WAIMAKARIRI DISTRICT COUNCIL

Activity Management Plan 2021

Oxford Wastewater Scheme

3 Waters | July 2021

Prepared by

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Document Acceptance

Action	Name		Signed	Date
Prepared by	Gavin Hutchison	Wastewater Asset Manager		17/02/2021
	Simon Collin	Infrastructure Strategy Manager		17/02/2021
	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			

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1 Executive Summary

The following table provides a summary of the key asset management issues of the Oxford Area Wastewater 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	A variation to the discharge consent was granted in 2019. The variation allows for peak weather discharges that exceed the normal dry weather volumes.
Levels of Service	The scheme generally meets its levels of service apart from compliance issues associated with effluent quality and quantity at the treatment plant. These have been mostly addressed by the new holding pond, although some risk remains.
Capacity & Performance	The reticulation system has adequate capacity for current and future demands.
	A programme of further I&I investigations is scheduled in 2021/22. A program of works to reduce the I&I levels will be developed from the outputs of the I&I investigations.
Asset Condition	The majority of the scheme is in good condition, with only minor replacements required over the next 50 years.
Risk Assessment	The principal risks associated with the scheme identified through the Risk Assessment were associated with the treatment process that was sensitive to shock loadings. These have been addressed by the new holding pond.
Disaster Resilience	Following completion of the holding pond, the main outstanding risk to the scheme identified through the Disaster Resilience Assessment is the moderate earthquake risk to the Oxford WWTP, Victoria St PS and Weld St PS. Further headwork's resilience assessments of these facilities are required.
Growth Projections	The number of connections is predicted to increase by approximately 37% over the next 50 years. Upgrades of the system will be required to accommodate this growth.

2 Introduction

The purpose of this Activity Management Plan (AMP) is to outline the significant issues associated with the Council's assets and to show how the Council proposes to manage the schemes in the future.

The data that has been relied upon to produce this document was taken at the end of the 19/20 financial year. i.e. 30 June 2020 . More up to date scheme statistics are available on document TRIM 121108078891 which is to be updated quarterly.

Further details of the asset management practices used by Council to manage this scheme are summarised in the District Wastewater AMP Overview document.

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.

Repair of wastewater supply asset damage from the Canterbury earthquake sequence has now been completed. No significant legacy effects are expected.

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 Wastewater Scheme is an urban gravity reticulation scheme with two small pump stations that discharge into the reticulation. The sewage is conveyed via a network of gravity pipes to the Oxford Wastewater Treatment Plant.

The treatment plant is a Modified Ludzack-Ettinger activated sludge process in a concentric tank surrounding a circular clarifier. An upgrade to this plant was undertaken in 2018. This involved the installation of an improved aeration system.

Treated effluent is stored in a holding basin before being pumped through a UV disinfection unit to an irrigation field located 1700 metres away where it is sprayed onto the land via two centre pivot irrigators that alternate between two adjacent sites.

Some key statistics (2019/20 year) of the scheme are shown in Table 2 to 6. The extent of the currently serviced area and comprehensive flow data records are presented in Figure 14 and Figure 16.

A schematic view of the treatment system is presented on the following page Figure 1. A more detailed view of the Modified Ludzack-Ettinger (MLE) Process Schematic is illustrated in Figure 2.

Table 2: Scheme Statistics for 2019/2020

Scheme Parameter	Statistics	Source
Type of Supply	Urban Gravity	
Treatment	Activated Sludge	
Length of Reticulation	20.8 km	Wastewater Asset Valuation Tables 8-5 and 8-6, pages 59 to 62
Total Replacement Value	$21,458,893	
Depreciated Replacement Value	$16,645,785	
Number of Connections	892	2019/20 Rating Query
Number of Rating Charges	892	
Average Daily Flow (5 year average)	474 m3/day	Flow Data Analysis - Sewer
Average Daily Flow/connection (5 year average)	537 l/day/con	
Peak Daily Flow (5 year average)	1,103 m3/day	
Peak Daily Flow/connection (5 year average)	1,247 l/day/con	
Resource Consent Discharge Limit (expires 8/08/2031)	1,382 m3/day, and a maximum annual volume of 228,125 m3 between 1 July and the following 30th June.	CRC184787

Table 3: Wastewater Gravity Pipe Data Summary

Wastewater Gravity pipe length (m) by diameter and pipe material										
Pipe Material	**Pipe Diameter (mm)**									
	50	**100**	**150**	**200**	**225**	**250**	**300**	**375**	**400**	**Total**
PVC	0m	62m	11,984m	2,333m	713m	1,594m	0m	0m	1,090m	17,776m
Total	**0m**	**62m**	**11,984 m**	**2,333 m**	**713 m**	**1,594 m**	**0m**	**0m**	**1,090 m**	**17,776m**

Table 4: Wastewater Pressure Pipe Data Summary

Wastewater Pressure pipe length (m) by diameter and pipe material									
Pipe Material	**Pipe Diameter (mm)**								
	50	**100**	**150**	**200**	**250**	**300**	**375**	**450**	**Total**
PE	400m	0m	14m	0m	0m	0m	0m	0m	414m
PVC	0m	1,000m	14m	1,467m	0m	0m	0m	45m	2,527m
Total	**400m**	**1,000m**	**28m**	**1,467m**	**0m**	**0m**	**0m**	**45m**	**2,941m**

Table 5: Wastewater Valve Data Summary

Wastewater Valves	
Diameter (mm)	**Count**
50	0
100	0
150	2
Total	**2**

Table 6: Wastewater Manhole Data Summary

Wastewater Manholes	
Diameter (mm)	**Count**
900	191
1050	55
Total	**246**

Table 7: Data References

Data Reference	Trim Reference
Flow Data Analysis – Sewer	121108078891
2020 3 Waters Asset Valuation	200824109857
2020 50 Year Water and Sewer Growth Forecast	200224024348
2019 Customer Satisfaction Survey	200313034937

Figure 1: Network Schematic

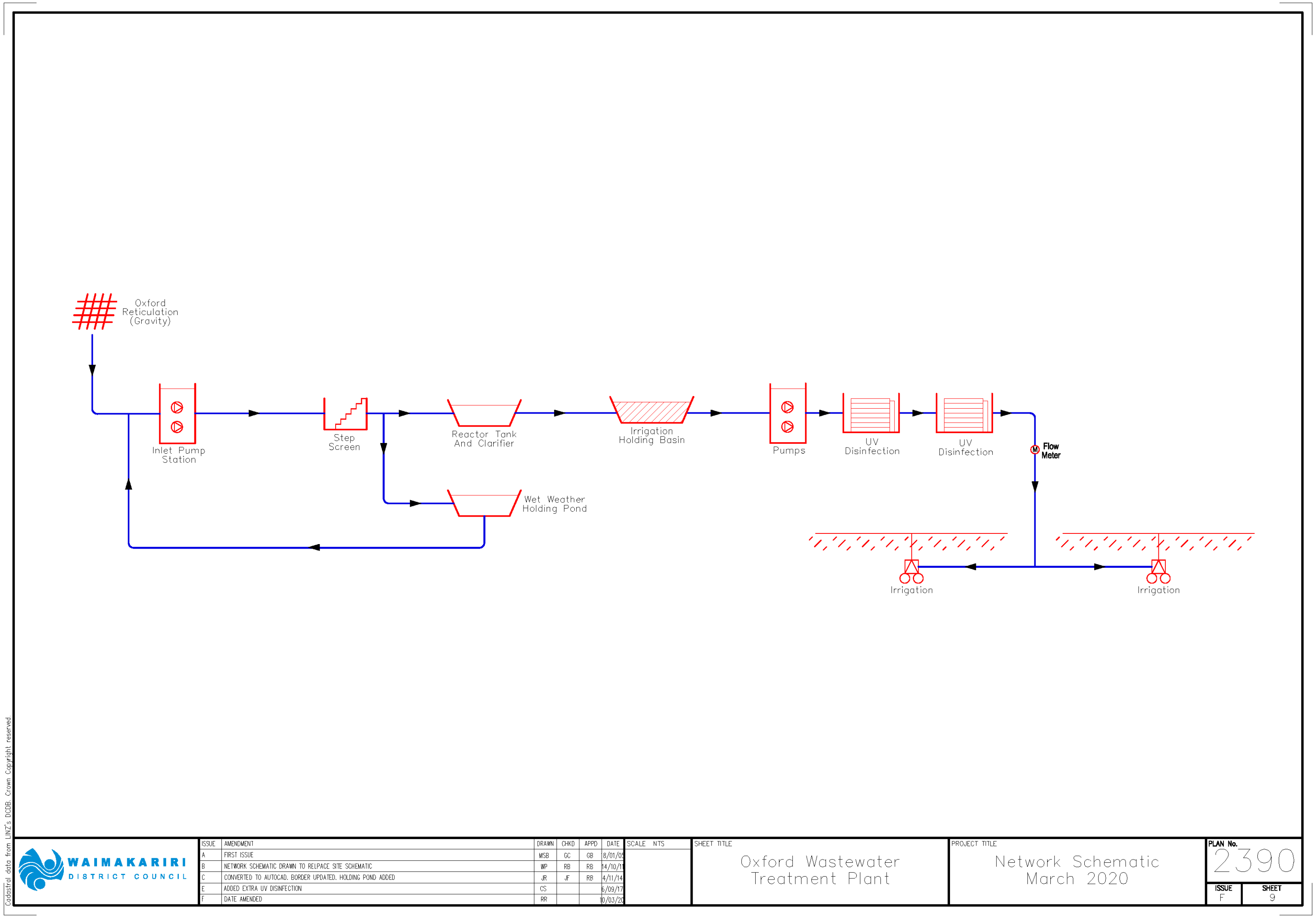
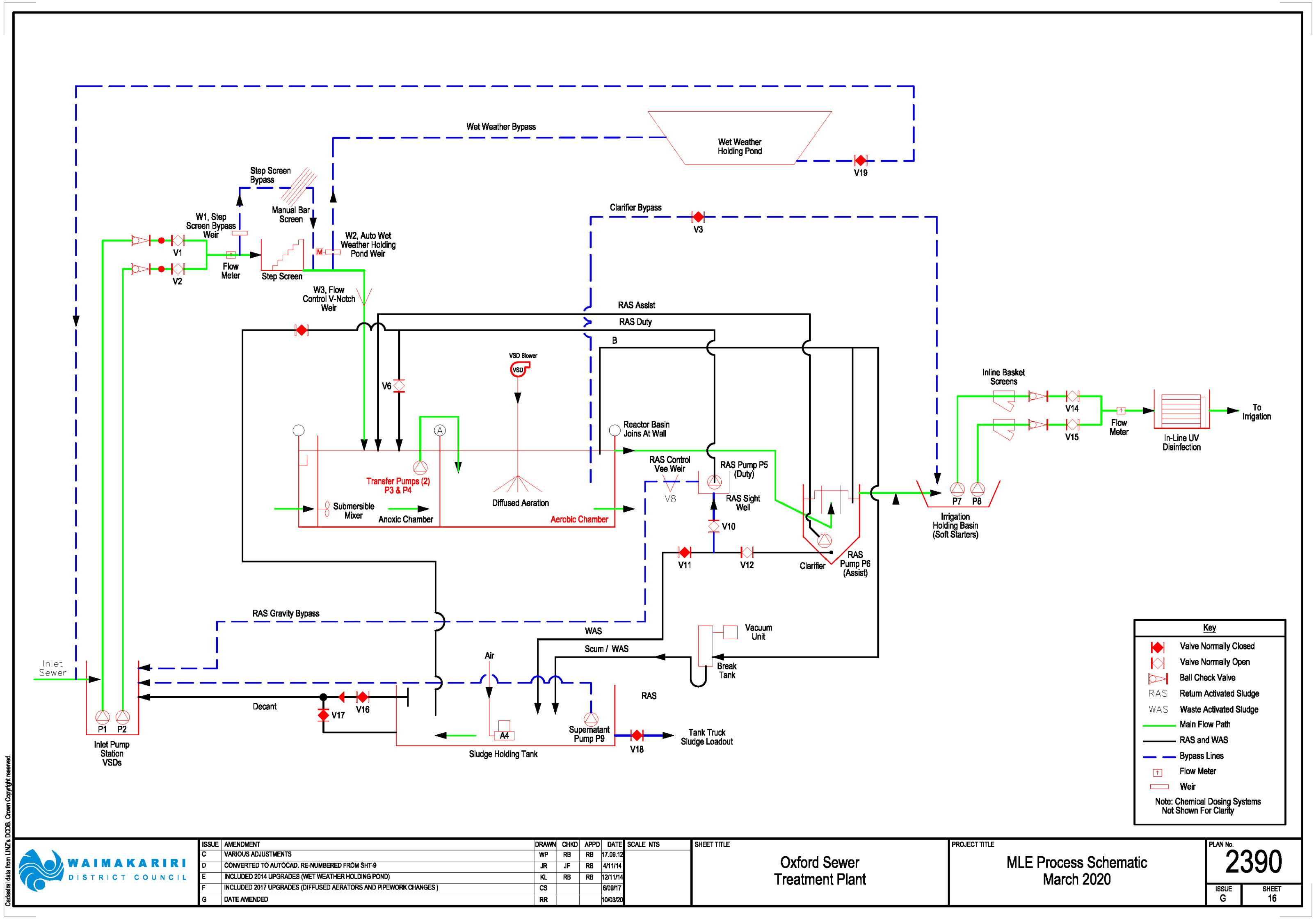


Figure 2: MLE Process Schematic



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

There are a number of key aspects to consider when managing a wastewater scheme, these include

- Target & actual levels of service
- Asset Condition & criticality
- Capacity & Performance of the supply
- Risks associated with the supply
- Growth predictions for the scheme

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

5.1 Levels of Service

Table 8 sets out the performance measures and targets for the scheme, and performance achievement against targets since 2008.

Mandatory performance measures are measured at the district wide level and are not included in the individual wastewater scheme AMPs. They are located in the District Overview Wastewater Activity Management Plan. However there is considerable overlap between the measures at Scheme and District levels. Mandatory measures cover overflows, consent compliance, time to respond to faults, and complaints. The Scheme LOS measures include more detail, and cover complaints, consent compliance, overflows and outages, but not response times, which are only measured at scheme level.

None of the WDC targets are expected to change over the 10 year LTP period, so only the one target value has been shown in this document

Performance in Table 8 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 8: Elective (non-mandatory) Levels of Service Targets and Performance Measures as Assessed in 2020

** Note A "Y" indicates that the LOS has been met, and an "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
Customer Complaints	Complaints - Midges & Insects - Treatment	Number of events that lead to complaints about midges and insects at treatment plants	Nil per Year	Nil	There were no complaints regarding midges or insects.	Achieved	N/A	Y	Y	Y	Y
	Complaints - Odour - Reticulation	Number of events that lead to complaints about odour from the reticulation	Less than 5 per year	Nil	There were no complaints regarding odour.	Achieved	N/A	Y	Y	Y	Y
	Complaints - Odour - Treatment	Number of events that lead to complaints about odour at treatment plants	Less than 5 per year	Nil	There were no complaints regarding odour.	Achieved	N/A	Y	Y	Y	Y
Resource Consents	Consent Breach - Action required	Number breaches of consent conditions that result in an ECan report that identifies compliance issues.	Nil per Year	Nil	No notices of consent breach were received.	Achieved	N/A	Y	N	Y	N
Outages	Outages - Events >8 hours	Number of events that cause a loss of service to any property for >8 hrs (does not include private laterals)	Nil per year	Nil	This level of service is met.	Achieved	N/A	Y	Y	Y	Y
Overflows	Overflows - Existing Reticulation	Minimum return period of rainfall event that can be accommodated in network components designed prior to May	1 in 2 year	Nil	This level of service is met.	Achieved	N/A	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
		1999 without overflows occurring									
Overflows	Overflows - New Reticulation	Minimum return period of rainfall event that can be accommodated in network components designed after May 1999 without overflows occurring	1 in 5 year	Nil	This level of service is met.	Achieved	N/A	Y	Y	Y	Y
	Overflows - Private Property	Number of recorded overflows on private property found to be the result of (a) blockage in the main (b) Insufficient capacity in the reticulation system for any rainfall up to a 1 in 2 year event, for areas designed prior to 1999. (c) Insufficient capacity in the reticulation system for any rainfall up to a 1 in 5 year event for areas designed after 1999.	Nil per year	Nil	This level of service is met.	Achieved	N/A	Y	Insf. Data	Y	Y

5.2 Asset Condition

The current assessment of asset condition is based on theoretical remaining useful life derived from component age and adopted useful life. Adjustments to the remaining life are made to individual components where information is available to suggest the theoretical remaining life is inappropriate.

A rolling wastewater CCTV programme was started in 2008 to survey the reticulation network and assign evidence based condition ratings. These surveys have identified a number of mains faults that have led to a remedial actions including immediate or scheduled repair, decreased remaining useful life and increased renewal priority. However analysis of this survey information has not been well managed due to the lack of appropriate software. The expected purchase of the widely used InfoAsset Manager software for this purpose will significantly improve this situation, and enable better determination of asset condition and remaining useful life.

The CCTV condition information is complemented with maintenance activity records from the field recording wastewater mains blockage and overflow records.

Figure 3 below, shows the assessed pipe condition for all pipes within the scheme. Figure 4 summarises the theoretical asset condition for both the network and headworks in a graph, while Table 9 provides more detail about the value of the assets within different asset condition categories.

The Oxford reticulation system is known to be of poor quality in some locations. Excessive amounts of inflow and infiltration during extended periods of wet weather cause the inflow at the treatment plant to remain high for extended periods of time. For this reason, a holding pond was constructed onsite in 2014 to hold these higher than expected flows so as to not overload the plant and also not breach the resource consent by overflowing the plant and spilling raw sewage.

To find the sources of this inflow and infiltration, an increased level of investigation of the reticulation system is being undertaken in 2021.

Figure 3: Pipe Condition Assessment Plan

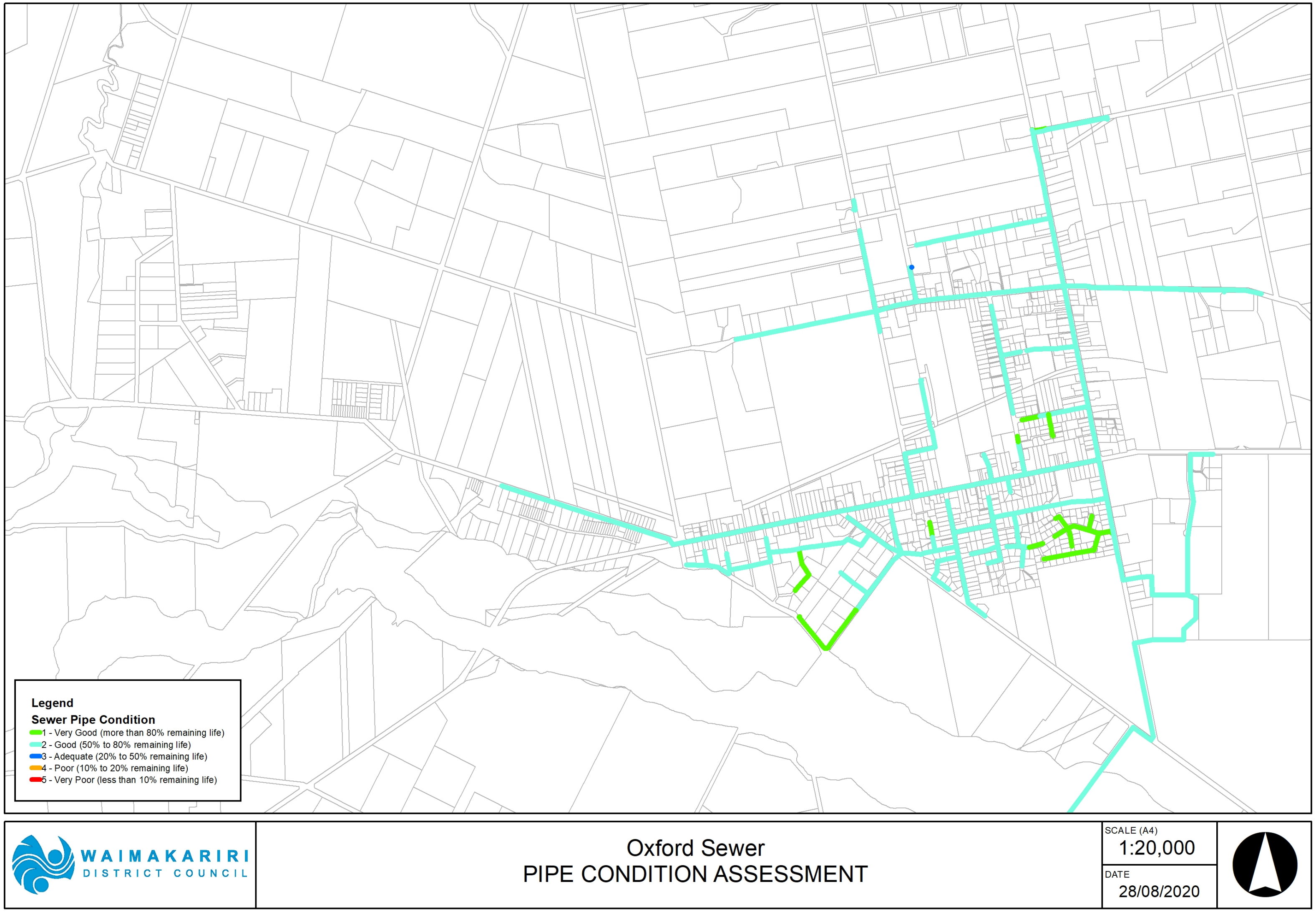
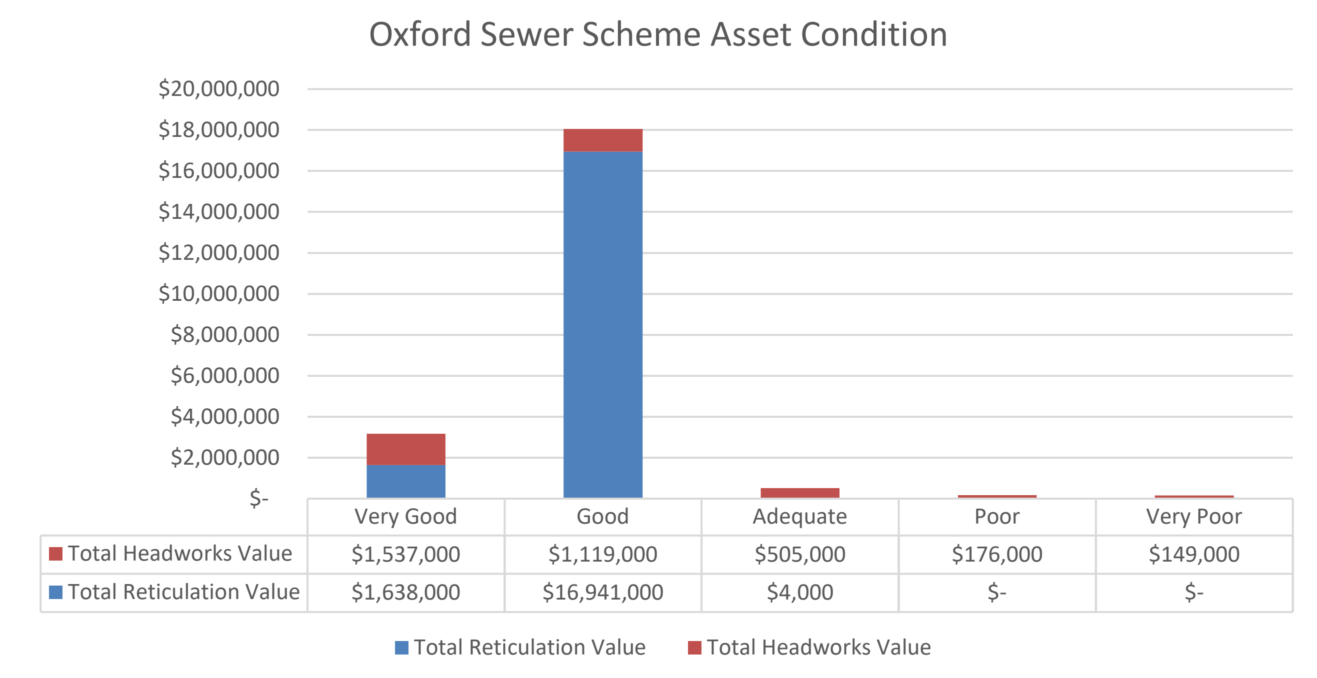


Figure 4: Asset Condition Summary



"Headworks" is inclusive of all above ground assets associated with the wastewater supply scheme e.g. buildings, pump sets.

Table 9: 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*	1.9 km *9%*	$ 1,638,000 *9%*	$ 1,537,000 *44%*	$ 3,175,000 *14%*
2	Good *Between 50% and 80% of life remaining*	18.8 km *91%*	$ 16,941,000 *91%*	$ 1,119,000 *32%*	$ 18,060,000 *82%*
3	Adequate *Between 20% and 50% of life remaining*	0.0 km *0%*	$ 4,000 *0%*	$ 505,000 *14%*	$ 509,000 *2%*
4	Poor *Between 10% and 20% of life remaining*	0.0 km *0%*	$ - *0%*	$ 176,000 *5%*	$ 176,000 *1%*
5	Very Poor *Less than 10% of life remaining*	0.0 km *0%*	$ - *0%*	$ 149,000 *4%*	$ 149,000 *1%*
Total		**20.8 km**	**$ 18,583,000**	**$ 3,486,000**	**$ 22,069,000**

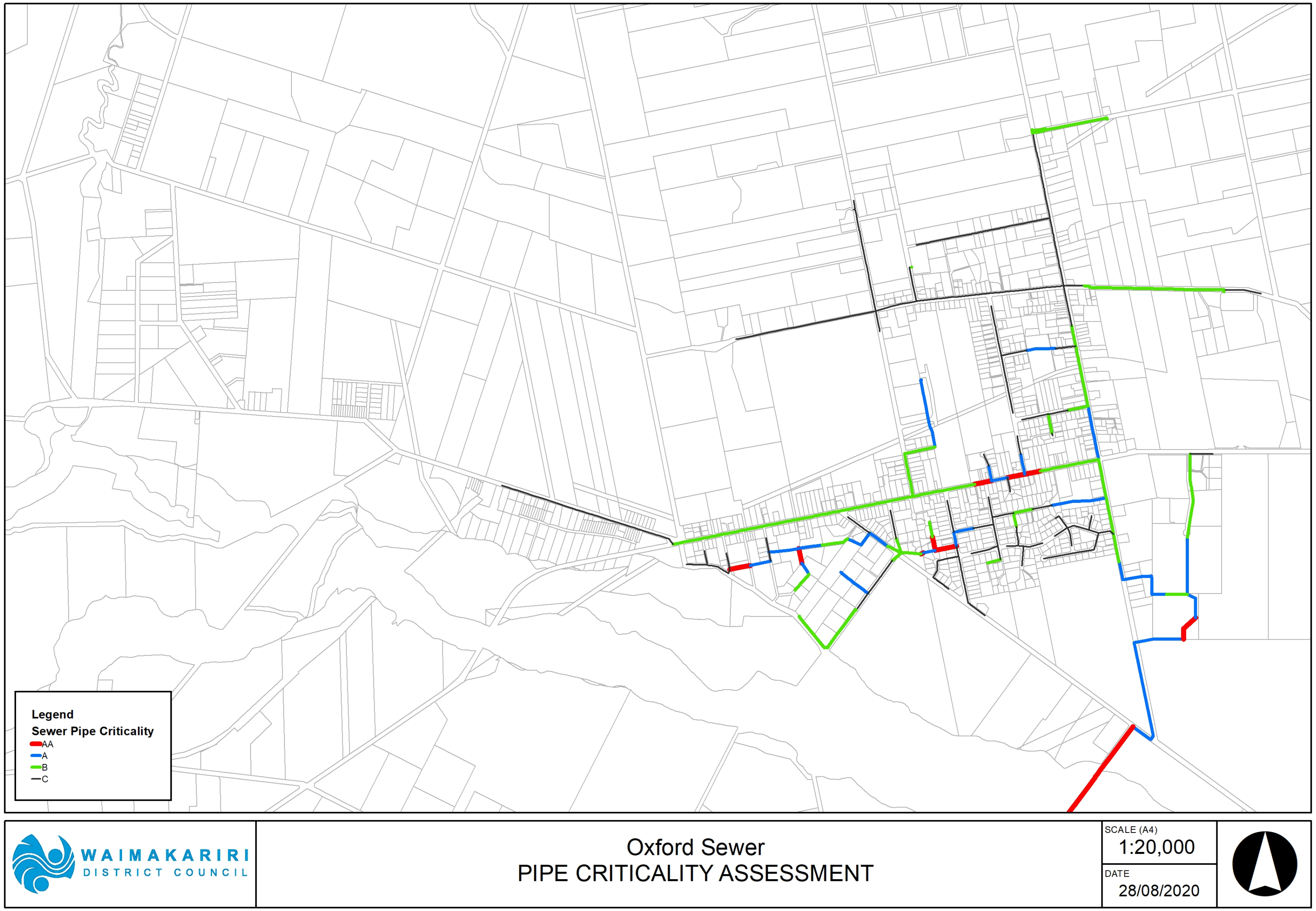
5.3 Asset Criticality

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 5 provides a spatial view of asset criticality for the scheme.

Figure 5: Pipe and Facilities Criticality



5.4 Risk Assessment

An Operational Risk Assessment was first undertaken for the Oxford Wastewater Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review.

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

Table 10 below summarises the number of events at each level of risk for the Oxford Wastewater Scheme:

Table 10: Number of Events per Level of Risk

Risk Level	2004	2008	2011	2014
Extreme risks	0	0	0	0
High risks	3	1	0	3
Moderate risks	33	32	18	18
Low risks	8	11	26	23
Not applicable	0	0	0	0
Total	44	44	44	44

After the last risk review in 2014, three high risk events remained on the Oxford scheme. These are all associated with the wastewater treatment plant, and have now all been mitigated by the construction of the new Oxford Wastewater Holding Pond.

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

5.5 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	Oxford Irrigator	Oxford WWTP	Victoria St Pump Station	Weld St Pump Station
100 yr Local Flooding	-	-	-	L
475 yr Earthquake Induced Slope Hazard	L	L	L	L
Earthquake (50 yr)	M	M	M	M
150 Yr Earthquake	L	L	L	L
475 Yr Earthquake	L	L	L	L
Wildfire	L	L	L	L
Snow 150 Yr	L	L	L	L
Wind 100 Yr	L	L	L	L
Lightning	M	M	M	M
Pandemic	M	M	M	M
Terrorism / Sabotage	L	L	L	L
E =- Extreme, H = High, M = Moderate, L = Low				

The most significant hazard impacting on the Oxford wastewater scheme is the risk of an earthquake.

All wastewater sites in the District have been identified at moderate risk from lightning and pandemic.

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 AMPs for details. Since there is some overlap of the DRA and Operational Risk Assessment, a review and potential integration of the risk assessment methodologies is planned, prior to risk assessments next being carried out.

5.6 Growth Projections

Situation

Until approximately 1996, growth in Oxford town was constrained by a lack of a sewage system. Since the construction of the wastewater system all new developments have connected to the sewer and there has been a steady conversion of existing septic tank systems to sewer connections.

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. Wastewater growth projections were calculated using the New Projections for LTP 2021-2031 (TRIM 200908117997), which was the basis for infrastructure planning.

Due to issues that have occurred with the Census 2018, the population projections that would normally be used as a basis for updating the work previously developed by the Council's Development Planning Unit have not been released by Stats NZ in time for the development of this assessment.

However, based on the historical growth patterns of new dwelling Building Consents over the last three years (636 in 2017/18, 661 in 2018/19 and 615 in 2019/20), the projections used for the previous LTP/infrastructure strategy remain valid to be used for infrastructure planning. As the timeframe for this infrastructure planning is for the thirty years between 2021 to 2051, the previous population projections have been extended out a further three years, as documented in New Projections for LTP 2021-2031 (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 Woodend wastewater scheme is expected to increase by 26%, by the end of the 2021-31 Long Term Plan (LTP) period. This projection is based on 21 connections being established from 2019/20 to 2030/31, as identified in the 2020 50 Year Water and Sewer Growth Forecast Report (TRIM reference number 200224024348).

The number of new residential connections are predicted to increase by 21 per year and commercial connections are predicted to increase by 0 per year, during the 2021-31 Long Term Plan (LTP) period to accommodate this demand. Demand beyond the 2021-31 LTP period (2030/31 to 2070/71) is forecast to transition to a slightly lower growth profile resulting in an average of 15 new connections per year (Table 12).

Table 12: Growth Projections

Oxford	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	889	985	1,118	1,296	1,451	1,729
Projected Rating Units	889	985	1,118	1,296	1,451	1,729
Projected increase in Connections		11%	26%	46%	63%	94%
Projected Average Dry Weather Flow (m3/day)	553	618	708	828	933	1,120
Projected Peak Wet Weather Flow (m3/day)	3,056	3,379	3,829	4,429	4,954	5,890

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 94%. This long term projection is lower than the 2017 growth projection, 37% (used for the 2017 AMP). Both projections utilised the best data and information available to project the connections for the wastewater schemes at the time. The base population projections given to PDU for 2019 infrastructure planning were more area specific than the 2017 projections, resulting in changes to Oxford's long term growth.

Average Dry Weather Flow (ADWF) and Peak Wet Weather Flow (PWWF) projections have been based on the assumptions that for future development areas the Engineering Code of Practice (ECOP) ADWF or PWWF per person is added to the existing flow. The assumptions made to calculate the future ADWF were based on the ECOP, with the residential 0.675m3/prop/day and non-residential 0.2m3/Ha/day; and the future PWWF was based on the ECOP, at residential 3.375m3/prop/day and non-residential 1m3/Ha/day.

Projections

Figure 6 & Figure 7 present the projected growth and corresponding demand trends for the Oxford wastewater scheme.

Figure 6: Population Projections

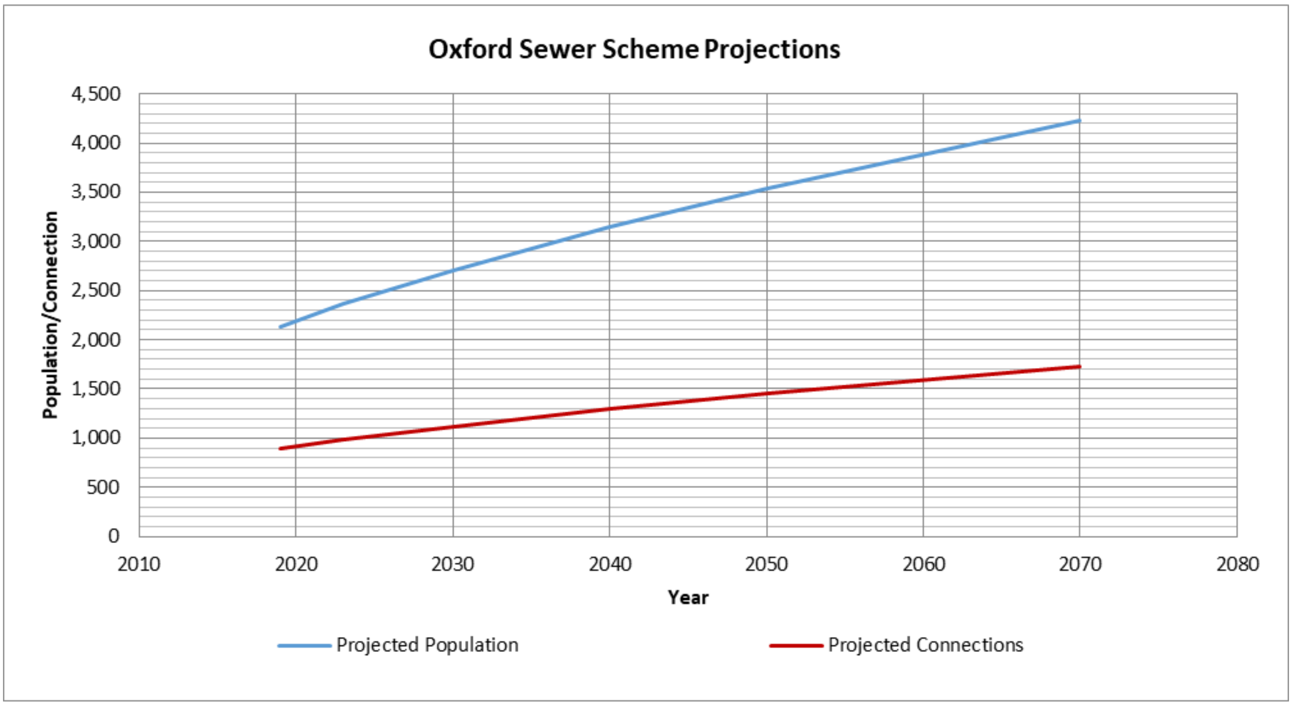
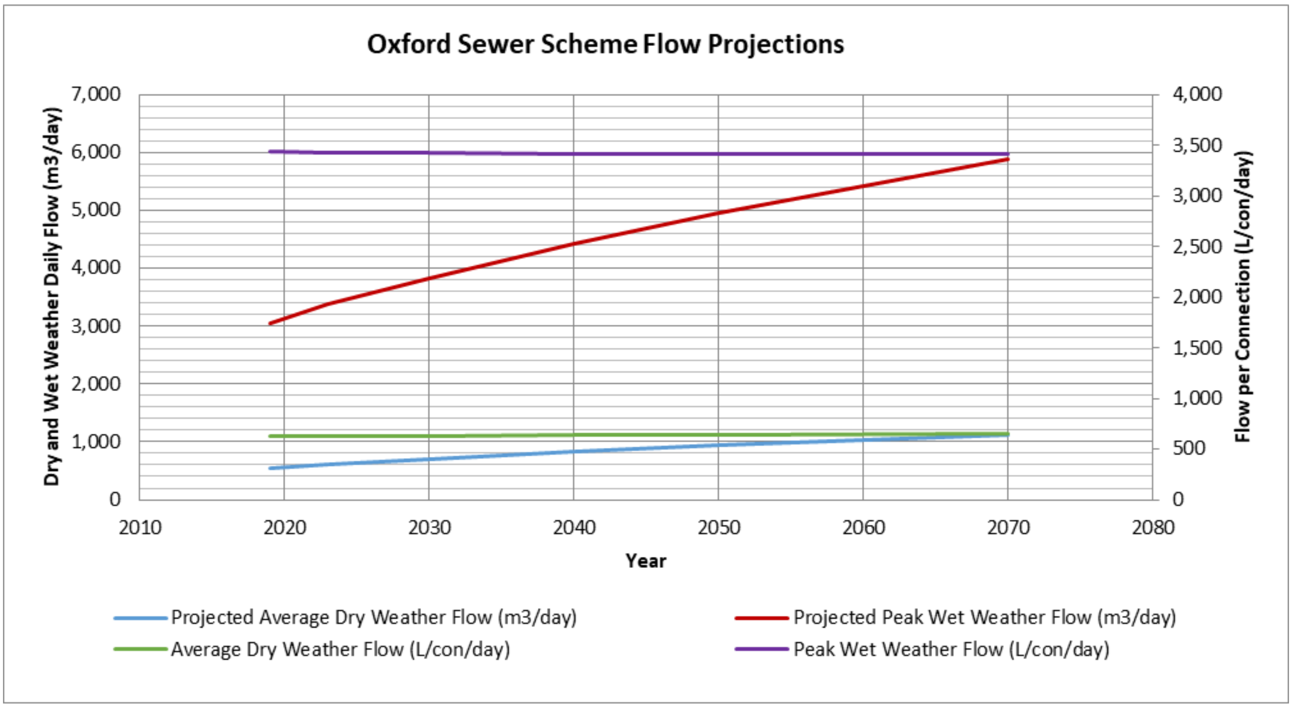


Figure 7: Flow Projections



5.7 Capacity & Performance

This section of the AMP considers the capacity and performance of the Oxford Wastewater Scheme. The specific aspects of the scheme that have been considered are the treatment plant and the reticulation system. These are discussed in more detail in the following sections.

Treatment Plant

The treatment plant is a Modified Ludzack-Ettinger activated sludge process in a concentric tank surrounding a circular clarifier.

When the treatment plant was originally constructed, it failed to meet the design criteria of the design & build contract. However, a major upgrade undertaken in around 2004 has seen the plant operate more reliably and consistently since that time.

A number of further upgrades to the plant were undertaken, including addition of a new holding pond in 2014 to cater for growth on the scheme and address operational and consent compliance issues. The aeration system was upgraded in 2018.

Reticulation System

The capacity of the sewer reticulation was assessed using a hydraulic model in 2007/08, which was revised in 2014. The model was used to assess the upgrades necessary to accommodate growth and to provide sufficient capacity to achieve the following LoS relating to overflows:

- A two level LoS based on age of the network: Adopting a baseline LoS of a 5 year period between overflows in new development areas as per the Council Design Guidelines and applying a 2 year LoS to the existing network.
- No overflows on private property (NOOPP) resulting from insufficient capacity in the reticulation system.

The model demonstrated that the existing system has capacity to meet the current and future demand for the 2 and 5 year levels of service. In addition, there have been no reports of overflows onto private property during the 2013, 2014 and 2017 storms.

Despite this, high I and I remains a concern due to the limited ability to buffer flows at the treatment plant. A programme of further investigation of the reticulation system is planned for in 2021.

There are several properties with Septic Tank Effluent Pumping connections to the Oxford gravity wastewater system. The Council currently owns the septic tank pumps on these properties and undertakes repairs to the pumps when they malfunction. However, any existing customer with a STEP connection to the Oxford scheme, who requires a replacement pump at any future time will have the ownership of all system components on their private property transferred to them, following the replacement of their pump.

Any new customer who requires a STEP connection to the Oxford scheme will be required to pay for the installation and ongoing maintenance of all system components located on their private property. The Council's Wastewater Policy 2014 provides further details of the ownership and maintenance responsibilities for these STEP connections to the Oxford wastewater scheme.

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

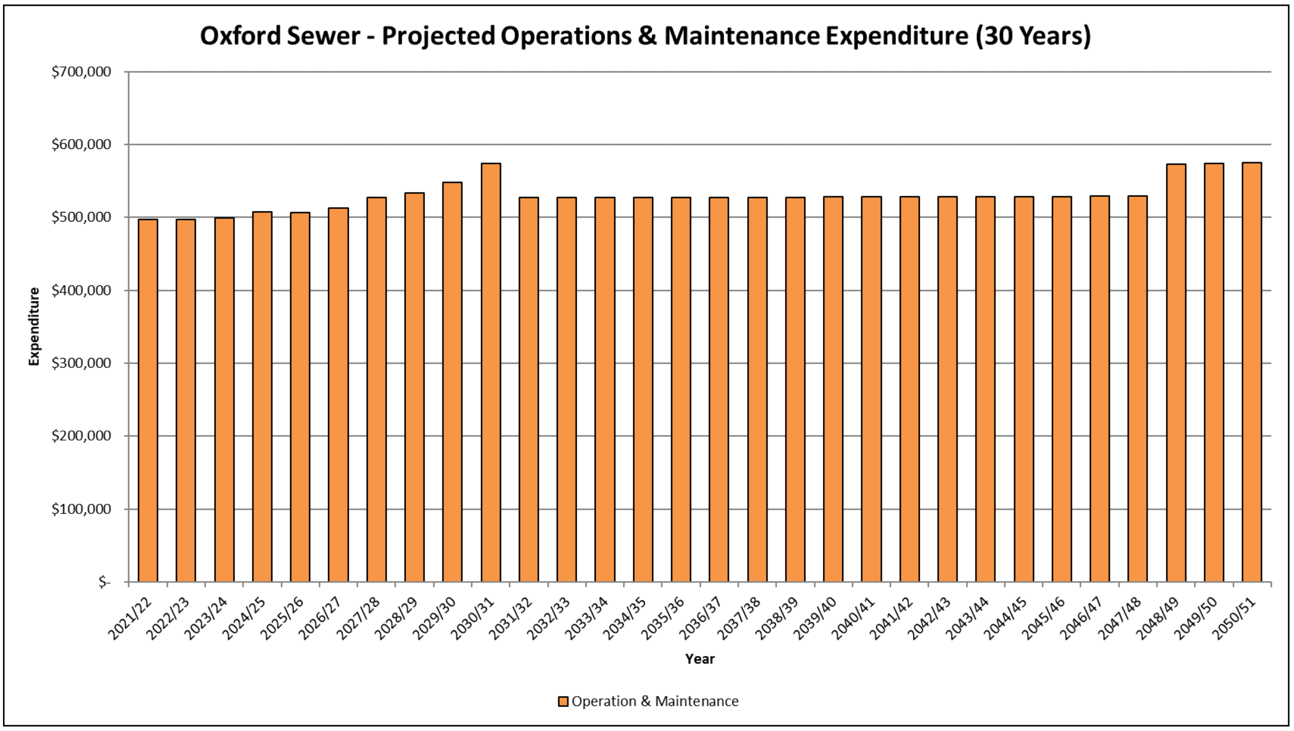
6.1 Operation & Maintenance

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 8.

Figure 8: Annual Operation & Maintenance 30-Year Budget



6.2 Renewals Programme

The renewals programme is determined in two stages. The renewals model, details of which are provided in the overview document, provides a long term view of the funding required to ensure that a renewals fund is sufficient to enable future asset renewals, without needing to borrow. The model provides Asset Managers, at a scheme level, prioritised candidates based on criticality, risk, and expected asset life on for consideration for inclusion in the LTP. Asset Managers consider other factors such as roading renewal programmes in determining final projects for the LTP.

Figure 9 below shows the output from the model only and provides a broad brush spatial view of the likely timeframe for renewals.

Figure 9: Pipe Renewal Time Frames

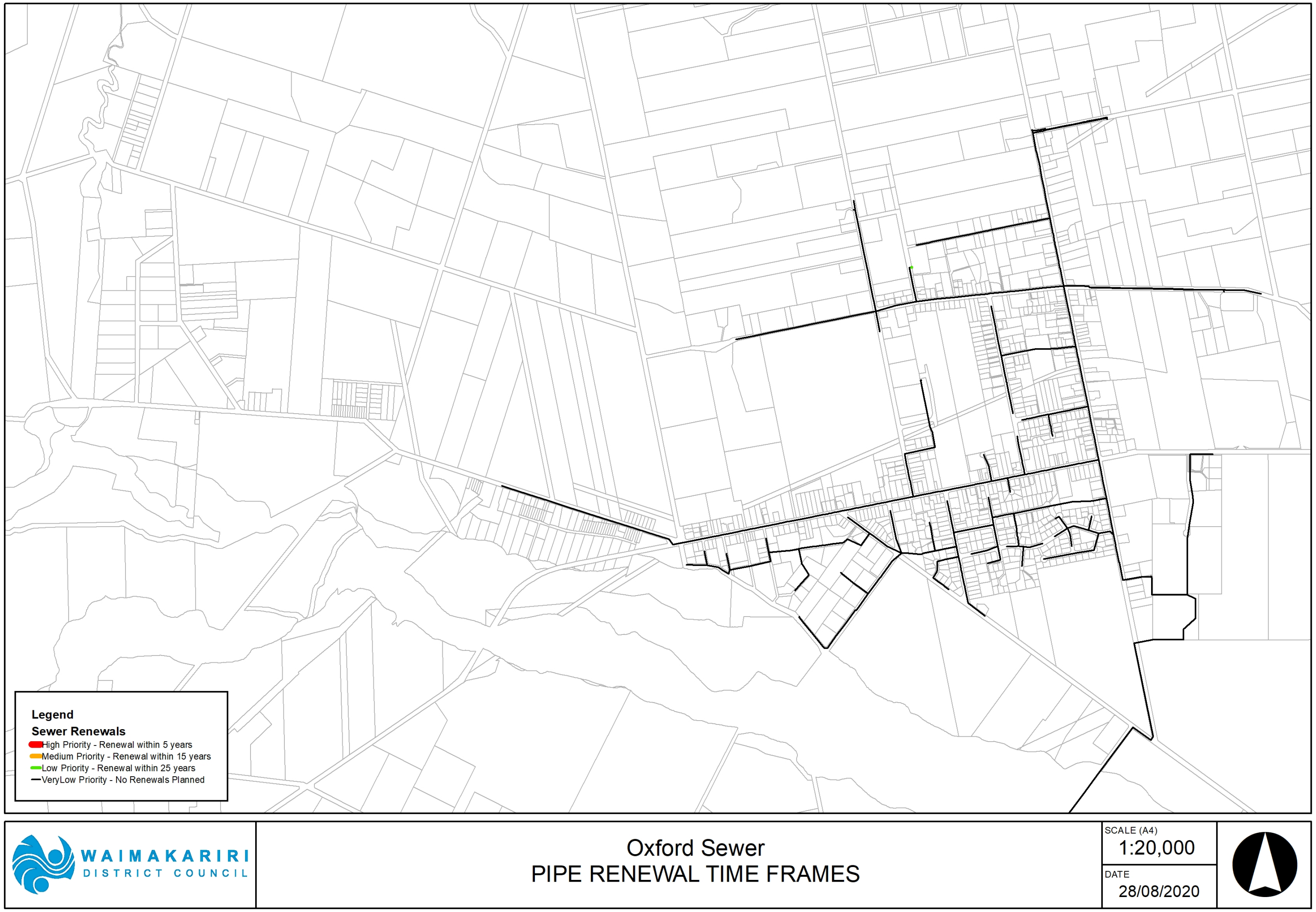


Figure 10 below shows the financial output from the model alone. Over a 150 year period it shows the projected expenditure; the value in the renewals fund; the level of funding required to ensure the fund can meet the required renewals programme, and the annual depreciation.

The figure only shows the output from the model, so expenditure shown in the graph for the first ten years may be different from the expenditure shown in the LTP, as adjustments may have been made by the Asset Manager from the direct renewals model outputs. The decision for deferring asset renewals identified in the model output is based on knowledge of the assets. Individual scheme AMPs detail the actual planned renewals budgets for the first ten years.

Figure 10: Annual Renewals Expenditure, 150 Year Budget

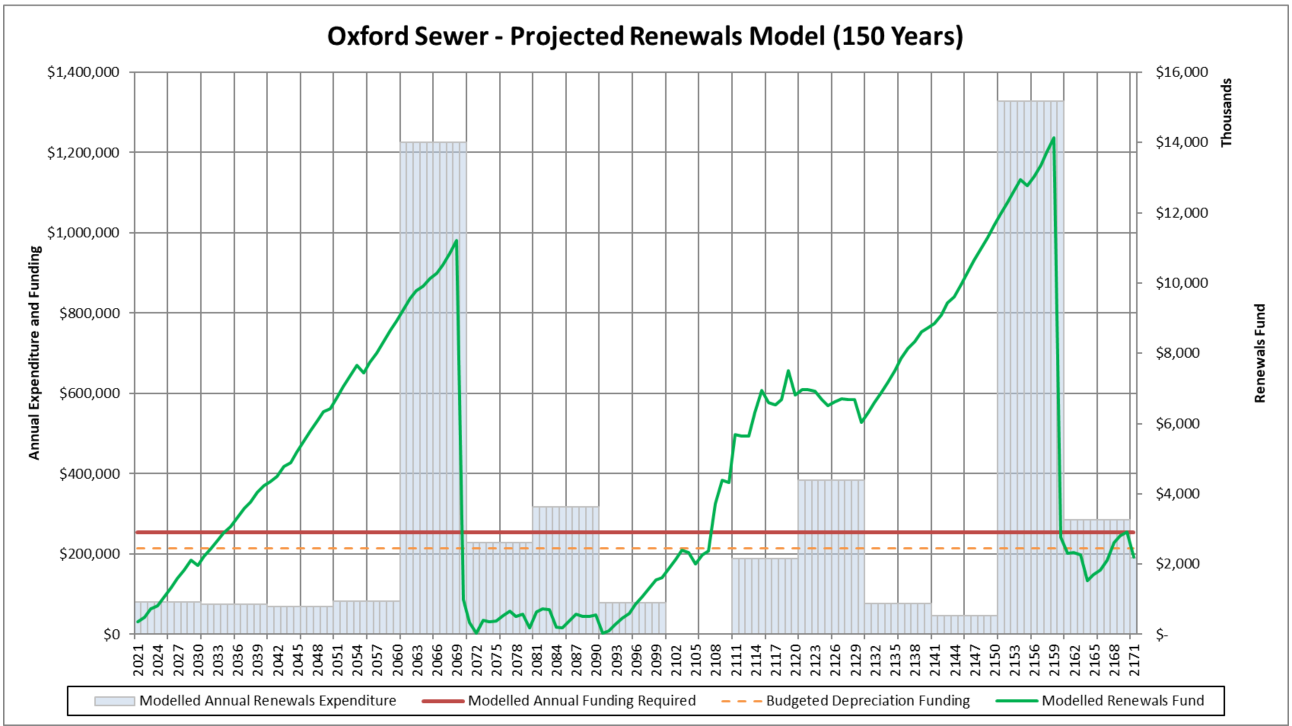


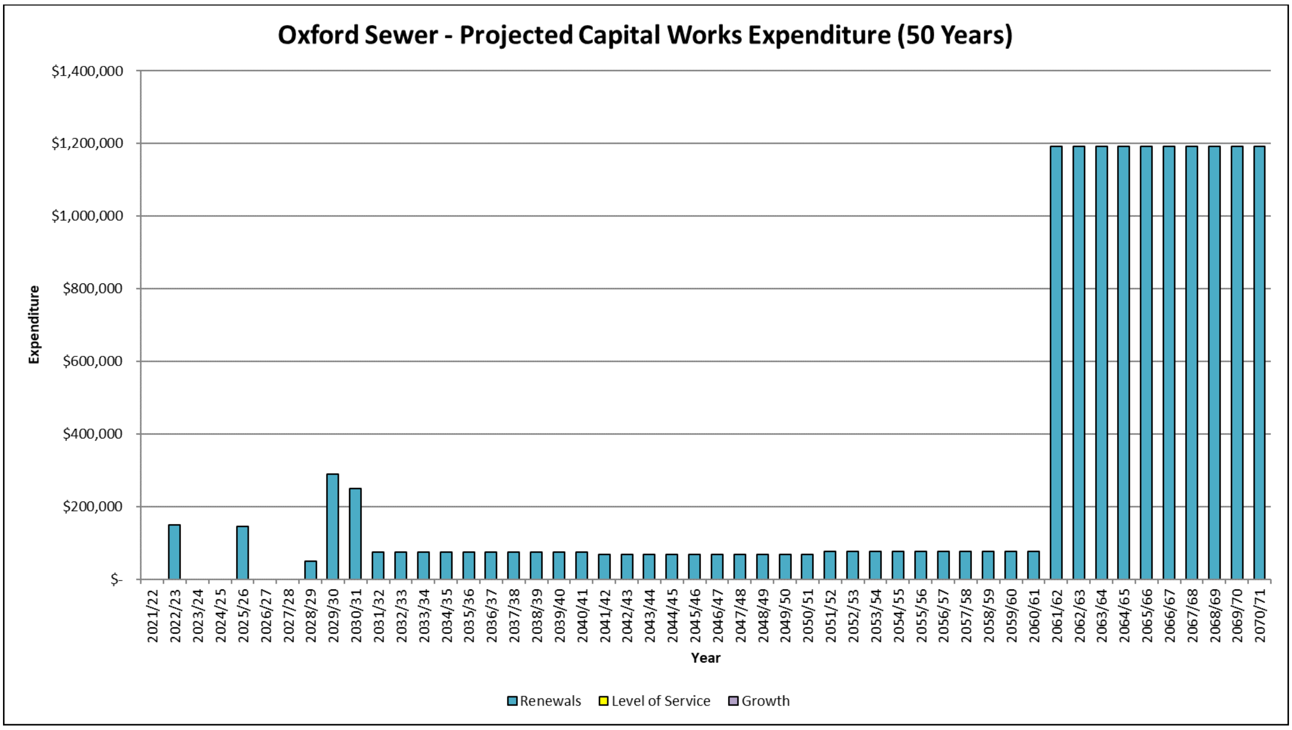
Figure 10 also shows the difference between the annual funding required for the renewal of assets at the end of their life, as determined by the renewals model, and the budgeted depreciation funding. Taken at face value the difference is a measure of the underfunding of the end of life asset renewal programme. This is not the case however, as the next paragraph explains.

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 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 the difference shown in Figure 10.

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 11). Renewals expenditure showing in the first ten years of the graph, includes the actual planned programme, not the model output.

Figure 11: Projected Capital Works Expenditure



The key renewal project occurring in 2022/23 is the replacement of the Oxford WWTP screen. Table 13 on the following page summarises the projected capital works for the next 50 years, including renewals. Figure 12 shows the corresponding location of the projected capital upgrade works.

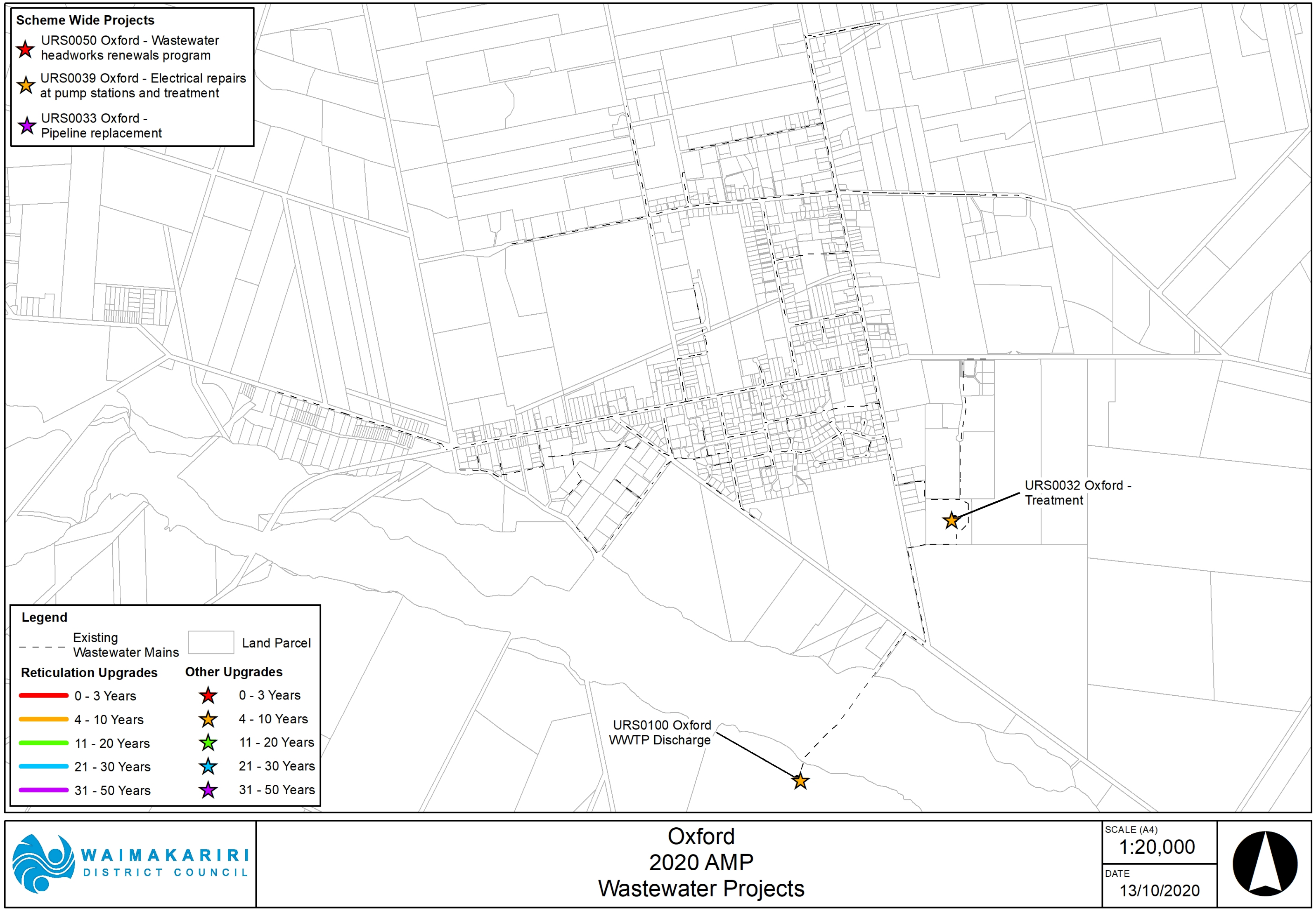
The level of confidence in the budget for the works (High / Medium / Low) is presented in the table. For a more complete discussion on the level of optimisation, refer to the introductory chapter of the AMP. The figures in the table are not adjusted for inflation.

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

Table 13: 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	**URS0050**	Oxford - Wastewater headworks renewals program	**2 - Very Low**	**$ 4,152,314**	**$ -**	**$ 4,152,315**	**$ -**
2026	**URS0032**	Oxford - Treatment Replacements	**5 - Medium**	**$ 100,000**	**$ -**	**$ 100,000**	**$ -**
2026	**URS0039**	Oxford - Electrical repairs at pump stations and treatment plant	**7 - High**	**$ 45,000**	**$ -**	**$ 45,000**	**$ -**
2030	**URS0100**	Oxford WWTP Discharge Consent Renewal	**0**	**$ 80,000**	**$ -**	**$ 80,000**	**$ -**
Year 31 - 50							
2062	**URS0033**	Oxford - Pipeline replacement program	**3 - Low**	**$ 10,630,823**	**$ -**	**$ 10,630,825**	**$ -**
Grand Total				**$ 15,008,137**	**$ -**	**$ 15,008,140**	**$ -**

Figure 12: Projected Capital Upgrade Works (not to scale)



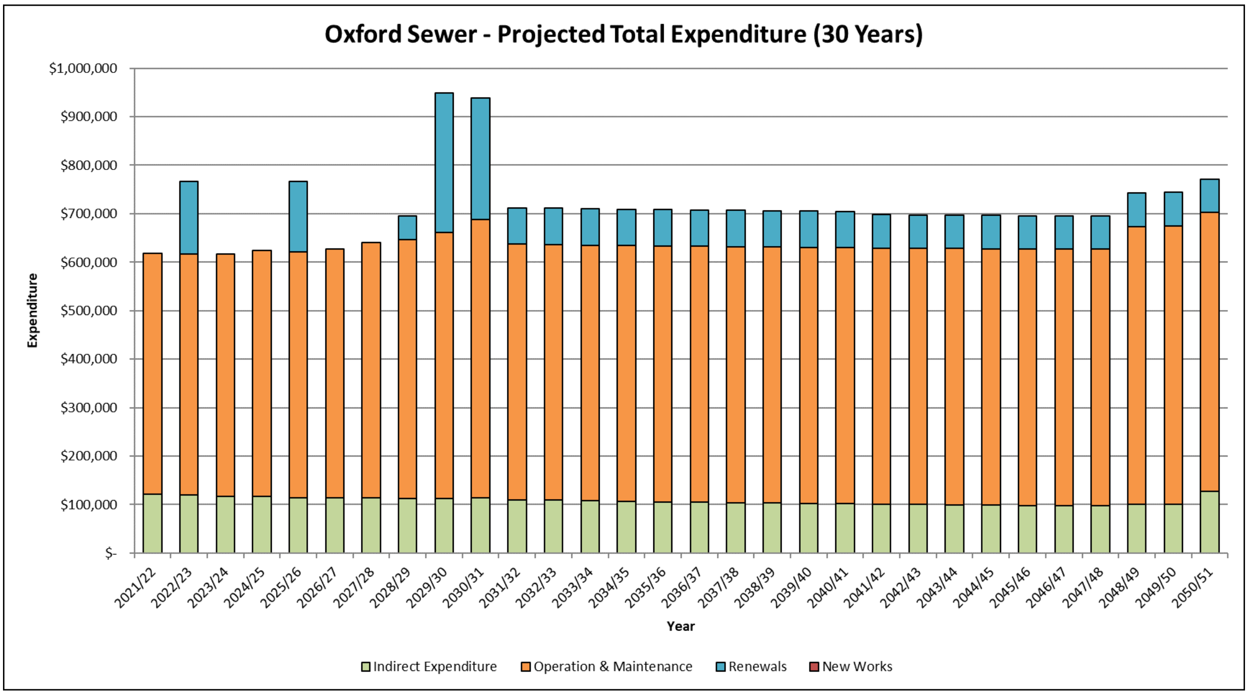
6.4 Financial Projections

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, but not indirect expenditure.

Indirect expenditure includes interest, rating collection costs, costs associated with maintaining the Asset Register, and other internal overhead costs.

Capital includes expenditure for growth, levels of service and renewals.

Figure 13: 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 14 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme.

Table 14: Asset Valuation

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation
Manhole	No.	250	$2,924,087	$2,422,280	$23,530
Valve	No.	2	$6,272	$5,566	$71
Main	m	20,762	$12,180,104	$9,443,982	$121,802
Service Line	properties	712	$2,861,853	$2,247,636	$28,619
Facilities			**$3,486,578**	**$2,526,321**	**$110,524**
Total			**$21,458,893**	**$16,645,785**	**$284,545**

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).

7 Improvement Plan

7.1 2021 Improvement Plan

Table 15 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 15: 2021 AMP Improvement Plan

Project Ref	AMP Section	Project Description	Priority	Status	Estimated Cost
N/A	Operations and Maintenance	Infiltration and Inflow Investigation	High	Planned for 2021	$300,000
N/A	Operations and Maintenance	Sludge dewatering options study at the WWTP	High	Planned for 2021	$70,000

APPENDIX 'A'. PLANS

Figure 14: A1 - Plan of Serviced Area

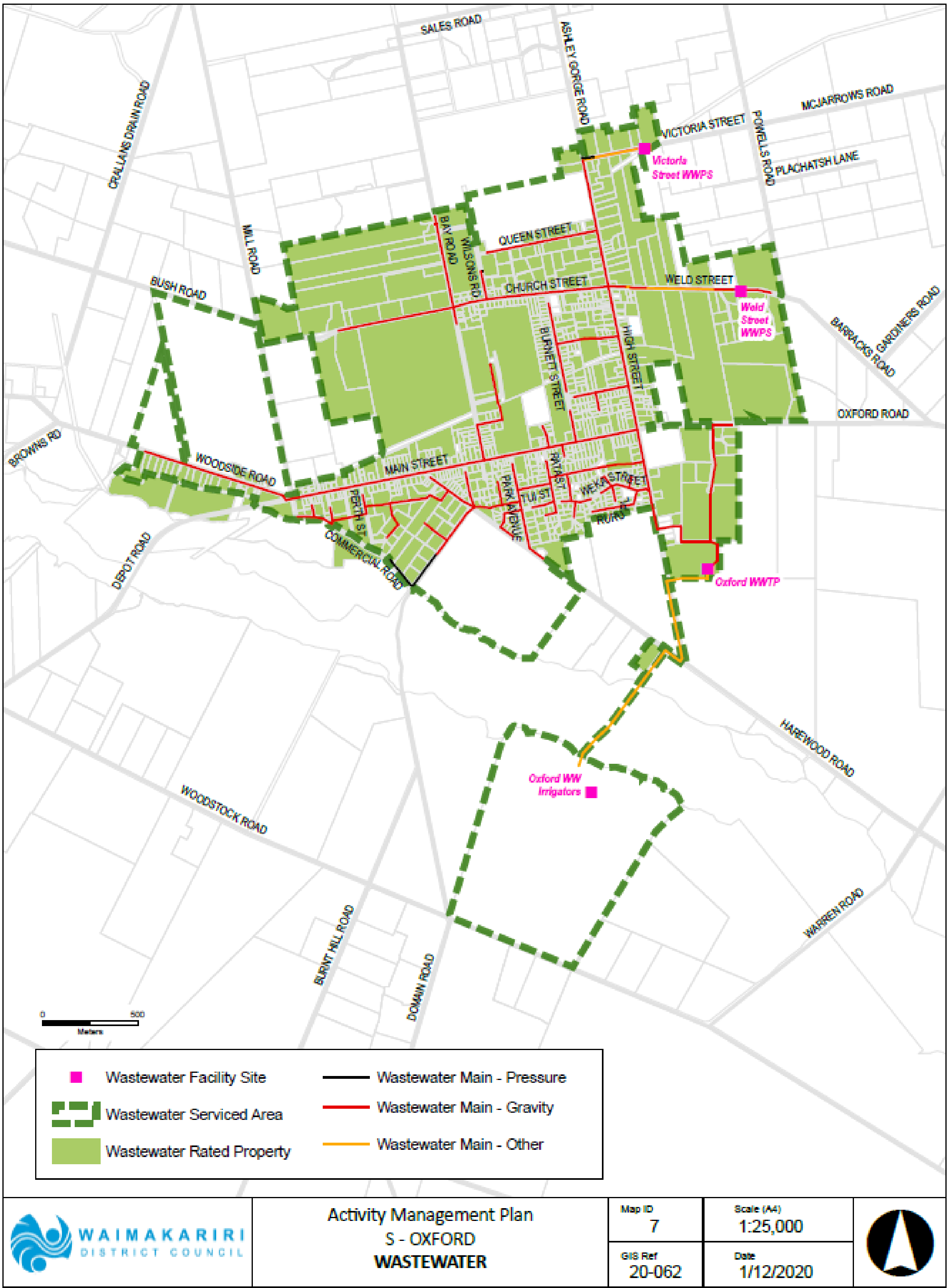


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Figure 15 Wastewewater Statistics

Oxford Wastewater Statistics

Oxford

19/20

Updated: 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
Average Daily Flow	m^3/day	505	514	521	566	561	452	449	469	553	463	436	474	498
Average Dry Weather Flow	m^3/day	432	508	479	498	498	453	432	434	455	420	388	426	457
Peak Daily Flow	m^3/day	1,730	1,664	1,269	1,997	1,796	878	670	859	1,528	1,242	1,216	1,103	1,312
Peak Weekly Flow	m^3/day	1,096	917	756	1,658	1,152	652	550	714	1,260	736	705	793	910
Peak Monthly Flow	m^3/day	884	698	619	1,025	777	505	518	622	757	605	546	610	667
Peak Instantaneous Flow	L/s	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Month		Jun	Jul	Oct	Jun	Jun	Jul	Sep	Apr	Oct	Nov	Aug		
Peak Week		Week 23	Week 31	Week 43	Week 26	Week 25	Week 26	Week 44	Week 16	Week 31	Week 23	Week 30		
Peak Day		26/06/2010	1/11/2010	20/10/2011	22/06/2013	10/06/2014	20/06/2015	29/10/2015	11/04/2017	23/07/2017	1/06/2019	21/07/2019		
Peak Day Rainfall	mm	1.4	0	18.2	7.5	72.5	18.2	2.7	0.6	9	92	18.2		
Peak Day Weather		Storm	Dry	Storm	Wet	Storm	Storm	Wet	Wet	Storm	Storm	Storm		
Total Annual Volume	m^3	185,333	188,541	191,291	207,647	205,747	165,845	164,676	172,030	202,429	170,094	159,679	173,782	182,798

		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
Rating Connections		755	750	771	788	806	839	872	878	883	889	892		
Rating Charges		755	750	771	788	806	852	884	878	883	889	892		
Average Daily Flow per Connection	L/con/day	669	685	676	718	696	539	515	534	626	521	489	537	600
Peak Daily Flow per Connection	L/con/day	2,291	2,219	1,646	2,534	2,228	1,047	768	978	1,730	1,397	1,363	1,247	1,591

	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
Data Quality	very high	very high	very high	very high	very high	very high	high	high	high	high	high