

Activity Management Plan 2021

Pegasus Urban Drainage Scheme

3 Waters | July 2021








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Revision History:

| Revision N° | Description | TRIM | Date |
|-------------|---|--------------|------------|
| A | Draft for Presentation to U and R Committee | 200120006578 | 18/12/2020 |
| C | Draft for presentation to Council | 200120006578 | 23/02/2021 |
| D | Final for presentation to Council | 200120006578 | 15/06/2021 |
| | | | |

Document Acceptance

| Action | Name | | Signed | Date |
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1 Executive Summary

The following table provides a summary of the key asset management issues of the Pegasus Urban Drainage 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

| | |
|--------------------------|--|
| Levels of Service | The scheme is meeting its level of service targets Although not a scheme specific service level, with analysis now possible down to scheme level, customer satisfaction (high and very high) can be reported for this scheme at 100% |
| Resource Consents | Pegasus Lake will be a drainage asset, but is currently under operation and maintenance by the developer, with an exact handover date yet to be agreed. |
| Capacity and Performance | The developer is responsible for maintenance and operation of the stormwater system for a period of 5 years from the issue of titles for each stage. At this stage parts of the system are maintained by the developer and parts by the Council. Since it is a new system, developed to the higher standard now required, capacity will be meet the required LOS |
| Asset condition | The asset condition of the reticulation system is considered to be good, as assets are only approximately 10 years old |
| Risk Assessment | From the desk top study here are three high risks in the scheme, relating to potential damage to the drainage pipes, pipe joints, pond bunds and headwalls from liquefaction during an earthquake. Further work is needed to better assess these risks |
| | The assessment rating methods used in the Operational Risk Assessment and Disaster Resilience Assessment need to be reviewed and aligned in order to better prioritise the risk reduction improvements required to the reticulation and facilities. |
| Disaster Resilience | No specific mitigation actions have been identified for this scheme for the facilities or for piped and open drains from the Disaster Resilience Assessment. |
| Growth Projections | The timing of growth is primarily driven by the developer's construction and sales programme. |

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 Pegasus Urban Drainage 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.

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

Projects identified to improve asset management processes for this scheme will also benefit the performance of the other 3 waters schemes and are managed at a District level for efficiency.

Projects are also identified within this AMP that will maintain or improve levels of service.

All figures within this AMP exclude inflation.

3 Related Documents

The following related documents have been used as reference documents or for guidance in the development of some of the sections in this Activity Management Plan.

- Waimakariri District Plan
- Population in the Waimakariri District (TRIM 170328030077)
- New Projections for LTP 2021-2031 (TRIM 200908117997)
- WDC Asset Management Policy (TRIM 180605062091)
- 2019 Customer satisfaction Survey (TRIM 200313034937)
- Development Contributions Policy 2021/22 (TRIM 200729095963)
- Flood Mitigation Works and Funding (TRIM 141009110892[v2])

4 Scheme Description (What Do We Have?)

Pegasus is an urban area being developed approximately 1 km north of Woodend and 1.3 km east of State Highway 1. Prior to development, it was characterised by undulating sand dunes, sloping from west to east towards former wetland areas along its eastern edge.

Water bodies within the scheme include Lake Pegasus and the wetlands to the east known as Te Kohaka Wetlands or the Eastern Conservation Management Area.

The lake has a surface of approximately 14 hectares and its primary function is a high quality amenity lake. The lake is also important for management of stormwater and attenuation of flooding in severe storm events. The lake is used for stormwater retention, not for treatment.

Pegasus stormwater system comprises of three major components:

- Private residential soakage systems- each residential lot has its own private soakhole. All stormwater runoff from the property is required to discharge into this soakhole for storm events up to 10% AEP. Thereafter, up to a 1% AEP storm, overland flows are channelled to the wetland and/or the lake. The soakage system also provides treatment.
- Planted infiltration strips, “swales” and roadside soakage- used on the roadside throughout the residential area of the township, grass swales allow stormwater to soak through the underlying soil/sand into the “aquacell” storage chambers and gravel, and ultimately via soakage to the ground below.
- Pegasus reticulation and Stormwater 360 Stormfilters- use of stormfilters in association with standard kerb and channel systems, sumps and stormwater piping to allow stormwater flow to be treated prior to discharge into the lake.

Some key statistics (end of 2019/20 year) of the scheme are shown in Tables 2 to 6.

The extent of the currently serviced area is presented in Appendix 1, and a schematic of the network is shown in Figure 1 below.

Table 2: Scheme Statistics for 2019/2020

| Scheme Parameter | Statistics | Source |
|-------------------------------|---|--|
| Drainage System | Gravity | |
| Drainage Area | 282 hectares | Source - GIS Layer |
| Reticulation & Treatment | Soak holes for private residential properties. Swales and soakage trenches for residential roads. Piping and treatment in Stormfilters for the commercial area. | |
| Length of Reticulation | 6.5km | Drainage Asset Valuation Tables 9-4 and 9-5, pages 66 to 68. |
| Total Replacement Value | \$6,970,257 | |
| Depreciated Replacement Value | \$6,425,833 | |
| Properties rated | 1,560 | Source 2019/20 Rating Query |

Table 3: Stormwater Pipe Data Summary

| | Stormwater pipe length (m) by diameter and pipe material | | | | | | | | | | | | |
|-----------------|--|-------------|-------------|---------------|-------------|---------------|-------------|-------------|-------------|-------------|-----------|-----------|---------------|
| Pipe Material | Pipe Diameter (mm) | | | | | | | | | | | | |
| | 100 | 150 | 225 | 300 | 375 | 450 | 525 | 600 | 750 | 900 | 1050 | >1200 | Total |
| Concrete | 0m | 0m | 203m | 1,030m | 654m | 1,008m | 717m | 492m | 393m | 472m | 0m | 0m | 4,969m |
| Perforated HDPE | 0m | 18m | 84m | 0m | 0m | 0m | 0m | 0m | 0m | 0m | 0m | 0m | 102m |
| Pvc | 0m | 245m | 508m | 658m | 13m | 0m | 0m | 0m | 0m | 0m | 0m | 0m | 1,424m |
| Other | 0m | 0m | 26m | 0m | 0m | 0m | 0m | 0m | 0m | 0m | 0m | 0m | 26m |
| Total | 0m | 262m | 821m | 1,689m | 667m | 1,008m | 717m | 492m | 393m | 472m | 0m | 0m | 6,520m |

Table 4: Open Channel Drain Data Summary

| Open Channel Drains | |
|---------------------|------------|
| Material | Length (m) |
| Unlined Drain | 482 |
| Lined Drain | 0 |
| Total | 482 |

Table 5: Other Stormwater Asset Data Summary

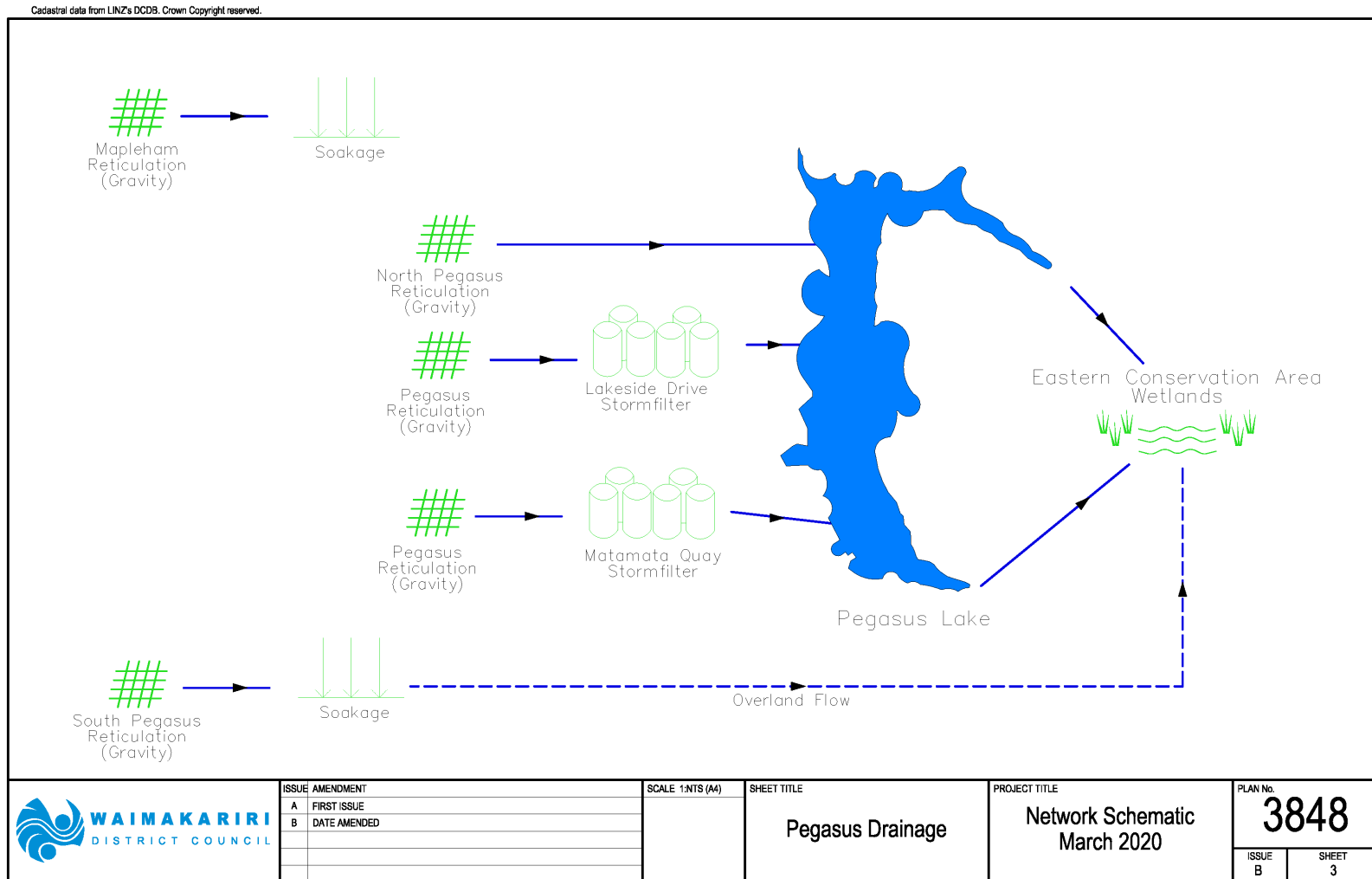
| Stormwater Assets | |
|-------------------|------------|
| Asset Type | Count |
| Inlet (Sump) | 2 |
| Manhole | 204 |
| Node | 0 |
| Valve | 0 |
| Total | 206 |

Table 6: Data References

| Data Reference | Trim Reference |
|--|------------------------------|
| 2020 3 Waters Asset Valuation | 200824109857 |
| 2020 50 Year Water and Sewer Growth Forecast | 200224024348 |

Figure 1 below provides an overview of the Pegasus drainage scheme.

Figure 1: Network Schematics



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

There are a number of key aspects to consider when managing a drainage scheme; these include:

- Desired & actual levels of service
- Asset condition & criticality
- Capacity & performance
- Risks
- Growth predictions for the scheme

These issues have been assessed in detail and are summarised 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 drainage scheme AMPs. They are located in the District Overview Drainage Activity Management Plan. However, there is considerable overlap between the measures at Scheme and District levels. Mandatory measures cover flooding, consent compliance, time to respond to faults, and complaints. The scheme LOS measures include more detail, and cover complaints, consent compliance, flooding, but not response times, which are only measured at scheme level

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 7 is measured against the performance measures set in 2018, as part of the 2018-28 Long Term Plan process. Going forward from 2021, 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 "Y" indicates that the LOS has been met, and "N" indicates it has not been met**

Details of performance measures may have been modified between various revisions of the AMP. The Previous Results reported are as assessed against the most relevant performance measure at the time of assessment.

| Section | Level of Service | 2018 – 2021 Performance Measure | 2018 – 2021 Target | 2020 | | | | Previous Results* | | | |
|------------------|--|--|--------------------|---------------|---|----------|-------------------|-------------------|------|------|------|
| | | | | Result | Commentary | Status | Action to Address | 2017 | 2014 | 2011 | 2008 |
| Resource Consent | Consent Breach | Number breaches of consent conditions that result in an ECan report that identifies compliance issues. | Nil per year | Nil | There were no consent breaches that resulted in non-compliance reports being received from Environment Canterbury for FY 19/20. | Achieved | N/A | Y | Y | Y | Y |
| Flooding | Flooding - CBD Nuisance or Carriageway | Minimum return period of flood event that can be accommodated in the system without having nuisance flooding of properties or road carriageways in the CBD area. | 1 in 10 year | 1 in 10 year | The system is designed to this standard, but maintenance is necessary to ensure LOS is met | Achieved | N/A | Y | Y | Y | N |
| | Flooding - Dwellings | Minimum return period of flood event that can be accommodated in the system without having flooding of dwellings. | 1 in 50 year | 1 in 100 year | 1 in 100 year flood modelling for Pegasus has identified no significant flooding of properties occurs in this sized event | 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 |
| | Flooding - Nuisance or Carriageway | The percentage of complaints about nuisance flooding caused by lack of capacity that are investigated and a project planned to resolve the issue. Applies to rain events with an Average Recurrence Interval of 5 years or less. | 100% | 100% | No outstanding nuisance drainage issues recorded | Achieved | N/A | Y | Y | Y | N |

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 targeted wastewater CCTV programme was started in 2016 to survey the reticulation network and assign evidence based condition ratings. Only a small amount of the network has been inspected so far and while the data has been placed in the Asset Register, it has not yet been analysed. The expected purchase of the widely used InfoAssets software for this purpose will aid this analysis. As data is gathered and analysed, the rate of CCTV inspections may need to be increased.

The data has been used in the renewals model.

The Pegasus drainage scheme assets are assumed to be in good condition, as they are only about 10 years old.

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

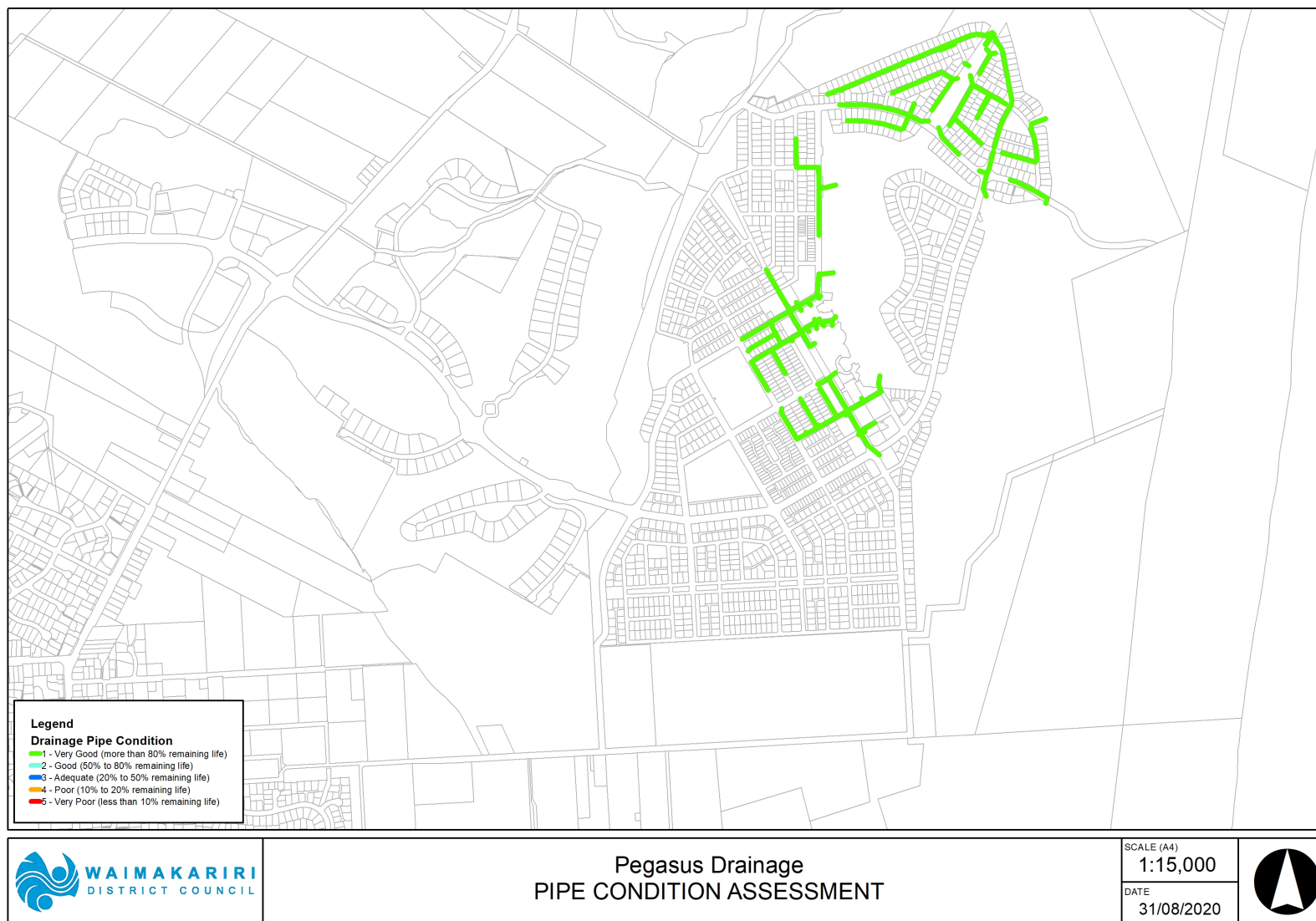
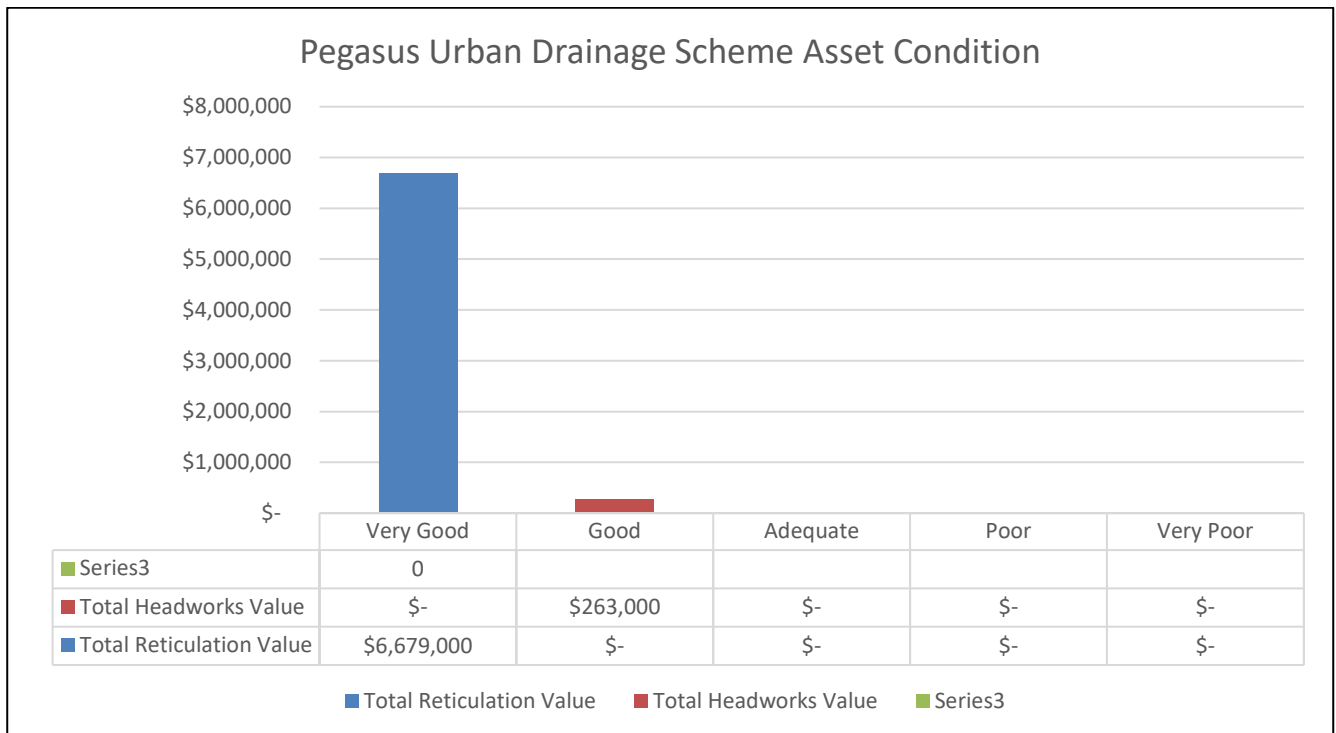


Figure 3: Asset Condition Summary



“Headworks” is inclusive of all above ground assets associated with the 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 <i>More than 80% of life remaining</i> | 6.6 km 100% | \$ 6,679,000 100% | \$ - 0% | \$ 6,679,000 96% |
| 2 | Good <i>Between 50% and 80% of life remaining</i> | 0.0 km 0% | \$ - 0% | \$ 263,000 100% | \$ 263,000 4% |
| 3 | Adequate <i>Between 20% and 50% of life remaining</i> | 0.0 km 0% | \$ - 0% | \$ - 0% | \$ - 0% |
| 4 | Poor <i>Between 10% and 20% of life remaining</i> | 0.0 km 0% | \$ - 0% | \$ - 0% | \$ - 0% |
| 5 | Very Poor <i>Less than 10% of life remaining</i> | 0.0 km 0% | \$ - 0% | \$ - 0% | \$ - 0% |
| Total | | 6.6 km | \$6,679,000 | \$263,000 | \$6,942,000 |

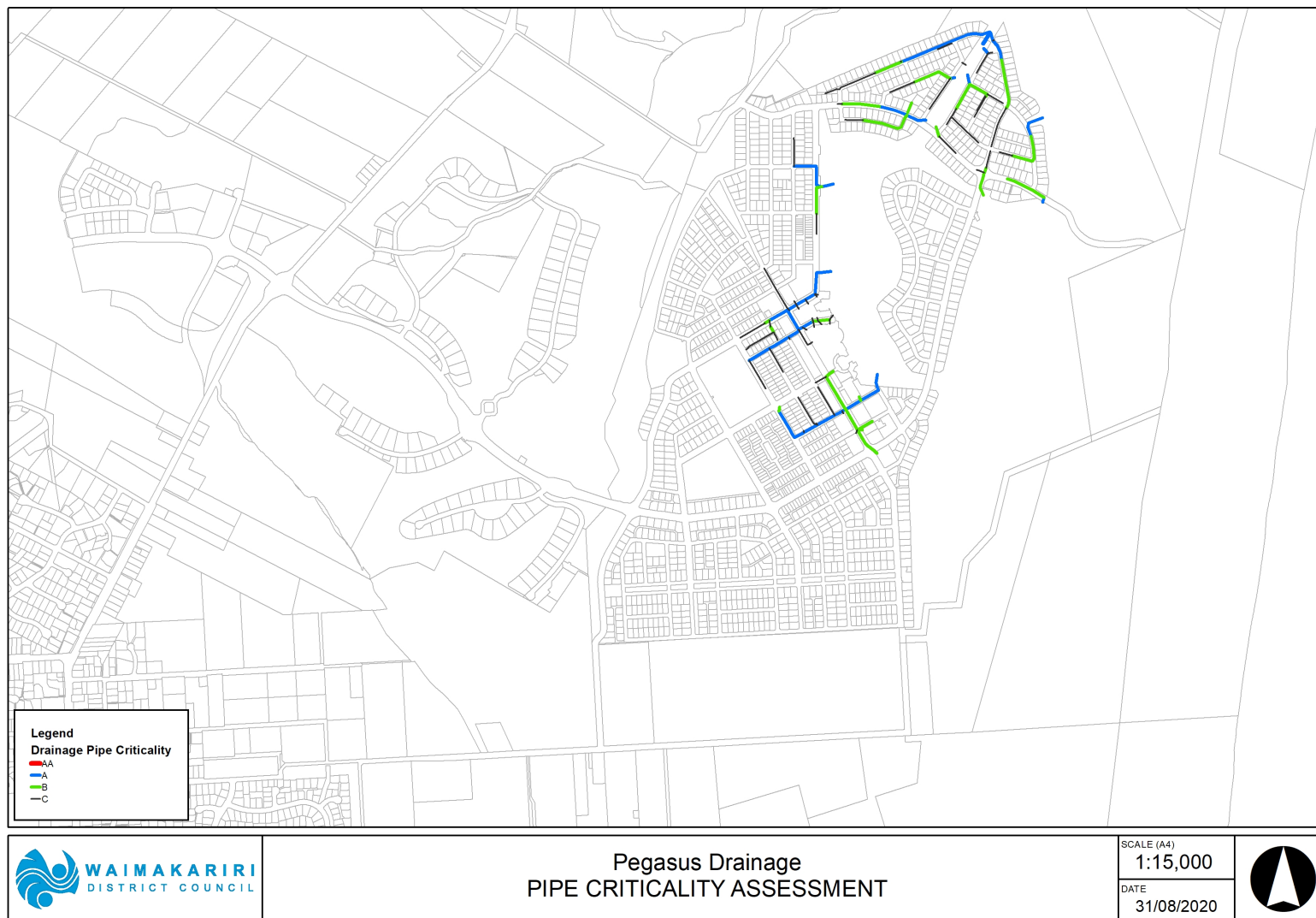
5.3 Asset Criticality

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. For 3 waters 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 Drainage 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

A risk assessment was undertaken for the Pegasus Urban Drainage Scheme for the first time in 2011 and was updated for the 2015 AMP.

The key output from the risk assessment was the identification of extreme and high risks to the scheme, which need to be mitigated. The preferred mitigation method has then be included in the forward works programme.

The risk analysis found that the system had 0 Extreme, 3 High, 11 Moderate, and 10 Low risks.

Table 9 summarises the risks for the Pegasus Urban Drainage scheme.

Table 9: Number of Events per Level of Risk

| Risk Level | 2011 | 2014 |
|----------------|-----------|-----------|
| Extreme risks | 0 | 0 |
| High risks | 3 | 3 |
| Moderate risks | 11 | 11 |
| Low risks | 10 | 10 |
| Not applicable | 4 | 4 |
| Total | 28 | 28 |

All three of the high risks identified relate mostly to damage to the pipe network from earthquake. Most of the network is concrete pipes, and a lesser amount of Pvc. Concrete pipes will be vulnerable to damage in an earthquake but there is no intention to replace these types of pipes because (a) they are almost new, are expected to be in good condition, and have a high residual value, and (b) the improvement in risk from using other pipe types would be marginal. Pvc pipes have been shown to perform reasonable well in earthquakes in areas prone to liquefaction. The risk level needs to be reviewed as part of the planned 2021 update of the Risk Assessment and DRA.

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.

The vulnerability assessment carried out for water and wastewater pipes in areas prone to liquefaction, has not been carried out for the stormwater network, as it contains no AC or earthenware pipes, which are those most vulnerable to damage in an earthquake strong enough to induce liquefaction.

No data was available for the Pegasus drainage mains, and therefore no earthquake risk assessment could be undertaken

Above Ground Facilities

There were no above ground assets assessed for impact potential. The only above ground asset within the scheme is the pump station that operates the water cascade within Pegasus lake. This is a decorative feature not associated with other drainage assets.

5.6 Growth Projections

There are a number of factors that are likely to influence future demand on land drainage systems. These may include:

- Population trends
- Changes in land use
- Climate change
- Changes in legislation
- Advancements in drain management

The growth in Pegasus is predominantly driven by the developer's construction and titling programme. Infrastructure has been sized to accommodate the full extent of the development.

No further development is expected for Pegasus after it is fully developed, due to geographical constraint, as shown in Table 10 below.

Table 10: Growth Projections

| Pegasus | Rates Strike | Years 1 - 3 | Years 4 - 10 | Years 11 - 20 | Years 21 - 30 |
|----------------------|--------------|--------------------|--------------------|--------------------|--------------------|
| | 2019/20 | 2021/22 to 2023/24 | 2024/25 to 2030/31 | 2031/32 to 2040/41 | 2041-42 to 2050/51 |
| Projected Properties | 1560 | 1919 | 1943 | 1943 | 1943 |

Note that the time frames have been chosen to reflect the periods 3, 10, 20, 30 and 50 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.

To calculate connection growth numbers from the population projections, existing Pegasus drainage connections were counted, then the maximum number of connection was evaluated using the Pegasus sewer connection figures. The additional connections were then spread across the first 5 year period.

5.7 Capacity & Performance

Since it is a new system, developed to the higher standard now required, capacity will be meet the required LOS. The customer satisfaction survey with 100% of the respondents being satisfied or very satisfied, also indicates that the drainage system is performing well

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.

6.1 Operation & Maintenance

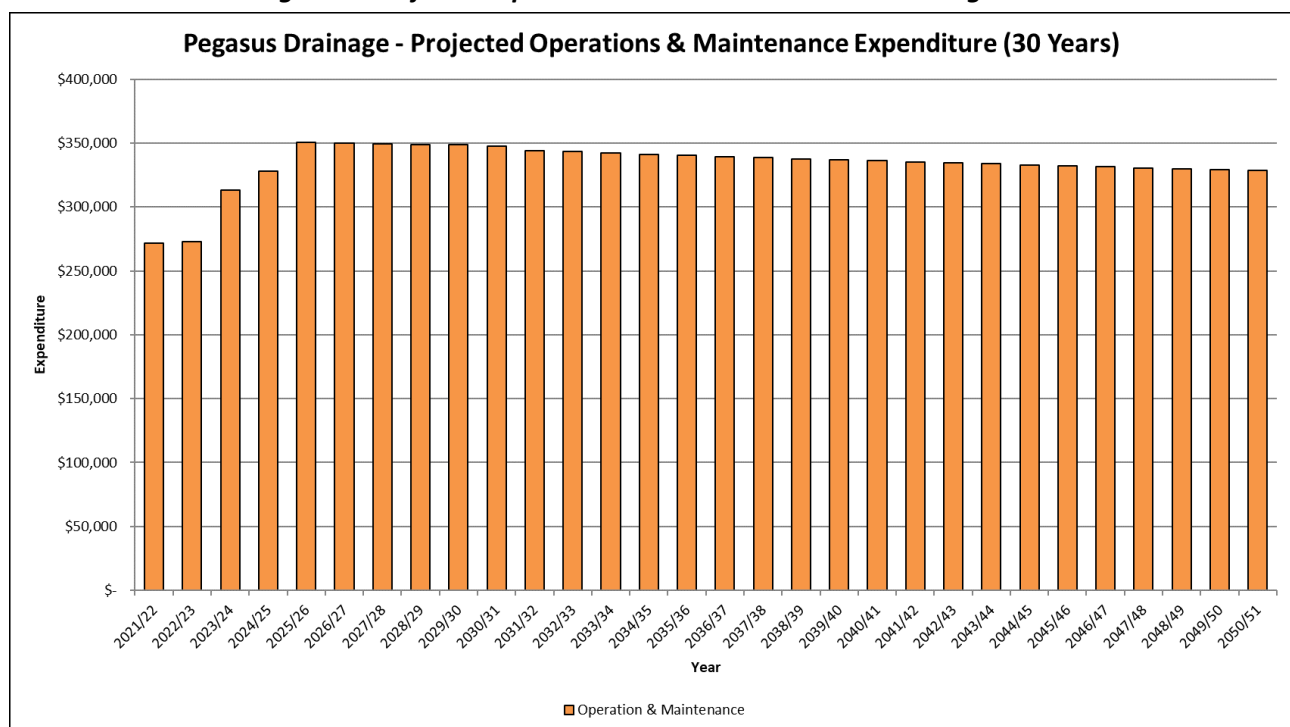
The Subdivision Resource Consent requires that operation and maintenance (O&M) of the stormwater system is carried out by Pegasus Town Ltd for a period of five years for all swales, sediment chambers and soakage trenches. Most stages are now complete and the 5 years elapsed, so WDC now maintains the majority of the schemes assets.

Due to various requirements, the design of the drainage system is expected to carry higher O&M costs in comparison to the more traditional drainage systems in other parts of the district.

Figure 5 shows the projected Operations and Maintenance budget over the next 30 years.

Systems are not yet in place to capture the cost distinction between planned and unplanned maintenance.

Figure 5: Projected Operation & Maintenance 30-Year Budget

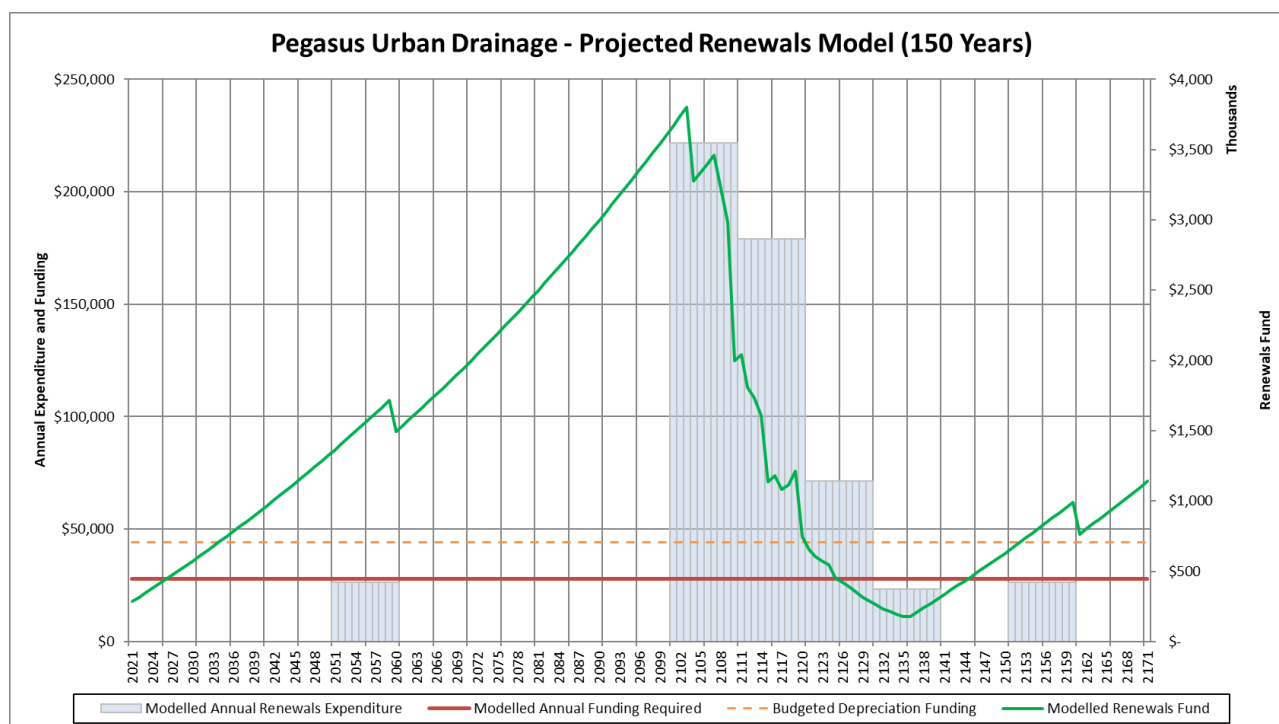


The increases in the operation and maintenance budget relate predominantly to the Council assuming responsibility for the operation and maintenance of the remaining stages of the Pegasus Urban drainage assets.

6.2 Renewals Programme

Given that the infrastructure has only very recently been completed, no renewals are expected to be required for many years. Never the less the annual renewals funding shown in Figure 6, which will produce an accumulating balance, will be required to fund future renewal work at the end of the assets lives. The planned renewals for this scheme, are shown spatially and temporally in Figure 7.

Figure 6: Projected Renewals 150 year Budget

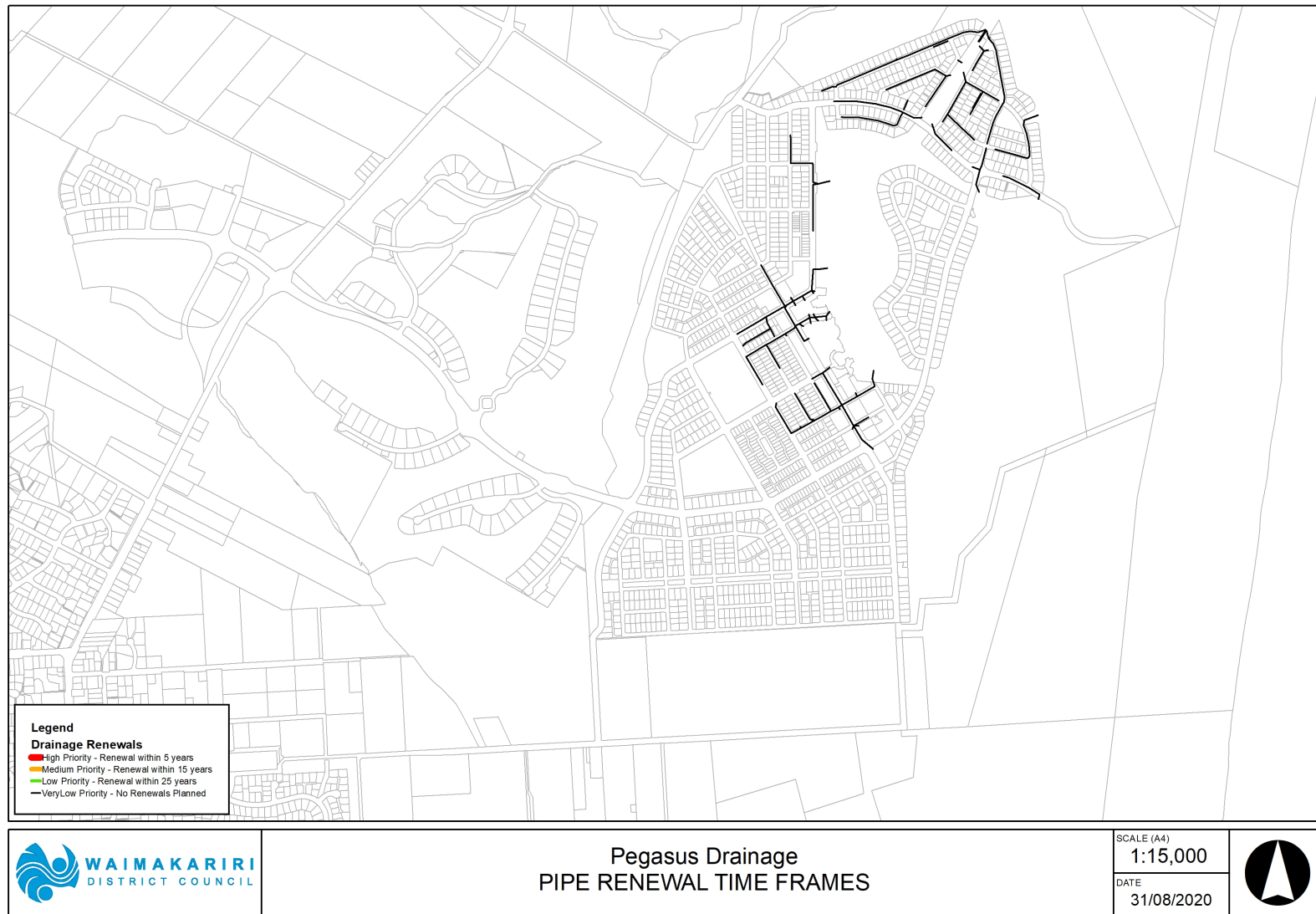


The key parameters in the figure above are explained below:

- **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 can be seen, this account is maintained as a surplus, peaking later this century, before being drawn down as the first lifecycle of current assets is completed.

As may be seen, the annual funding required is less than the depreciation funding, showing that future renewals are fully funded.

Figure 7: Pipe Renewal Time Frames



6.3 Capital Works

The private Pegasus Development is still relatively new, and capital works of any significance are not expected to be required in the foreseeable future, although a small funding stream has been included in the budget in case a severe rain event shows up something untoward. The city centre has a reticulated system, and is multi staged.

The following graph shows the 50 year budget for all capital works, including projects driven by growth and levels of service, (including carry forwards), but excluding projects funded by the district wide drainage rate (if any).

Figure 8: Projected Capital works Expenditure

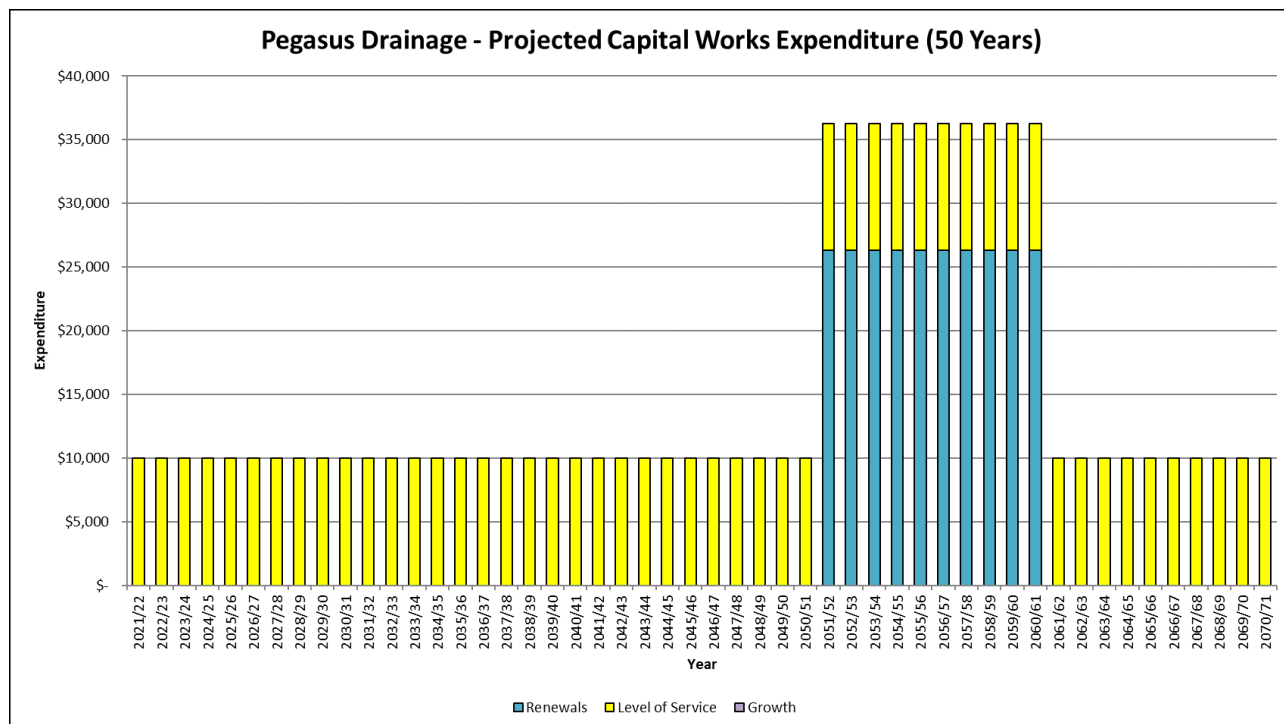


Table 11 summarises the projected capital works for the next 50 years.

The level of confidence in the budget for the works (High / Medium / Low) is presented in the table.

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

Table 11: Summary of Capital Works (Includes Renewals)

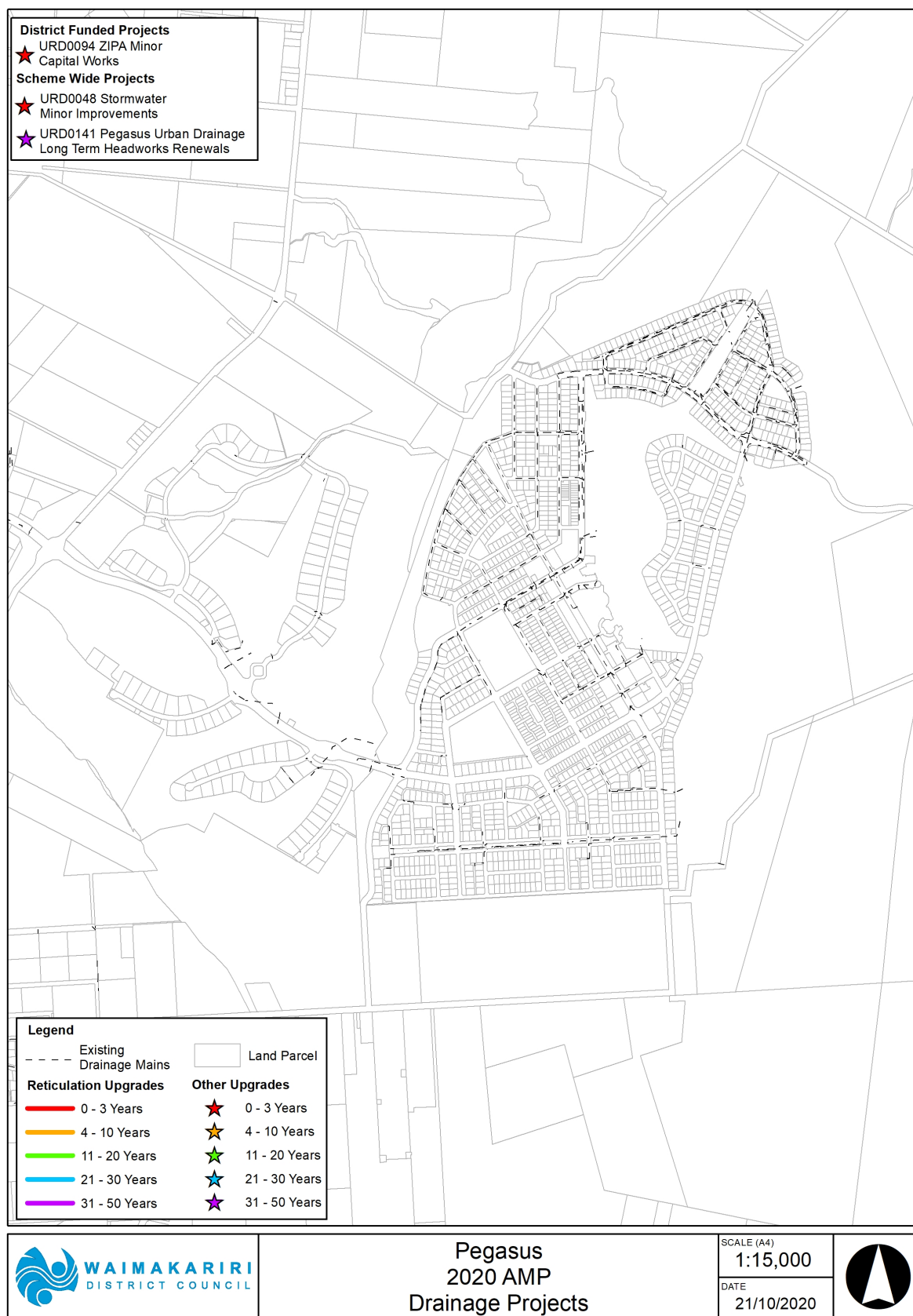
| Year | Project ID | Project Name | Level of Confidence | Project Value | LOS Component | Renewals Component | Growth Component |
|--------------|------------|---|---------------------|---------------|---------------|--------------------|------------------|
| Year 1 - 10 | | | | | | | |
| 2022 | URD0048 | Stormwater Minor Improvements | 0 | \$ 500,000 | \$ 500,000 | \$ - | \$ - |
| Year 31 - 50 | | | | | | | |
| 2052 | URD0141 | Pegasus Urban Drainage Long Term Headworks Renewals | 3 - Low | \$ 262,842 | \$ - | \$ 262,842 | \$ - |
| Grand Total | | | | \$ 762,842 | \$ 500,000 | \$ 262,842 | \$ - |

Flood Response Programme

There are no works planned within this scheme funded by the district wide flood response rate.

Figure 9: Projected Capital Upgrade Works (not to scale)

Includes works funded through the flood response works.

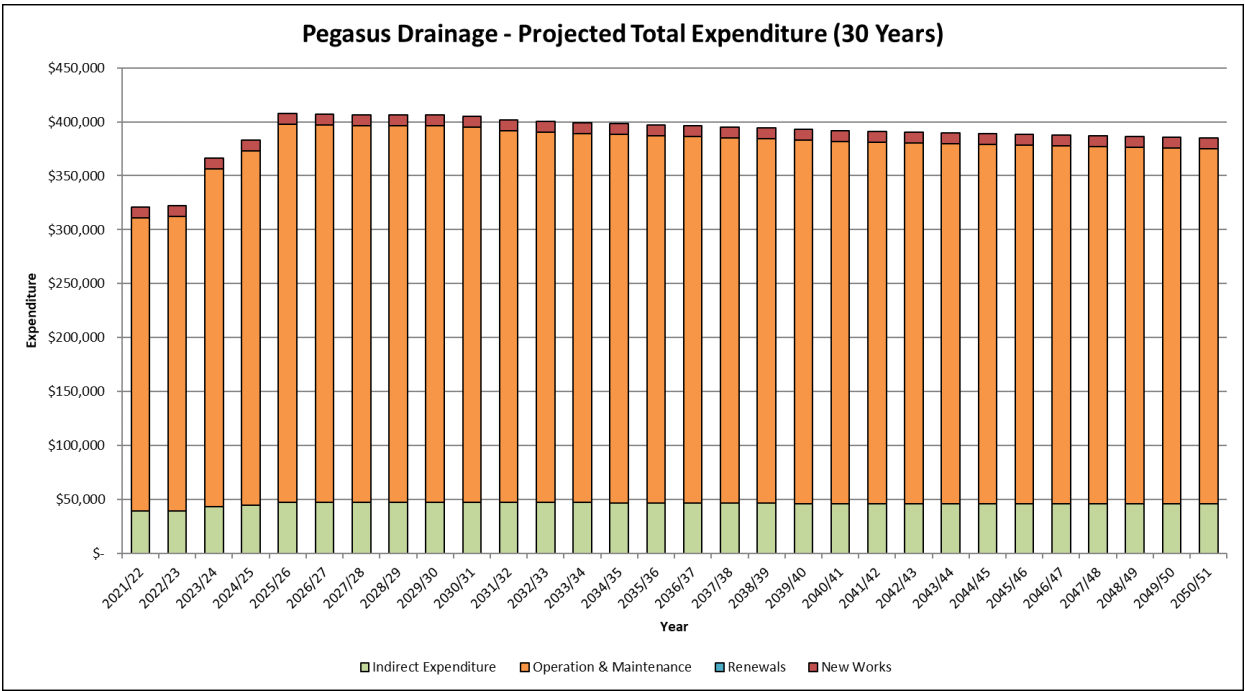


6.4 Financial Projections

The following graph summarises the breakdown of projected total expenditure over a 30 year time horizon. It includes both operational and capital expenditure. Operational costs include operations and maintenance, and indirect expenditure.

Indirect expenditure includes interest, rating collection costs, costs associated with maintaining the Asset Register, and internal overhead costs. Capital includes expenditure for growth, levels of service and renewals, but excludes both projects funded by the district wide drainage rate, and carry forwards.

Figure 10: 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 12 below provides a summary of the replacement cost, depreciated replacement cost and annual depreciation for this scheme

Table 12: Asset Valuation

| Asset Type | Unit | Quantity | Replacement Cost | Depreciated Replacement Cost | Annual Depreciation |
|--------------|------|----------|--------------------|------------------------------|---------------------|
| Manhole | No. | 204 | \$1,988,926 | \$1,837,120 | \$19,889 |
| Sump | No. | 2 | \$4,243 | \$3,968 | \$42 |
| Valve | No. | 0 | \$- | \$- | \$- |
| Network Main | m | 6,520 | \$4,699,334 | \$4,367,409 | \$47,086 |
| Open Channel | m | 482 | \$14,913 | \$14,913 | \$- |
| Facilities | | | \$262,842 | \$202,422 | \$5,257 |
| Total | | | \$6,970,257 | \$6,425,833 | \$72,274 |

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).

Generally rates are targeted rates charged to homeowners within the schemes geographical boundaries. There is also a district wide Flood Response rate which is used to fund flood improvement works anywhere within the district.

7 Improvement Plan

7.1 2021 AMP Achievement

Table 13 details the scheme specific 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 13: 2021 AMP Improvement Plan

| Project Ref | AMP Section | Project Description | Priority | Status | Estimated Cost |
|-------------|-------------------|--|----------|------------------|---|
| IP052 | Levels of Service | Define CBD areas, as these feed into Level of Service reporting. | High | Planned for 2021 | No budget required, done using in-house resources |

APPENDIX 'A'. PLANS

Figure 11: A1 - Plan of Serviced Areas as of November 2017

