

1. Purpose

On the 26th of September, Watercare was alerted to the formation of a large sinkhole over the Ōrākei Main Sewer (OMS) at 79 St Georges Bay Road in Parnell.

The OMS is a 2.1 - 2.4-metre diameter egg-shaped sewer constructed in 1911. The sewer has a precast concrete base and a brick arch.

The sinkhole grew over the next 24 hours and on the 27th of September the sewer collapsed, and the OMS became fully blocked. Further site investigation showed the blockage spanned 25 metres and is comprised mainly of large rocks and clays. The roof of the OMS collapsed over four metres.

The OMS is currently discharging all flows via several EOPs (Engineered Overflow Points) with the majority of flow discharging via an EOP at Mechanics Bay and another at Daldy Street.

This engagement will review the incident and determine the cause of the failure mode. In addition, the review will include an assessment of Watercare's current condition assessment planning and maintenance practises, asset management procedures, AMP planning process for rehabilitation works on Ōrākei Main Sewer.

2. Terms of reference

The scope of incident review shall be undertaken in three parts and will consider the current incident failure analysis and a wider review of Watercare's current asset management practises.

The three parts of the assessment are as follows:

Part 1: Site investigation and failure review

- Review of all available data from incident (including a site visit to view temporary work, review of CCTV etc.)
- Explanation of failure mechanisms for interceptor sewers like the Ōrākei Main Sewer
- Definition of sinkholes including an explanation of how they form both naturally and around infrastructure.
- Review of available geotechnical data at the failure site (79 St Georges Bay Road)
- Review of the stormwater management at 79 St Georges Bay Road
- Review of available as-built and condition assessment data for the Ōrākei Main Sewer
- Development of a theory for the cause of the sinkhole at 79 St Georges Bay Road and a failure mechanism of the Ōrākei Main Sewer
- Assessment of any proven or potential damage to the Ōrākei Main Sewer outside of the immediate failure site
- Review of the over pumping set up at Weld Street relieving surcharge on the Ōrākei Main Sewer.

Part 2: Maintenance and condition assessment review

- Review of the historical wastewater transmission planned maintenance and condition assessment programs with a brief explanation of the methods used.
- Review of all planned maintenance and condition assessment activities undertaken on the Ōrākei Main Sewer over the last 10 years
- Commentary on the appropriateness of the planned maintenance and condition assessment programmes and a gap analysis between Watercare's current practice and typical worldwide best practice for large diameter brick sewers. A commentary should be added if there are any new or emerging technologies.

Part 3: Rehabilitation and renewal planning review

- Review of Watercare's current capital programme for wastewater transmission sewer rehabilitation including methods for prioritisation
- Provide commentary on how the current methods align with typical worldwide industry best practice.

Any assessment of the impact of the failure on the environment and stakeholders is excluded from this review and will be undertaken as a separate engagement.

It is intended that the outcome of this investigation will be made public. Accordingly, the report's executive summary should take this into account.

The scope of work should allow for the preparation of a draft report for review by Watercare prior to completion of the final report. Watercare will restrict comments to factual correctness and the final report will be the authors'.