

Queensland's Ageing Pipes

October 2019



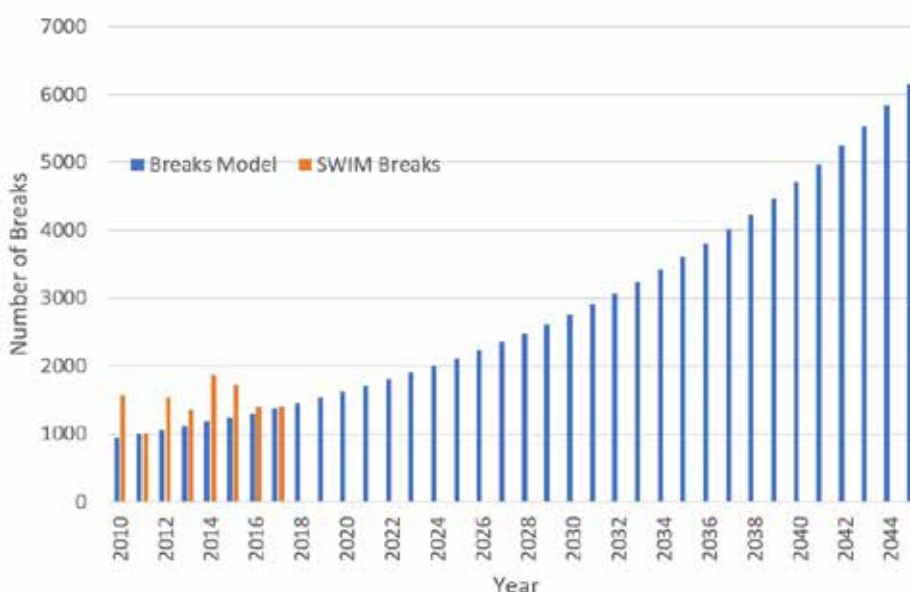
Pipes or 'in-ground' network assets are the most expensive component of a water utility's infrastructure. The hidden nature of existing networks means that degradation of existing pipes is not easy to detect and ageing assets often attract attention only if there is an incident. Most pipes have an expected life of around 70 years so across much of Queensland significant renewals have not been needed in the past. This is beginning to change.

Information on the age of Queensland's networks was collected to estimate likely deterioration and three different modelling approaches agreed that the rate of failures will increase rapidly over the next two decades to peak sometime in the 2040s.

This means councils must place more emphasis on repair and replacement than has been needed in the past. Australian utilities typically replace less than 0.3% of their networks per year but this rate will not keep pace as the extensive networks installed in the 50s and 60s 'come of age'. The low renewals needed to date coupled with the length of pipe at risk means significant change is needed to avoid increased network failure, breaks and leaks in coming years.

To manage the coming period of increasing repairs and renewals there needs to be a shift in the way in-ground assets are managed. For councils in regional Queensland this presents a particular challenge, as many lack capacity and resources to appropriately target renewals. Non-targeted investment inflates costs because inevitably it results in replacing some pipes before replacement is required. Even some large communities may lack capacity to appropriately target renewals simply because this did not need to be a priority in the past.

A primary driver of efficiency for a network utility is the density of its connections. High densities mean more customers are served with a smaller total 'footprint' of infrastructure thus reducing costs. Consequently, economies of scale are elusive where density is low and networks are too small and isolated for viable interconnection. Queensland is one of the largest sub-national jurisdictions in the world but has a relatively large population. The population is widely dispersed: Queensland has the largest number of residents outside major cities and 'inner regional' areas of all Australian jurisdictions.



Comparison of the predicted breaks of asbestos cement pipes with those reported to the Statewide Water Information Management (SWIM) database shows that predicted rates will increase rapidly in coming years.

Investing in Network Assets

A focus on targeted, considered investment in steady renewal of Queensland's in-ground assets will mitigate the impacts of rapidly ageing networks. Wholesale replacement of networks is not necessarily the answer as it can result in renewal of pipes that are still in good condition leading to higher costs in the long term. However, targeting only deteriorated pipes is impractical because of the difficulty of determining the exact condition of networks and the many constraints involved in undertaking renewals and relining.

So: what is the best investment strategy?

Ideally, pipes will be replaced as late as possible in their life cycle while maintaining levels of service and minimising customer interruptions and costs for the community (including the impacts of numerous breaks and associated unscheduled emergency repairs).

However, this is a nuanced trade-off which requires accurate information about the condition and criticality of networks. It can be difficult for utilities, particularly smaller regional councils to collate this information.

Modelling undertaken for the Queensland Water Regional Alliances Program (QWRAP) compared the long-term costs of various investment strategies showing that the most effective approach was a balanced investment across both high and low-criticality pipes.

Targeting poor condition pipes was more efficient than un-targeted investment but the proportion of funding directed at deteriorated pipes did not have to be 100% to produce effective results.

These findings reflect well-known principles of asset management: basing renewals on reasonable understanding of condition and criticality.

Modelling also explored the importance of early, up-front investment showing that this provided long-term benefits by reducing the back-log of already aged (and deteriorated) pipes.

However, a modestly increased initial investment targeted at the most deteriorated pipes was more efficient than a large initial injection spread across the entire network. This reflects the need to target renewals and again highlights the importance of assessing the condition of networks.

Despite the risk associated with a large up-front injection of capital, this approach can present a politically attractive option. It provides immediate benefits for the community in terms of reduced breaks (at least initially) and also immediately reduces secondary costs. It can be viewed as a bold and decisive investment possibly using external funds and does not demand (often difficult) operational improvements. However, the long-term costs if this approach were broadly adopted would have significant impacts on both ratepayers and taxpayers in general.

To be successful, councils must concurrently focus on:

- bringing expenditure forward to immediately address the worst condition assets, thereby reducing breaks and associated secondary costs,
- targeting further investment to the worst condition assets across both high and low criticality assets, and
- investing in technology and expertise to build understanding about the criticality and condition of the assets.

Anecdotal evidence from regional councils suggests that strategic investment and the knowledge of condition of network assets needs to be improved.

Some councils may lack resources to undertake this work alone and collaboration may be necessary. Such approaches are being tested by Water Alliances formed under QWRAP and can provide information and learnings for other councils considering future investment in strategic assets at the lowest possible cost with appropriate levels of service for its customers.

More information on regional approaches are available in other information sheets** or by contacting enquiry@qldwater.com.au but the following table provides broad advice for councils of different sizes.

Size of service provider	Possible strategy	Comments
Small regional councils with up to 100 km water mains (up to 2000 connections)	Repair breaks as they arise. Wholesale replacement of high criticality water mains as required.	These councils have small networks with high criticality. Funding will likely rely on government grants as they have limited resources and remoteness means that targeted renewals may cost more than broad replacement programs. Improved understanding of pipe condition will still be beneficial but needs to be locally appropriate and affordable. Regional critical mass underpinned with local knowledge could assist in targeted assessment and provide savings through joint procurement of services.
Medium – Regional councils with 100 - 300 km water mains (up to 7,000 connections)	Invest in renewals based on improved knowledge of asset condition and criticality.	These SPs may have the resources to conduct opportunistic condition assessments and increase knowledge of network risk, but also have the highest cost profiles (because of their average length of mains per customer). These councils can gain significantly from collaboration to share knowledge, systems and seek economies of scale and joint procurement.
Large – Regional councils with 300 – 1000 km water mains (up to 35,000 connections)	Invest in renewals based on knowledge of asset condition and criticality. Undertake active condition monitoring programs to optimise investment.	These councils have resources to direct to maintaining and understanding of asset condition and risk but may improve access to new technologies, systems and approaches through regional collaboration.
Very large utility over 1000 km water mains	Targeted ongoing renewals based on risk. Active monitoring based on criticality and condition.	Have active asset management programs in place, and should be developing appropriate knowledge of their network risk. Regional approaches could help share improvements in systems and technologies with smaller service providers.



***This information sheet is part of a series aimed at preparing regional councils for changing investment needs of network assets. They are available along with two detailed reviews at <https://www.qldwater.com.au/QWRAP>.*