WAIMAKARIRI
DISTRICT COUNCIL

Activity Management Plan 2021

Oxford Rural No. 1

Water Supply Scheme

3 Waters | July 2021

Prepared by

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***Revision History*:**

Revision Nº	Description	TRIM	Date
A	Draft for Presentation to U and R Committee	200120006298	18/12/2020
B	Draft for presentation to Council	200120006298	23/02/2021
C	Final for presentation to Council	200120006298	

Document Acceptance

Action	Name		Signed	Date
Prepared by	Colin Roxburgh	Water Asset Manager		17/02/2021
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Reviewed by	Kalley Simpson	3 Waters Manager		17/02/2021
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Adopted by	Council			

Contents

Tables

Figures

1 Executive Summary

The following table provides a summary of the key asset management issues of the Oxford Rural No. 1 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	With the completion of upgrade works since the last LTP, the scheme meets most of the levels of service (LoS). Those that are not being met relate to flow at restricted connections and water losses. 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 LoS implementation of actions within the Water Conservation Strategy is required before this LoS can be met.
Capacity & Performance	Capacity of the water supply system has been assessed as being capable of meeting current demand. Future upgrades of various components are programmed to ensure supply is able to meet demand. However current redundancy standards are not being met and a backup well is planned for 2025/26 The restrictor check programme will be continued to ensure that the peak daily demand does not exceed allocated units.
Asset Condition	The majority of the scheme is in good condition, but there is a significant portion of pipe assets that only have 20% to 50% remaining life. These are proposed to be replaced between 2032 and 2051
Risk Assessment	The key high risks on the scheme were related to inadequacies with the previous source, which was a river intake. These have been resolved with the new McPhedrons Road well, which is a deep and secure groundwater well.
Disaster Resilience	The Disaster Resilience Assessment indicates the Rockford Road and View Hill headworks are a high security risk from public interference or sabotage. The headworks are also all at medium risk in a large earthquake.
	Further works are required to refine the DRA and identify future work to improve the scheme resilience.
Growth Projections	The scheme is predicted to increase in size by 86% in the next 50 years. Upgrades will be required to accommodate this growth but it is difficult to predict where the growth will occur within the scheme.

2 Introduction

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

- Provide an overview of the Oxford Rural No.1 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 Oxford Rural No.1 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 Oxford Rural No.1 water supply scheme is a restricted water supply serving a large rural area to the west of Oxford town. The scheme supplies water to two discrete communities; View Hill with approximately 300 properties, and Chalk Hill with 30 properties.

The water had historically been sourced from two infiltration galleries in the Waimakariri River, which have since been relegated to an emergency backup source. While treated with chlorine disinfection, this water was not deemed sufficiently safe as there was no treatment for protozoa, and the high turbidity at times compromised the effectiveness of the chlorine.

To address this, a series of wells were drilled with the aim of establishing a new deep secure source for the scheme. This has been successfully achieved, with the new source being commissioned in 2018. This source on McPhedrons Road is certified as secure under the Drinking-water Standards for New Zealand (DWSNZ), and as such the scheme complies with both the bacterial and protozoal requirements of the DWSNZ. The McPhedrons Road well is supplemented from another secure well with limited capacity on Rockford Road (Rockford Road Deep Well).

Some key statistics (2019/20 year) of the scheme are shown in Table 2 to 5. The extent of the currently serviced area and comprehensive flow data records are presented in Figure 13 and Figure 15

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

Table 2: Scheme Statistics for 2019/2020

Scheme Parameter	Statistics	Source
Type of Supply	Rural Restricted	
Principal Sources	McPhedrons Road Well (secure) Rockford Road Deep Well (secure)	
Back-up Source	Rockford Road No. 1 and No.2 infiltration gallery wells (non-secure surface water)	
Treatment	Chlorine disinfection	
Nominal Storage Capacity	250,000 litres at View Hill Reservoir 95,000 litres at Chalk Hill Reservoirs **345,000 litres total storage**	200121007544
Length of Reticulation	137.3 km	Water Asset Valuation Tables 7-4 and 7-5, pages 53 - 55.
Total Replacement Value	$11.8 mil	
Depreciated Replacement Value	$8.23 mil	
Number of Connections	339	Rates Strike 2019/20
Number of Water Units	1,541	
Average Daily Flow (5 year average)	1,317 m^3/day	Flow Data Analysis - Water
Peak Daily Flow (5 year average)	1,752 m^3/day	
Resource Consent Abstraction Limit (primary source)	1,987 m^3/day (expires 4/08/2034) 864 m^3/day (expires 14/12/2050) 2,592 m^3/day (expires 06/07/2053)	CRC990926.1 CRC144773 (Rockford Road Deep Well) CRC183143 (McPhedrons Road Well)
Average Daily Flow per Connection (5 year average)	3,996 l/day/con	Flow Data Analysis - Water
Peak Daily Flow per Connection (5 year average)	5,306 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**	**250**	**Total**
Asbestos cement	0m	0m	3,264m	4,159m	0m	7,423m
PE	1,006m	55,372m	10,004m	1,527m	4,751m	72,659m
PVC	29,376m	8,649m	19,178m	3m	0m	57,207m
Steel	10m	0m	0m	0m	0m	10m
Total	**30,392m**	**64,020m**	**32,447m**	**5,689m**	**4,751m**	**137,299m**

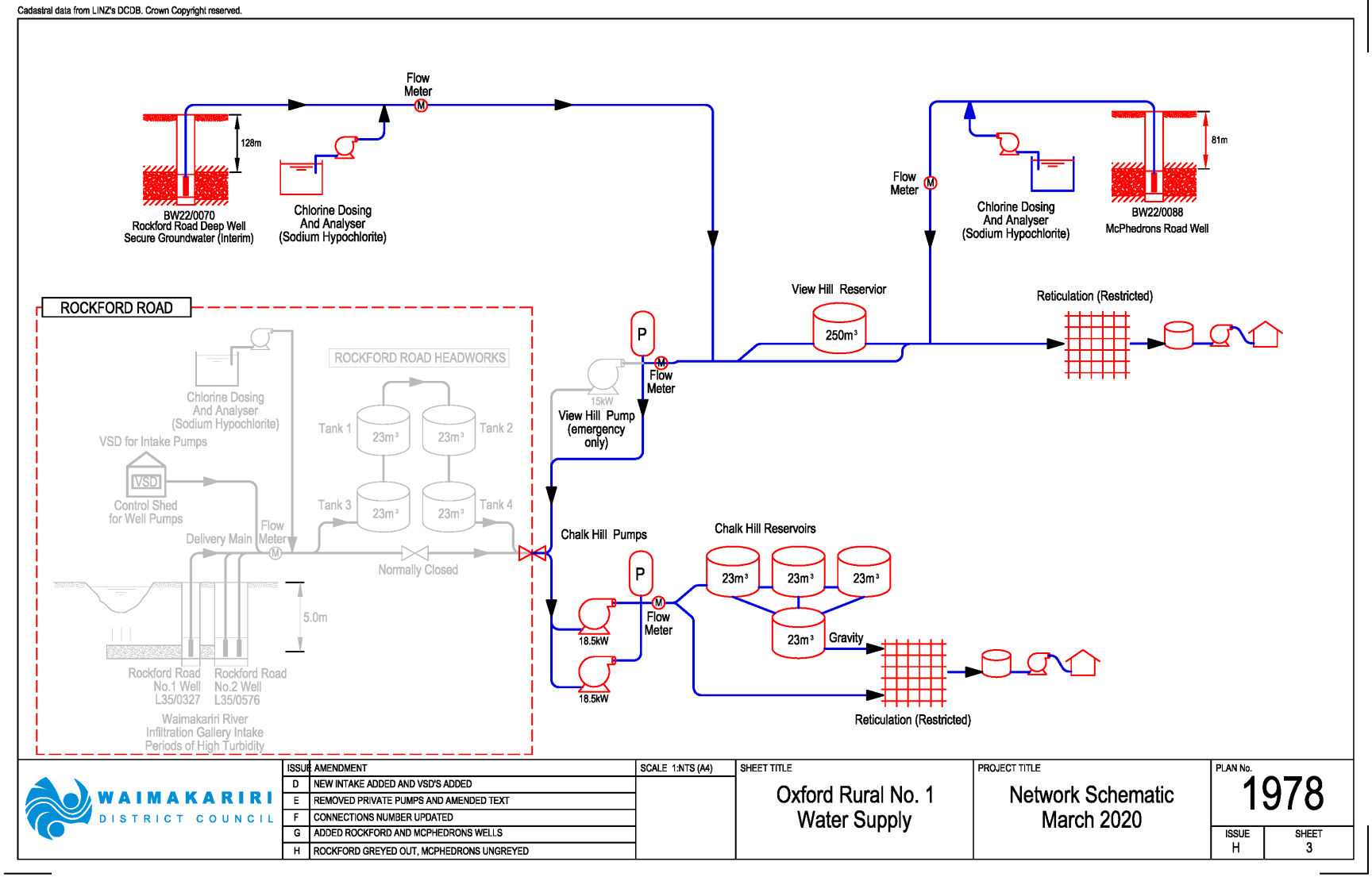
Table 4: Water Supply Valve Data Summary

Water Valves	
Diameter (mm)	**Count**
< 50	50
50	89
100	40
150	8
200	14
Total Valves	**201**
Fire Hydrants	**15**

Table 5: Data References

Data Reference	Trim Reference
Flow Data Analysis – Water	121108078783
2020 3 Waters Asset Valuation	200824109857
2020 Water Conservation Strategy	200501050668
2019 Water Safety Plan	190212015575
2019 Water Supply System Assessment	190212015573
2020 50 Year Water and Sewer Growth Forecast	200224024348
2014 Water Safety Plan	140130008132
2014 Water Supply System Assessment	140130008131
2019 McPhedrons Road Bore Level Analysis	190423059078 and 190213016270
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 Oxford No.1 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	Complies	Secure groundwater status	Achieved	NA	N	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	1805	Data as per Water Conservation Strategy (200501050668).	Not achieved	LoS changed to more realistic measure (ILI). Need to improve method for analysing night flows on restricted schemes as per Water Conservation Strategy.	Y	Y	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	>150kPa for 100% of the time	Complies	Validated by water model, running scheme at target	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
		demonstrated by a reticulation model or audits.			demand and ensuring target pressure is achieved.						
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	10.1 hours	Required storage calculated based on resiliency and redundancy	Achieved	NA	Y	-		
Water Usage	Usage - Average Day	Actual usage on average day	Maintain the average daily water use below 100% of the assessed reasonable water use	60%	Refer to Water Conservation Strategy (200501050668)	Achieved	NA	Y	Y	Y	NA
Water Usage	Usage - Peak Day	Actual usage on Peak Day	Reduce the peak daily usage to below 110% of the assessed	61%	Refer to Water Conservation Strategy	Achieved	NA	Y	Y	Y	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
			reasonable water use		(200501050668)						

5.2 Asset Condition

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

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

Table 7: Adopted Reticulation Asset Base Lives for Pressure Pipes

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

Asset Condition Calculation

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

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

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

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

Figure 2: Pipe Condition Assessment Plan

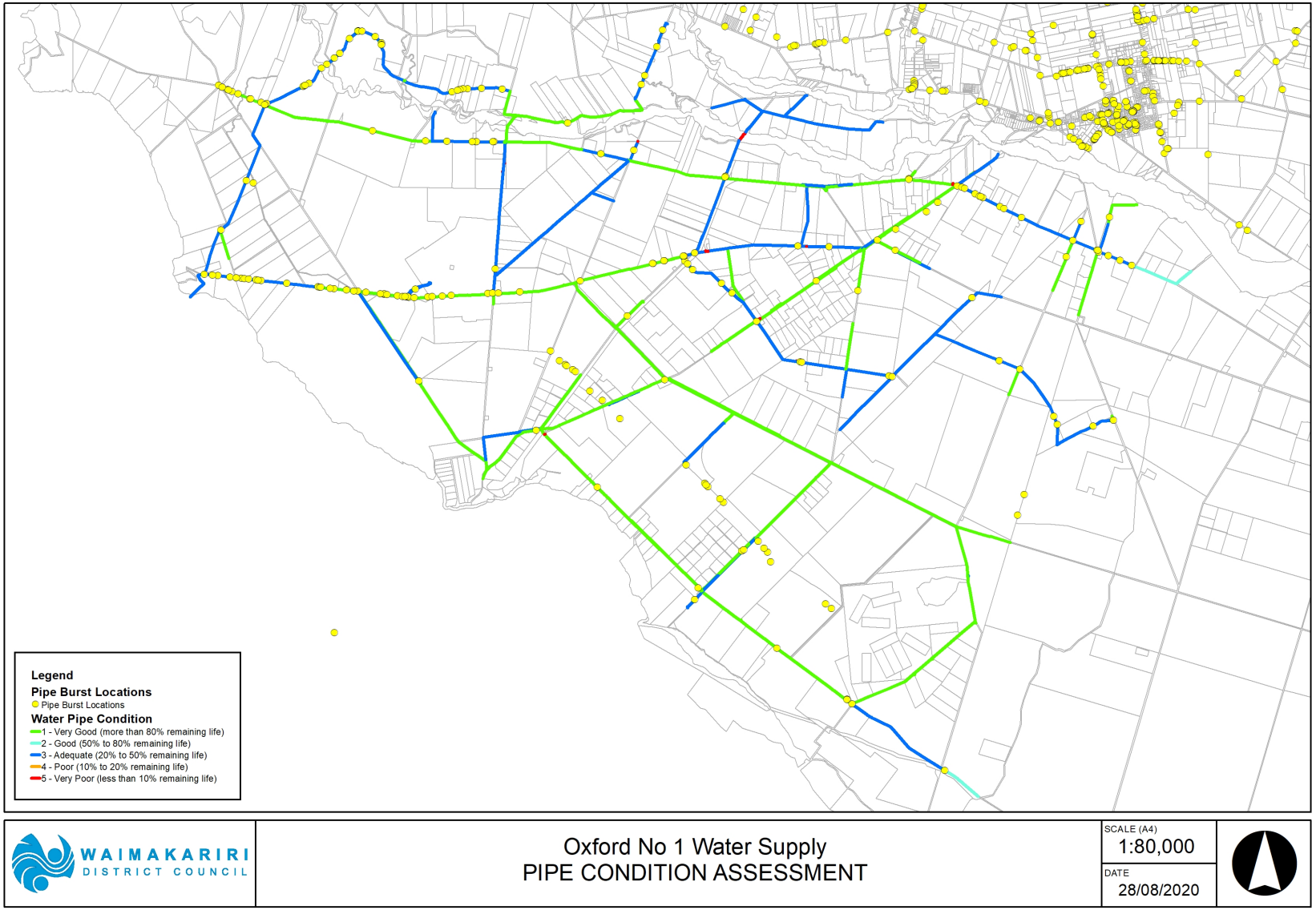


Figure 3: Asset Condition Summary

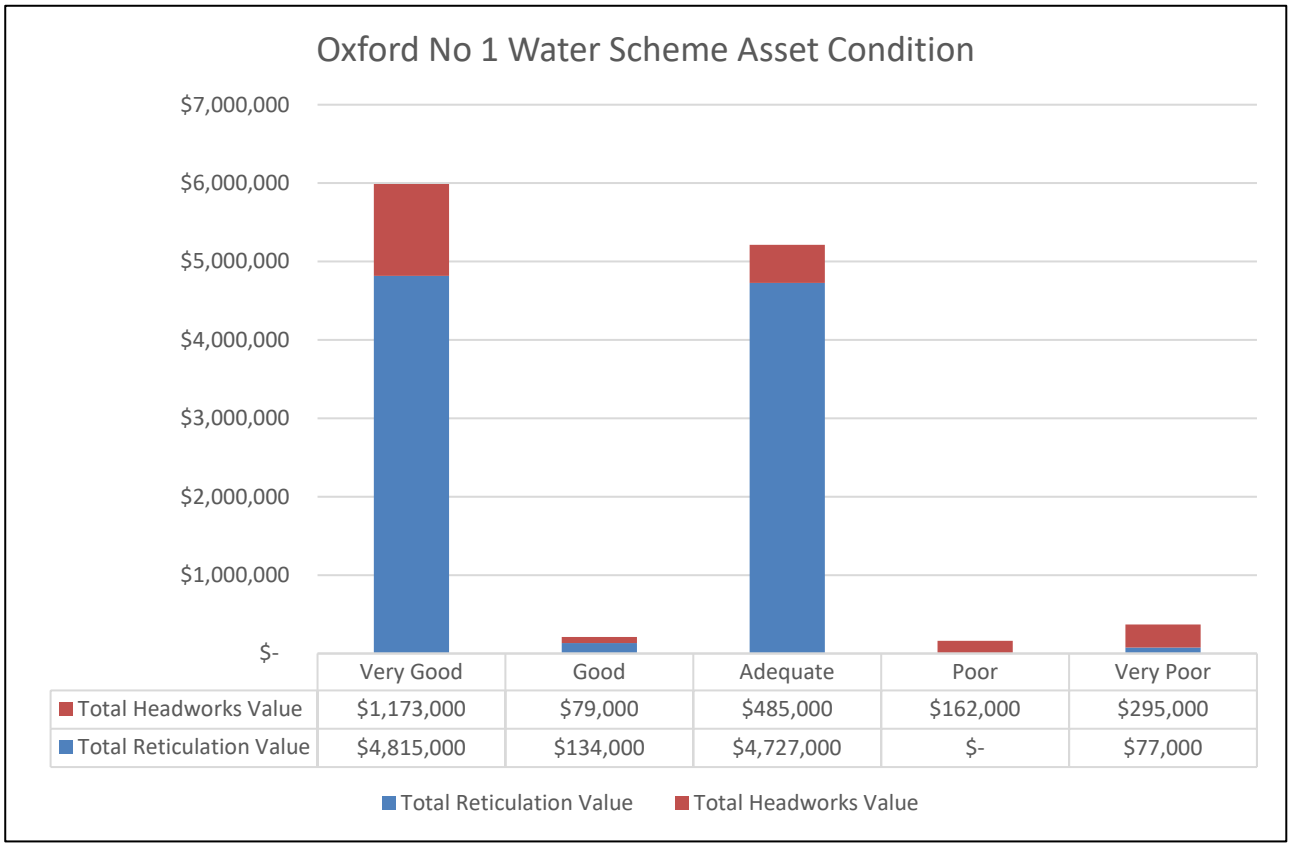


Table 8: Pipe Condition Summary

Condition Grade	Definition	Pipeline Quantity	Total Reticulation Value	Total Headworks Value	Total Value
1	Very Good *More than 80% of life remaining*	72.3 km *53%*	$ 4,815,000 *49%*	$ 1,173,000 *53%*	$ 5,988,000 *50%*
2	Good *Between 50% and 80% of life remaining*	2.7 km *2%*	$ 134,000 *1%*	$ 79,000 *4%*	$ 213,000 *2%*
3	Adequate *Between 20% and 50% of life remaining*	61.9 km *45%*	$ 4,727,000 *48%*	$ 485,000 *22%*	$ 5,212,000 *44%*
4	Poor *Between 10% and 20% of life remaining*	0.0 km *0%*	$ - *0%*	$ 162,000 *7%*	$ 162,000 *1%*
5	Very Poor *Less than 10% of life remaining*	0.4 km *0%*	$ 77,000 *1%*	$ 295,000 *13%*	$ 372,000 *3%*
Total		**137.4 km**	**$9,753,000**	**$2,194,000**	**$11,947,000**

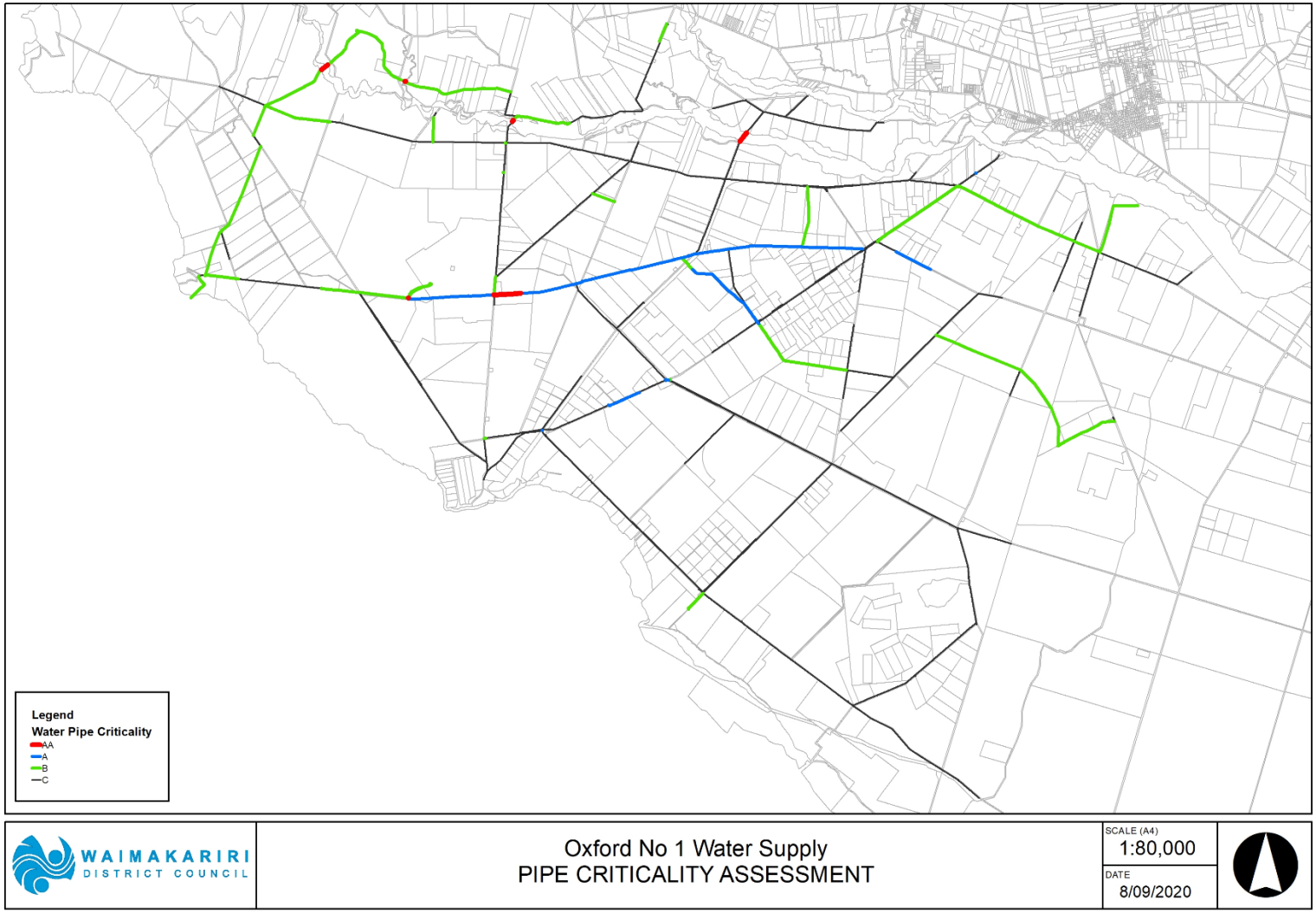
5.3 Asset Criticality

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 Oxford Rural No.1 Water Supply Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review. The 2014 assessment identified 9 remaining high risks for the Oxford Rural No.1 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 Oxford Rural No. 1 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	10	10	10	9
Moderate risks	18	19	24	24
Low risks	13	13	11	11
Not applicable	14	13	13	14
Total	**55**	**55**	**58**	**58**

Table 10 summarises the Extreme and High risks for this scheme. It shows a number of high risks associated with the source, treatment and distribution. Eight of the nine identified high risks have now been mitigated through the completion of project URW0067. The remaining risk of lack of supply as a result of inadequate storage capacity is planned for resolution in FY2025/26

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

Table 10: Summary of High & Extreme Risks

Risk Event & Cause	Reasoning	Solution	Project Details	Project Ref	2011	2014
SOURCE						
Contamination **due to** livestock	Infiltration gallery with some filtration & dilution	Oxford Rural 1 water supply upgrade to implement new source	Oxford No. 1 Source Upgrade. Completed	URW0067	H	H
Contamination **due to** surface water influence	Intake experiences periods of elevated turbidity				H	H
Insufficient water **due to** well / aquifer failure	Source in Waimakariri river bed and subject to flooding				H	H
Insufficient water **due to** resource consent limitations	Potential to exceed consent limit				H	H
Natural disaster & other **due to** flood / tsunami	Major flood could destroy intake, no backup source				H	H
TREATMENT						
Protozoa contamination **due to** inadequate treatment process	Chlorine ineffective against giardia & cryptosporidium	Oxford Rural 1 water supply upgrade to implement new source	Oxford No. 1 Source Upgrade. Completed	URW0067	H	H
Inadequate chlorination **due to** electrical / mechanical failure	Inadequate chlorination from electrical/mechanical failure				H	H
Elevated turbidity **due to** inadequate treatment	Occasional periods of elevated turbidity				H	H
DISTRIBUTION						
Inadequate supply **due to** insufficient reservoir capacity	Insufficient reservoir capacity	Oxford Rural 1 water supply upgrade to implement new source. It is proposed that a second primary well be drilled in order to negate the need for additional storage.	Oxford No. 1 Back-up well, planned for 2024-2026	URW0005	H	H
Pipeline deterioration resulting in contamination **due to** sediment build-up	Risk reduced through implementation of mains flushing programme	Risk reduced	N/A	-	H	M
Pipeline breakages causing contamination or loss of supply **due to** third party damage	Risk reduced through enforcement of Water Supply Bylaw and Engineering Code of Practice	Risk reduced	N/A	-	H	M

5.5 Water Safety Plan

Oxford Rural No 1 has an approved Water Safety Plan (WSP). This provides a summary of how the scheme is operated, undertakes a risk assessment for the scheme, identifies preventative measures, and recommends any upgrades to address unacceptable risks. Under the Health Act, these are required to be renewed every 5 years. The Oxford Rural No 1 WSP was last approved in 2019, which means it will be due for renewal next in 2024.

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 across all Council operated 3 Waters schemes. The original assessment was updated in 2012 using revised hazard and asset behaviour information captured during the 2010-11 Canterbury earthquake sequence.

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

Above Ground Facilities

The above ground facilities were assessed for risk of failure against 13 natural and 2 manmade hazard scenarios. The following risk profile (Table 11) reflects the likelihood of the event occurring and the consequence on the community of the facility failing. Hazards classified as having 'No Known Risk' have been omitted from the table.

Table 11: Risks to Above Ground Facilities

Threat	Rockford Rd Headworks	Chalk Hill Reservoir	View Hill Reservoir
475 yr Earthquake Induced Slope Hazard	M	M	M
Waimakariri Flood (3,300 yr)	L	-	-
Earthquake (50 yr)	M	M	M
Earthquake (150 yr)	M	L	L
Earthquake (475 yr)	M	L	L
Wildfire (threat based)	L	L	L
Snow (150 yr)	L	L	L
Wind (150 yr)	L	L	L
Lightning (100 yr)	L	L	L
Pandemic (50 yr)	M	M	M
Terrorism (100 yr)	H	M	H
E = Extreme, H = High, M = Moderate, L = Low			

The scheme is located outside the zone of potential liquefaction but is close to fault lines within the District. The reservoirs at Chalk Hill and View Hill and the Rockford Road Headworks have been identified as at risk of earthquake induced slope failure, however the likelihood of this event is sufficiently long to not generate significant risk.

Some assets in this scheme have been rated as at high risk from terrorism. Rockford Road headworks and View Hill Reservoir are considered moderately resilient to this hazard and Chalk Hill has been rated highly resilient due to its remote location.

Both wind and snow hazard impacts are considered to present a significant hazard to these high elevation sites. The sites are considered to have high resilience against these events with on-site storage plus storage at the reservoirs.

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

The growth expected to occur mainly as infill within the existing scheme boundary. In addition to supplying water units to service residences (typically two water units per dwelling) there are a significant number of water units sold for farming activities from the Oxford Rural No. 1 supply. The growth projections allow for population growth on the scheme not further intensification of farming activities. This would need to be considered separately.

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 Statistics New Zealand in time for the development of this assessment.

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

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

Demand

Demand on the Cust water supply scheme is expected to increase by 23%, by the end of the 2021-31 Long Term Plan (LTP) period.

This projection is based on 78 new dwellings and connections being established from 2019/20 to 2030/31, identified in the 2020 50 Year Water and Sewer Growth Forecast Report (TRIM reference number 200224024348).

The number of restricted connections will be increased by an average of 7 per year during the 2021-31 LTP period. Demand beyond the 2021-31 LTP period (2030/31 to 2070/71) is forecast to transition to a lower growth profile resulting in an average of 5 new connections per year (Table 12).

Table 12: Growth Projections

Oxford Rural No. 1	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	338	371	416	478	532	628
Projected Rating Units	1,539	1,684	1,887	2,161	2,402	2,826
Projected Increase in Connections		10%	23%	41%	58%	86%
Projected Average Daily Flow (m^3/day)	1,414	1,509	1,640	1,818	1,975	2,251
Projected Peak Daily Flow (m^3/day)	1,830	1,997	2,230	2,545	2,822	3,310

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

Longer term, connections are projected to increase by 86%. This long term projection is higher than the 2017 growth projection, 67% (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. In both 2017 and 2019 the projection used for this area was the rural population growth profile.

Water use predictions for the Oxford Rural No. 1 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).

Projections

Figure 5 and Figure 6 present the projected growth and corresponding demand trends for the Oxford Rural No. 1 Water Supply.

Figure 5: Population Projections

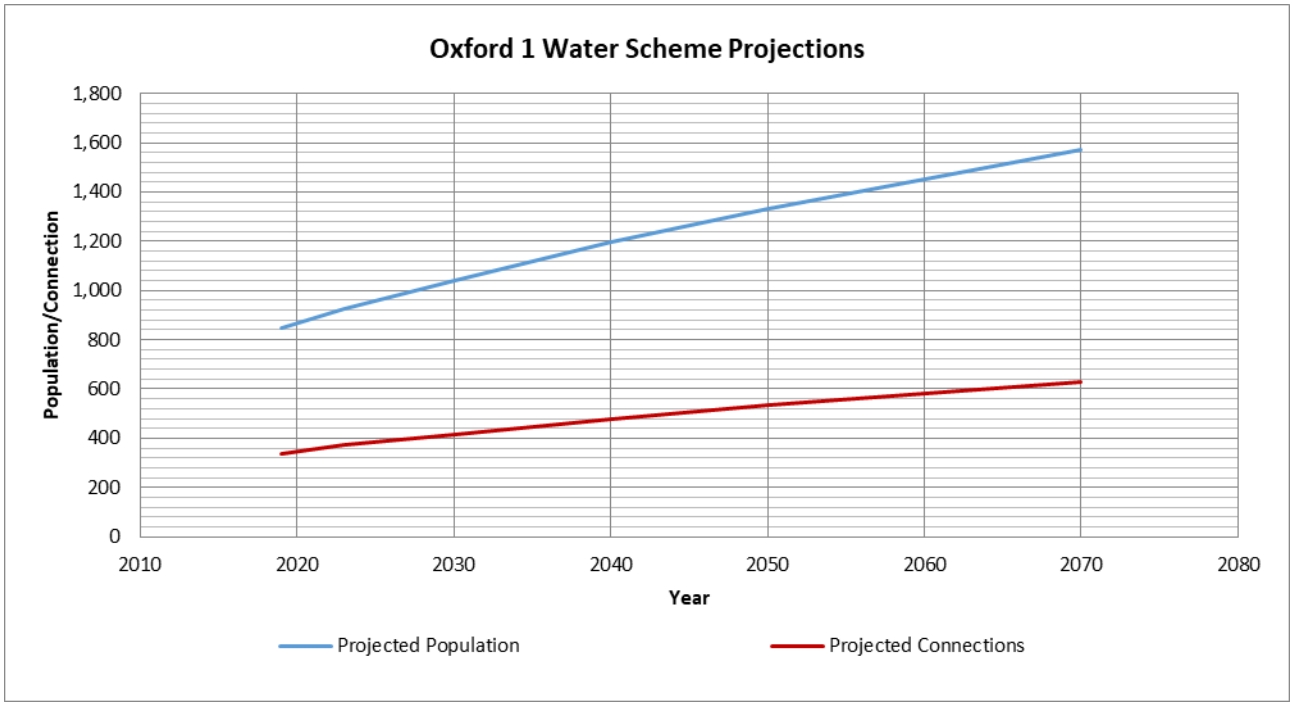
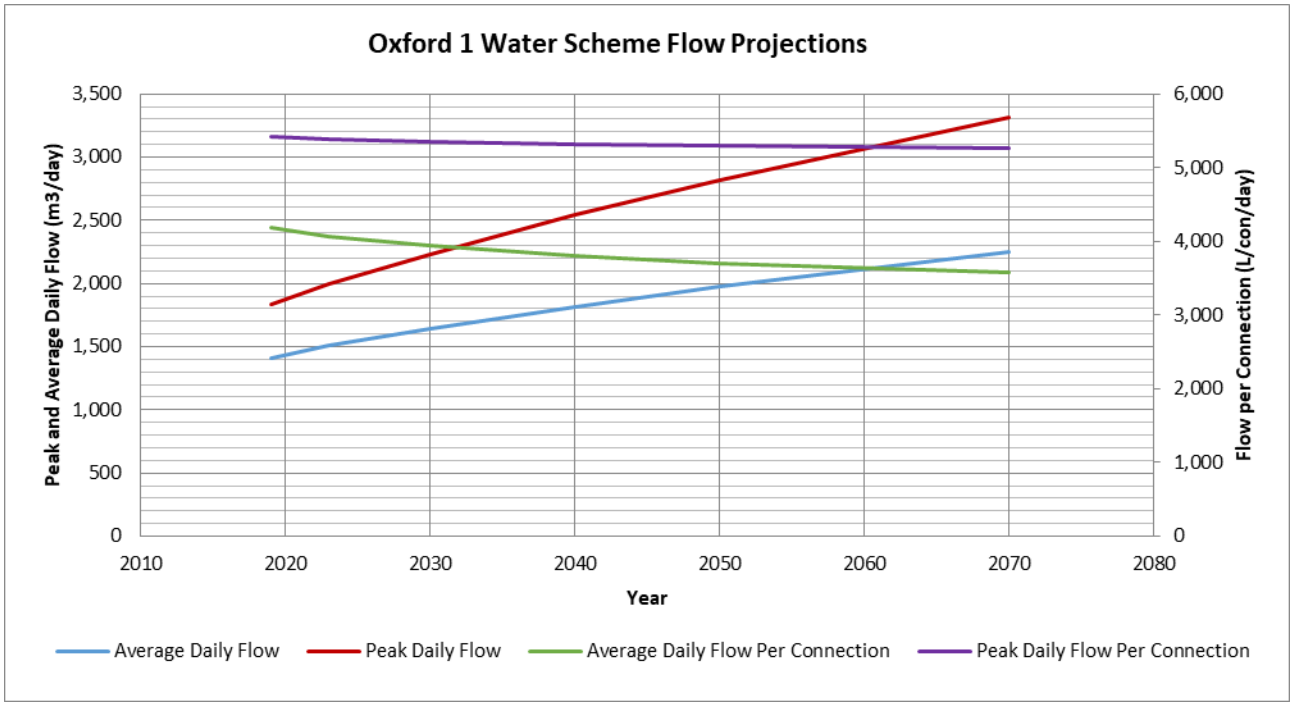


Figure 6: Flow Projections



5.8 Capacity & Performance

This section of the AMP considers the capacity and performance of the Oxford Rural no1 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 Oxford Rural No. 1 Water Supply Scheme draws water from the following source (Table 13).

Table 13: Scheme Sources

Well name	Well No.	Diameter (mm)	Depth (m)
Rockford Road Deep Well	BW22/0070	300	128
McPhedrons Road Well	BW22/0088	300	81
Rockford Rd Gallery well No. 1	L35/0327	1200	12
Rockford Rd Gallery well No. 2	L35/0576	1200	6.6

The Rockford and McPhedrons Road sources are the primary sources for the Oxford Rural No. 1 scheme. The Rockford Road Galleries are emergency back up sources for the supply, as they do not meet the DWSNZ.

The resource consent (CRC144773) conditions for the Rockford Road well allows an abstraction to 864 cubic metres per day or a maximum rate of 7 L/s and 220,752 cubic metres in any year. The consent expires in 2050.

The resource consent (CRC183143) conditions for the McPhedrons Road well allows an abstraction to 2,592 cubic metres per day or a maximum rate of 30 L/s and 349,920 cubic metres in any year. The consent expires in 2053.

The resource consent (CRC990926.1) conditions for the Rockford Road Galleries, limits the allowable abstraction to 1,987 cubic metres per day at a maximum rate of 23.0 L/s under normal flow conditions in the Waimakariri River. When the flow in the Waimakariri River falls below 41m3/day at the Old Highway Bridge, water restrictions are required to be put in place, which limits the abstraction to 250 litres per person per day and reasonable stock water use. This consent covers both the intake galleries from the Waimakariri River. The two existing well pumps at the Rockford Road infiltration gallery source match the resource consent limit of 23.0 L/s. These infiltration gallery sources would only be used in an emergency situation.

Table 14: Well Capacities

Well	Capacity (l/sec)	Comments
Rockford Road Deep Well	5.5	Flow records
McPhedrons Road Well	30	Pumping test (180406036599)
Rockford Rd No. 1	20	Calculated
Rockford Rd No. 2	20	Calculated

Table 15 presents the projected water demand and associated required source capacity for the Oxford Rural No. 1 water supply scheme. 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 15: Project Demand and Required Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Projected Peak Daily Flow (L/s)	20.6	24.8	27.9	31.0	33.4
Required Source Capacity (L/s)	22.9	27.6	31.0	34.4	37.1

Currently the McPhedrons source is required to supply the scheme and the Rockford Road Deep Well is considered the back up well. However the Rockford Road Deep Well does not have enough capacity to supply the scheme independently. Therefore construction of a new well is scheduled in 2025/26 which is proposed to be a duplicate of the McPhedrons Road well, to improve redundancy for the Oxford No. 1 water scheme.

Prior to the drilling of the next McPhedrons Road bore, some further thought will need to be given to screening depths, taking into account aquifer levels. There has been some variability in aquifer levels, which is documented within memo 190423059078 and 190213016270.

Treatment

As mentioned previously the Oxford Rural No. 1 scheme's primary sources are now the Rockford Road Deep Well, and the McPhedrons Road well, both of which have achieved secure status. The source wells therefore achieve compliance with the microbiological and protozoal requirements of the Drinking Water Standards for New Zealand.

The well supply is still chlorinated in order to provide residual disinfection to reduce the risk of contamination in private tanks, in accordance with Council's Chlorination Strategy.

A "placeholder" budget has been included in the draft LTP in 2021/22 in anticipation of the outcome from the Havelock North Water Supply Inquiry being that the category of a "secure" water supply will no longer exist. This will enable the installation of UV treatment plant if necessary. This was also factored into the design of the McPhedrons Road water headworks.

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 Oxford Rural No 1 Water Supply Scheme has a total storage capacity of 345 cubic metres made up from four 23.8 cubic metre tanks at Chalk Hill, a 250 cubic metre reservoir at View Hill and four 23 cubic metre tanks at Rockford Road (which are not used).

The storage requirement for Oxford Rural No. 1 is driven by the emergency storage requirements. Emergency storage requirements for Oxford Rural No. 1 are 7.8 hours of Average Daily Flow, based on a 2020 update of the work carried out in the Water Supply Source Resilience Analysis (170623064893).Table 16 presents the required storage capacity.

Table 16: Required Storage Capacity for Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Required Storage Volume (m^3)	325	344	387	430	463
Planned Storage Volume (m^3)	345	345	595	595	595
As the source flow is greater than demand the source flow increase (source upgrade scheduled for 2025), would have no impact on the required storage. However the required emergency storage component would decrease due to an increased resilience. This would be achieved by improving the ease of resupply from an alternative source (reducing the emergency storage requirement to 6.87 hours of ADF).					

A storage upgrade is scheduled for 2034/35. It is proposed that a new 500 cubic meter reservoir is built at View Hill. This will meet storage requirements for beyond the 50 year projection period.

Headworks

The wells pump directly into the reticulation and into the View Hill and Chalk Hill reservoirs when the pumps are running. When the bore pumps are not running the View and Chalk Hill reservoirs gravity feed separate parts of the system. The Chalk Hill part of the scheme is much smaller than the View Hill scheme.

Table 17 presents the projected peak hourly flows for the Oxford Rural No. 1 water supply scheme.

Table 17: Projected Peak Hourly Flows for Surface Pumps in Scheme

	0yrs	10yrs	20yrs	30yrs	50yrs
Expected Peak Hourly Flow (L/s)	20.6	24.8	27.9	31.0	33.4

No storage is required for operational requirements for this scheme as the well pump exceeds the maximum flow from the supply pumps.

There will be sufficient capacity in the well pumps and reservoir head to supply peak hourly flow to the scheme for the full 50 year projection period.

Reticulation

The capacity of the water supply headworks and reticulation has been assessed using an un-calibrated reticulation model. The model and associated monitoring has confirmed that the existing reticulation system has adequate capacity for the existing demands. The projected 50-year demand generally involves 50 mm and 100mm diameter reticulation upgrades spread over the period.

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

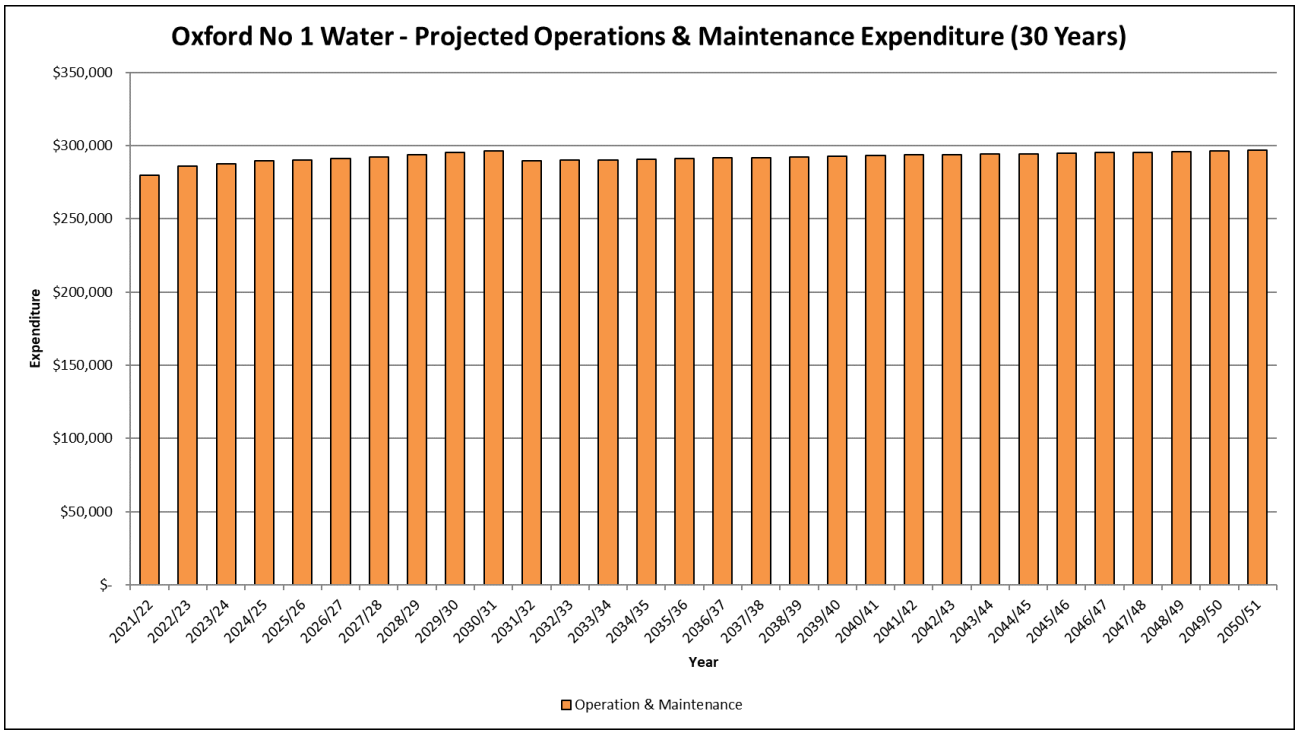
6.1 Operation & Maintenance

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



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

6.2 Renewals Programme

A renewals model is used to generate renewal timeframes for each reticulation asset on each scheme. This model takes into account the remaining life from the asset condition data, and the criticality of each asset, and recommends an acceptable renewals window for each pipe. More information on the model is provided in the overview document.

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

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

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

Figure 8: Pipe Renewal Time Frames

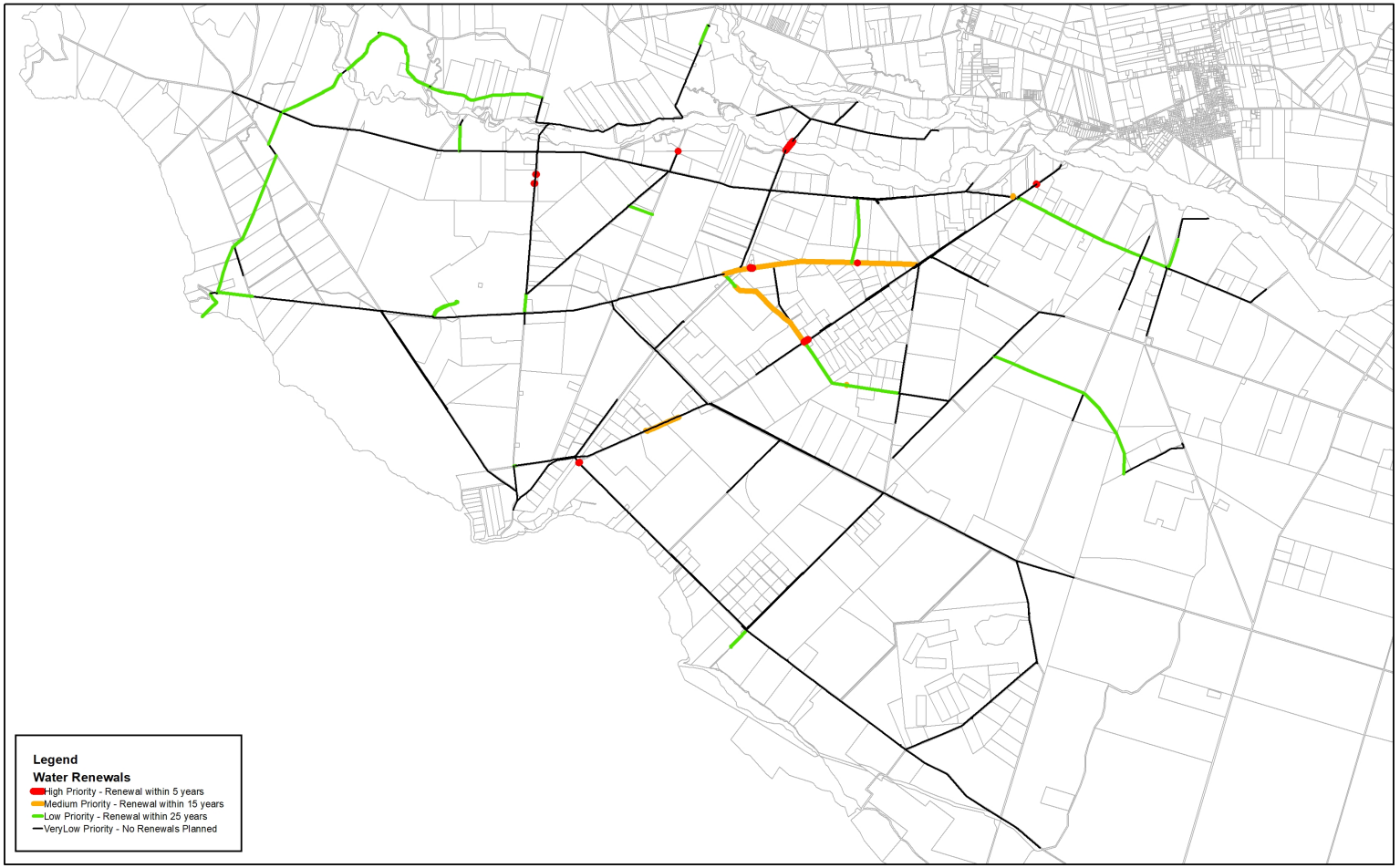
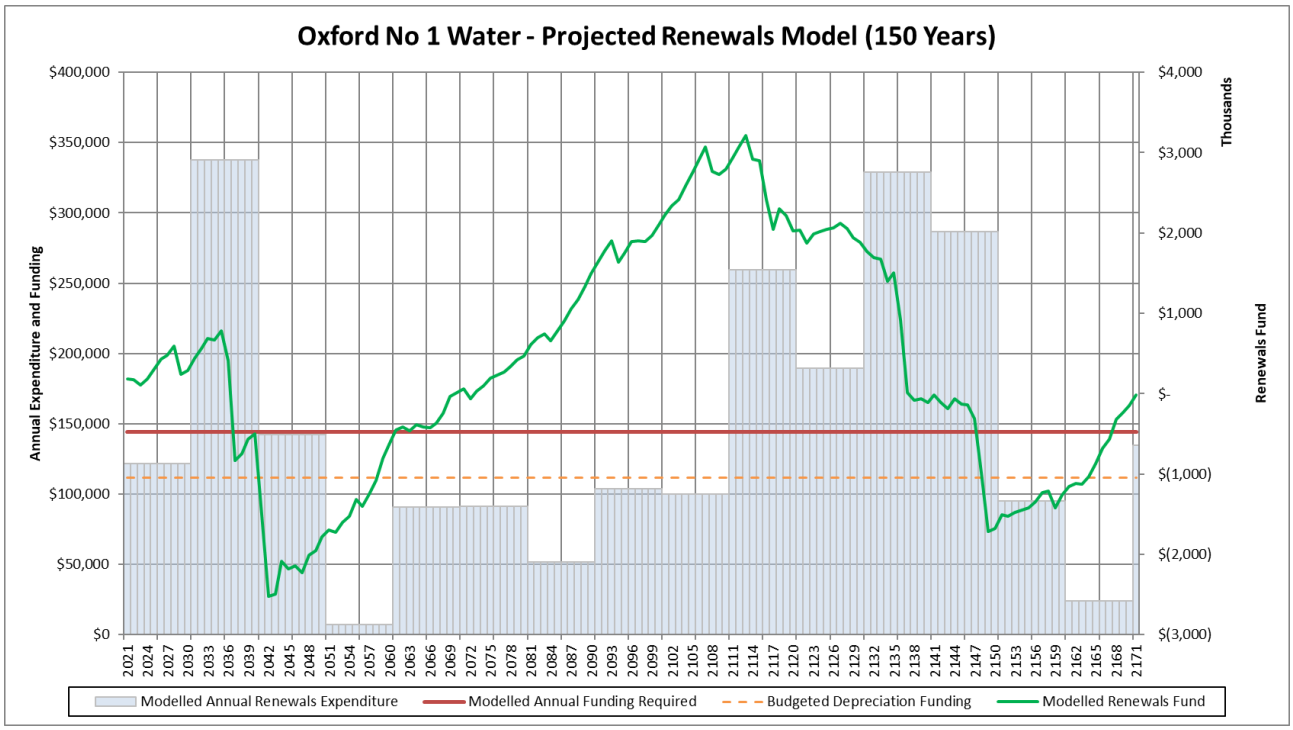


Figure 9 below shows the financial output from the model alone. Over a 150 year period it shows the projected expenditure; the value in the renewals fund; the level of funding required to ensure the fund can meet the required renewals programme, and the annual depreciation.

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. 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

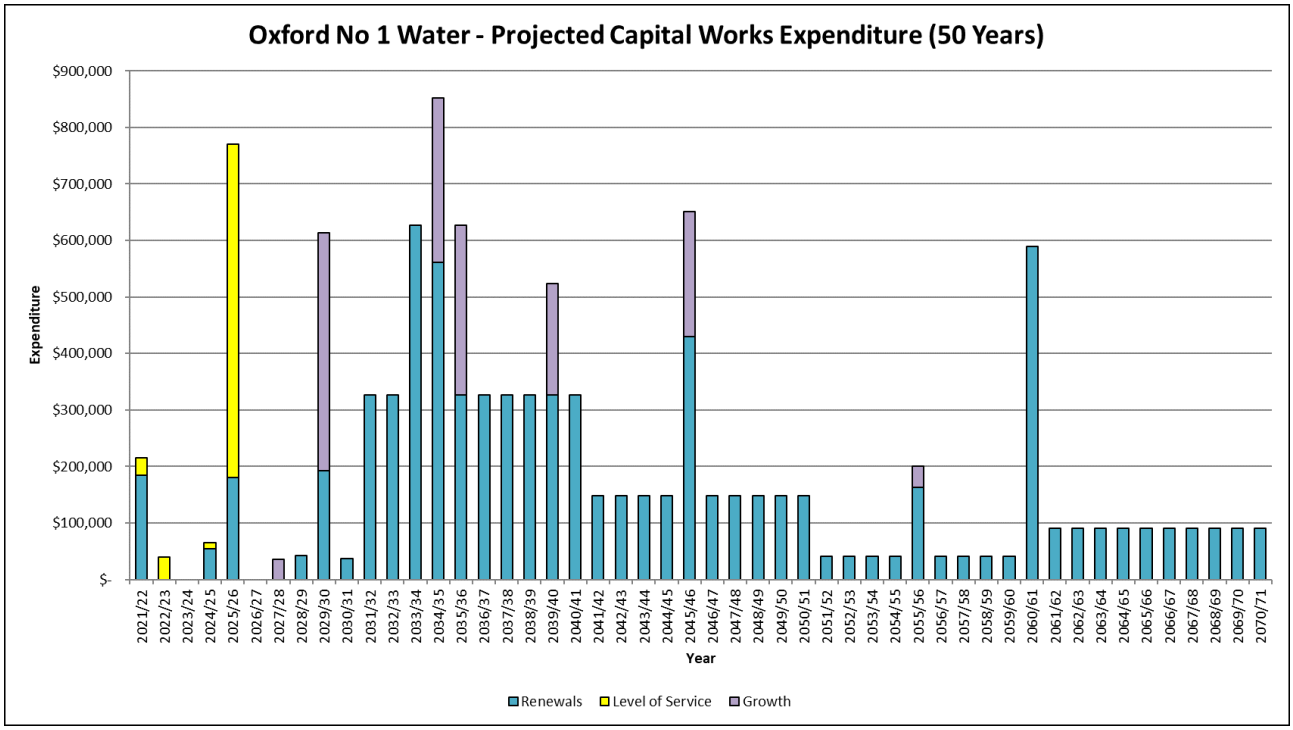


Table 18 summarises the projected capital works for the next 50 years, including renewals. Figure 11 shows the corresponding location of the projected capital works. Showing in Figure 11, but not in Table 18 is the $250,000 district wide funded amount for the installation of UV treatment in 2024/25

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.

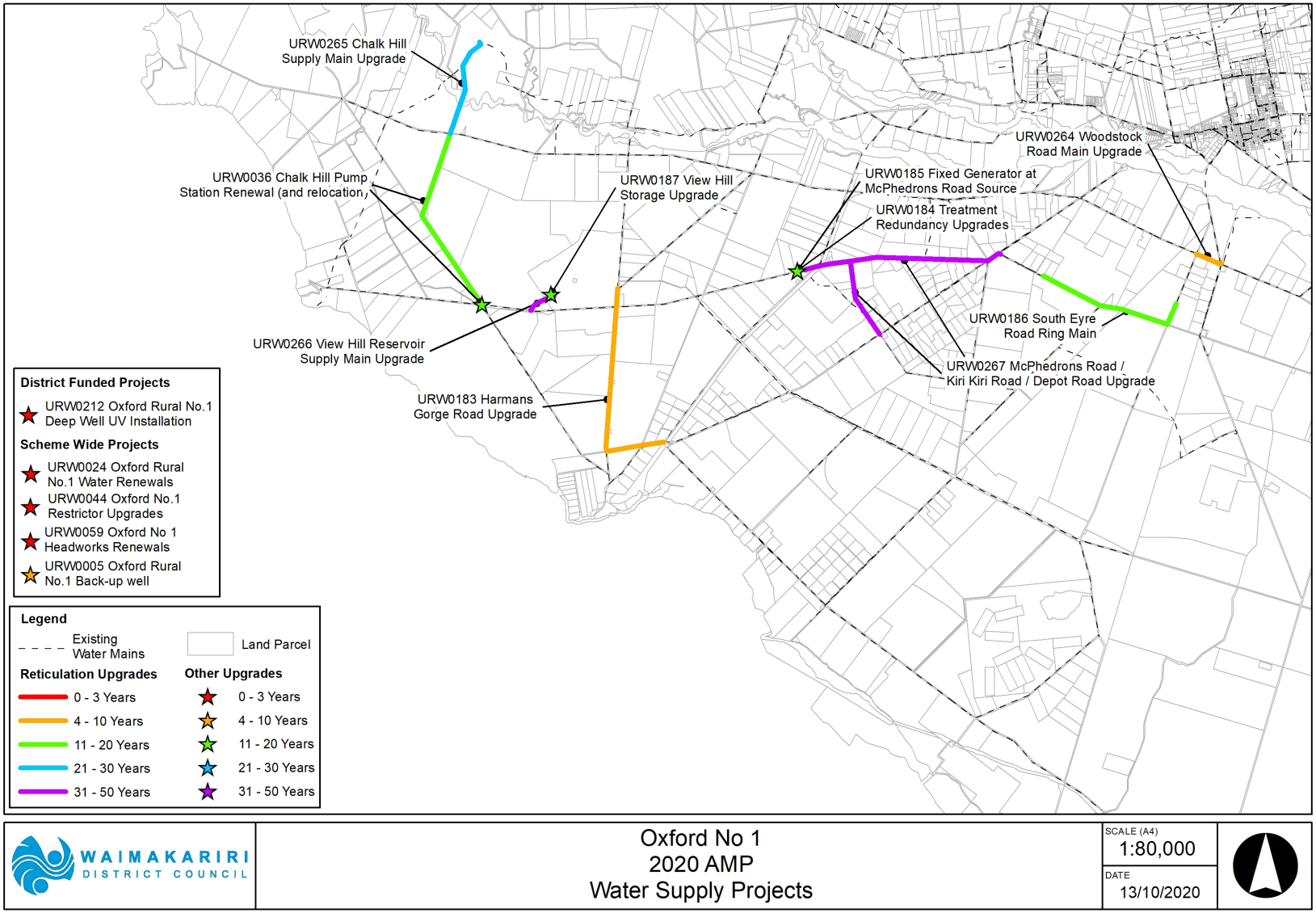
Any programme or project that occurs over a number of years, such as the renewals programme, is only shown within the table for the first year in which it occurs. The Project Value indicates the projected full total cost of the project over the number of years it occurs.

The major expenditure shown in 2025/26 is for a backup well as noted in the Capacity and Performance section

Table 18: 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	**URW0024**	Oxford Rural No.1 Water Renewals	**3 - Low**	**$ 4,778,266**	**$ -**	**$ 4,778,266**	**$ -**
2022	**URW0044**	Oxford Rural No.1 Restrictor Upgrades	**5 - Medium**	**$ 70,000**	**$ 70,000**	**$ -**	**$ -**
2022	**URW0059**	Oxford No 1 Headworks Renewals	**3 - Low**	**$ 1,971,865**	**$ -**	**$ 1,971,865**	**$ -**
2025	**URW0005**	Oxford Rural No.1 Back-up well	**5 - Medium**	**$ 600,000**	**$ 600,000**	**$ -**	**$ -**
2028	**URW0264**	Woodstock Road Main Upgrade	**3 - Low**	**$ 35,000**	**$ -**	**$ -**	**$ 35,000**
2030	**URW0183**	Harmans Gorge Road Upgrade	**3 - Low**	**$ 421,000**	**$ -**	**$ -**	**$ 421,000**
Year 11 - 20							
2034	**URW0036**	Chalk Hill Pump Station Renewal (and relocation)	**2 - Very Low**	**$ 300,000**	**$ -**	**$ 300,000**	**$ -**
2035	**URW0187**	View Hill Storage Upgrade	**3 - Low**	**$ 525,000**	**$ -**	**$ 234,000**	**$ 291,000**
2036	**URW0184**	Treatment Redundancy Upgrade	**2 - Very Low**	**$ 200,000**	**$ -**	**$ -**	**$ 200,000**
2036	**URW0185**	Fixed Generator at McPhedrons Road Source	**2 - Very Low**	**$ 100,000**	**$ -**	**$ -**	**$ 100,000**
2040	**URW0186**	South Eyre Road Ring Main	**3 - Low**	**$ 197,000**	**$ -**	**$ -**	**$ 197,000**
Year 21 - 30							
2046	**URW0265**	Chalk Hill Supply Main Upgrade	**3 - Low**	**$ 503,000**	**$ -**	**$ 281,000**	**$ 222,000**
Year 31 - 50							
2056	**URW0266**	View Hill Reservoir Supply Main	**3 - Low**	**$ 160,000**	**$ -**	**$ 122,000**	**$ 38,000**
2061	**URW0267**	McPhedrons Road / Kiri Kiri Road / Depot Road Upgrade	**3 - Low**	**$ 549,000**	**$ -**	**$ 549,000**	**$ -**
Grand Total				**$ 10,410,132**	**$ 670,000**	**$ 8,236,132**	**$ 1,504,000**

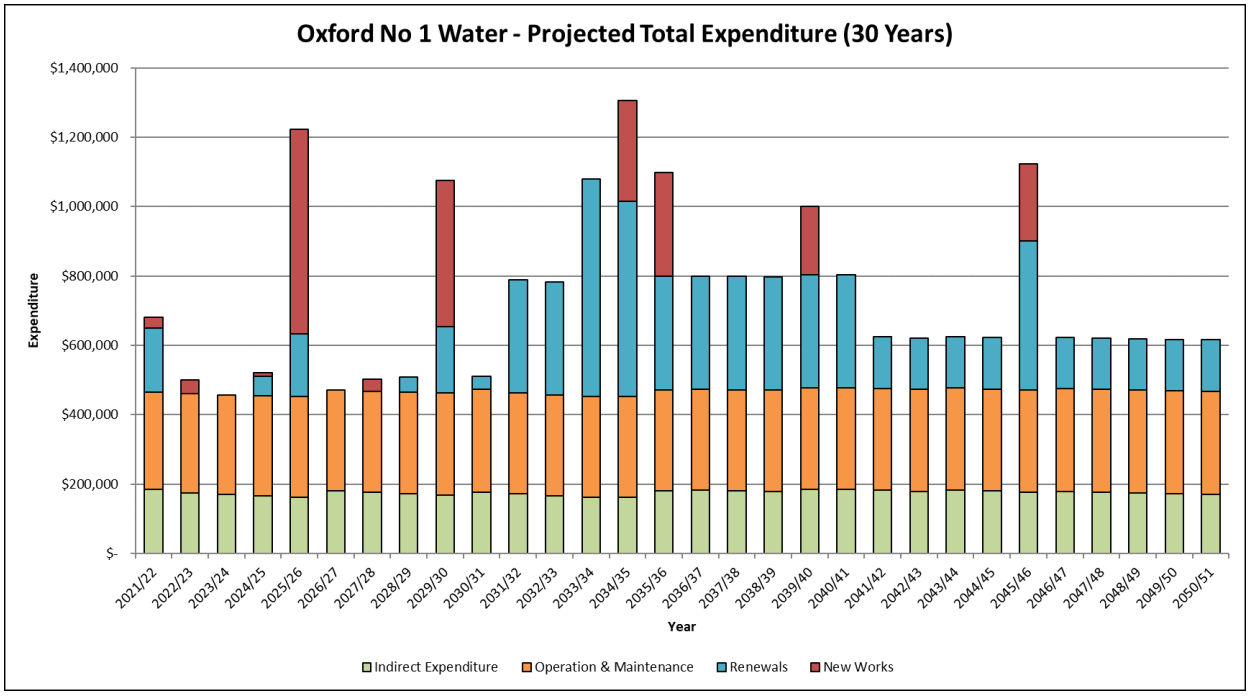
Figure 11: Projected Capital Upgrade Works (not to scale)



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

Table 19: Asset Valuation

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
Valve	No.	202	$548,945	$423,664	$6,032
Main	m	137,299	$8,706,032	$6,112,015	$93,285
Hydrant	No.	17	$46,359	$40,682	$482
Service Line	Properties	389	$333,600	$249,686	$3,488
Facilities			**$2,193,957**	**$1,403,934**	**$59,792**
Total			**$11,828,893**	**$8,229,980**	**$163,079**

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 20 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 20: 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

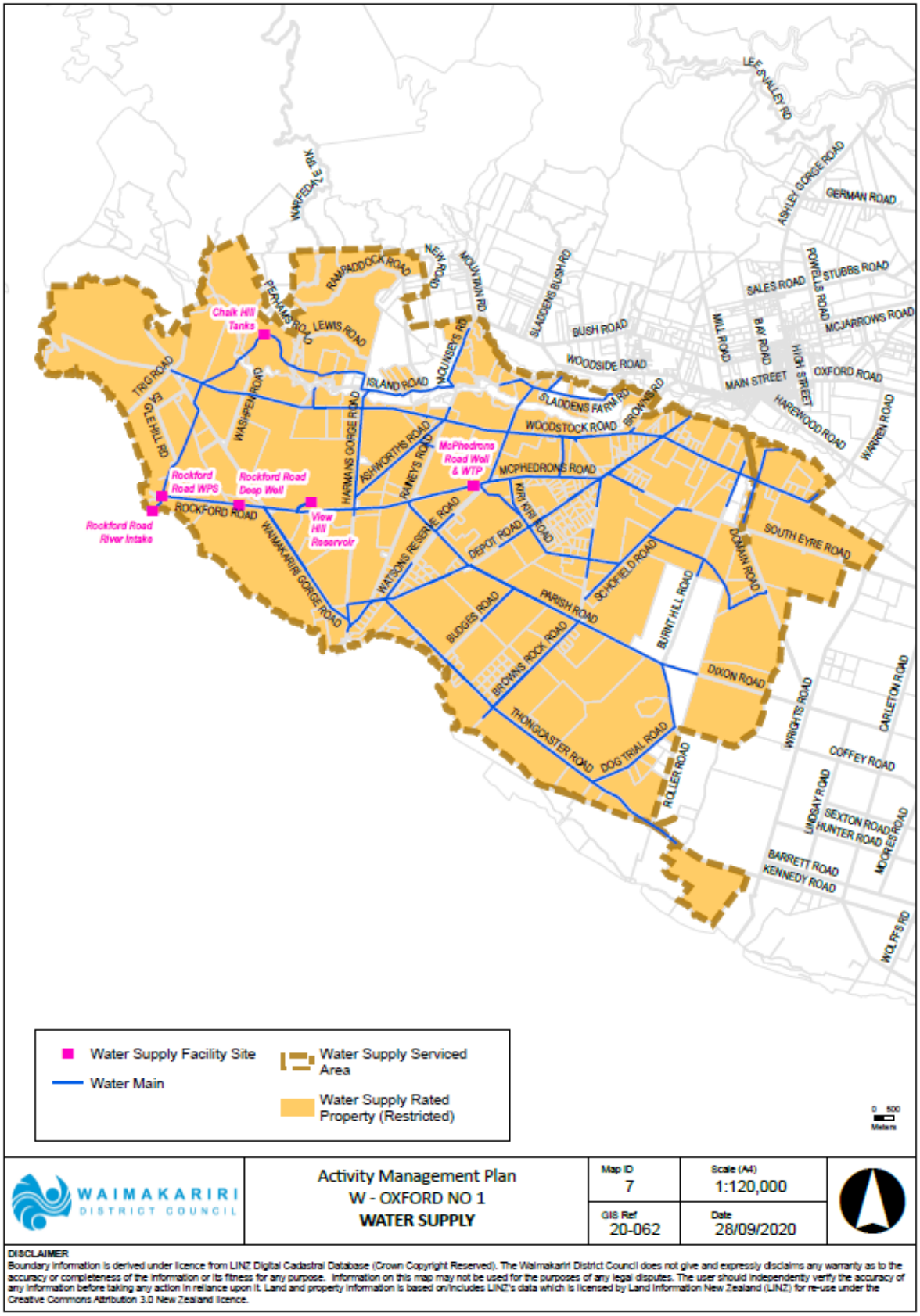
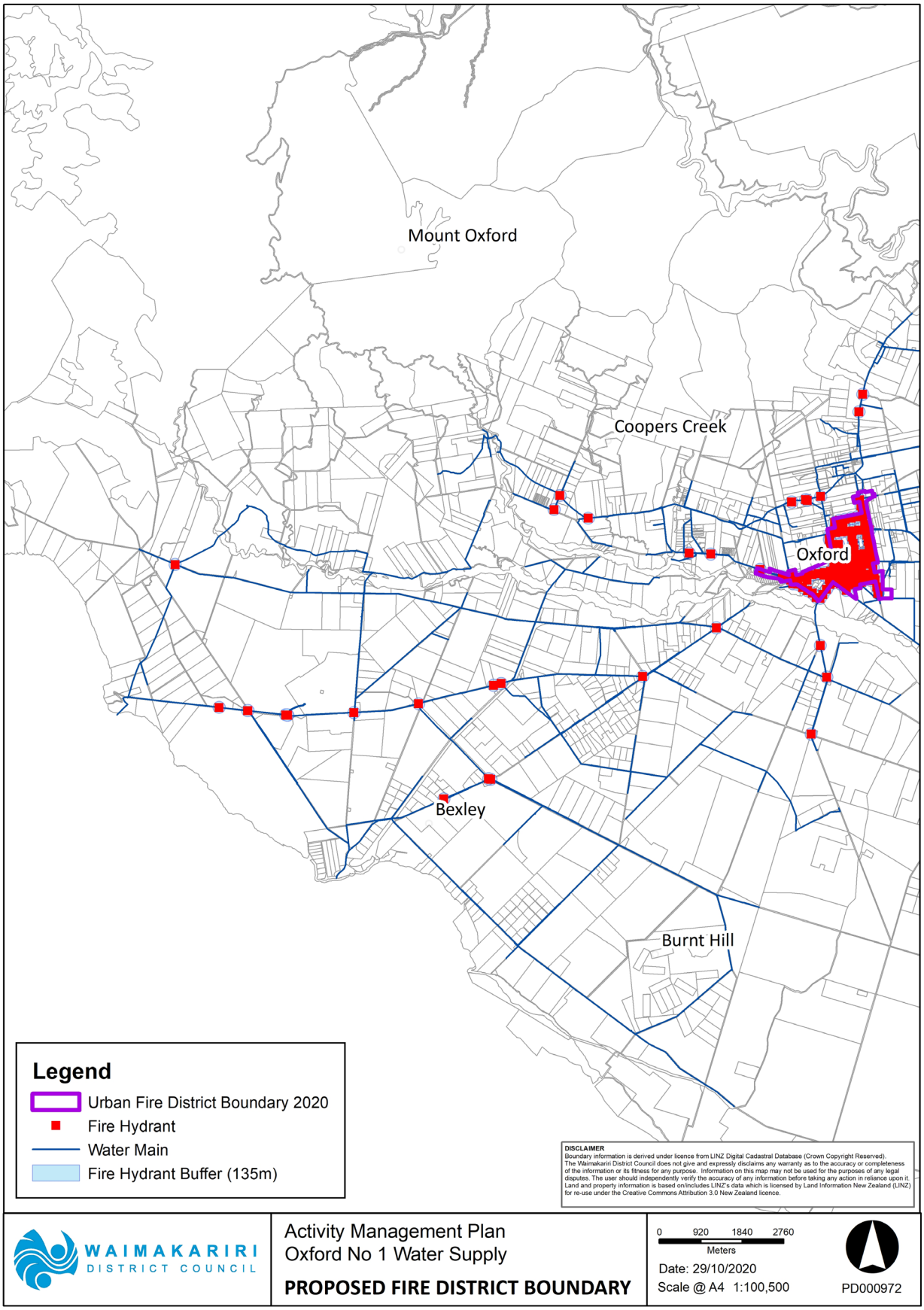


Figure 14: A2 - Plan of Fire District & Extent of Fire Mains



This scheme is not included in a Fire District but a plan of hydrants is included for reference.

Figure 15: Oxford 1 Water Supply Statistics

Oxford 1 Water Supply Statistics

Oxford 1 | 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	-	-	-	-	-	-	-	-	N/A	8.00	-	8.00	8.00
Average Daily Flow	m^3/day	1,234	1,312	1,249	1,330	1,301	1,262	1,414	1,359	1,303	1,156	1,354	1,317	1,304
Peak Daily Flow	m^3/day	1,846	1,742	1,467	1,673	1,599	1,527	1,734	1,647	1,830	1,503	2,047	1,752	1,677
Peak Weekly Flow	m^3/day	1,649	1,576	1,419	1,482	1,520	1,436	1,695	1,516	1,788	1,369	1,644	1,602	1,544
Peak Monthly Flow	m^3/day	1,399	1,456	1,371	1,414	1,350	1,386	1,626	1,462	1,713	1,275	1,505	1,516	1,456
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	29.5	-	-	29.5	29.5
Peak Month		Feb	Dec	Jun	Jul	Nov	Feb	Feb	Feb	Dec	Jan	Jan		
Peak Week		Week 6	Week 6	Week 23	Week 28	Week 32	Week 7	Week 9	Week 9	Week 52	Week 2	Week 35		
Peak Day		3/02/2010	5/09/2010	10/06/2012	14/08/2012	4/08/2013	5/02/2015	15/02/2016	30/05/2017	24/12/2017	23/10/2018	18/08/2019		
Peaking Factor		1.5	1.3	1.2	1.3	1.2	1.2	1.2	1.2	1.4	1.3	1.5		
Total Annual Volume	m^3	452,804	481,640	458,248	487,971	477,459	463,289	518,941	498,850	478,166	424,200	496,844	483,400	478,561
Resource Consent	m^3/day	1,987	1,987	1,987	1,987	1,987	1,987	1,987	1,987	2,851	2,851	5,443	3,024	2,505
Well Pump Capacity	m^3/day	1,650	1,650	1,650	1,650	1,650	1,987	1,987	1,987	2,587	2,587	2,587	2,347	2,032
Surface Pump Capacity	m^3/day	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160	2,160
On-Demand Connections		-	-	-	-	-	-	-	-	-	-	-		
Restricted Connections		326	326	330	334	333	333	321	320	333	338	339		
Total Connections		326	326	330	334	333	333	321	320	333	338	339		
Average Daily Demand	L/con/day	3,785	4,026	3,784	3,981	3,907	3,791	4,405	4,248	3,913	3,420	3,994	3,996	3,947
Peak Daily Demand	L/con/day	5,663	5,344	4,445	5,009	4,802	4,586	5,402	5,147	5,495	4,447	6,039	5,306	5,072
Allocated Water Units	m^3/day	1,482	1,480	1,485	1,497	1,499	1,501	1,499	1,505	1,523	1,537	1,541		
Average Daily Flow per Unit	L/unit/day	833	887	841	888	868	841	943	903	855	752	879	866	866
Peak Daily Flow per Unit	L/unit/day	1,246	1,177	988	1,118	1,067	1,017	1,157	1,094	1,202	978	1,329	1,152	1,113
On-Demand Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Restricted Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Total Rating Charges		-	-	-	-	-	-	-	-	-	-	-		
Data Quality		medium	medium	medium	low	low	low	low	low	medium	very high	very high		