

3 Waters | July 2021



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1 Executive Summary

The following table provides a summary of the key asset management issues associated with the Woodend-Pegasus Water Supply Scheme identified through consideration of the levels of service, consents, asset condition, risk analysis, disaster resilience, growth projections, and capacity assessment:

Resource Consents	The scheme continues to comply with its resource consent conditions.
Level of Service	All levels of service which the scheme is assessed against are met, with one exception. The level of service for placement of hydrants from the Code of Practice is not achieved for a small percentage of the network, with additional hydrants required to meet the target maximum separation distance of 135m. A cost benefit analysis is planned to consider if the cost is worth meeting this LoS.
	The water quality from the sources is compliant with the health and aesthetic requirements of the Drinking Water Standards for New Zealand (DWSNZ). The scheme therefore currently complies with all requirements of the DWSNZ.
Capacity & Performance	Capacity of the water supply system has been assessed as being capable of meeting current demand, with the exception of the Woodend headworks pumping capacity. This is planned for improvement on 2021/22. Future upgrades of various components are programmed to ensure supply is able to meet future demand as the community grows
Risk Assessment	There are no extreme or high risks associated with the Woodend-Pegasus water supply scheme as identified through the Risk Assessment.
Asset Condition	The majority of the scheme is in good condition, with asset age generally very new relative to other schemes.
Disaster Resilience	The Chinnerys Road headworks and Gladstone Park wells were previously assessed as being a high earthquake and security hazard (risk of public interference). A security cage has been fitted to a well head, and security fence installed at the headworks to address the security issues. The Pegasus wells and WTP were also assessed as being at high/extreme risk from earthquake, although these assets are also considered to be some of the most resilient in the district. The scheme has over 6km of extreme or high risk mains vulnerable to natural disasters, including earthquake hazard and several waterway crossings. However, material selection
	requirements in the Engineering Code of Practice (ECoP) considers this risk, and requires that polyethylene (PE) pipe be used in liquefaction prone areas.
Growth Projections	The connections on the scheme are predicted to increase in by 142% by 2071. Upgrades of the source, storage capacity and distribution system will be required to accommodate this growth.

Table 1: Key Asset Management Components

2 Introduction

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

- Provide an overview of the Woodend-Pegasus 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 Woodend-Pegasus 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 <u>121108078783</u> 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, or as general background information:

- Waimakariri District Plan (<u>https://www.waimakariri.govt.nz/your-council/council-documents/district-plan</u>)
- 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)
- Waimakariri District Council Water Supply 50 Year Growth Modelling Assessment 2021 (TRIM 201102146327 for report, 201015138457 for spreadsheet, 200121007544 for model inputs).
- Pegasus Biological Filter Investigation 2020 (refer TRIM 200831113906[v2] for main report, and 201120157064 as subsequent documentation).
- Pegasus Water Supply WTP Operations and Maintenance Manual (TRIM 150525082226).
- Chinnerys Road Surface Pump Upgrade 2017 (AsBuilt data 170818089389, Options memo and pump tests 160331028291 and 151111151686).

4 Scheme Description (What Do We Have?)

The Woodend - Pegasus water supply scheme is an urban water supply with fire-fighting capacity. There are two primary headworks; the Pegasus headworks which provides treatment to all the source water, and distributes water to the Pegasus part of the scheme, and the Chinnerys Road headworks which receives water from the Pegasus headworks and distributes it to the Woodend part of the scheme also supplies the Tuahiwi area.

The Woodend and Pegasus schemes used to be separate, however in 2019 the supplies were joined. Currently just their sources and treatment are shared, with the reticulation systems still separated, with a closed valve providing the point of delineation between schemes. Once the two reticulation networks have a consistent treatment system, this valve will be opened and the schemes fully joined.

The water is sourced from two wells at Gladstone Park, three wells in the Equestrian well field which is located close to Gladstone Park, and one well on Pegasus Boulevard. All primary wells are deep and secure groundwater sources. The wells comply with the bacterial and protozoal requirements of the Drinking-water Standards for New Zealand (DWSNZ).

Treatment is provided at the Pegasus headworks to remove manganese and iron from the source water. The filter was originally a chemical filter which used chlorine as part of the manganese removal treatment process, however in 2018 the filter was converted to a biological filter. This means that manganese and iron are removed without the addition of chemicals. The water that is delivered to Pegasus is treated with chlorine disinfection downstream of the filter, while the water delivered to Woodend is not.

It was originally intended that when the supplies were joined, chlorine would be removed from the Pegasus supply. Due to the upcoming regulatory changes following the Havelock North Drinking-water contamination event, and signals that chlorine may be mandatory, chlorine has been left in the Pegasus supply until further certainty is gained on the future requirements.

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 17.

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

Table 2: Scheme Statistics for 2019/2020

	Stati	6		
Scheme Parameter	Woodend-Tuahiwi	Pegasus	Source	
Type of Supply	Urban (on demand) with fire flows	Urban (on demand) with fire flows		
Principal Source	Gladstone Park 1, Gladstone Parl	< 2, EQ1, EQ2, EQ3, PW1		
Back-up Source	Chinnerys Rd well No. 2 (non- secure groundwater)			
Treatment	Biological iron & manganese rem chlorine disinfection system for t Backup chlorination system at Ch Woodend supply, for emergency			
Nominal Storage Capacity	Total of 900m ³ (2 x 450m ³ Reservoirs)	Total of 4060 m ³ (1360 m ³ + 2700 m ³ Reservoirs)	200121007544	
Length of Reticulation	51.0 km	78.8 km		
Total Replacement Value	\$47.6	Water Asset Valuation Tables 7-4 and 7-5.		
Depreciated Replacement Value	\$39.6	pages 53 - 55.		
Number of Connections	1,526	1,669		
Number of Rating Charges	1,674	1,702	2019/20 Rates Strike	
Average Daily Flow (5 year average)	1,012 m³/day	1,047 m³/day	Flow Data Analysis -	
Peak Daily Flow (5 year average)	2,736 m³/day	2,928 m³/day	Water	
Resource Consent Abstraction Limit	6,912 m³/day (expires 28/02/2043)	12,288 m ³ /day (expires 21/11/2043)	CRC074057	
Average Daily Flow per Connection (5 year average)	796 L/conn./day	645 L/conn./day	Flow Data Analysis - Water	
Peak Daily Flow per Connection (5 year average)	2,131 L/conn./day	1,803 L/conn./day		

Water Supply pipe length (m) by diameter and pipe material													
Pipe		Pipe Diameter (mm)											
material	< 50	50	100	150	200	250	300	375	450	Total			
Asbestos cement	0m	0m	2,097m	2,170m	1,302m	26m	0m	0m	Om	5,595m			
PE	334m	53,011m	299m	13m	7m	387m	3,574m	1,784m	122m	59,532m			
PVC	0m	9,626m	25,382m	17,846m	5,078m	5,659m	1,103m	0m	0m	64,694m			
Steel	0m	4m	0m	0m	0m	0m	0m	0m	0m	4m			
Other	0m	7m	0m	0m	0m	2m	0m	0m	0m	9m			
Total	334m	62,650m	27,779m	20,029m	6,386m	6,074m	4,677m	1,784m	122m	129,834m			

Table 3: Water Supply Pipe Data Summary – Woodend - Pegasus

Water Valves							
Diameter (mm)	Count						
< 50	56						
50	662						
100	296						
150	204						
200	57						
250	44						
300	26						
350	0						
375	6						
400	3						
Total Valves	1,354						
Fire Hydrants	394						

Table 4: Water Supply Valve Data Summary – Woodend - Pegasus

Table 5: Data References

Data Reference	Trim Reference
Flow Data Analysis - Water	<u>121108078783</u>
2020 3 Waters Asset Valuation	200824109857
2019 Customer Satisfaction Survey	200313034937
2020 50 Year Water and Sewer Growth Forecast	200224024348
2019 Woodend-Pegasus Water Safety Plan (pending Drinking Water Assessor approval)	<u>191023148220</u>
2018 Pegasus Water Safety Plan	<u>181219150458</u>
2018 Pegasus Water System Assessment	<u>181219150454</u>
2014 Woodend Water Safety Plan	140805082196
2013 Public Health Risk management Plan - Pegasus	<u>131216116993</u>
2014 Water Supply System Assessment -Woodend	140805082193
2013 Water Supply System Assessment -Pegasus	131216116992
2020 Fire Fighting Code of Practice Compliance Update	200904117110

Figure 1: Network Schematic



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

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

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

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

5.1 Levels of Service

Table 6 sets out the performance measures and targets specific to the Woodend and Pegasus water 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 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 for previous results "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. Note, historic data below is for the Woodend scheme. For historic Pegasus data, refer to past Pegasus AMPs.

		2018 – 2021 Performance Measure	2018 – 2021 Target	2020				Previous Results#			
Section	Level of Service			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, and manganese within guideline levels	Achieved	NA	Y	Y	Y	Y
	DWSNZ – E. Coli Presence	Number of instances where the presence of E coli was detected at the headworks or within the reticulation	Nil/yr	Nil	No E. coli detected	Achieved	NA	Y	Y	Y	Y
	DWSNZ - Protozoa Compliance	Water supply delivers water that achieves a standard suitable for compliance with the health requirements of DWSNZ	Complies	Complies	Secure groundwater status	Achieved	NA	Y	Y	Y	Y
	DWSNZ - Sampling Non- compliance	Number of instances where sampling programme did not comply with DWSNZ, as demonstrated by Water	Nil/yr	Nil	All samples taken in	Achieved	NA	Y	Y	Y	N

		2018 - 2021 Borformanco	2018 - 2021	2020				Previous Results#			
Section	Level of Service	Measure	7018 – 2021 Target	Result	Commentary	Status	Action to Address	2017	2014	2011	2008
		Information NZ (WINZ) database			accordance with DWSNZ						
Fire Fighting	Fire CoP - Hydrant Placement - Urban	Percentage of properties within a Fire District serviced by a reticulated system that complies with the Fire Service Code of Practice for placement of hydrants	100%	99%	Isolated areas where standards are not met in older parts of network.	Not achieved	Consider review of level of service versus investment required to fully met target.	Ν	N	Ν	N
Fire Fighting	Fire CoP – System Flow - Urban	Percentage of properties within a Fire District serviced by a reticulated system that complies with the Fire Service Code of Practice for flow from system	95%	100%	Flow able to be delivered calculated by hydraulic model of reticulation network	Achieved	NA	Y	Y	Y	Y
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	77	Based on average of Woodend and Pegasus zones. Data as per Water Conservation Strategy (2005010506 68).	Achieved	NA	Y	N	Ν	N

		2019 2021 Devfermence	2018 2021	2020				Previous Results#			
Section	Level of Service	2018 – 2021 Performance Measure	2018 – 2021 Target	Result	Commentary	Status	Action to Address	2017	2014	2011	2008
Service Outages	Outages - Events >8 hours	Number of events that cause water not to be available to any connection for >8 hours	Nil/yr	Nil	No events > 8 hours during 19/20 period	Achieved	NA	Y	Insuf. Data	Y	Y
Water Pressure	Pressure - Point of Supply - On Demand	Water pressure at the point of supply in On Demand and Semi-Restricted schemes, excluding outages, as demonstrated by a reticulation model or audits.	>250kPa for 100% of the time >300kPa for 99% of the time	Complies	Validated by water model, running scheme at target demand and ensuring target pressure is achieved.	Achieved	NA	Y	γ	Y	γ
Scheme Capacity	Scheme Capacity - On Demand	Actual peak capacity of the scheme for domestic use - On Demand	>2500 litres/ connection/ day	Complies	Validated by water model, running scheme at target demand and ensuring target pressure is achieved.	Achieved	NA	Y	Y	Y	γ
Storage Volume	Storage - On Demand	Volume of available and usable storage for On Demand and Semi- Restricted schemes (dependant on source type)	7.0 hours	16.4 hours	Required storage calculated based on resiliency and redundancy	Achieved	NA	N	N	Y	Y

		2018 - 2021 Performance	2018 - 2021		202	20			Previou	s Results [#]	
Section	Level of Service	Measure	Target	Result	Commentary	Status	Action to Address	2017	2014	2011	2008
Water Usage	Usage - Average Day	Actual usage on average day	Maintain the average daily water use below 100% of the assessed reasonable water use	73%	Refer to Water Conservation Strategy (2005010506 68)	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 reasonable water use	87%	Refer to Water Conservation Strategy (2005010506 68)	Achieved	Implement actions as identified in Water Conservation Strategy.	N	N	Y	N

5.2 Asset Condition

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

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

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

Table 7: Adopted Reticulation Asset Base Lives for Pressure Pipes

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	106.9 km <i>82%</i>	\$ 31,498,000 <i>81%</i>	\$ 5,783,000 <i>61%</i>	\$ 37,281,000 77%
2	Good Between 50% and 80% of life remaining	14.7 km <i>11%</i>	\$ 4,849,000 <i>13%</i>	\$ 1,706,000 <i>18%</i>	\$ 6,555,000 14%
3	Adequate Between 20% and 50% of life remaining	7.9 km <i>6%</i>	\$ 2,314,000 <i>6%</i>	\$ 1,525,000 <i>16%</i>	\$ 3,839,000 <i>8%</i>
4	Poor Between 10% and 20% of life remaining	0.0 km <i>0%</i>	\$ - 0%	\$ 161,000 <i>2%</i>	\$ 161,000 <i>0%</i>
5	Very Poor Less than 10% of life remaining	0.3 km <i>0%</i>	\$ 60,000 <i>0%</i>	\$ 332,000 <i>3%</i>	\$ 392,000 <i>1%</i>
Total		129.9 km	\$ 38,721,000	\$ 9,507,000	\$ 48,228,000

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 both Supply Schemes in 2004, and they has been regularly updated since that time. They were last updated for the 2015 AMP review. The most recent review revealed no extreme or high risks for either 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 Woodend and Pegasus water supply schemes.

Risk Level	2004 2008 2011			2014			
WOODEND							
Extreme risks	0	0	0	0			
High risks	3	2	2	0			
Moderate risks	17	18	18	19			
Low risks	19	22	27	29			
Not applicable	16	13	11	10			
Total	55	55	58	58			
	PEGA	SUS					
Extreme risks	0	0	0	0			
High risks	0	0	0	0			
Moderate risks	0	17	13	12			
Low risks	0	30	39	39			
Not applicable	0	8	6	7			
Total	0	55	58	58			

Table 9: Number of Events per Level of Risk

All high risks for Woodend scheme have now been reduced to moderate risk.

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

5.5 Water Safety Plan

The Woodend and Pegasus schemes previously had approved Water Safety Plans (WSPs) as they were separate schemes. Since the schemes joined however, the need for a new WSP was triggered, as this is considered a significant change to schemes.

A new WSP was prepared, and submitted to the Drinking Water Assessor (DWA) in December 2019. However, at the time that this AMP was being prepared, the WSP had not been approved. Throughout 2020, there have been significant challenges gaining approved WSPs, with only one WSP having been approved across the country by late October 2020. Staff are continuing to provide the necessary updates and information to work towards gaining approval of the WSPs that are currently outstanding, including for Woodend-Pegasus. It is understood

Budgetary requirements arising from the plan are incorporated into the draft LTP.

When the Water Services Bill comes into effect, which is expected to be in mid-2021, the requirement for WSPs to be produced will be transferred from the Health Act to the Water Services Bill. The plans will then be submitted to Taumata Arowai, rather than the current Drinking-water Assessors which operate under the Ministry of Health.

5.6 Disaster Resilience Assessment

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

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

Above Ground Facilities

The above ground facilities were assessed for risk of failure against 13 natural and 2 manmade hazard scenarios. The following risk profile (Table 10) has been estimated based on the likelihood of the event occurring and, the consequence on the community of the facility failing. Hazards classified as 'No Known Risk' have been omitted from the table.

Threat	Chinnerys Rd Headworks	Gladstone Park Wells	Pegasus Wells EQ1 & 2	Pegasus Well PW1	Pegasus WTP		
100 yr Local Flooding	М	-	Ν	Ν	М		
475 yr Earthquake Induced Slope Hazard	L	L	L	L	L		
Earthquake (50 yr)	Н	Н	E	Н	E		
Earthquake (150 yr)	М	М	Н	М	Н		
Earthquake (475 yr)	М	М	М	М	М		
Wildfire (threat based)	L	L	М	L	М		
Snow (150 yr)	L	L	L	L	L		
Wind (150 yr)	L	L	L	L	L		
Lightning (100 yr)	L	L	L	L	L		
Pandemic (50 yr)	М	М	М	М	М		
Terrorism (100 yr)	Н	Н	М	М	М		
E = Extreme, H = High, M = Moderate, L = Low							

Table 10: Risks to Above Ground Facilities

The Woodend scheme is located in the zone of liquefaction susceptibility and the facilities are considered to be of low resilience due to their age, construction and location. By contrast Pegasus assets are new and considered to be some of the most resilient in the District. Field work is required to better assess the actual risks from moderate earthquake to the Pegasus infrastructure.

The vulnerability of both schemes has been reduced by connecting them together and providing some redundancy.

Chinnerys Road is at moderate risk from 0.25 metres of flooding from local sources, and Pegasus Water Treatment Plant is at moderate risk from 0.2 m of flooding from local sources.

The wildfire threat as modelled by Rural Fire is high at the EQ1 & 2 well sites and moderate for other facility locations.

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

Historically, the growth in Woodend has been constrained by a lack of sewer capacity. However, the Eastern Districts Sewer Scheme has relieved this constraint. Recent developments now mean that Woodend-Pegasus is expected to experience rapid growth and ultimately accommodate a significant portion of the District's growth. It is expected that Pegasus will continue developing within the urban limits until complete.

The mainly residential growth is expected to occur both within the existing town boundary and through expansion of the residential zone. The Woodend growth forecast is mainly being driven by the Ravenswood development in the short term, a 1,500 lot subdivision to the north of Woodend. Longer term growth has been projected to occur in the East and North of the existing Woodend township. It is projected that Pegasus township will continue developing within the urban limits, while the land surrounding the township is not suitable for further expansion.

The overall district population growth scenario used for the 2021 AMP update was supplied by Council's Development Planning Unit, broken into towns and rural areas. Water supply growth projections were calculated using the New Projections for LTP 2021-2031 (TRIM200908117997), which was the basis for infrastructure planning.

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

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

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

Demand

Demand on the Woodend-Pegasus water supply scheme is expected to increase by 60% between the July 2019 rates strike base year and year ten of the 2021-31 Long Term Plan (LTP). This projection is based on:

- 1. 822 new connections from Ravenswood during the 2021-31 LTP period as identified as part of the 2020 WDC 50 Year Water and Sewer Connection Growth Forecast Work (TRIM reference number 200224024348).
- 2. 282 new connections from in Pegasus township during the 2021-31 LTP period as identified as part of the 2020 WDC 50 Year Water and Sewer Connection Growth Forecast Work (TRIM reference number 200224024348).
- 3. 438 new connections from East Woodend and Woodend Beach during the 2021-31 LTP period as identified as part of the 2020 WDC 50 Year Water and Sewer Connection Growth Forecast Work (TRIM reference number 200224024348).
- 4. 400 new connections in the Tuahiwi area, developing over the next 50 year period as identified as part of planning development work.

The number of on-demand connections is predicted to increase by an average of 160 per year during the 2021-31LTP period to accommodate this demand. The small number of properties supplied by a restricted connection (2 units per day) is projected to increase to 47 (or 94 rating units) over the 10 year period.

Demand in the longer term is expected to transition back to a lower growth profile as shown in the document New Projections for LTP 2021-2031 (TRIM200908117997), which was the basis for infrastructure planning. Table 11 shows the projected connections for the next 50 years for the combined Woodend-Pegasus scheme.

	Rates Strike July 2019	Years 1 - 3	Years 4 - 10	Years 11 - 20	Years 21 - 30	Years 31 - 50
Woodend-Pegasus	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	3,025	3,723	4,832	5,522	6,113	7,322
Projected Rating Units	3,203	3,944	5,099	5,825	6,433	7,675
Projected increase in Connections		23%	60%	83%	102%	142%
Projected Average Daily Flow (m3/day)	2,297	3,051	4,204	4,936	5,532	6,751
Projected Peak Daily Flow (m3/day)	6,891	8,759	11,616	13,428	14,903	17,918

Table	11:	Growth	Projections	

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.

Long term, connections are projected to increase by 142%. This long term projection is lower than the 2017 growth projection, 208% (used for the 2017 AMP). Both projections utilised the best data and information available to project the connections for the water schemes at the time. The 2017 population projections had much higher long term growth for the Woodend/Ravenswood area, resulting in a lot of long term growth north of Ravenswood.

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

Projections

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

Figure 5: Population Projections



Figure 6: Flow Projections



5.8 Capacity & Performance

This section of the AMP considers the capacity and performance of the Woodend-Pegasus Water Supply Scheme. The specific aspects of the scheme that have been considered are the source, treatment, storage, headworks, and reticulation system. These are discussed in more detail in the following sections. All of the upgrades mentioned in the following sections necessary to maintain capacity for growth have been included in the long term budgets

Since the 2017 AMP, the Woodend and Pegasus water supplies have been joined physically. This involved:

- 1. Converting the Pegasus filter to a biological manganese removal filter, and treating all water for the combined scheme at the Pegasus water treatment plant.
- 2. Modified the chlorination system to treat the Pegasus water post treatment, resulting in a more stable chlorine concentrations in the supply.
- 3. Constructing water mains to link all source wells into the Pegasus Water Treatment Plant (WTP), and then allow the Pegasus WTP to supply the Woodend water headworks.
- 4. Construct extensions to the reticulation (as part of the Ravenswood development) to join the reticulation systems.

Source

The Woodend-Pegasus Water Supply Scheme draws water from the following primary sources (Table 12).

Well name	Well No.	Diameter (mm)	Depth (m)
Gladstone Road No.1	M35/7542	200	205.8
Gladstone Road No.2	M35/11693	300	210
Equestrian Park 1 (EQ1)	M35/18017	300	214
Equestrian Park 2 (EQ2)	M35/18018	250	250
Equestrian Park 3 (EQ3)	M35/18019	300	210
Pegasus Well 1 (PW1)	M35/10908	250	143

Table 12: Woodend-Pegasus Scheme Primary Sources

There is one back up well near the Woodend Headworks, Chinnerys Road No. 2.

 Table 13: Woodend-Pegasus Scheme Backup Source

Well name Well No.		Diameter (mm)	Depth (m)	
Chinnerys Rd No.2	M35/0470	203	30.2	

The Gladstone Road resource consent (CRC074057) permits a combined flow of 80 litres per second, or 6,912 m3/day, or 1,200,000 cubic metres in any year from the two Gladstone Park wells. These wells originally supplied just the Woodend part of the scheme.

The resource consent (CRC167262) conditions for the original Pegasus wells permit an allowable combined abstraction from the Equestrian Park and Pegasus source wells to 12,288 cubic metres per day at a maximum rate of 142 L/s, or 1,756,015 cubic metres per year.

All the wells in Table 12 are primary wells for the Woodend-Pegasus water supply. The capacity of the wells is shown in Table 14 and Table 15.

Table 14: Woodend-Pegasus	Well	Capacities
---------------------------	------	------------

Well	Capacity (I/sec)	Comments		
Gladstone Park No.1	31	SCADA Measured		
Gladstone Park No.2	31	SCADA Measured		
Equestrian Park 1 (EQ1)	30	Reduced capacity following advice after re- development in 2016		
Equestrian Park 2 (EQ2)	37	SCADA Measured		
Equestrian Park 3 (EQ3)	37	SCADA Measured		
Pegasus Well 1 (PW1)	20	SCADA Measured		
Total	185			

Note that these capacities are when the wells are run independently.

Chinnerys Road No.2 well provides back-up supply only. This pumps separately to the Chinnerys Road headworks (Table 15). Chinnerys Road No.1 well is now disconnected.

Table 15: Chinnerys Road Well Capacity

Well	Capacity (l/sec)	Comments
Chinnerys Rd No.2	25	Measured

Council plans capacity for its water supplies on the basis that one of the primary wells is out of operation at any given time. This concept is used to ensure that there are sufficient levels of resilience and redundancy available. Therefore the Woodend-Pegasus scheme is considered to have a capacity of 155L/s, based on a 30 L/s well not being available.

To calculate the required source capacity, further contingency is introduced through assuming 10% down time, which increases required source capacity above the Peak Daily Flow. The following table presents the projected water demand and associated required source capacity for the Woodend-Pegasus supply.

	Oyrs	10yrs	20yrs	30yrs	50yrs
Projected Peak Daily Flow (L/s)	106	160	182	201	236
Required Source Capacity (L/s)	118	174	197	219	257

Table 16: Project Demand and Required Capacity for Scheme

While there is sufficient capacity for current demands, there is not sufficient capacity available to meet the 10 year projected demand. However there is a well site in the Equestrian Park area which has the potential to deliver similar flows to the other EQ wells (approximately 37L/s) once fully developed. This source upgrade is scheduled to be undertaken in 2025/26, bringing the total capacity to 192 L/s (155 L/s + 37 L/s). There is an additional upgrade scheduled for 2043/44 to provide source water for the full 50 year period.

Treatment

All of the primary sources for the Woodend-Pegasus supply are certified as secure groundwater. This means that the wells achieve compliance for both microbiological and protozoan requirements in the DWSNZ, without requiring any treatment for bacteria or protozoa.

Treatment is provided to remove manganese and iron from the source water, by way of a biological filter. This was previously a chemical filter, however was upgraded in 2018 to a biological filter both to increase the overall filter capacity as part of the schemes joining, and also to improve the aesthetic properties of the water.

Originally, it was intended that when the manganese removal filter was converted from a chemical to biological filter, that chlorine could be removed from the system. Following the Havelock North Drinking-water Inquiry, and subsequent regulation and legislation changes that are underway currently, chlorine has been kept in the Pegasus part of the system until further guidance is received. The intention with leaving chlorine out of the Woodend part of the system, but keeping it in the Pegasus system, is to avoid significant changes until there is greater certainty on the long term future requirements.

A placeholder budget has been included in the draft LTP in 2022/23 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. It is assumed that this change will require the installation of UV treatment plant, and possibly permanent chlorination equipment of the Woodend part of the system, as well as Pegasus. The final decision regarding the treatment requirements will be made following review of the next revision of the Drinking-water Standards (expected to be released in 2021) and also after gaining a better understanding about potential requirements for mandatory chlorination and the exemption process under the new drinking-water regulator (Taumata Arowai).

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 Chinnerys Road headworks has an existing storage capacity of 914 m³ made up of two 457 m³ reservoirs.

At Pegasus, in order to provide stored water redundancy, firefighting capacity and allow for staging, two separate reservoirs have been installed. These are reservoir A (1,362 m³), and Reservoir B (2,714 m³) which are located in the lower southeast corner of the Pegasus WTP site.

After treatment the water is stored separately for each sub scheme (Woodend and Pegasus). This is so that the water can remain chlorinated for Pegasus but not Woodend. It is noted however that the storage requirements for the scheme are kept combined as the water can be shared if required. Reservoir B is connected to the transfer pumps and pumps water to the Woodend headworks for distribution. Reservoir A is chlorinated and connected to the Pegasus network distribution pumps.

Emergency storage requirements for Woodend-Pegasus are 7.0 hours of Average Daily Flow, based on a 2020 update of the work carried out in the Water Supply Source Resilience Analysis (170623064893).

Table 17 presents the required storage capacity.

	Oyrs	10yrs	20yrs	30yrs	50yrs							
Woodend-Pegasus Required Storage Volume (m ³)	3548	4843 ¹	5509	4810	5816							
Woodend-Pegasus Planned Storage Volume (m ³)	4990	4990	6090 ²	6090 609								
Note no. 1 - that the required storage capacity depen the working volume required reduces, and therefore t have been scheduled in the 0 – 10 and 20-30 year per Note no. 2 – 2000m ³ reservoir upgrade at Chinnerys F	Note no. 1 - that the required storage capacity depends heavily on the source capacity. When a source is upgraded the working volume required reduces, and therefore the overall storage requirement reduces. Source upgrades have been scheduled in the $0 - 10$ and $20-30$ year periods. Note no. $2 - 2000m^3$ reservoir upgrade at Chinnerys Road.											

Table 17: Required Storage Capacity for Woodend-Pegasus Scheme

It is projected that an additional 2000m³ of storage is required at Chinnerys Road in the next 50 years, to meet the projected 50 year demands.

Headworks

The Pegasus headworks features two backwash pumps, operating as duty/standby, that take the treated water from the balance tank and pump this back through the filters as part of the combined air and backwashing sequence. The water from the 120 m³ treated water tank is pumped through two treated water pumps that operate on a duty/standby basis and are fitted with non-return valves on the pump discharge manifold to the reservoirs.

In 2019 the Pegasus reticulation pump manifold was modified to accommodate three transfer pumps, to pump treated water to the Woodend headworks. These pumps were designed to transfer 58L/s, in a duty-assist-standby arrangement.

Woodend headworks consist of four supply pumps, with all connected to VSD's (variable speed drives). The pumps operate as duty-assist-assist-standby and have an estimated combined capacity of 69 L/s (including one 17L/s pump being on standby, for redundancy).

Pegasus has six booster pump sets (including 2 jockey pumps) which are located after the reservoirs to boost supply pressure to meet the design flow. The pumps operate as duty-assist-standby and have an estimated combined capacity of 110 L/s (143L/s including the standby pump).

Combined Pegasus and Woodend headworks would have a combined capacity of 179L/s.

Table 18 presents the projected peak hourly flows for the Woodend-Pegasus supply.

	Oyrs	10yrs	20yrs	30yrs	50yrs
Woodend Expected Peak Hourly Flow (L/s)	91	109	146	183	219
Pegasus Expected Peak Hourly Flow (L/s)	110	186	187	187	217

Table 18: Projected Peak Hourly Flows for Surface Pumps in Woodend-Pegasus Scheme

An upgrade is first required at Chinnerys Road in year 2021/22 (to address the existing deficiency in terms of its pumping capacity versus projected peak hourly flow), then again in 2049/50, which involves upsizing the existing pumps to larger pumps. The Pegasus headworks requires a surface pump upgrade in year 2025/26, which replaces the jockey pumps with main pumps. Additionally there is a surface pump upgrade scheduled for 2050/51, which upgrades all of the pumps and

manifold at the Pegasus headworks. These staggered four surface pump upgrades would meet the projected PDF demands at 50 years.

The transfer pumps are scheduled for an upgrade in 2036/37 to increase their capacity to 100L/s.

Reticulation

The capacity of the reticulation upgrades have been assessed using a partly calibrated reticulation model. The model and associated monitoring has confirmed that the existing reticulation system has adequate capacity for the existing demands. However, substantial reticulation upgrades will be required over the next 10 years to accommodate future growth. These upgrades are mainly in the Woodend area.

The reticulation upgrades have been modelled, cost estimates undertaken and the projects have been included in the 2021-31 LTP. For further information refer to Section 6.3 of this document.

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





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

Other one-off O&M costs in initial years includes additional pipe scouring costs in Woodend, as part of the initial implementation of chlorination which is anticipated, as well as an allowance of \$100,000 in Year 3 of the LTP period to replace all the sand in the filters, to improve capacity and overall performance (refer to report 200831113906[v2] for background to this).

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.

As may be seen from the graph depreciation is slightly higher than the modelled annual funding required

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

Table 19 summarises the projected capital works for the next 50 years, including renewals. Figure 11 shows the corresponding location of the projected capital 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.

It can be seen that the most significant upcoming works on this scheme are to accommodate growth. This is a reflection of the relatively new asset age (minimising the amount of initial renewals required), and also the high growth projected to occur.

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.

Year	Project ID	Project Name	Level of Confidence	Pro	oject Value	LOS	Component	I Ci	Renewals omponent	Growt	th Component
Year 1 - 10											
2022	URW0029	Woodend Water Supply Pipe Renewals	3 - Low	\$	4,559,693	\$	-	\$	4,559,693	\$	-
2022	URW0040	Woodend Headworks Renewals	3 - Low	\$	6,300,923	\$	-	\$	6,300,923	\$	-
2022	URW0099	Chinnerys Road Surface Pump Upgrade 1	3 - Low	\$	268,000	\$		\$	68,000	\$	200,000
2022	URW0231	Woodend-Pegasus Water Reticulation Quality Monitoring Equipment	0	\$	60,000	\$	60,000	\$	-	\$	-
2023	URW0100	Main North Road Main Upgrade 1	3 - Low	\$	79,000	\$	-	\$	50,000	\$	29,000
2024	URW0286	Pegasus Water Treatment Plant Sand Upgrade	5 - Medium	\$	120,000	\$	-	\$	-	\$	120,000
2025	URW0101	Rangiora Woodend Road Booster Main Stage 1	3 - Low	\$	619,000	\$	-	\$	140,000	\$	479,000
2026	URW0138	Additional Equestrian Source Well	3 - Low	\$	400,000	\$	-	\$	-	\$	400,000
2026	URW0153	Pegasus Surface Pump Upgrade 1	2 - Very Low	\$	50,000	\$	-	\$	14,000	\$	36,000
2027	URW0104	Pegasus Waikuku Link Main Stage 1	3 - Low	\$	338,000	\$	-	\$	-	\$	338,000
2027	URW0202	Woodend Ravenswood Eastern Link Main	3 - Low	\$	70,000	\$	-	\$	36,000	\$	34,000
2028	URW0103	James Drive Main Upgrade	3 - Low	\$	39,000	\$	-	\$	-	\$	39,000
2029	URW0216	Woodend Well Head Improvement	5 - Medium	\$	125,000	\$	125,000	\$	-	\$	-
2030	URW0249	Welsford Street Upgrade	3 - Low	\$	137,000	\$	-	\$	67,000	\$	70,000
2031	URW0140	Ravenswood Trunk Main North Upgrade	3 - Low	\$	12,000	\$		\$		\$	12,000
Year 11 - 20											
2033	URW0147	Chinnerys Road Reservoir Upgrade 1	3 - Low	\$	2,000,000	\$	-	\$	-	\$	2,000,000
2034	URW0106	Waikuku Township Mains	1 - Coarse	\$	955,000	\$	-	\$	-	\$	955,000
2035	URW0105	Woodend Beach Supply Main	3 - Low	\$	2,334,000	\$	-	\$	-	\$	2,334,000
2035	URW0141	Rangiora Woodend Road Booster Main Stage 2	3 - Low	\$	375,000	\$	-	\$	-	\$	375,000
2036	URW0143	Fixed Generator at EQ1 and EQ2 Wells	2 - Very Low	\$	200,000	\$	-	\$	-	\$	200,000
2040	URW0145	Main North Road Main Upgrade 2	3 - Low	\$	41,000	\$	-	\$	35,000	\$	6,000

Table 19: Summary of Capital Works (Includes Renewals)

Year 21 - 30								
2042	URW0142	Chinnerys Road Main Upgrade	3 - Low	\$	341,000	\$ -	\$ -	\$ 341,000
2044	URW0250	Woodend Pegasus Source Upgrade 2	3 - Low	\$	750,000	\$ -	\$ -	\$ 750,000
2050	URW0144	Chinnerys Road Surface Pump Upgrade 2	3 - Low	\$	80,000	\$ -	\$ 66,000	\$ 14,000
2051	URW0251	Pegasus Surface Pump Upgrade 2	3 - Low	\$	400,000	\$ -	\$ 305,000	\$ 95,000
Year 31 - 50								
		Pegasus to Woodend Transfer Pumps						
2037	URW0146	Upgrade	3 - Low	\$	80,000	\$ -	\$ 37,000	\$ 43,000
2037	URW0248	Pegasus Waikuku Link Main Stage 2	3 - Low	\$	610,000	\$ -	\$ -	\$ 610,000
2052	URW0149	North Woodend Trunk Main Upgrade 1	3 - Low	\$	28,000	\$ -	\$ -	\$ 28,000
2056	URW0150	North Woodend Trunk Main Upgrade 2	3 - Low	\$	34,000	\$ -	\$ -	\$ 34,000
2061	URW0252	North Woodend Upgrade 3	3 - Low	\$	60,000	\$ -	\$ -	\$ 60,000
Grand Total				\$	21,465,617	\$ 185,000	\$ 11,678,617	\$ 9,602,000
			District U	V Fund	ed			
2025	UR00988	WTP Upgrade- Transfer pumps and UV			\$ 650,000			

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 operation and capital expenditure. Operational costs included 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 20 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme

Asset Type	Unit	Quantity	Replacement Cost	Depreciated Replacement Cost	Annual Depreciation	
Valve	No.	1,354	\$4,151,094	\$3,642,349	\$42,786	
Main	m	129,834	\$30,138,560	\$25,797,150	\$312,897	
Hydrant	No.	395	\$1,076,150	\$898,514	\$11,489	
Service Line	Properties	3,126	\$2,680,808	\$2,260,456	\$27,974	
	Facilities		\$9,524,954	\$7,004,591	\$209,287	
	Total		\$47,571,566	\$39,603,059	\$604,433	

7	able	20:	Asset	Valuation
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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 <u>191129168016</u>), while targeted rates are charged in accordance with Council's Revenue and Financing Policy (TRIM 180522056008).

A further revenue source is the district wide rate that has been set up specifically to fund installation of UV disinfection at all schemes that do not already have it, although it is noted this is simply an alternative type of targeted rate, rather than a separate type of funding source.

7 Improvement Plan

7.1 2021 Improvement Plan

Error! Reference source not found. details the scheme specific improvements 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.

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

Table 21: 2021 AMP Improvement Plan

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

Some changes to budgets have arisen as a consequence of a staff submission report to Council during LTP hearings 25-26 May (TRIM 210420063358). Projects themselves have not changed, but budgets have been modified as a consequence of detailed designs progressing.

For the Woodend Pegasus WS scheme, the only change was the Pipeline Cleaning and Flushing budget was brought forward to enable earlier air scouring of pipes than previously planned, (increased in 2021/22 from \$20,670 to \$60,670, and reduced in 2022/23 from \$62,250 to \$22,250)

PLANS

Figure 13: A1 - Plan of Serviced Area – Woodend and Tuahiwi

Figure 14: A1 - Plan of Serviced Area – Woodend & Tuahiwi (Restricted)

Figure 15: A1 - Plan of Serviced Area – Pegasus

Figure 16: A2 - Plan of Fire District & Extent of Fire Mains

Figure 17: Woodend Water Supply Statistics

Woodend	Water S	Supply S	<u>tatistics</u>		Woodend		•		19/20		•		Last Update	
Note that shading indicates the relativ	/e quantity m	easured for th	ie ten year pe	eriod (i.e. the	lowest value	has no shadi	ng, the highe	st has compl	ete shading.)	te shading.)				
		July '09 -	July '10 -	July '11 -	July '12 -	July '13 -	July '14 -	July '15 -	July '16 -	July '17 -	July '18 -	July '19 -	5 yr	10 yr
		June '10	June '11	June '12	June '13	June '14	June '15	June '16	June '17	June '18	June '19	June '20	Average	Average
Nightly Flow	L/s	-	-	-	-	-	-	-	-	2.60	2.49	-	2.55	2.55
Average Daily Flow	m³/day	1,047	1,024	915	1,054	919	1,081	1,052	930	959	956	1,164	1,012	1,005
Peak Daily Flow	m³/day	2,292	2,515	1,890	2,900	2,489	2,989	2,467	2,246	2,981	2,663	3,323	2,736	2,646
Peak Weekly Flow	m³/day	2,109	2,499	1,690	2,194	1,587	2,345	2,029	1,848	2,563	2,132	2,582	2,231	2,147
Peak Monthly Flow	m³/day	1,554	1,893	1,313	1,705	1,340	1,956	1,650	1,703	1,773	1,735	2,147	1,801	1,721
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Month		Feb	Dec	Jan	Jan	Jan	Jan	Dec	Feb	Dec	Feb	Jan		
Peak Week		Week 2	Week 53	Week 4	Week 3	Week 6	Week 2	Week 49	Week 6	Week 50	Week 7	Week 5		
Peak Day		7/01/2010	7/02/2011	5/12/2011	22/12/2012	19/01/2014	4/01/2015	2/12/2015	4/02/2017	10/12/2017	10/02/2019	2/02/2020		
Peaking Factor		2.2	2.5	2.1	2.8	2.7	2.8	2.3	2.4	3.1	2.8	2.9		
Total Annual Volume	m ³	384,100	375,629	335,648	386,986	337,263	396,560	385,933	341,310	351,948	351,031	427,270	371,498	368,958
		-												
Resource Consent	m³/day	6,912	6,912	6,912	6,912	6,912	6,912	6,912	6,912	6,912	6,912	6,912	6,912	6,912
Well Pump Capacity	m³/day	3,456	3,456	3,456	3,456	3,456	4,752	4,752	4,752	4,752	4,752	4,752	4,752	4,234
Surface Pump Capacity	m³/day	6,912	6,912	6,912	6,912	6,912	4,838	4,838	4,838	4,838	4,838	4,838	4,838	5,668
On-Demand Connections]	969	970	973	975	1,029	1,032	1,037	1,090	1,227	1,332	1,443		
Restricted Connections]	8	8	8	9	46	46	46	46	47	83	83		
Total Connections		977	978	981	984	1,075	1,078	1,083	1,136	1,274	1,415	1,526		
Average Daily Demand	L/con/day	1,071	1,047	932	1,072	855	1,002	971	819	753	676	763	796	889
Peak Daily Demand	L/con/day	2,346	2,572	1,927	2,947	2,315	2,773	2,278	1,977	2,340	1,882	2,178	2,131	2,319
Allocated Water Units	m³/day	-	-	-	-	-	-	-	-	-	-	-		
Average Daily Flow per Unit	L/unit/day	-	-	-	-	-	-	-	-	-	-	-	-	-
Peak Daily Flow per Unit	L/unit/day	-	-	-	-	-	-	-	-	-	-	-	-	-
On-Demand Rating Charges		1,024	1,020	1,030	1,030	1,085	1,086	1,091	1,147	1,257	1,388	1,504		
Restricted Rating Charges		16	16	16	22	100	96	96	96	98	170	170		
Total Rating Charges		1,040	1,036	1,046	1,052	1,185	1,182	1,187	1,243	1,355	1,558	1,674		
Data Quality		very high	very high	very high	very high	very high	very high	high	very high	very high	very high	very high		

Figure 18: Pegasus Water Supply Statistics

Pegasus	Pegasus Water Supply Statistics							Pegasus 💌					Last Update Jun-20		
Note that shading indicates the relative	/e quantity m	easured for th	ne ten year pe	eriod (i.e. the	lowest value	has no shadi	ng, the highe	st has compl	ete shading.)						
		July '09 -	July '10 -	July '11 -	July '12 -	July '13 -	July '14 -	July '15 -	July '16 -	July '17 -	July '18 -	July '19 -	5 yr	10 yr	
		June '10	June 11	June 12	June 13	June 14	June 15	June 16	June 17	June 18	June 19	June 20	Average	Average	
Nightly Flow	L/S	-	-	-	-	-	-	-	-	1.00	1.82	-	1.41	1.41	
Average Daily Flow	m°/day	324	448	516	932	905	1,216	1,035	961	977	1,013	1,248	1,047	925	
Peak Daily Flow	m³/day	1,113	1,334	1,393	2,399	3,074	3,902	2,774	2,324	3,112	2,819	3,610	2,928	2,674	
Peak Weekly Flow	m³/day	877	1,006	978	1,867	2,205	3,125	1,964	1,970	2,573	2,433	2,760	2,340	2,088	
Peak Monthly Flow	m³/day	605	811	817	1,481	1,998	2,701	1,753	1,827	1,999	2,098	2,562	2,048	1,805	
Peak Hourly Flow	L/s	-	-	-	-	-	-	-	-	-	-	-	-	-	
Peak Month		Nov	Jan	Feb	Jan	Feb	Jan	Dec	Feb	Dec	Feb	Jan			
Peak Week		Week 48	Week 3	Week 6	Week 3	Week 6	Week 7	Week 49	Week 6	Week 50	Week 6	Week 5			
Peak Day		24/11/2009	10/01/2011	20/01/2012	28/11/2012	4/02/2014	8/02/2015	21/12/2015	15/02/2017	10/12/2017	27/01/2019	2/02/2020			
Peaking Factor		3.4	3.0	2.7	2.6	3.4	3.2	2.7	2.4	3.2	2.8	2.9			
Total Annual Volume	m ³	118,966	164,588	189,416	341,960	332,305	446,277	379,843	352,753	358,649	371,861	458,017	384,224	339,567	
									-						
Resource Consent	m³/day	-	-	-	-	-	12,288	12,288	12,288	12,288	12,288	12,288	12,288	12,288	
Well Pump Capacity	m³/day	-	-	-	-	-	12,010	12,010	12,010	12,010	12,010	12,010	12,010	12,010	
Surface Pump Capacity	m³/day	-	-	-	-	-	19,181	19,181	19,181	19,181	19,181	19,181	19,181	19,181	
	_														
On-Demand Connections]	866	865	867	1,091	1,304	1,542	1,604	1,608	1,608	1,611	1,669			
Restricted Connections		-	-	-	3	3	3	3	3	3	-	-			
Total Connections		866	865	867	1,094	1,307	1,545	1,607	1,611	1,611	1,611	1,669			
Average Daily Demand	L/con/day	374	518	595	852	693	787	644	597	607	629	748	645	667	
Peak Daily Demand	L/con/day	1,285	1,542	1,607	2,193	2,352	2,526	1,726	1,443	1,932	1,750	2,163	1,803	1,923	
Allocated Water Units	m³/day	-	-	-	-	-	-	-	-	-	-	-			
Average Daily Flow per Unit	L/unit/day	-	-	-	-	-	-	- 1	-	-	-	-	-	-	
Peak Daily Flow per Unit	L/unit/day	-	-	-	-	-	-	-	-	-	-	-	-	-	
On-Demand Rating Charges		869	868	868	1,110	1,327	1,567	1,634	1,639	1,639	1,645	1,702			
Restricted Rating Charges		-	-	-	6	6	6	6	6	6	-	-			
Total Rating Charges		869	868	868	1,116	1,333	1,573	1,640	1,645	1,645	1,645	1,702			
Data Quality		medium	medium	medium	medium	medium	medium	medium	medium	medium	medium	medium			