WAIMAKARIRI
DISTRICT COUNCIL

# Activity Management Plan 2021

## Pines Kairaki Wastewater Scheme

3 Waters | July 2021

**Prepared by**

**Waimakariri District Council**

**215 High Street,**

**Private Bag 1005**

**Rangiora 7440,**

**New Zealand**

**waimakariri.govt.nz**

### Revision History:

| Revision Nº | Description | TRIM | Date |
|---|---|---|---|
| A | Draft for Presentation to U and R Committee | 200120006516 | 18/12/2020 |
| B | Draft for presentation to Council | 200120006516 | 23/02/2021 |
| C | Final for presentation to Council | 200120006516 | |
| | | | |

### Document Acceptance

| Action | Name | | Signed | Date |
|---|---|---|---|---|
| Prepared by | Gavin Hutchinson | 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 | | | |

**Contents**

1 Executive Summary ....4
2 Introduction ....5
3 Related Documents ....5
4 Scheme Description (What Do We Have?) ....5
5 Scheme Management Issues (What Do We Need to Consider?) ....10
5.1 Levels Of Service ....10
5.2 Asset Condition ....13
5.3 Asset Criticality ....16
5.4 Risk Assessment ....18
5.5 Disaster Resilience Assessment ....19
5.6 Growth Projections ....20
5.7 Capacity & Performance ....22
6 Future Works & Financial Projections (What Do We Need To Do?) ....24
6.1 Operation & Maintenance ....24
6.2 Renewals Programme ....25
6.3 Capital Works ....28
6.4 Financial Projections ....31
6.5 Valuation ....32
6.6 Revenue Sources ....32
7 Improvement Plan ....33
7.1 2021 Improvement Plan ....33

**Tables**

Table 1: Key Asset Management Components....4
Table 2: Scheme Statistics for 2019/2020....7
Table 3: Wastewater Gravity Pipe Data Summary....7
Table 4: Wastewater Pressure Pipe Data Summary....7
Table 5:Wastewater Manhole Data Summary....8
Table 6: Data References....8
Table 7: Elective (non-mandatory) Levels of Service Targets and Performance Measures as Assessed in 2020....11
Table 8: Pipe Condition Summary....15
Table 9: Number of Events per Level of Risk....18
Table 10: Risks to Above Ground Facilities....19
Table 11: Growth Projections....21
Table 12: Summary of Capital Works (Includes Renewals)....29
Table 13: Asset Valuation....32
Table 14: 2021 AMP Improvement Plan....33

**Figures**

Figure 1: Network Schematic....9
Figure 2: Pipe Condition Assessment Plan....14
Figure 3: Asset Condition Summary....15
Figure 4: Pipe and Facilities Criticality....17
Figure 5: Population Projections....22
Figure 6: Flow Projections....22
Figure 7: Annual Operation & Maintenance 30-Year Budget....24
Figure 8: Pipe Renewal Time Frames....26
Figure 9: Annual Renewals Expenditure, 150 Year Budget....27
Figure 10: Projected Capital Works Expenditure....28
Figure 11: Projected Capital Upgrade Works (not to scale)....30
Figure 12: Projected Total Expenditure....31
Figure 13: A1 - Plan of Serviced Area....34
Figure 14: Pines Kairaki Wastewater Supply Statistics....35

# 1 Executive Summary

The following table provides a summary of the key asset management issues of the Pines Kairaki 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 | There is no consent that specifically relates to the Pines Kairaki Wastewater Scheme. The overall Eastern Districts Sewer Scheme is operating well and is generally compliant with the resource consent conditions. |
| Levels of Service | The scheme is currently meeting all level of service requirements. |
| Capacity & Performance | The existing reticulation system has sufficient capacity to accommodate the existing peak wet weather flow during the 2 and 5 year rainfall (target level of service). |
| Asset Condition | Post-earthquake repairs, the majority of the scheme is in moderate condition, and will be managed through the normal CCTV inspection programme. |
| Risk Assessment | The Risk Assessment did not reveal any high or extreme risks on this scheme. |
| Disaster Resilience | The Disaster Resilience Assessment identified extreme and high risks for 1.9km of mains in an earthquake. |
| | It also identified a high risk of flooding from a tsunami for the Featherstone Ave pump station and a moderate risk from tsunami for the other two pump stations. |
| | There was also a high or moderate risk to all the pump stations in an earthquake. |
| | Further headworks and reticulation assessments are required to determine and address resilience. |
| Growth Projections | The scheme is projected to have 32% growth over the next 50 years. |

## 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.

This plan summarises the various components of the Pines Kairaki wastewater 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 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 Pines Kairaki Wastewater Scheme is part of the Eastern Districts Sewer Scheme. It is generally an urban gravity reticulation scheme except for two small pump stations that discharge into the reticulation. The sewage is conveyed via a network of gravity pipes to the Featherstone Ave Pump Station where it is transferred via a rising main to the Kaiapoi Wastewater Treatment Plant.

The sewage is treated at the Kaiapoi Treatment Plant, and this is covered in the Kaiapoi Wastewater Scheme AMP.

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 14.

A schematic of the reticulation system for Pines / Kairaki is presented on the following page (Figure 1). Refer to the Eastern Districts Sewer Scheme AMP for a plan of how the Pines Kairaki system fits within the overall scheme. The extent of the currently serviced area and full flow data records are presented in Figure 14.

***Table 2: Scheme Statistics for 2019/2020***

| Scheme Parameter | Statistics | Source |
|---|---|---|
| Type of Supply | Urban Gravity | |
| Treatment | Oxidation ponds (Kaiapoi) | |
| Length of Reticulation | 2.0 km | Wastewater Asset Valuation Tables 8-5 and 8-6, pages 59 to 62 |
| Total Replacement Value | $2,863,438 | |
| Depreciated Replacement Value | $1,970,064 | |
| Number of Connections | 167 | 2019/20 Rating Query |
| Number of Rating Charges | 220 | |
| Average Daily Flow (5 year average) | 171 m3/day | Flow Data Analysis – Sewer |
| Average Daily Flow/connection (5 year average) | 1,031 l/day/con | |
| Peak Daily Flow (5 year average) | 618 m3/day | |
| Peak Daily Flow/connection (5 year average) | 3,727 l/day/con | |

***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** | **Total** |
| Asbestos cement | 0m | 2m | 766m | 57m | 0m | 824m |
| Polyvinyl chloride | 0m | 0m | 336m | 0m | 4m | 341m |
| Other | 0m | 0m | 149m | 0m | 0m | 149m |
| **Total** | **0m** | **2m** | **1,251m** | **57m** | **4m** | **1,313m** |

***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** | **Total** |
| Asbestos cement | 0m | 182m | 0m | 0m | 0m | 182m |
| Polyethylene | 149m | 0m | 0m | 0m | 0m | 149m |
| Polyvinyl Chloride | 0m | 0m | 0m | 395m | 0m | 395m |
| **Total** | **149m** | **182m** | **0m** | **395m** | **0m** | **725m** |

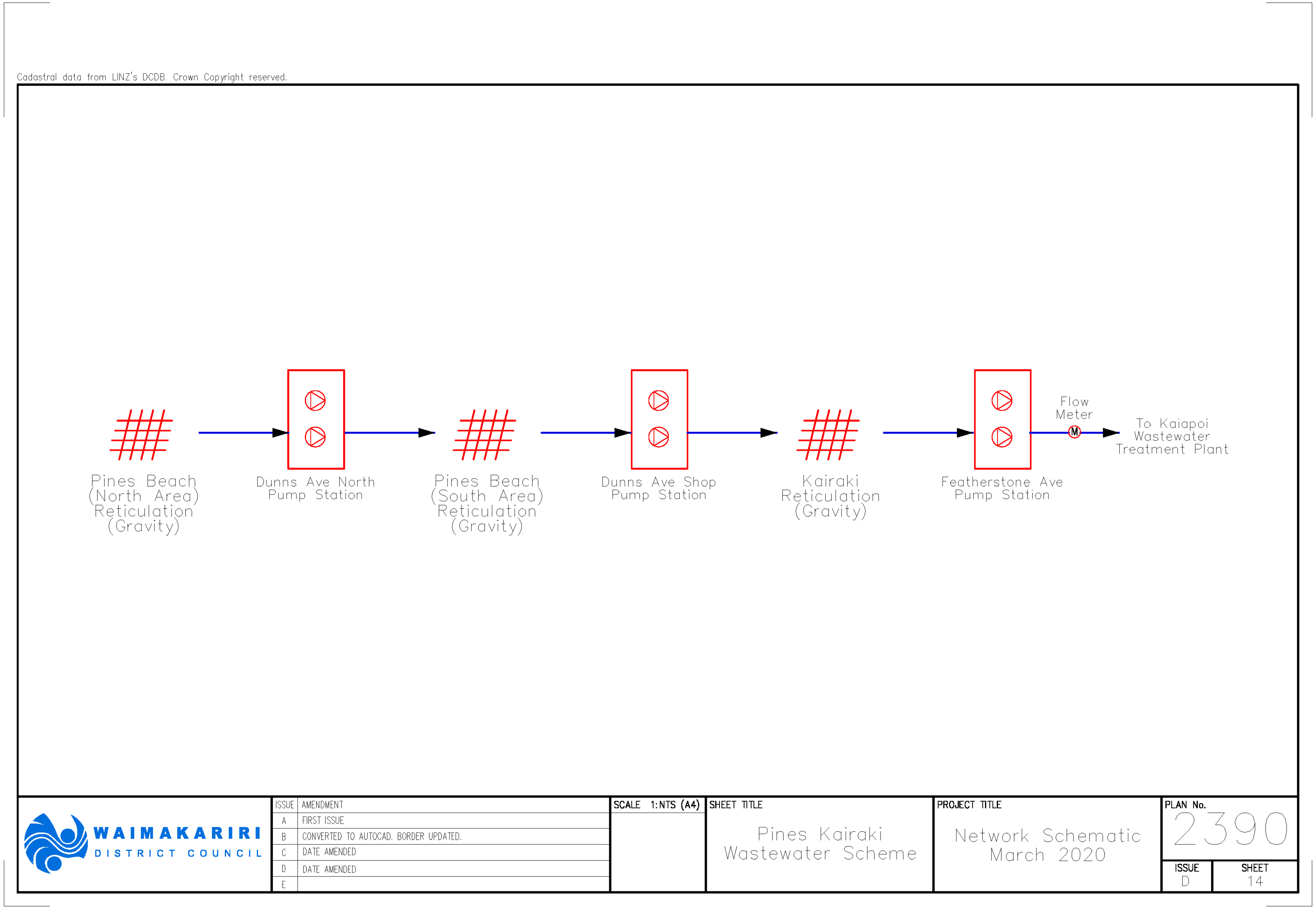
*Table 5:Wastewater Manhole Data Summary*

| Wastewater Manholes | |
|---|---|
| **Diameter (mm)** | **Count** |
| 900 | 16 |
| 1050 | 7 |
| **Total** | **23** |

*Table 6: Data References*

| Data Reference | Trim Reference |
|---|---|
| Sewer flow data analysis | 121108078891 |
| 2014 50 Year Water and Sewer Growth Forecast | 150112003122 |
| 2020 3 Waters Asset Valuation | 200824109857 |
| 2020 50 Year Water and Sewer Growth Forecast | 200224024348 |

***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 sewer 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 7 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 change over the 10 year LTP period, so only the one target value has been shown in this document.

Performance in Table 7 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 7: 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 - 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 |
| 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 | There were no losses of service greater than 8 hours. | 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 1999 without overflows occurring | 1 in 2 year | Nil | This level of service is met. | Achieved | N/A | Y | Y | Y | Y |
| 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 |

| Section | Level of Service | 2018 – 2021 Performance Measure | 2018 – 2021 Target | 2020 | | | | Previous Results# | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Result | Commentary | Status | Action to Address | 2017 | 2014 | 2011 | 2008 |
| Overflows | Overflows - Private Property | Number of recorded overflows on private property found to be the result of<br>(a) blockage in the main<br>(b) Insufficient capacity in the reticulation system for any rainfall up to a 1 in 2 year event, for areas designed prior to 1999.<br>(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. District wide 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 2 below, shows the assessed pipe condition for all pipes within the scheme. Figure 3 summarises the theoretical asset condition for both the network and headworks in a graph, while Table 8 provides more detail about the value of the assets within different asset condition categories.

***Figure 2: Pipe Condition Assessment Plan***

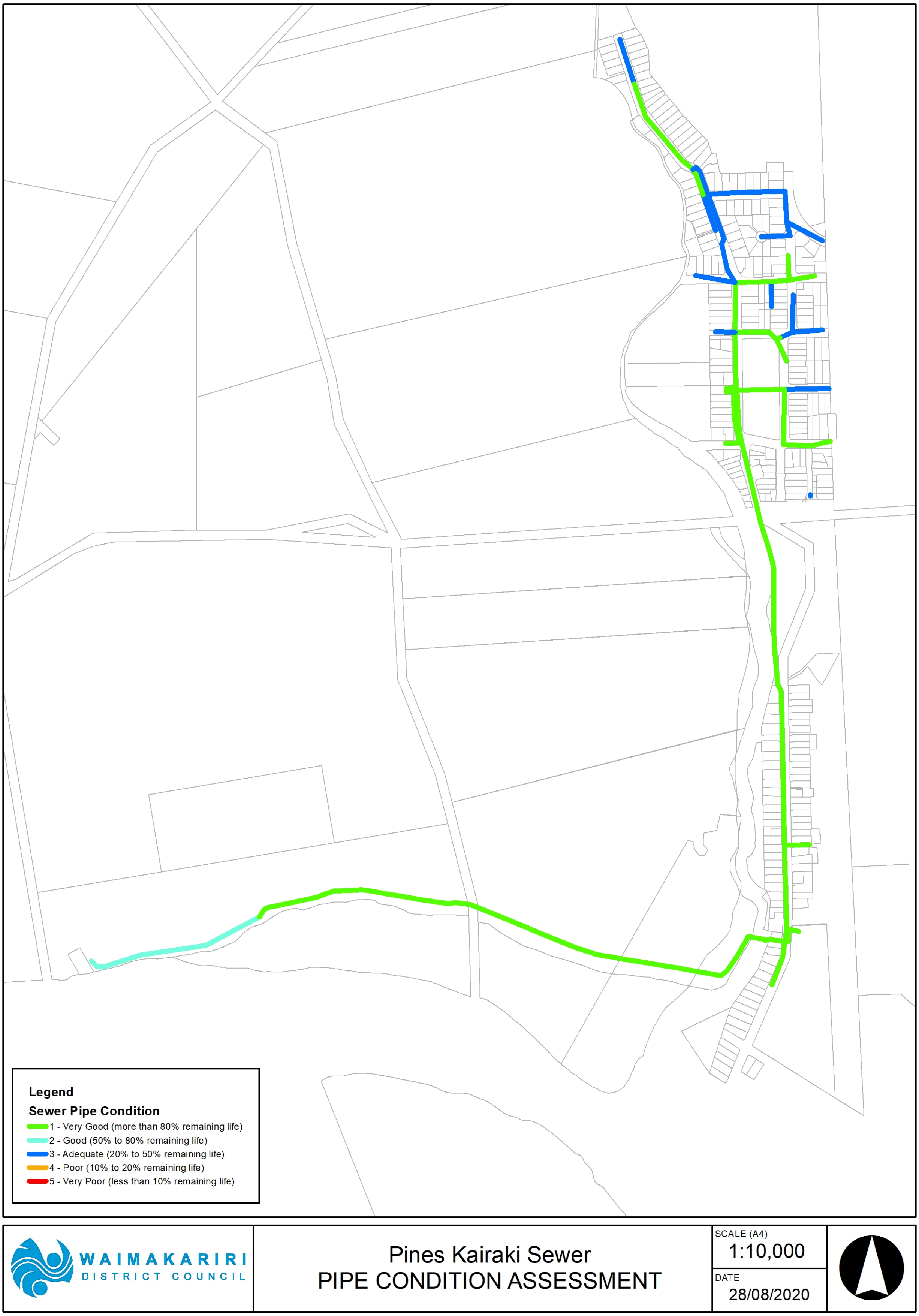
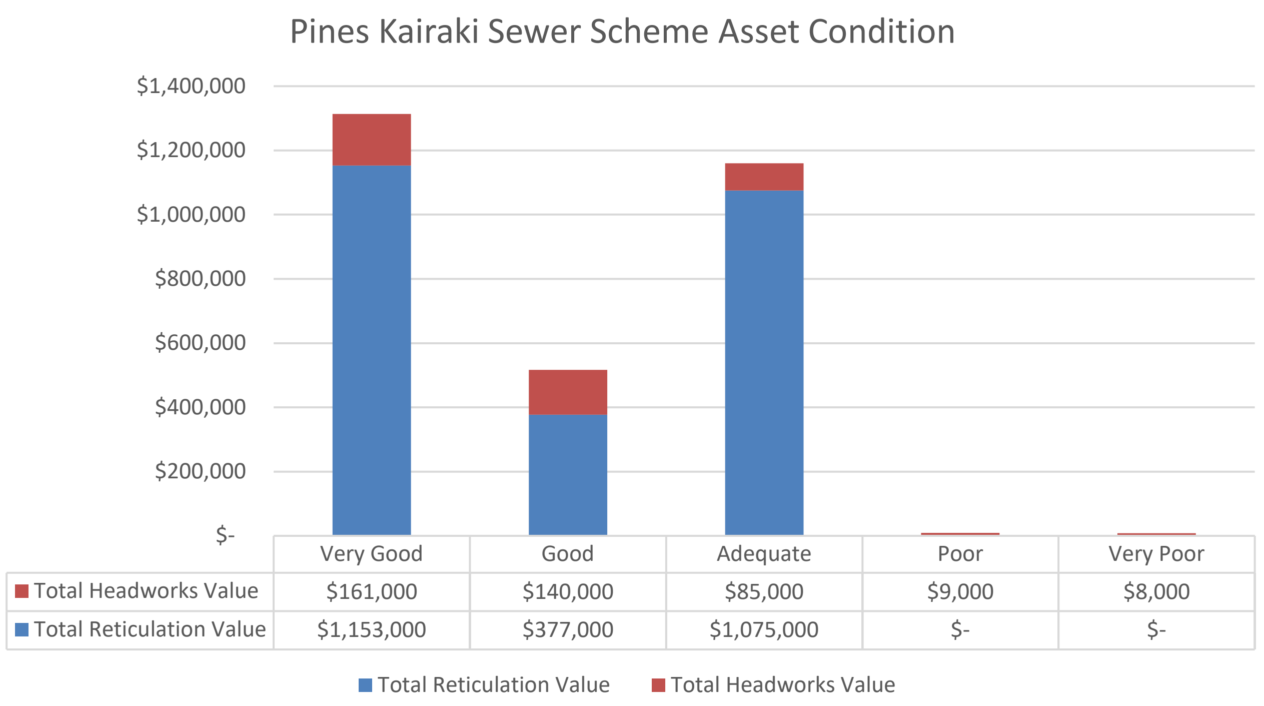


*Figure 3: Asset Condition Summary*




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

*Table 8: Pipe Condition Summary*

| Condition Grade | Definition | Pipeline Quantity | Total Reticulation Value | Total Headworks Value | Total Value |
|---|---|---|---|---|---|
| 1 | Very Good<br>*More than 80% of life remaining* | 4.5 km<br>*77%* | $ 1,153,000<br>*44%* | $ 161,000<br>*40%* | $ 1,314,000<br>*44%* |
| 2 | Good<br>*Between 50% and 80% of life remaining* | 0.0 km<br>*0%* | $ 377,000<br>*14%* | $ 140,000<br>*35%* | $ 517,000<br>*17%* |
| 3 | Adequate<br>*Between 20% and 50% of life remaining* | 1.4 km<br>*23%* | $ 1,075,000<br>*41%* | $ 85,000<br>*21%* | $ 1,160,000<br>*39%* |
| 4 | Poor<br>*Between 10% and 20% of life remaining* | 0.0 km<br>*0%* | $ -<br>*0%* | $ 9,000<br>*2%* | $ 9,000<br>*0%* |
| 5 | Very Poor<br>*Less than 10% of life remaining* | 0.0 km<br>*0%* | $ -<br>*0%* | $ 8,000<br>*2%* | $ 8,000<br>*0%* |
| **Total** | | **5.9 km** | **$2,605,000** | **$403,000** | **$3,008,000** |

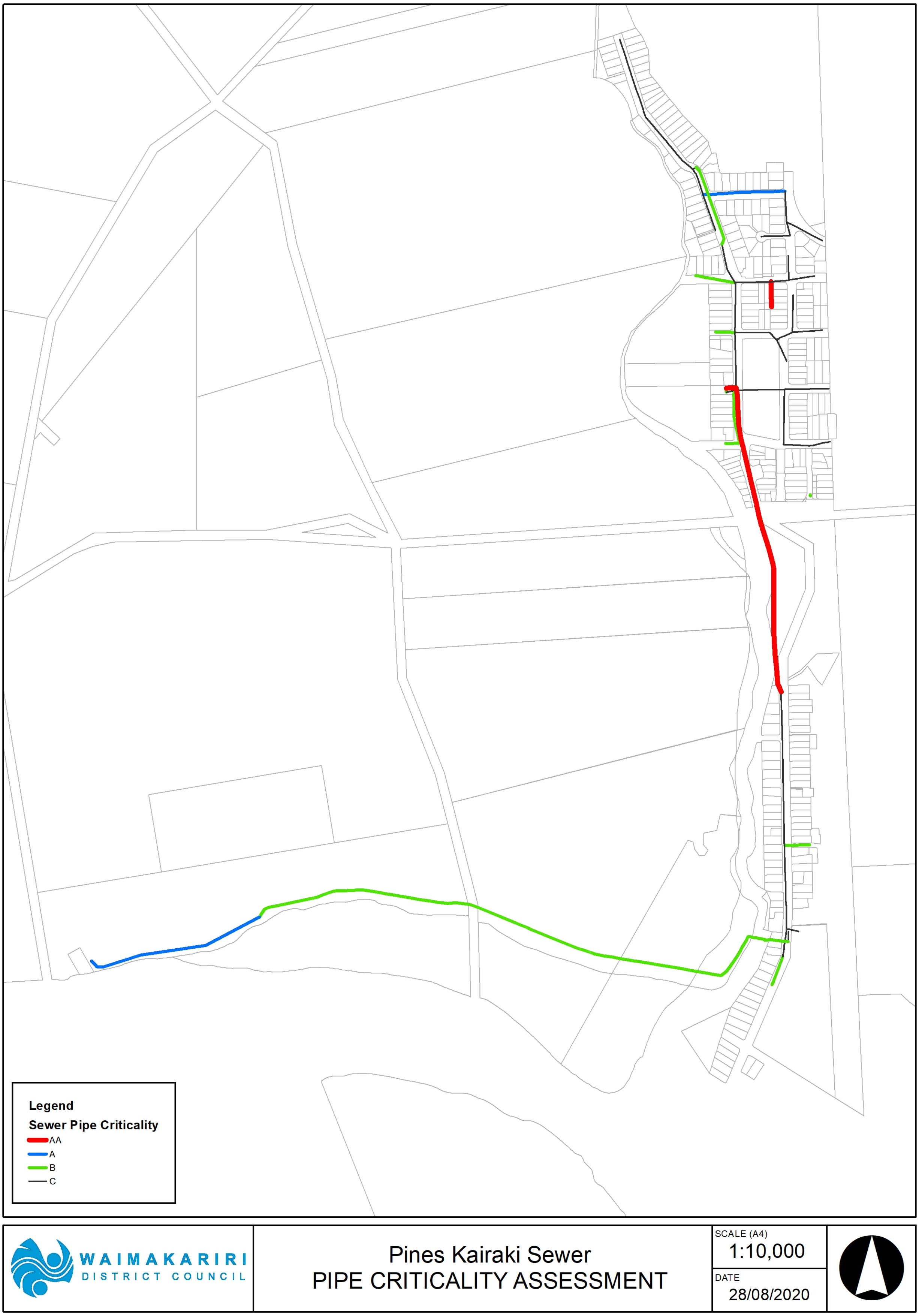
## 5.3 Asset Criticality

Asset criticality provides an indication of the importance of an individual asset and the corresponding impact on the service delivery should the asset fail for any reason. Criticality is used in risk based investment decisions to help decide when an asset should be replaced to avoid the consequences of failure. The Council has developed an assessment process which scores assets from most critical ‘AA’ to least critical ‘C’. Further details of the criticality assessment methodology is covered in the WS Overview AMP.

The pipe criticality scoring process has been significantly improved through automation and dynamic links to GIS data layers for this AMP.

Figure 4 provides a spatial view of asset criticality for the scheme.

*Figure 4: Pipe and Facilities Criticality*



### 5.4 Risk Assessment

An Operational Risk Assessment was first undertaken for the Pines Kairaki Wastewater Scheme in 2004, and it has been regularly updated since that time. It was last updated for the 2015 AMP review. At the last review there were no extreme or high risks remaining for the Pines Kairaki wastewater scheme.

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 9 summarises the number of events at each level of risk for the Pines Kairaki Wastewater Scheme.

***Table 9: Number of Events per Level of Risk***

| Risk Level | 2004 | 2008 | 2011 | 2014 |
|---|---|---|---|---|
| Extreme risks | 0 | 0 | 0 | 0 |
| High risks | 0 | 0 | 0 | 0 |
| Moderate risks | 19 | 19 | 12 | 15 |
| Low risks | 1 | 1 | 8 | 5 |
| Not applicable | 20 | 20 | 20 | 20 |
| **Total** | **40** | **40** | **40** | **40** |

There have been a number of moderate risks which have been mitigated since 2009. These include risks associated with possible operations and management failures which have now been given a low risk rating.

Improvements have also been made to reduce the potential of an overflow or discharge of raw sewage from gravity reticulation.

Generally 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 10) reflects the likelihood of the event occurring and the consequence on the community of the facility failing. Hazards classified as having 'No Known Risk' have been omitted from the table.

***Table 10: Risks to Above Ground Facilities***

| Hazard | Dunns Ave North PS | Dunns Ave Shop PS | Featherstone Ave PS |
|---|---|---|---|
| 100 yr Local Flooding | - | L | L |
| 475 yr Earthquake Induced Slope Hazard | L | L | L |
| 500 Yr Ashley Flood | L | L | L |
| 3,300 yr Waimak Flood | L | - | - |
| Earthquake (50 yr) | M | H | H |
| 150 Yr Earthquake | M | M | M |
| 475 Yr Earthquake | L | L | M |
| 200 Yr Tsunami | M | M | H |
| Wildfire | L | L | L |
| Snow 150 Yr | L | L | L |
| Wind 100 Yr | L | L | L |
| Lightning | M | M | M |
| Pandemic | M | M | M |
| Terrorism / Sabotage | L | L | L |
| E = Extreme, H = High, M = Moderate, L = Low | | | |

The scheme is located within the zone of high liquefaction susceptibility and liquefaction occurred at two of the wastewater sites during the 2010 earthquake.

Significant inundation of 3-4 metres from a worst case distant source tsunami has been modelled for all pump stations.

Dunns Ave Shop and Dunns Ave North pump stations are both modelled to be threatened by 1.2-2 metres of river breakout flooding from the Ashley and Waimakariri.

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

The Councils response to these risks is being managed at a district level via the DRA Action Plan and related projects. Refer to the District level AMPs for details.

### 5.6 Growth Projections

**Situation**

The growth in the Pines Kairaki area is constrained by the physical characteristics of the area and adjacent reserves. There is low potential for infill development, but not larger developments.

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 Pines and Kairaki Beach wastewater scheme is expected to increase by 12%, by the end of the 2021-31 Long Term Plan (LTP) period. This projection is based on 19 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 2 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 1 new connections per year (Table 11).

***Table 11: Growth Projections***

| **Pines Kairaki** | **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 | 165 | 173 | 184 | 195 | 203 | 219 |
| Projected Rating Units | 218 | 226 | 237 | 248 | 256 | 272 |
| Projected increase in Connections | | 5% | 12% | 18% | 23% | 32% |
| Projected Average Dry Weather Flow (m3/day) | 224 | 230 | 237 | 244 | 250 | 260 |
| Projected Peak Wet Weather Flow (m3/day) | 1,934 | 1,961 | 1,998 | 2,033 | 2,060 | 2,115 |

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 32%. This long term projection is slightly higher than the 2017 growth projection, 22% (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. Particularly in the small town / beach areas the 2019 projections assessment is more area specific, and therefore a better forecast for Pines and Kairaki Beach.

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.

On average Pines and Kairaki Beach's existing Inflow/Infiltration, level is considered moderate, resulting in average Peak Wet Weather Flow (PWWF).

**Projections**

Figure 5 and Figure 6 present the projected growth and corresponding demand trends for the Pines Kairaki wastewater scheme.

*Figure 5: Population Projections*

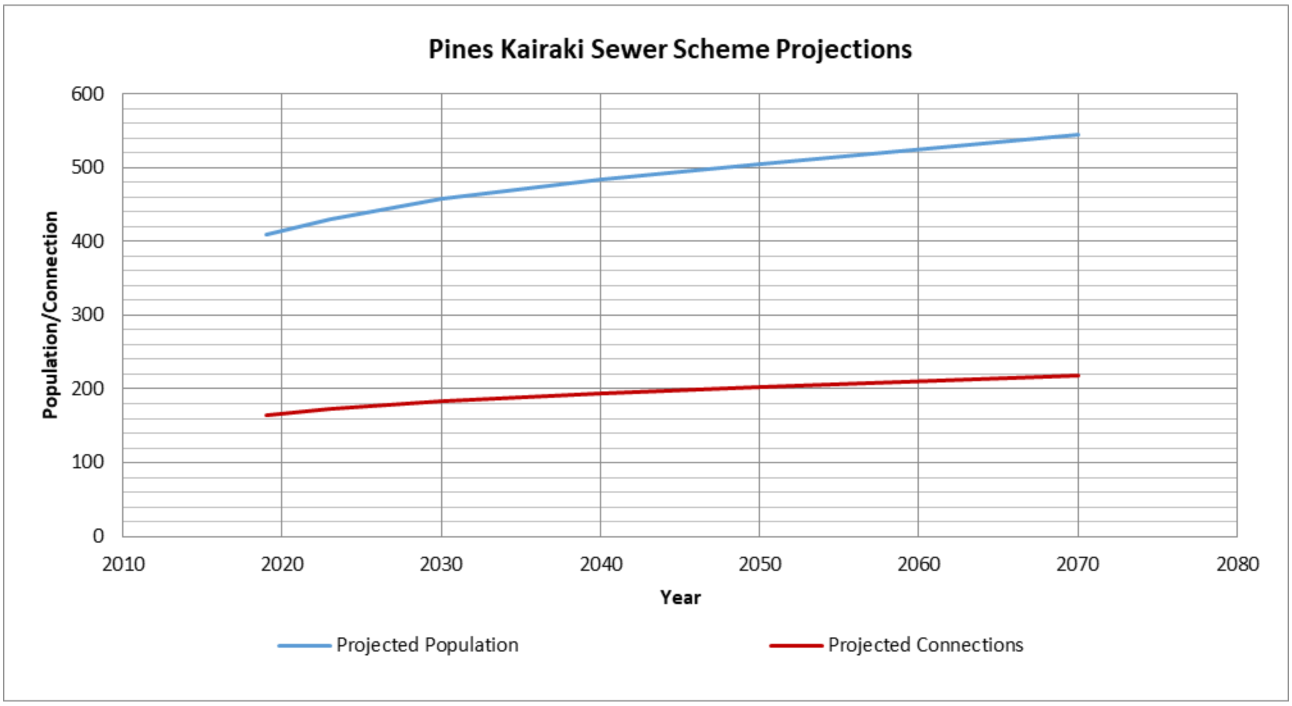
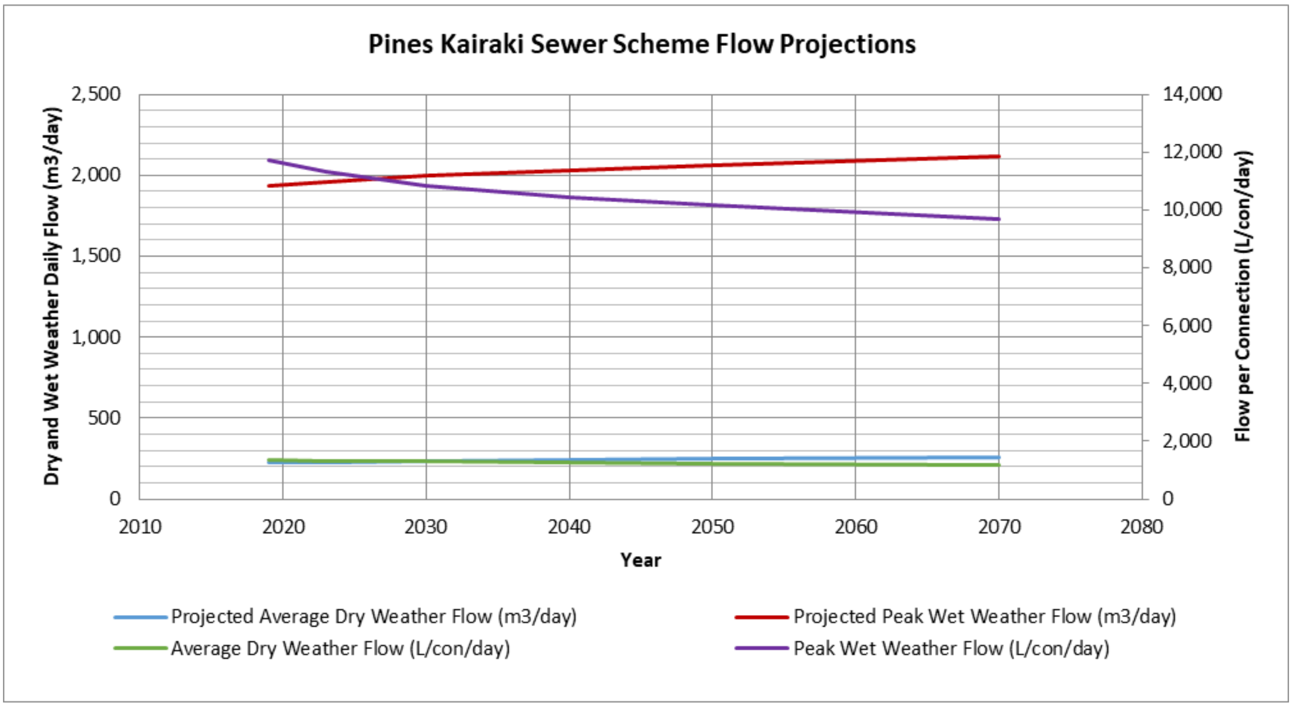



*Figure 6: Flow Projections*




## 5.7 Capacity & Performance

This section of the AMP considers the capacity and performance of the Pines Kairaki Wastewater Scheme. The specific aspect of the scheme that has been considered is the reticulation system. This is discussed in more detail in the following section.

### Treatment Plant

The sewage from Pines Kairaki is treated at the Kaiapoi wastewater treatment plant, and this is covered in the Kaiapoi Wastewater Scheme AMP.

### Reticulation System

The capacity of the sewer reticulation has been assessed by a desktop exercise. The assessment has confirmed that the existing reticulation system has sufficient capacity to accommodate the existing peak wet weather flow during the 2 and 5 year rainfall (target level of service).

The performance of the existing reticulation was significantly affected by the damage sustained from the earthquakes, but a programme of post-earthquake of replacements and relining has now been completed. No further works to repair earthquake damage are planned

# 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

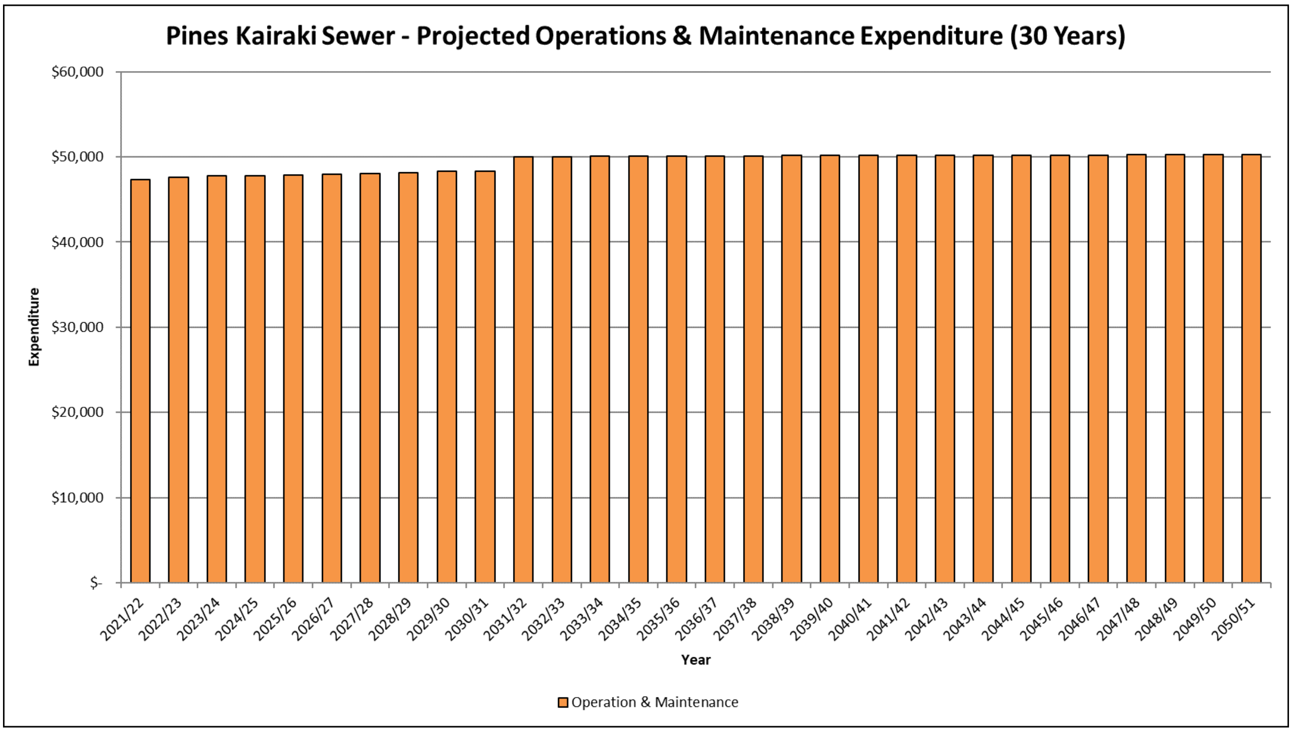
Operation and maintenance (O&M) expenditure incorporates the day to day running of the water supply network and allows the system to carry on functioning to deliver the agreed levels of service.

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.

While there are no known deferred maintenance items, it is expected that the recent implementation of an Asset Management Information System (AMIS) will enable improved planned maintenance regimes. For example the new system will allow analysis of blockages that will identify where a pre-emptive regular cleaning programme should prevent blockages from occurring.

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.

***Figure 7: Annual Operation & Maintenance 30-Year Budget***




The primary reasons for the increase in the operation and maintenance budget are related to inflation and growth on the scheme.

## 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.

For wastewater, for those schemes connected to it the model is operated at the Eastern Districts Sewer Scheme level. It 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 other works that may be planned in the area, as well as local asset history, in determining final projects for the LTP.

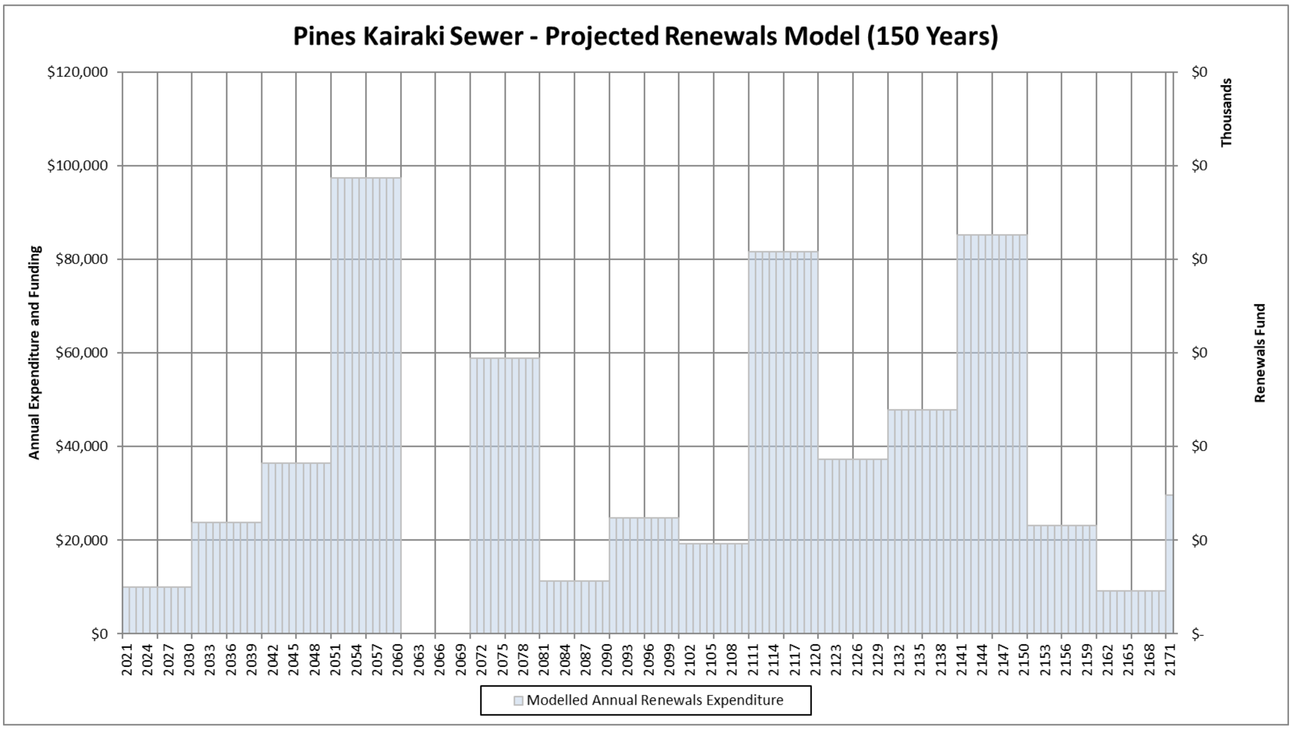
Figure 8 below shows the output from the model only and provides a broad brush spatial view of the likely timeframe for renewals.

***Figure 8: Pipe Renewal Time Frames***

Figure 9 below shows the renewals expenditure from the model only. Budgeted depreciation funding, modelled annual funding required, and the modelled renewals fund are not shown on this graph, but are shown on the equivalent graph in the Overview AMP. This is because all properties that are connected to the Eastern District Wastewater Scheme (EDWS) are charged using the same set of (differential) rates.

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 final budget, as adjustments may have been made by the Asset Manager from the direct renewals model outputs. The final renewals budget put forward into the draft LTP, is included in the capital works graph. There are no deferred renewals.

***Figure 9: Annual Renewals Expenditure, 150 Year Budget***



### 6.3 Capital Works

The following graph shows the 50 year budget for all capital works, including projects driven by growth and levels of service (Figure 10). Renewals expenditure showing in the first ten years of the graph, includes the actual planned programme, not the model output.

***Figure 10: Projected Capital Works Expenditure***

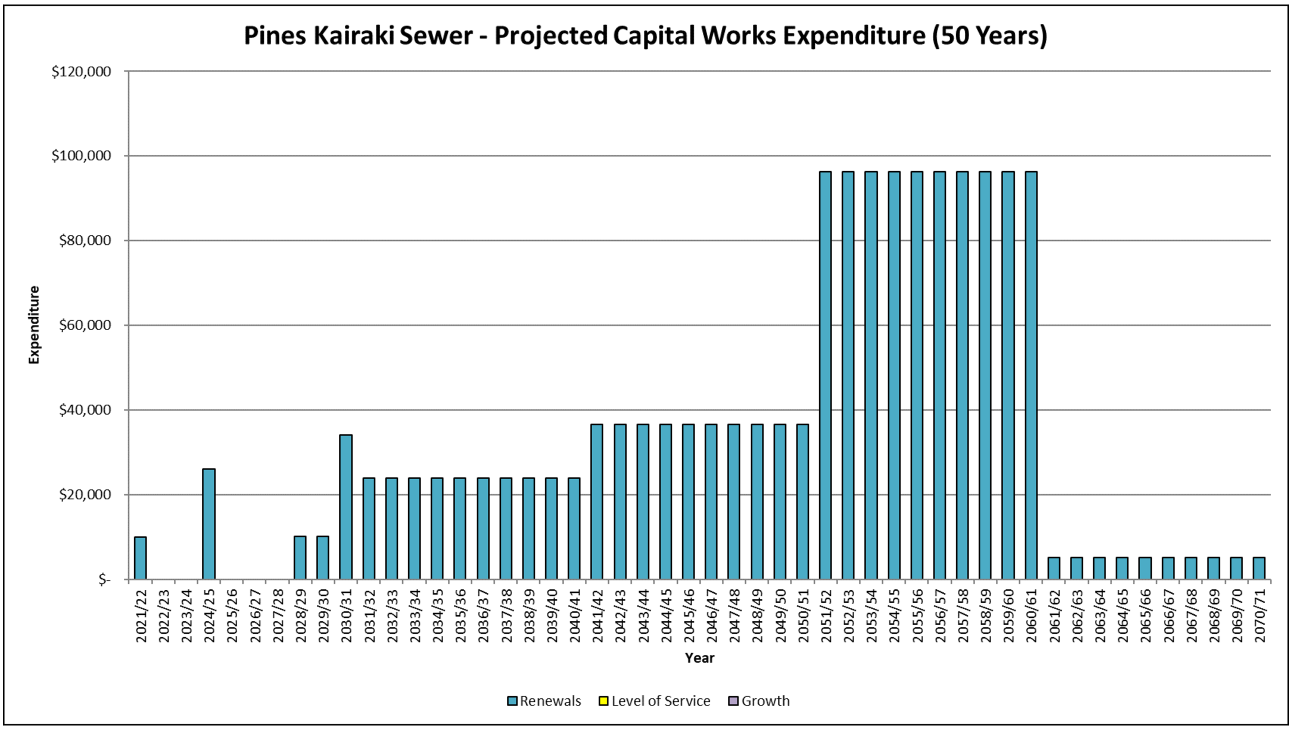



Table 12 on the following page summarises the projected capital works for the next 50 years, including renewals. Figure 11 shows the corresponding location of the projected capital upgrade works.

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

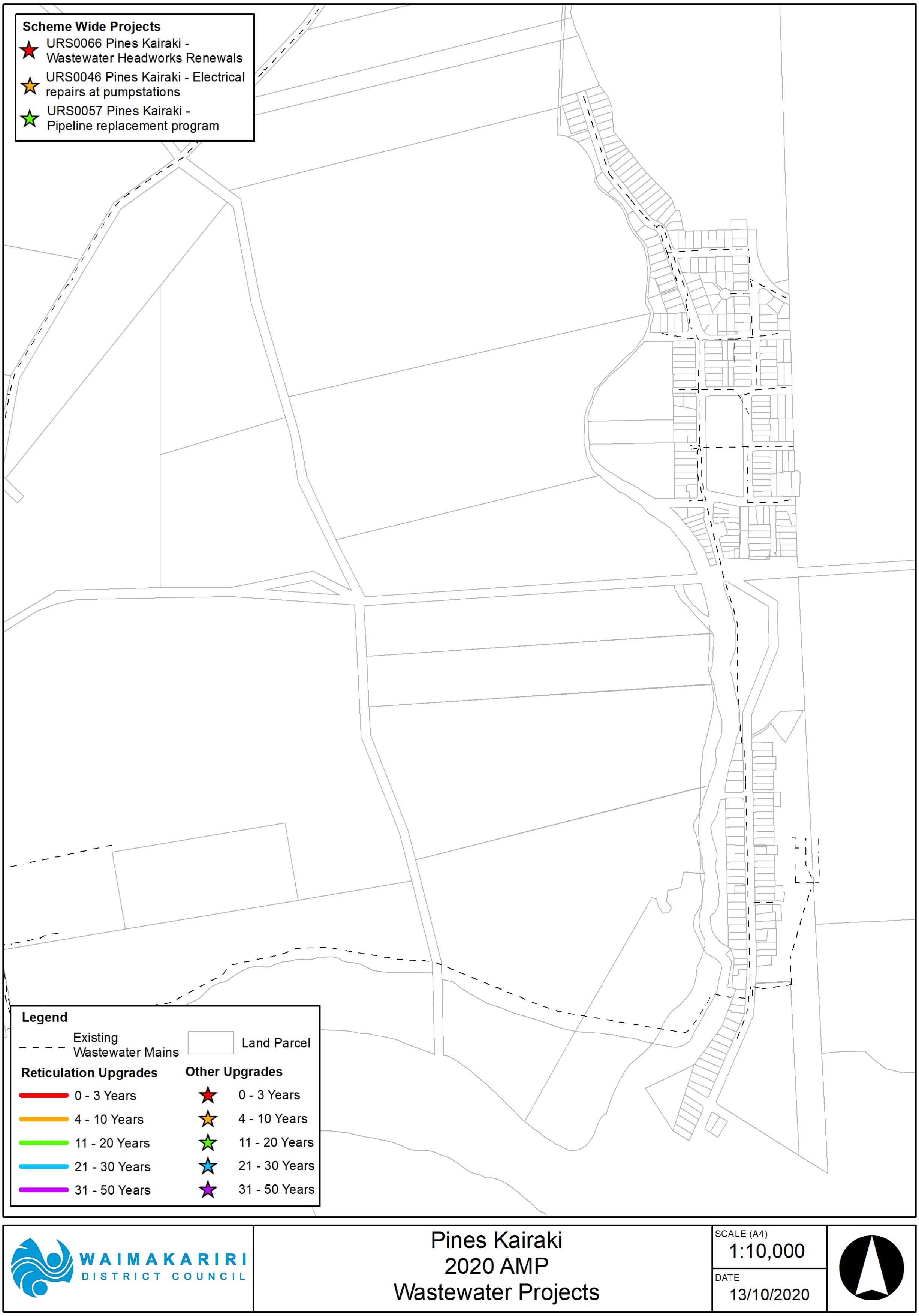
Any programme or project that occurs over a number of years, such as the renewals programme, is only shown within the table for the first year in which it occurs. The Project Value indicates the projected full total cost of the project over the number of years it occurs.

*Table 12: Summary of Capital Works (Includes Renewals)*

| Year | Project ID | Project Name | Level of Confidence | Project Value | LOS Component | Renewals Component | Growth Component |
|---|---|---|---|---|---|---|---|
| Year 1 - 10 | | | | | | | |
| 2022 | URS0066 | Pines Kairaki - Wastewater Headworks Renewals | 2 - Very Low | $ 606,610 | $ - | $ 616,628 | $ - |
| 2025 | URS0046 | Pines Kairaki - Electrical repairs at pump stations | 7 - High | $ 26,000 | $ - | $ 26,000 | $ - |
| Year 11 - 20 | | | | | | | |
| 2032 | URS0057 | Pines Kairaki - Pipeline replacement program | 3 - Low | $ 1,074,962 | $ - | $ 1,074,962 | $ - |
| Grand Total | | | | $ 1,707,572 | $ - | $ 1,717,590 | $ - |

*Note: the Pines Kairaki Wastewater Scheme renewals item indicates the total renewals programme value for the 50 years beginning in the financial year shown*

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



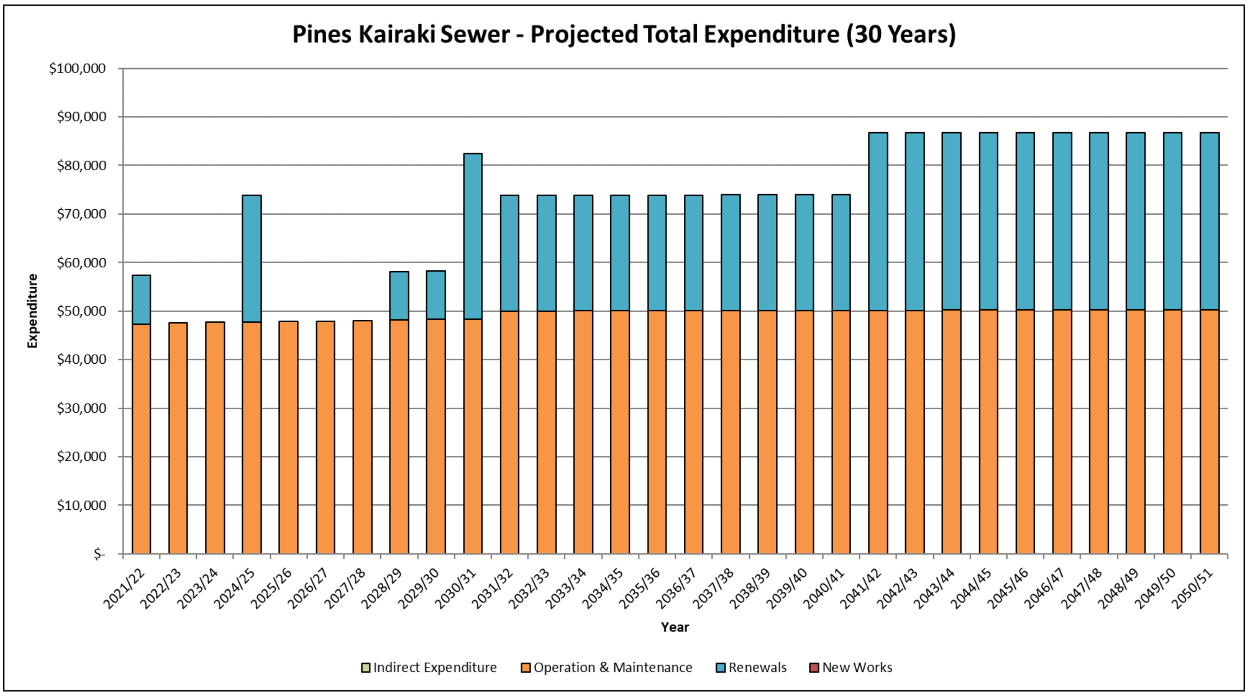
### 6.4 Financial Projections

The following graph summarises the breakdown of projected total expenditure over a 30 year time horizon. It includes both operational and capital expenditure. Operational costs include operations and maintenance, but not indirect expenditure.

Indirect expenditure includes interest, rating collection costs, costs associated with maintaining the Asset Register, and other internal overhead costs. For systems connected to the Eastern District Wastewater Scheme, these costs are aggregated within the Eastern District Scheme budget.

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

***Table 13: Asset Valuation***

| Asset Type | Unit | Quantity | Replacement Cost | Depreciated Replacement Cost | Annual Depreciation |
|---|---|---|---|---|---|
| Manhole | No. | 31 | $412,133 | $293,698 | $3,317 |
| Valve | No. | 0 | $- | $- | $- |
| Main | m | 2,039 | $1,179,673 | $756,705 | $14,482 |
| Service Line | properties | 216 | $868,202 | $637,222 | $10,035 |
| **Facilities** | | | **$403,430** | **$282,439** | **$17,041** |
| **Total** | | | **$2,863,438** | **$1,970,064** | **$44,876** |

### 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 14 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 2021.

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 14: 2021 AMP Improvement Plan***

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

## *APPENDIX 'A'.* PLANS

***Figure 13: A1 - Plan of Serviced Area***


| WAIMAKARIRI DISTRICT COUNCIL | Activity Management Plan<br>S - PINES/KAIRAKI<br>**WASTEWATER** | Map ID<br>9 | Scale (A4)<br>1:15,000 |
|---|---|---|---|
| | | GIS Ref<br>20-062 | Date<br>1/12/2020 |


**DISCLAIMER**
Boundary information is derived under licence from LINZ Digital Cadastral Database (Crown Copyright Reserved). The Waimakariri District Council does not give and expressly disclaims any warranty as to the accuracy or completeness of the information or its fitness for any purpose. Information on this map may not be used for the purposes of any legal disputes. The user should independently verify the accuracy of any information before taking any action in reliance upon it. Land and property information is based on/includes LINZ's data which is licensed by Land Information New Zealand (LINZ) for re-use under the Creative Commons Attribution 3.0 New Zealand licence.

*Figure 14: Pines Kairaki Wastewater Supply Statistics*

## Pines Kairaki Wastewater Statistics

Pines Kairaki | 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 | 198 | 403 | 338 | 387 | 360 | 173 | 163 | 201 | 224 | 145 | 121 | 171 | 252 |
| Average Dry Weather Flow | $m^3$/day | 193 | 405 | 334 | 346 | 301 | 168 | 156 | 181 | 181 | 136 | 97 | 150 | 230 |
| Peak Daily Flow | $m^3$/day | 460 | 715 | 1,018 | 1,319 | 1,331 | 432 | 349 | 924 | 967 | 578 | 272 | 618 | 790 |
| Peak Weekly Flow | $m^3$/day | 305 | 650 | 632 | 792 | 699 | 360 | 239 | 436 | 495 | 234 | 173 | 315 | 471 |
| Peak Monthly Flow | $m^3$/day | 220 | 535 | 456 | 568 | 530 | 298 | 190 | 321 | 293 | 196 | 168 | 234 | 356 |
| Peak Instantaneous Flow | L/s | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Peak Month | | Jul | Nov | Aug | Aug | Apr | Jul | May | Apr | Jul | Jun | Jul | | |
| Peak Week | | Week 23 | Week 2 | Week 34 | Week 26 | Week 17 | Week 29 | Week 22 | Week 16 | Week 9 | Week 23 | Week 28 | | |
| Peak Day | | 29/05/2010 | 24/02/2011 | 18/08/2011 | 17/06/2013 | 10/06/2014 | 19/06/2015 | 23/05/2016 | 14/04/2017 | 21/02/2018 | 1/06/2019 | 26/02/2020 | | |
| Peak Day Rainfall | mm | 10.2 | 1.6 | 9.4 | 74.5 | 95.1 | 27.7 | 18.9 | 38 | 9.8 | 0 | 0 | | |
| Peak Day Weather | | Wet | Wet | Wet | Storm | Storm | Storm | Storm | Storm | Storm | Storm | Wet | | |
| Total Annual Volume | $m^3$ | 72,758 | 147,855 | 124,082 | 141,848 | 132,293 | 63,637 | 59,646 | 73,916 | 82,285 | 53,268 | 36,684 | 61,160 | 91,551 |
| Rating Connections | | 297 | 297 | 295 | 165 | 167 | 165 | 165 | 165 | 167 | 165 | 167 | | |
| Rating Charges | | 361 | 353 | 359 | - | 207 | 205 | 213 | 212 | 220 | 218 | 220 | | |
| Average Daily Flow per Connection | L/con/day | 668 | 1,356 | 1,146 | 2,342 | 2,159 | 1,051 | 985 | 1,221 | 1,343 | 880 | 727 | 1,031 | 1,321 |
| Peak Daily Flow per Connection | L/con/day | 1,549 | 2,407 | 3,449 | 7,991 | 7,968 | 2,615 | 2,116 | 5,602 | 5,789 | 3,503 | 1,627 | 3,727 | 4,307 |
| Data Quality | | very high | very high | very high | very high | very high | high | high | high | high | high | medium | | |