



Wellington Water Committee | Komiti Ngā Wai Hangarua

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Update on Asset Condition Assessment Programme

Purpose of Report

1. To give the Wellington Water Committee an update on the condition assessment programme and provide key insights.

Recommendations

That the Committee:

- (1) receives the report;
- (2) notes that with an asset base of \$6B, approximately \$10M of condition assessment should be conducted annually;
- (3) notes that expenditure of this budget would stress existing resources nationally and would require a sector-wide uplift;
- (4) notes that the approximately \$2.5M per annum of condition assessment work is being completed across the region, excluding the assessment of the Very High Criticality Assets which has been funded from the Government stimulus package; and
- (5) notes that the risk of unplanned service failures and interruptions occurring across the region therefore remains.

Key Messages

2. Understanding the condition of the region's water assets is a fundamental part of a prudent asset management system. However, historic under-investment in the region's water assets, including condition assessment, has resulted in a low understanding of the health of the assets, an increased risk of service failures and consequent poor customer outcomes.
3. Wellington Water Limited (the company) is part-way through a four year programme worth a total of \$17.9M (\$10.2M Government stimulus funding and \$7.7M council opex budgets) to assess the condition of the most important water assets and to put in place plans to address the findings.
4. As assets needing action and attention are identified, they are being programmed for renewal or maintenance as appropriate. All assessed assets have some further activities programmed, including those in good condition (which only need their next inspection to be scheduled).
5. In order for the initial health assessments to be completed, and for a rolling programme to reassess asset health to be implemented, a condition assessment budget of \$10M per year (in addition to planned maintenance) is considered an appropriate level of investment for the size of our asset base.
6. Expenditure of \$10M per year on condition assessment would require significant capability uplift nationally. If the current LTP funding of approximately \$2.5M per year for condition assessment programmes continues, it will take 8 years for the region to have an initial understanding of the health of the most critical assets, and this current constraint will continue to limit the effective planning of asset renewal programmes.
7. Condition assessment does not provide a complete picture of asset health, and there will always be some level of risk of unplanned failures. That risk, and the associated costs to customers of service failure, will remain relatively high at the current level of investment in health and condition assessment.

Background

8. Unplanned critical asset failure is a key risk to meeting customer service expectations. The most critical assets provide essential services that support the health and livelihoods of the region's communities and the environment. Unplanned failures can have significant impacts that are difficult to mitigate. Recent examples include the discharge of material volumes of untreated wastewater into the Wellington and Porirua harbours due to failures in trunk mains running through the CBD and from the northern suburbs, respectively.
9. Understanding the health and condition of these assets is essential for minimising the risk of unplanned failures. These assessments, conducted periodically over the lifetime of the assets, enables optimal decision-making on when to maintain or replace them. They also help to optimise the cost of delivering the services by ensuring that these interventions are undertaken at the ideal time. Assets can be replaced when this provides greater net benefit than continuing to maintain them. They can also be maintained in a manner that prolongs their operating life and performance.

10. The collection of robust asset condition data, and its use in planning renewals, will also, over time, address the “matter of emphasis” identified in the audits of the councils’ 2021 Long Term Plan Consultation Document earlier this year.
11. The company applies a criticality framework to determine which condition assessments are required, and when. Very high and high criticality assets have significant consequences should they fail and understanding their health and condition is essential to how they are managed. The very high and high criticality assets include:
 - a. many (but not all) of the water treatment plant components that have no alternative or contingency should they fail;
 - b. 35% of all pipes by length;
 - c. all pumping stations; and
 - d. all reservoirs.
12. The programme presents a range of challenges including the need to complete physical inspections in complex environments without disrupting services to customers. The majority of the pipeline assets being assessed, and some of the reservoirs, are buried underground and are constrained in their ability to be taken out of service. The wide variety of asset types, materials, and operating environments requires the use of a range of techniques. All pipeline assets receive a preliminary assessment through peer-to-peer workshops prior to inspection.

The understanding of the assets, and how to assess them, has increased

13. The condition of the assets is graded on a scale from 1 to 5, with those in “very good” condition scoring as grade 1 and those in “very poor” condition and requiring urgent replacement scoring as grade 5. Those at grade 1 do not require further action other than the scheduling of a further inspection (potentially many years into the future) while those at grade 5 need to be scheduled for renewal or maintenance, depending on the nature of the failure.
14. The assessments completed to-date include all the pump stations, the majority of the reservoirs and water treatment assets, and around 15% of the VHCA pipeline length. The latest progress update is provided as Appendix 1 attached to the report, with a high-level summary provided in the table below:

Asset type	Number of VHCA assets	% of VHCA assessed	Assets identified as very poor ('grade 5') condition
Pump stations	84	100%	6 (7%)
Reservoirs	79	75%	3 (5%)
Treatment plant	560	85%	11 (2%)
Pipelines (all waters)	465 km	15% validated in the field (100% have preliminary assessments)	15 km (3%)

All reviewed assets have next steps programmed, regardless of their condition

15. All assets have further activities programmed as soon as their condition assessment has been completed. For those assets in:
- a. Very good and good condition, the programmed activity might simply be to schedule the next inspection. For those that are showing very low rates of deterioration this could be many years away (see the example in Appendix 2 attached to the report).
 - b. Moderate-to-poor condition, the programmed activities might include some relevant maintenance as well as further inspections; and
 - c. Very poor (Grade 5) condition, attention is required. This might be the programming of relevant maintenance and repairs (for example, to patch holes in reservoirs that are a contamination pathway) or the programming of a renewal within the coming 3-6 year investment period (as has happened with the wastewater mains in the Wellington CBD and at Paremata).

The programme will be progressively expanded within the limits of the available funding

16. Based on the assets' current age, around 50-60% of the three waters network theoretically requires renewal in the next 30 years.
17. Condition assessment is an ongoing process. The rate of deterioration changes as an asset ages and is influenced by its operating conditions. The frequency of assessment is dependent on the asset type and how far it is through its life. This VHCA programme is capturing recognised international good practice and the programme is more advanced than has ever been previously applied in the New Zealand water sector, but it is only the first step towards a more comprehensive approach to condition assessment across all asset criticalities and classes that will need to continue as required for the lifetime of the assets.

The extent of the assessments of the 'High Criticality Assets' will be limited by the available funding and capability

18. Recent evidence suggests that the optimal level of investment for a water utility is in the region of 1-2% of the total value of the assets, which in the region equates to approximately \$60-120M per annum for planned maintenance and condition assessment - noting that our current budgets are approximately \$12.5M per year for planned maintenance and condition assessment.
19. The assessment of VHCA (refer to Appendix 3 attached to the report for programme status) has been largely enabled by access to the Government stimulus funding, with \$10.2M available over the 2020/22 period. A reduced level of funding is available for the 2022/24 period. \$7.7M of council opex was provided for the 2021/24 LTP period, some of which has already been used for the VHCA programme.
20. This reduced level of funding will determine the scope of the High Criticality Asset (HCA) programme. It is currently anticipated that 40% of the total VHCA and HCA asset base will have been assessed by the end of June 2024 (including all VHCAs). While the approach will be to seek to prioritise assets where the greatest risk is anticipated, this will still mean that the condition and associated risks for a large proportion of the HCAs will not be fully understood.
21. There is currently limited suitably skilled resources and expertise to support a significant expansion in the assessment of underground assets. For example, there is only one company in New Zealand that is currently able to provide analytical services for the laser profiling of pipes, which is a critical technique for pipe assessment. Addressing these capability shortcomings will take some time, as they will need to have confidence in the ongoing need for these services and build up the relevant skills.
22. Ultimately, the programme also needs to be expanded to help the region understand the deterioration rates of the medium, low, and very low criticality assets. There is not an aspiration to have complete condition data for these assets but enough information is needed to be able to make effective decisions about the maintenance and replacement of the various asset classes. With sufficient, good quality information it will be possible to start to predict how they will deteriorate over time. The data for these asset categories can also be collected opportunistically when other maintenance works provide easier access for inspection and sampling.
23. In the coming years better representative understanding of medium to low criticality assets will be built from the analysis of historical information, targeted pipe sampling and lab testing, and capturing condition insights during everyday operational work. However, the extent of this activity will be limited by the availability of funding and the need to prioritise this funding towards understanding the higher criticality assets.

Appendices

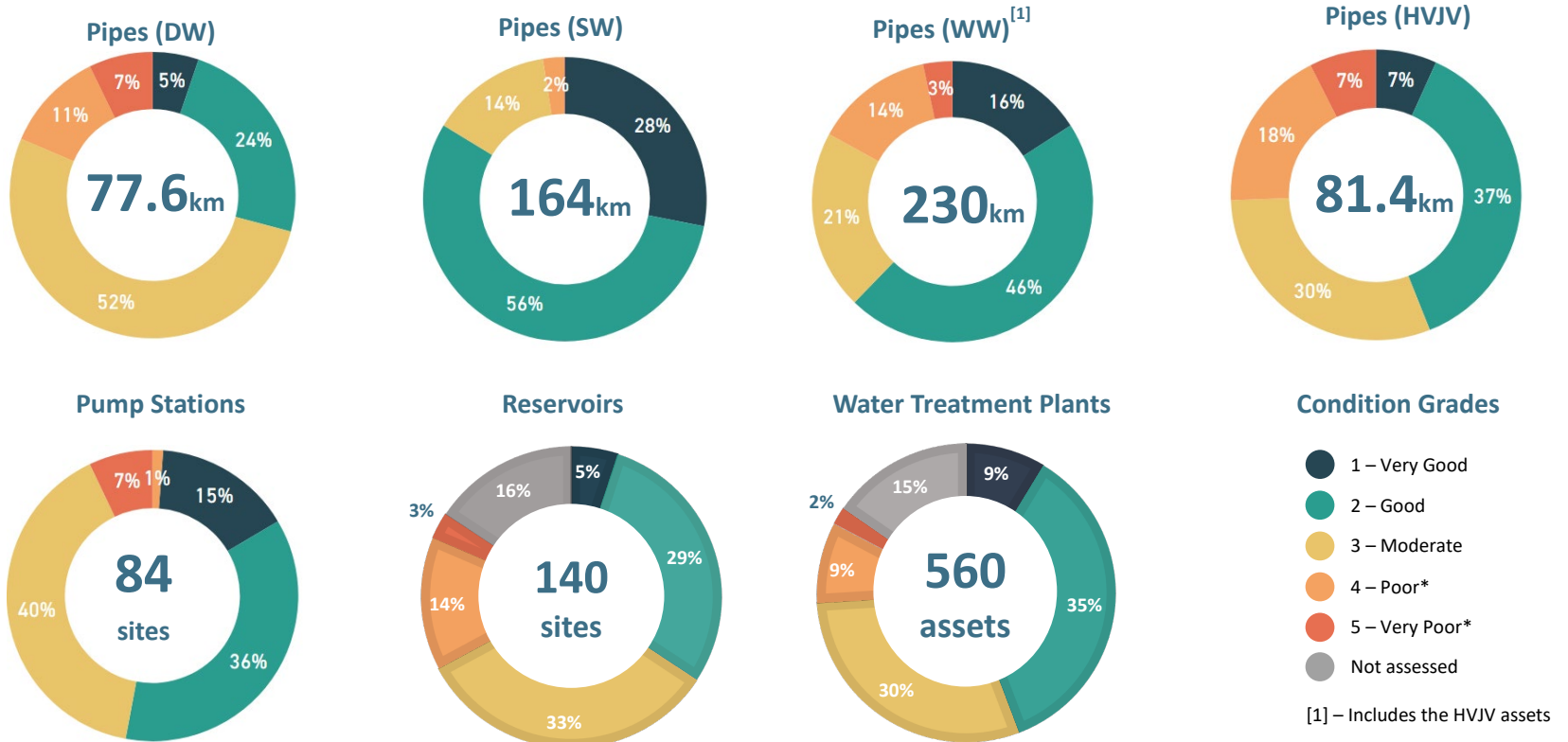
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Author: External Author (Wellington Water Ltd)

ASSET CONDITION PROGRAMME: APPENDIX 1

Very High Criticality Assets (VHCA)

All Councils | 30 October 2021 update



ASSET CONDITION PROGRAMME: APPENDIX 2

The Paremata wastewater pressure pipe that recently failed was theoretically expected to last another 15 years

The picture below shows the 43-year-old pipe and the advanced deterioration of the pipe wall. Compare the white material at the top (which has a consistency like wet Weetbix) compared to the solid black pipe wall material around the rest of its circumference that would be expected to be typical of a pipe this age.



ASSET CONDITION PROGRAMME: APPENDIX 2

This 120+ year old concrete wastewater pipe in Thorndon has exceeded its expected life and remains in good condition

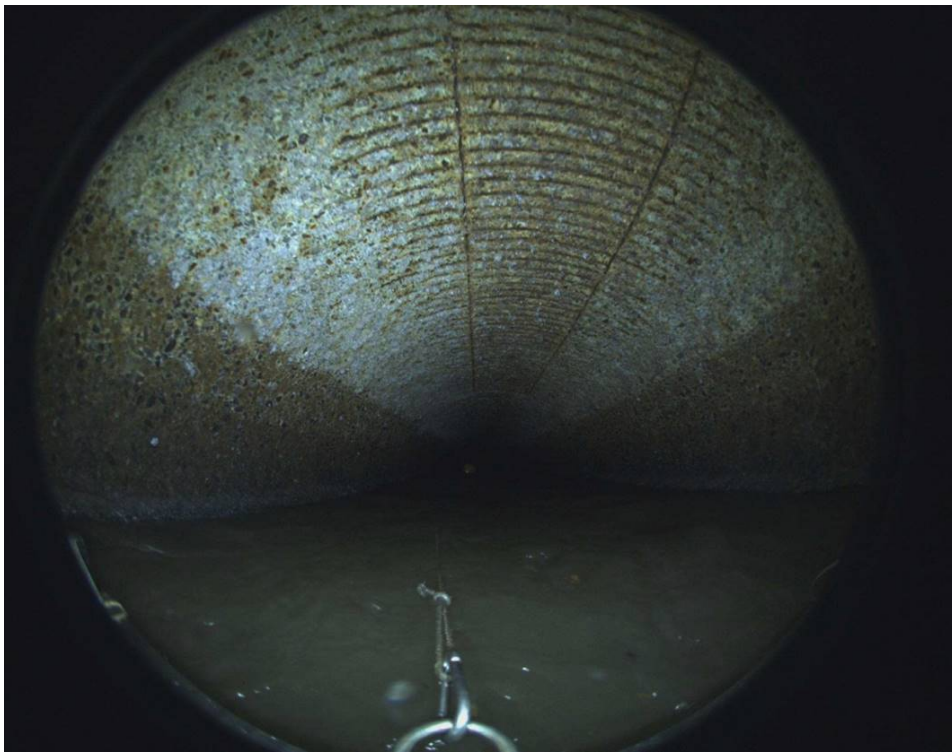
This pipe was installed in 1900 and has been categorised as in good condition, condition grade 1. The next planned inspection is now set for 2029.



ASSET CONDITION PROGRAMME: APPENDIX 2

Rapid deterioration of the very highly critical wastewater interceptor at Moa Point was found in time

This interceptor collects all the wastewater from Wellington City and delivers it to the Moa point wastewater treatment plant. Although only 23 years old, it was being routinely inspected because of its critical nature. The 5-yearly condition assessments of this VHCA identified rapid deterioration. The reinforcing steel normally embedded in the pipe material can clearly be seen at the top of the photo. The decision was made to refurbish the pipe immediately.



ASSET CONDITION PROGRAMME: APPENDIX 3

Status of VHCA Programme					
Asset Type	Programme Quantity	Desktop assessment complete	Field, site, or plant inspection complete	Data batched up for final analysis	Comment
Pipes	470 (km)	470 (km)	120km Gravity + 30km Pressure	44 (km)	Note pressure pipes may need more than one form of field inspection technique
Reservoirs					
Above ground	122 (No.)	NA	122 (No.)	122 (No.)	Assessments complete
Below ground	18 (No.)	NA		0 (No.)	Work planning underway
Pumpstations	85 (No.)	NA	85 (No.)	85 (No.)	Assessments largely complete – a few electrical panels remain to be assessed
Water treatment plants (WTP)	560 (No.)	NA	470 (No.)	470 (No.)	Condition assessment of 470 assets complete. Planning underway to complete the balance (15% approx.) of these more difficult inspections
Wastewater treatment plants Selection of assets at Seaview, Moa Point, Western and Porirua	70 (No.)	NA	Seaview dryer assessment complete	Dryer Report received	WWTP assets lumped together into clusters. This is a new addition to VHCA scope in October 2021 to align with WTP process – VHCA work to be completed by Dec 2021