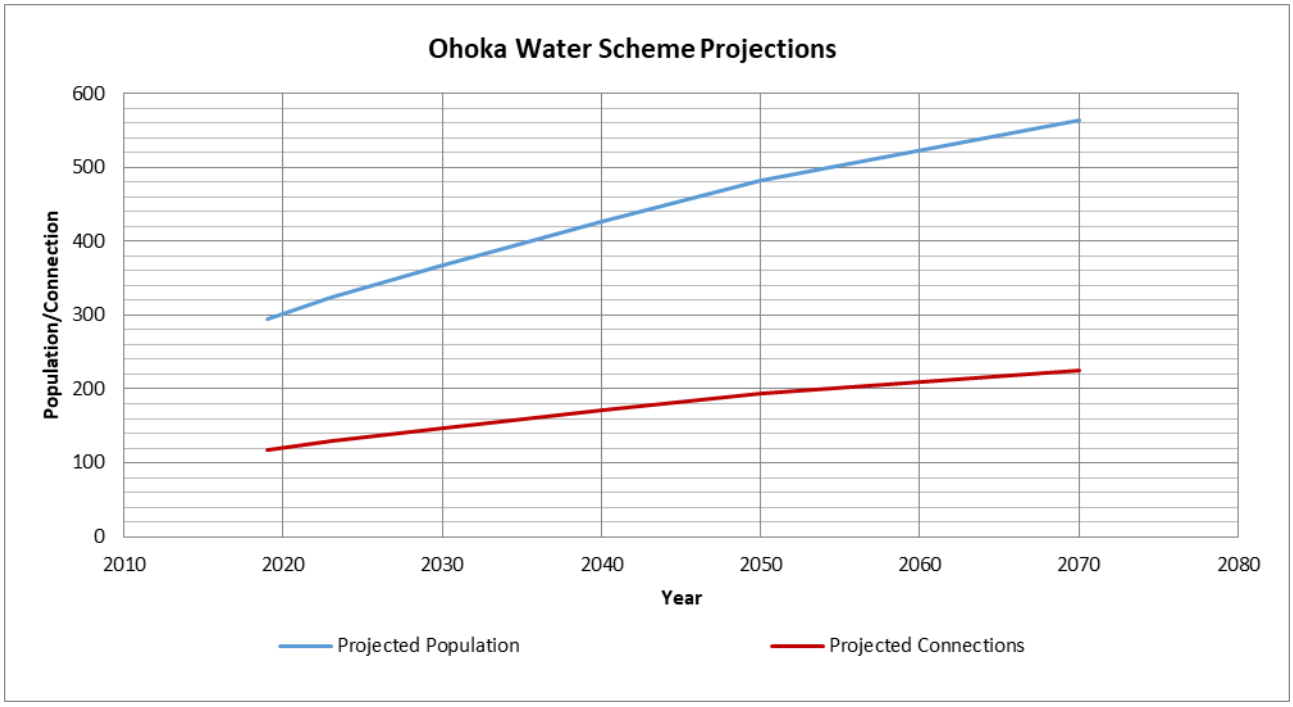
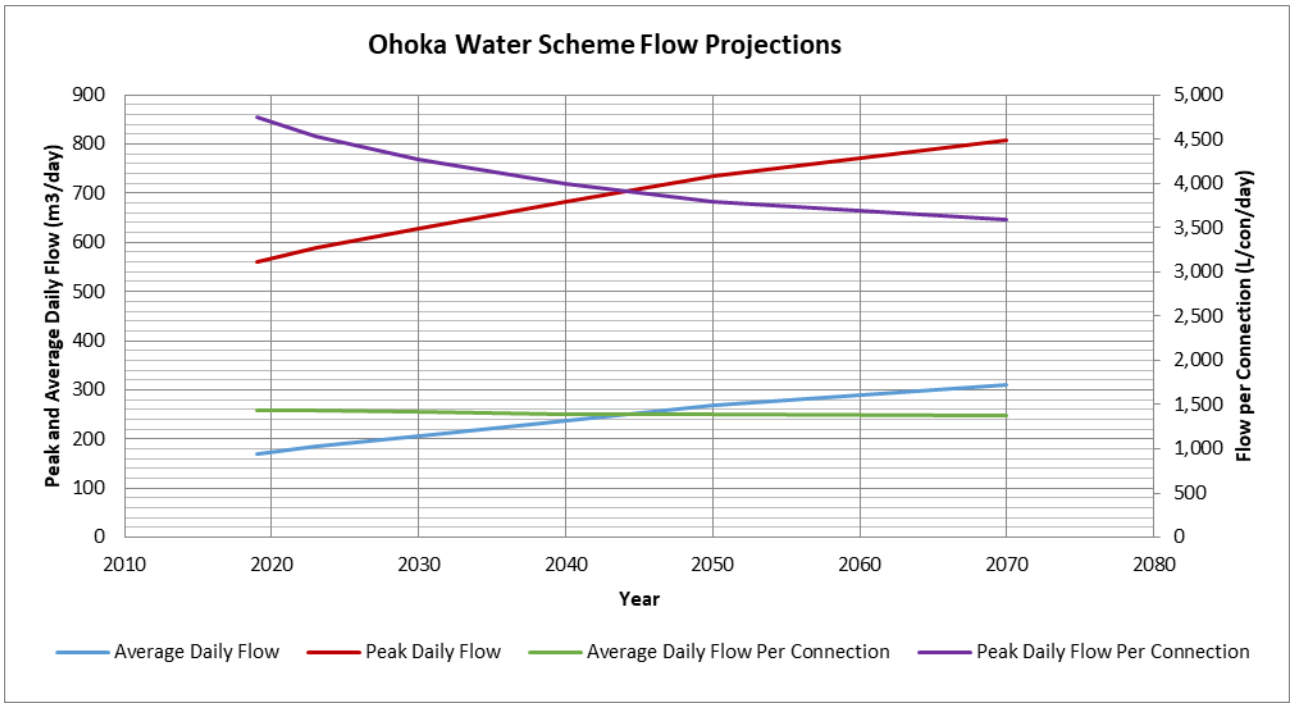


Figure 6: Flow Projections



5.8 Capacity & Performance

This section of the AMP considers the capacity and performance of the Ohoka 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 Ohoka Water Supply draws water from the following source (Table 12).

Table 12: Scheme Sources

Well name	Well No.	Diameter (mm)	Depth (m)
Ohoka Well 1 (back-up well)	M35/5609	200	18.8
Ohoka Well 2 (primary well)	BW24/0262	300	84.7

The resource consent (CRC990932 for the back up well and CRC166054 for the primary well) conditions allow for a combined allowable abstraction to 248,030 cubic metres per year at a maximum rate of 18.0 L/s.

The primary well bore has a duty set point of 12.8L/s and the back-up bore has a duty set point of 18L/s.

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. For the Ohoka scheme, there is no compliant backup well, and hence the required level of redundancy is not achieved currently. A second primary well is included with the LTP.

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

Table 13 presents the projected water demand and associated required source capacity for the Ohoka supply.

Table 13: Project Demand and Required Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Daily Flow (L/s)	6.5	7.3	7.9	8.5	9.3
Required Source Capacity (L/s)	7.2	8.1	8.8	9.4	10.4

At 12.8 l/s there is sufficient source capacity for the existing demand and for the 50 year projected demand.

Treatment

The existing treatment system comprises chlorine disinfection and pH correction using soda ash. The pH correction is only required in the event that the old source is required to be brought back online. Since the new source has been commissioned, the scheme has complied with the bacterial and protozoal requirements of the DWSNZ, and the source has been certified as providing secure groundwater.

Chlorine is dosed manually and monitored through the analyser which was installed in 2010.

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 Ohoka scheme has a total storage capacity of 120 cubic metres made up from four 30 cubic metre tanks.

Emergency storage requirements for Ohoka are 8.12 hours of Average Daily Flow, based on work carried out in Water Supply Source Resilience Analysis (TRIM 170623064893). No storage is required for operational requirements for this scheme as the well pump exceeds the maximum flow from the supply pumps.

Table 14 presents the required storage capacity.

Table 14: Required Storage Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Required Storage Volume (m3)	115	121	125	129	137
Planned Storage Volume (m3)	120	150	150	150	150
A fifth reservoir is scheduled in year 2031, to increase the total storage capacity to 150m^3.					

Headworks

The existing Ohoka headworks consists of two supply pumps connected to variable speed drives (VSD). The pumps operate as duty-assist and have an estimated combined capacity of 14.2 L/s. Normally for redundancy, it is assumed that one of the main pumps is unavailable, under which condition the capacity is only 7.1 L/s. This under capacity represents an operational risk which will need to be addressed at the next LTP.

Table 15 presents the projected peak hourly flows for the Ohoka supply.

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

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Hourly Flow (L/s)	10.6	11.0	11.3	11.6	12.1

Reticulation

The capacity of the headworks and reticulation has been assessed using an uncalibrated but validated reticulation model. The model and associated monitoring has confirmed that the existing reticulation system has adequate capacity for the existing and future demands. However, reticulation extensions will be required over the next 50 years to accommodate future growth.

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.

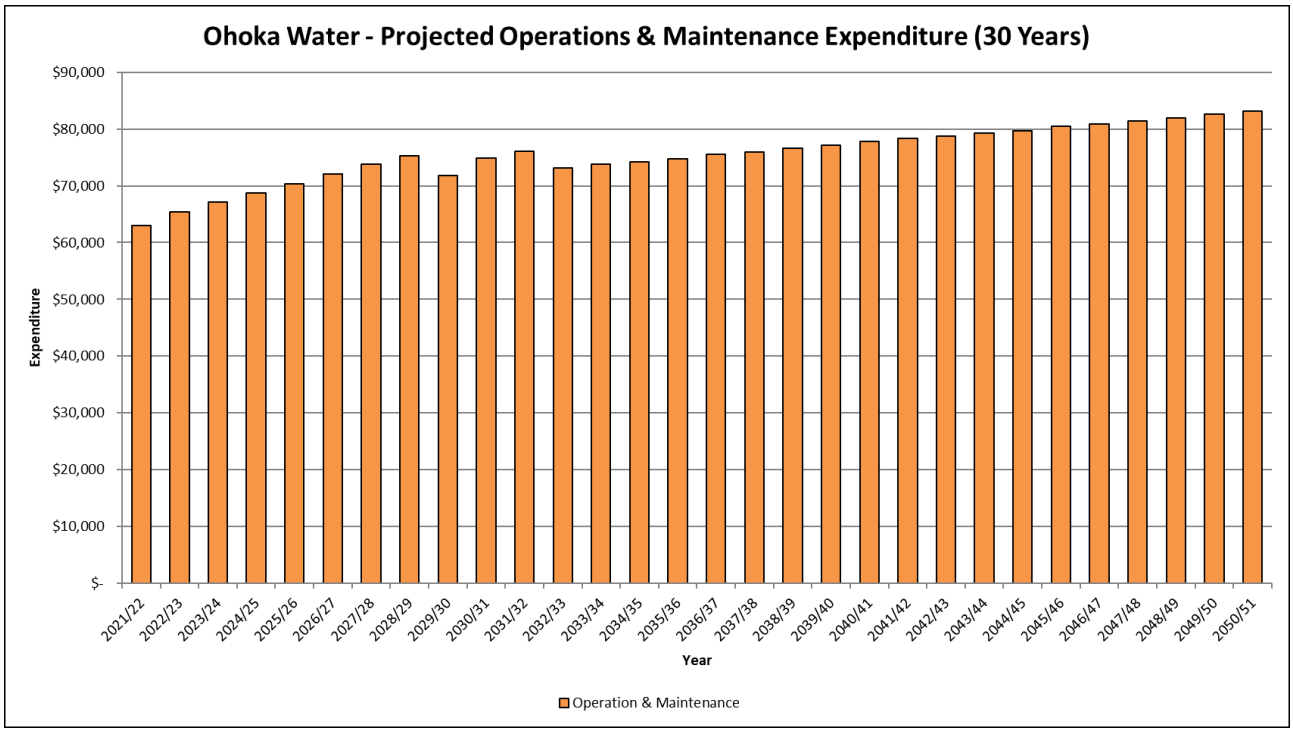
6.1 Operation & Maintenance

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 increase in O and M costs through to 2028/29 is due to largely to forecast increases in connections. It is noted that there was an error in the population forecasts adopted within the earlier iteration of the budget used to generate the above graph, which had a decrease in population in 2029/30, resulting in a decrease in O&M costs. This has been corrected prior to the final budget adoption, however due to the timing of the release of documents, has not been reflected in the graph above.

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

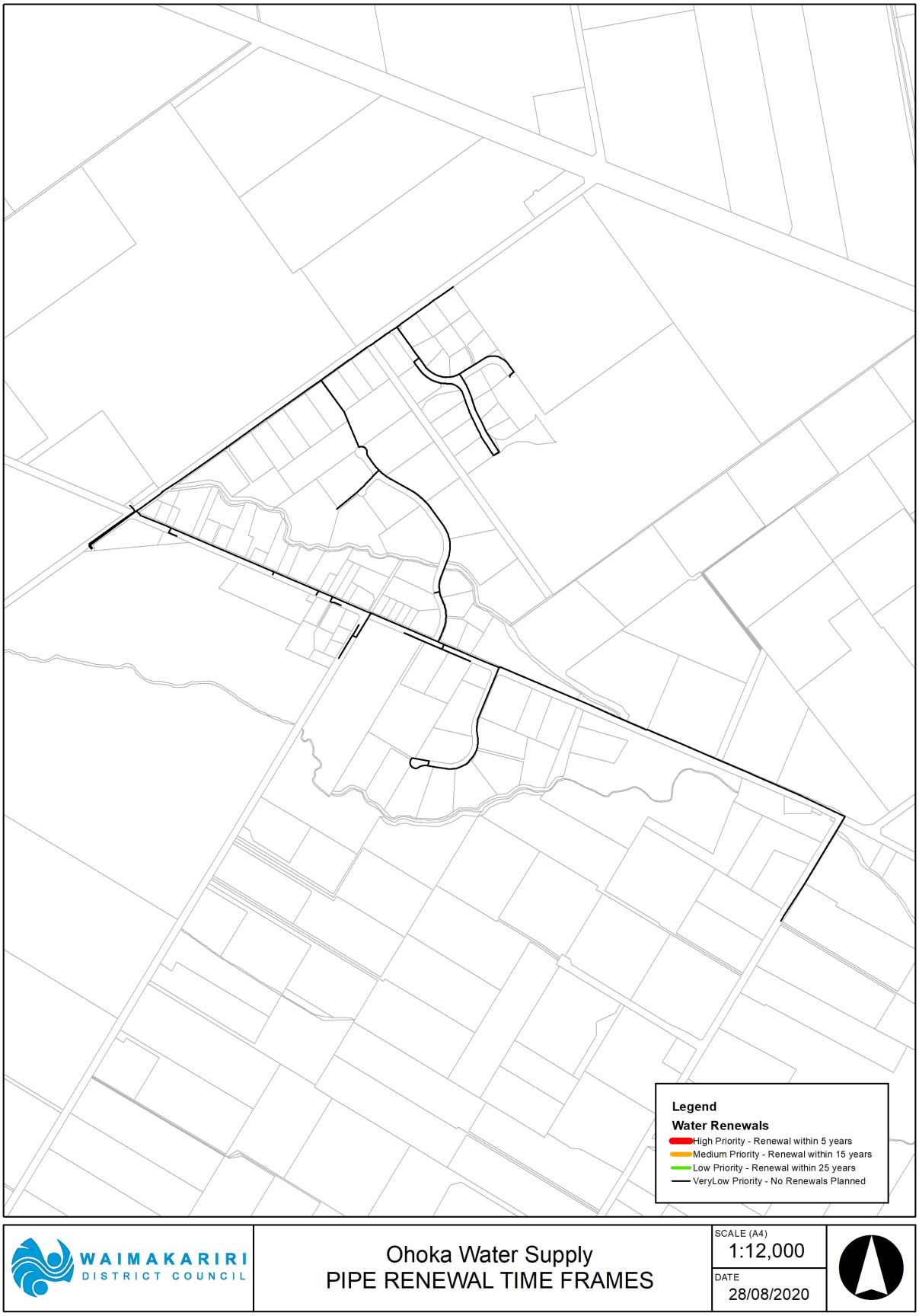
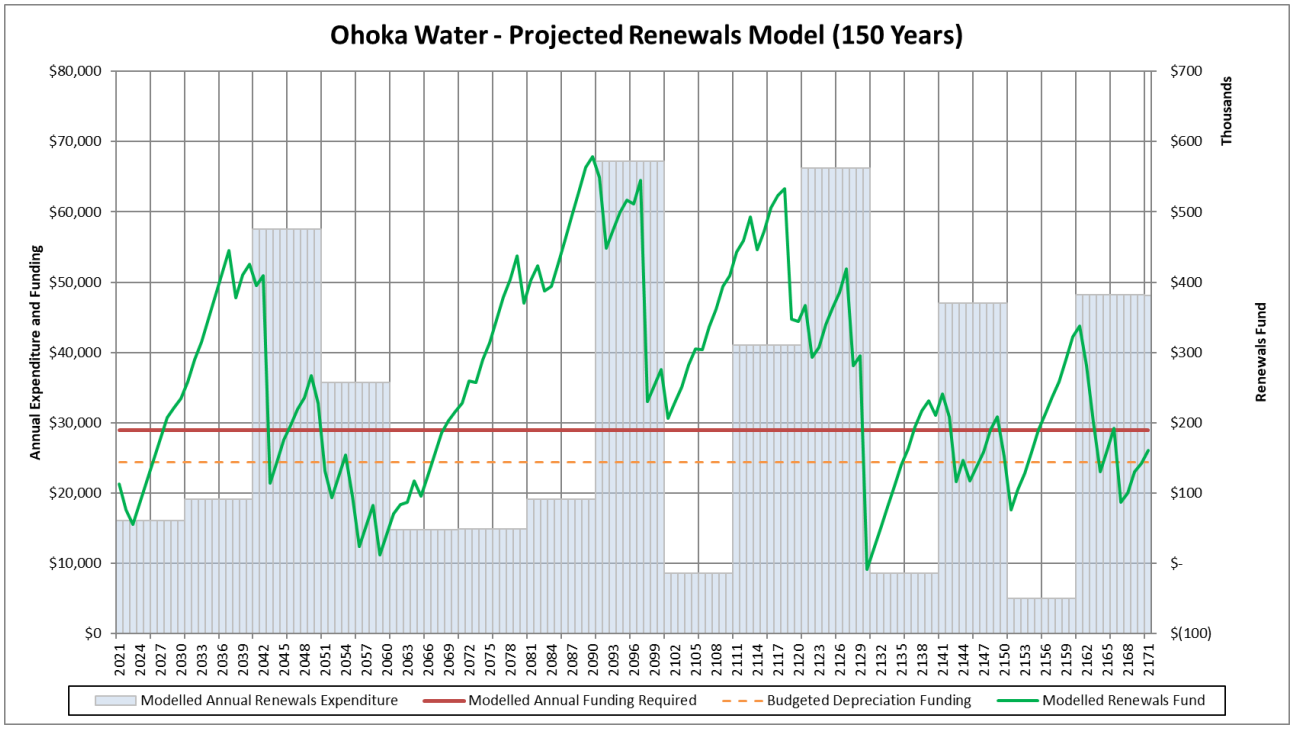


Figure 9 below shows the financial output from the model alone. Over a 150 year period it shows the projected expenditure; the value in the renewals fund; the level of funding required to ensure the fund can meet the required renewals programme, and the annual depreciation.

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. Individual scheme AMPs detail the actual planned renewals budgets for the first ten years. The final renewals budget put forward into the draft LTP, is included in the capital works graph, Figure 9 . 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. Stimulus grant and district wide rate funded projects are not included

Figure 10: Projected Capital Works Expenditure

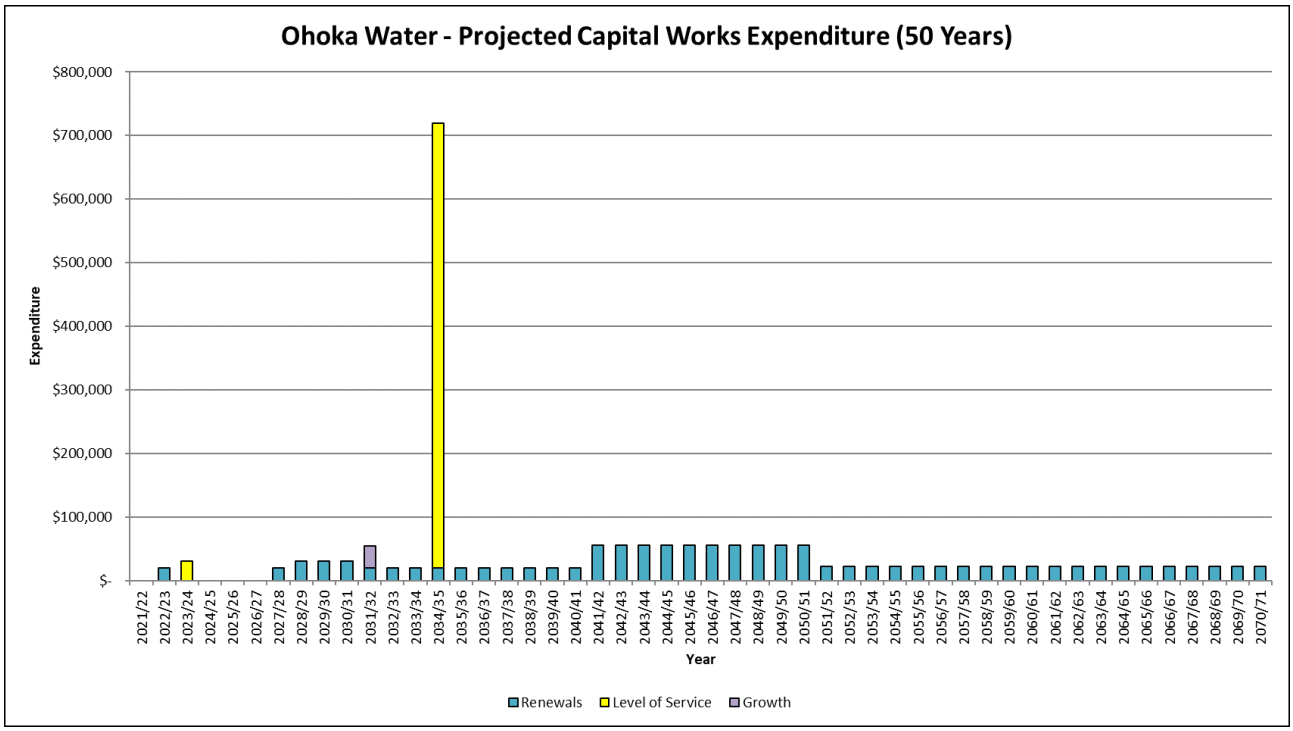


Table 16 and 17 summarise the projected capital works for the next 50 years. Including renewals. Figure 11 shows the corresponding location of the projected capital works. Not shown in either table is the $500,000 for installation of a UV treatment plant in 2023/24, but this is shown in Figure 11

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.

The LoS expenditure spike in 2034/35 is for a new deep well as a secure back up source.

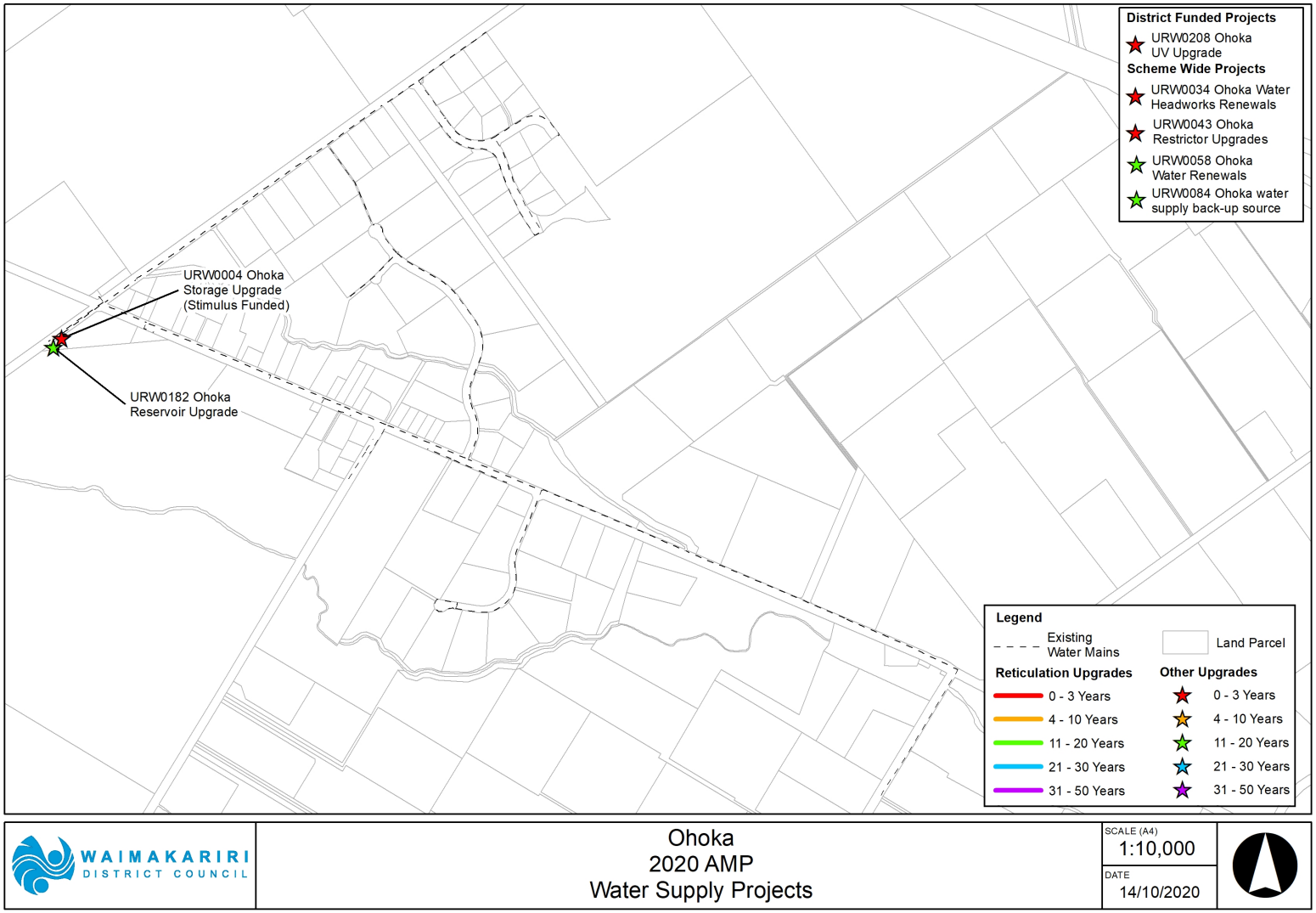
Table 16: Summary of Capital Works (Includes Renewals)

Year	Project ID	Project Name	Level of Confidence	Project Value	LOS Component	Renewals Component	Growth Component
Year 1 - 10							
2023	**URW0034**	Ohoka Water Headworks Renewals	**3 - Low**	**$ 691,351**	**$ -**	**$ 691,351**	**$ -**
2024	**URW0043**	Ohoka Restrictor Upgrades	**5 - Medium**	**$ 30,000**	**$ 30,000**	**$ -**	**$ -**
Year 11 - 20							
2032	**URW0058**	Ohoka Water Renewals	**3 - Low**	**$ 632,846**	**$ -**	**$ 632,846**	**$ -**
2032	**URW0182**	Ohoka Reservoir Upgrade	**3 - Low**	**$ 35,000**	**$ -**	**$ -**	**$ 35,000**
2035	**URW0084**	Ohoka water supply back-up source	**3 - Low**	**$ 700,000**	**$ 700,000**	**$ -**	**$ -**
Grand Total				**$ 2,089,197**	**$ 730,000**	**$ 1,324,197**	**$ 35,000**

Table 17: Stimulus Grant Funded Projects

Year	Project ID	Project Name	Level of Confidence	Project Value	LOS Component	Renewals Component	Growth Component
Year 1 - 10							
2022	**URW0004**	Ohoka Water Storage upgrade	-	**$ 145,000**	**$ 145,000**	**$ -**	**$ -**
Grand Total				**$ 2,089,197**	**$ 730,000**	**$ 1,324,197**	**$ 35,000**

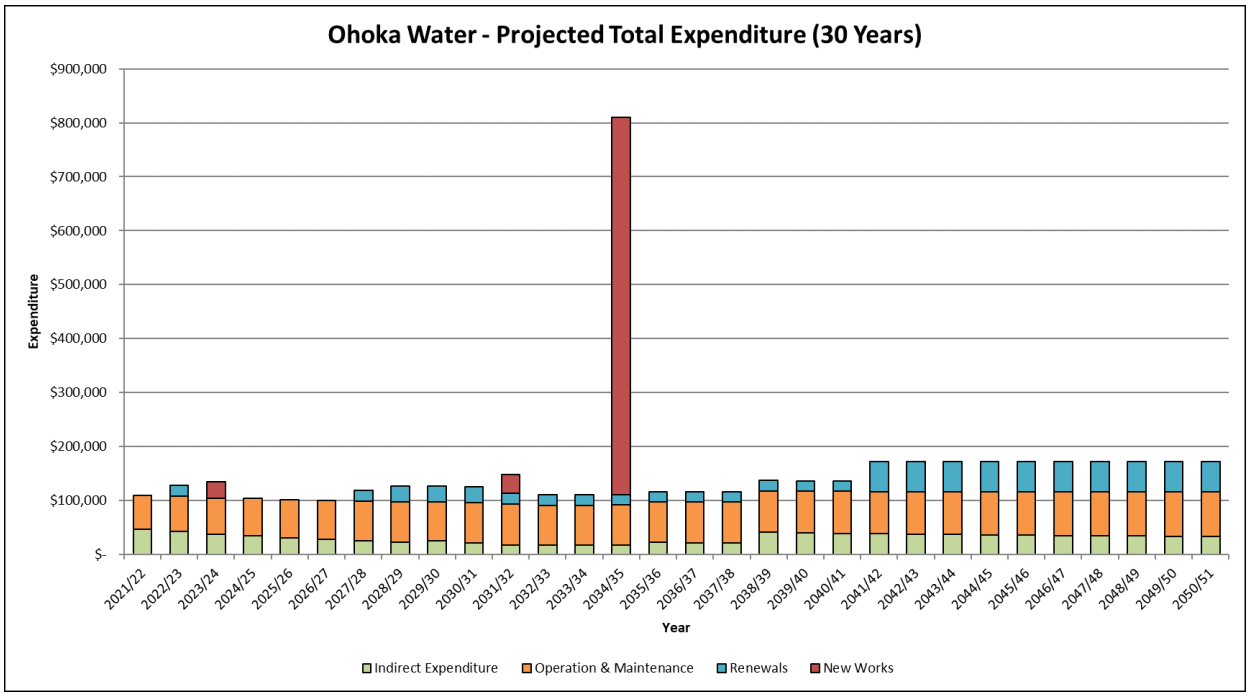
Figure 11: Projected Capital Upgrade Works (not to scale)



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.	35	$90,571	$77,509	$906
Main	m	6,728	$861,329	$685,199	$8,617
Hydrant	No.	24	$65,447	$58,903	$654
Service Line	Properties	120	$127,828	$100,939	$1,278
Facilities			**$905,766**	**$673,084**	**$20,579**
Total			**$2,050,941**	**$1,595,634**	**$32,034**

6.6 Revenue Sources

Revenue is normally 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)

An additional source has become available for this particular LTP in the form of the Covid-19 stimulus grant. The opportunity is being taken to provide the additional storage required for future growth, and to improve resilience on the supply.

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 19 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 19: 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

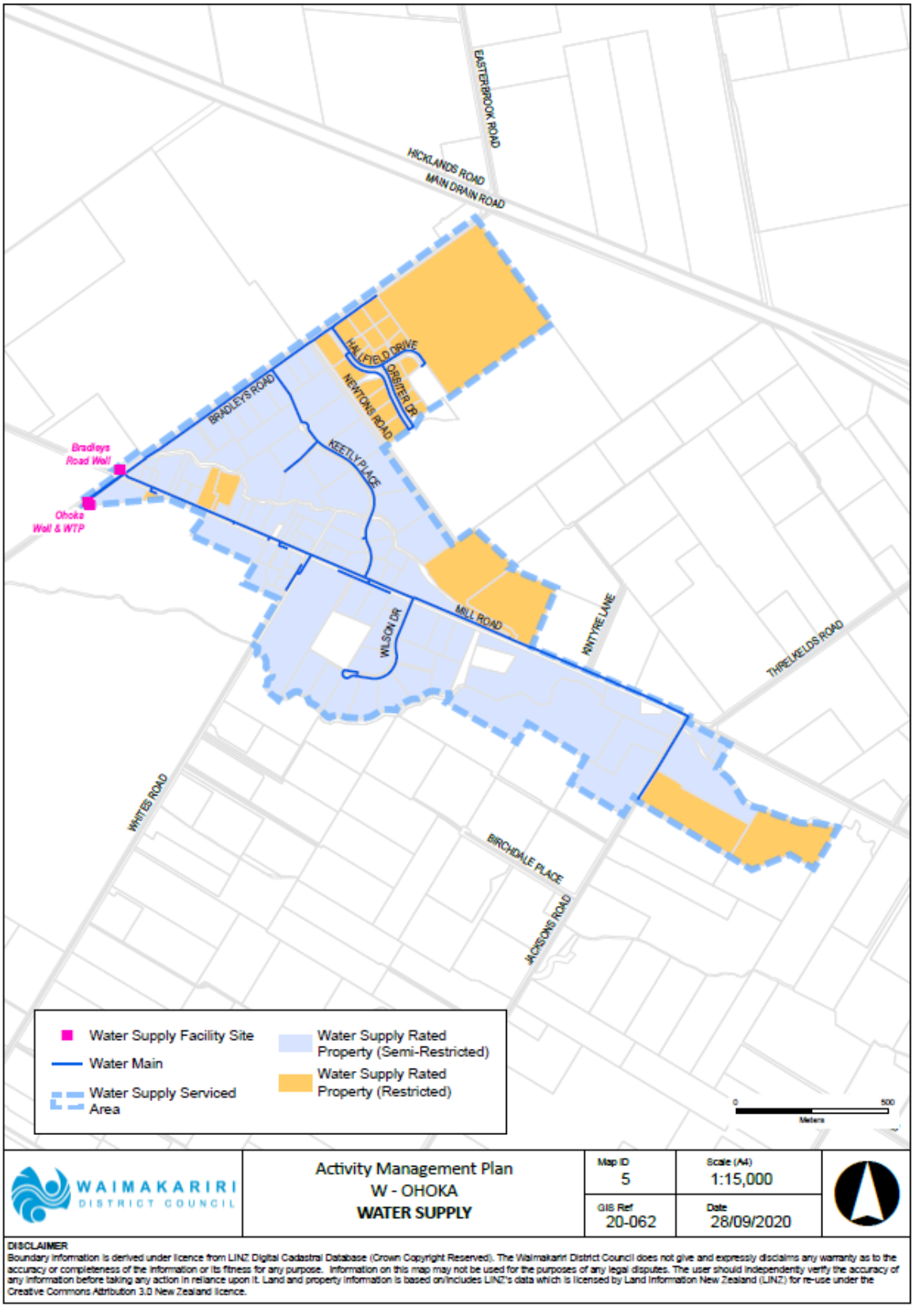
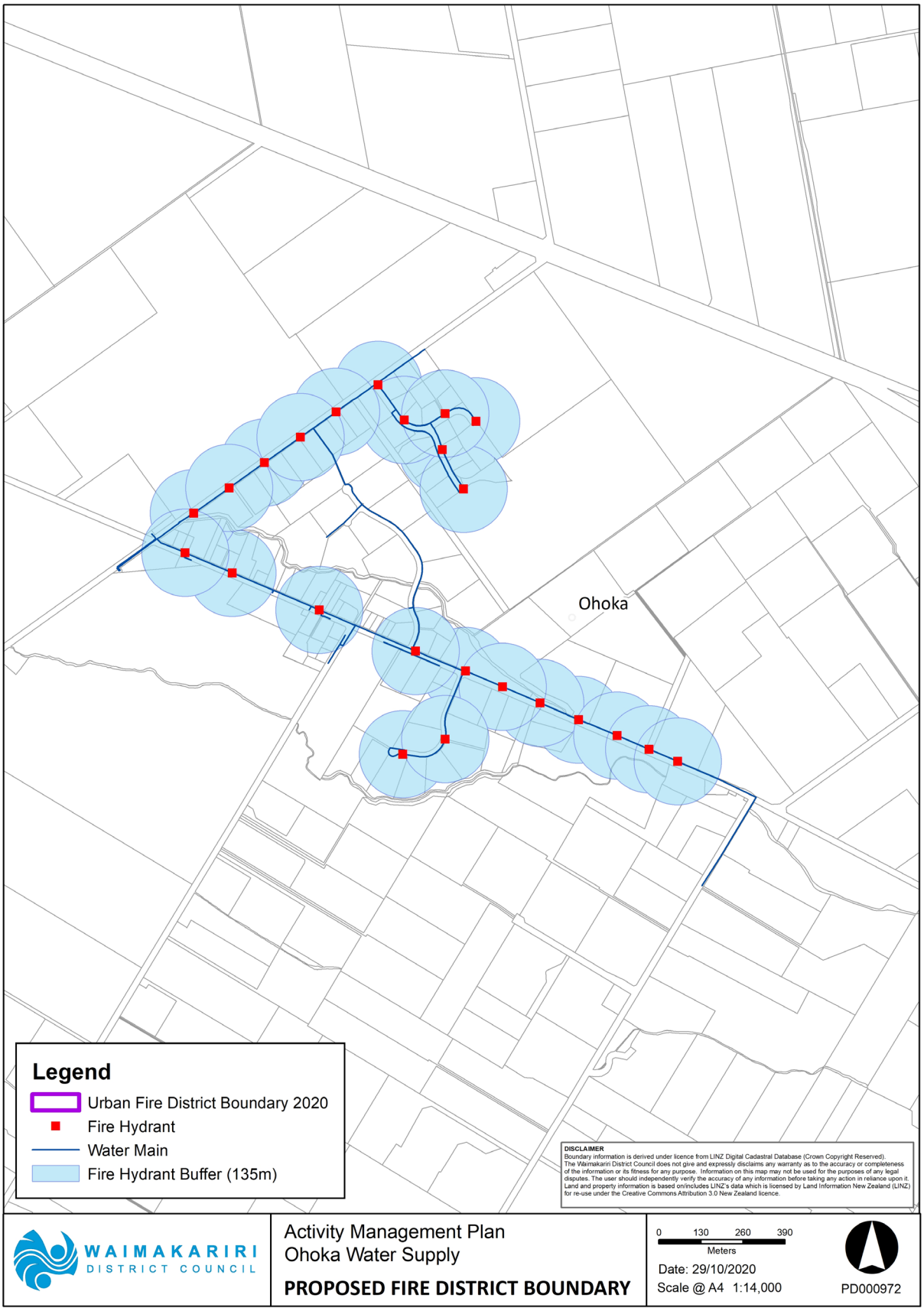


Figure 14: A2 - Plan of Fire District & Extent of Fire Mains



The Ohoka water supply is not included in a Fire District but a plan of hydrants is provided for reference.

Figure 15: Ohoka Water Supply Statistics

Ohoka Water Supply Statistics

Ohoka | 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	-	-	-	-	-	-	-	-	0.39	0.27	-	0.33	0.33
Average Daily Flow	m^3/day	114	115	106	135	108	170	153	141	139	122	159	143	135
Peak Daily Flow	m^3/day	382	407	323	491	365	543	482	456	561	482	532	503	464
Peak Weekly Flow	m^3/day	296	301	271	382	286	425	423	395	464	399	459	428	380
Peak Monthly Flow	m^3/day	210	266	213	267	235	390	339	349	344	335	368	347	310
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	9.5	-	-	9.5	9.5
Peak Month		Feb	Dec	Jan	Feb	Feb	Jan	Dec	Feb	Dec	Feb	Jan		
Peak Week		Week 2	Week 52	Week 4	Week 3	Week 7	Week 6	Week 49	Week 7	Week 50	Week 7	Week 5		
Peak Day		7/02/2010	18/01/2011	21/01/2012	14/01/2013	18/02/2014	11/01/2015	27/11/2015	7/02/2017	10/12/2017	10/02/2019	25/01/2020		
Peaking Factor		3.3	3.5	3.1	3.6	3.4	3.2	3.2	3.2	4.0	3.9	3.4		
Total Annual Volume	m^3	41,875	42,232	38,730	49,410	39,748	62,339	56,018	51,690	50,893	44,864	58,174	52,328	49,410
Resource Consent	m^3/day	680	680	680	680	680	680	680	680	680	680	1,555	855	768
Well Pump Capacity	m^3/day	1,642	1,642	1,642	1,642	1,642	1,512	1,512	1,106	1,106	1,106	1,106	1,187	1,402
Surface Pump Capacity	m^3/day	968	968	968	968	968	1,227	1,227	1,227	1,227	1,227	1,227	1,227	1,123
On-Demand Connections		-	-	-	-	-	-	-	-	-	-	-		
Restricted Connections		91	91	91	93	91	90	91	91	97	118	118		
Total Connections		91	91	91	93	91	90	91	91	97	118	118		
Average Daily Demand	L/con/day	1,254	1,265	1,160	1,448	1,190	1,887	1,677	1,548	1,434	1,036	1,343	1,408	1,399
Peak Daily Demand	L/con/day	4,198	4,473	3,549	5,277	4,010	6,031	5,300	5,006	5,782	4,088	4,508	4,937	4,802
Allocated Water Units	m^3/day	1,576	1,576	1,576	1,578	1,578	1,559	1,578	1,578	1,692	1,770	1,766		
Average Daily Flow per Unit	L/unit/day	72	73	67	85	69	109	97	89	82	69	90	85	83
Peak Daily Flow per Unit	L/unit/day	242	258	205	311	231	348	306	289	332	273	301	300	285
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	very high	very high	very high	very high		