



# Sewer Solids Modelling to Reduce Blockages and Overflows

Reducing a major uncertainty on the impacts of decentralised water recycling and other sustainable water measures on existing sewers and their operations

## Sewer Operations

- Sewer maintenance and replacement is a significant cost for Operators, with an estimated \$24 billion spent on sewer rehabilitation in the USA alone up to 2010.<sup>[1]</sup>

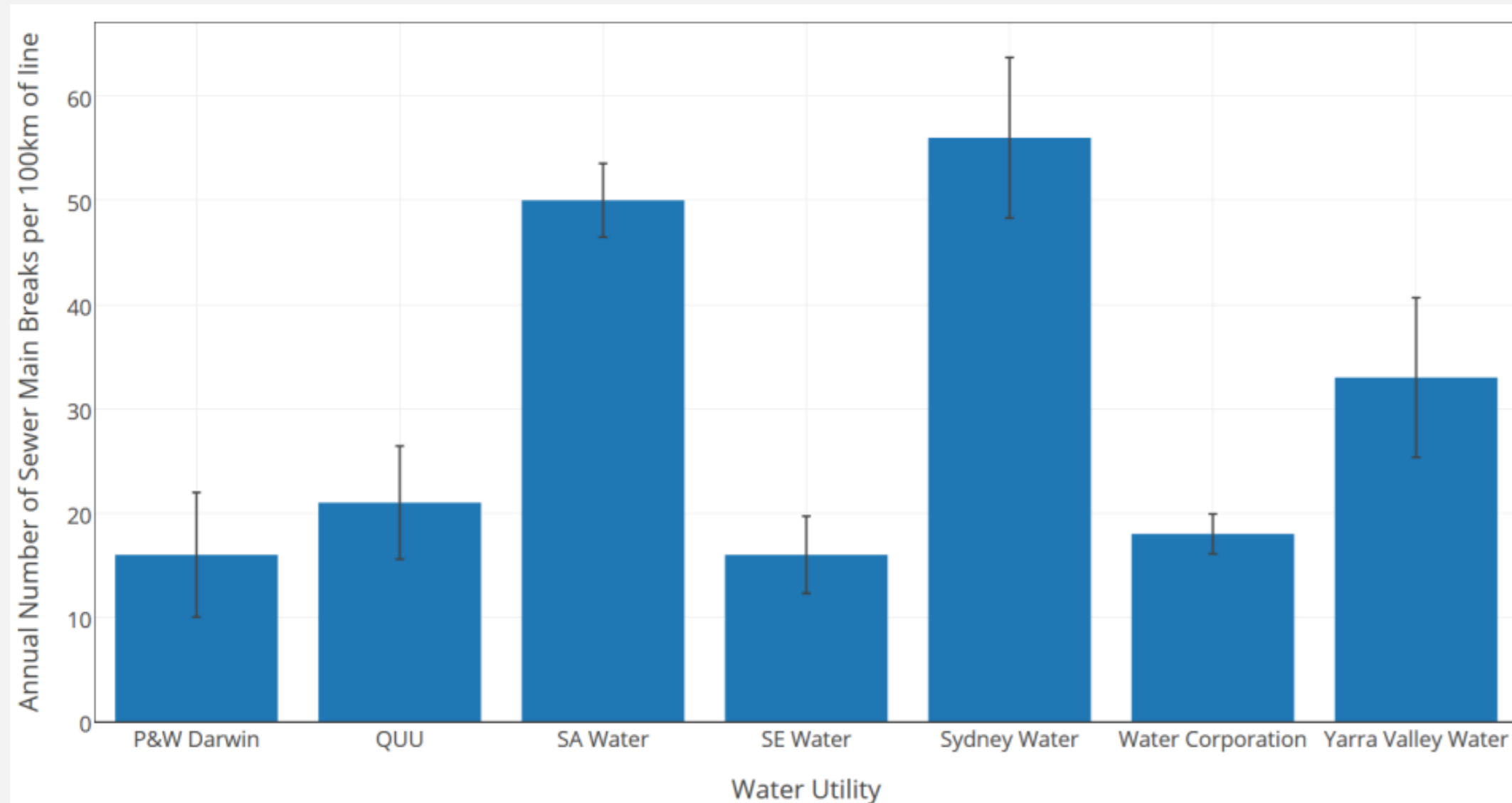


Figure 1: Average Sewer main breaks (per 100km of sewer line) occurring for selected Australian water utilities from 2009 to 2015. A number of factors including solids related blockages and overflows contribute to these figures.<sup>[2]</sup>

## Potential Issues

- To improve water resilience and sustainability, cities are aiming for decreased water use and increased water recycling.<sup>[3]</sup>
- Potential issues due to the subsequent reduction in peak flows (Figure 2) and increased pollutant concentrations are higher blockages, overflows, odor, and corrosion.<sup>[3]</sup>

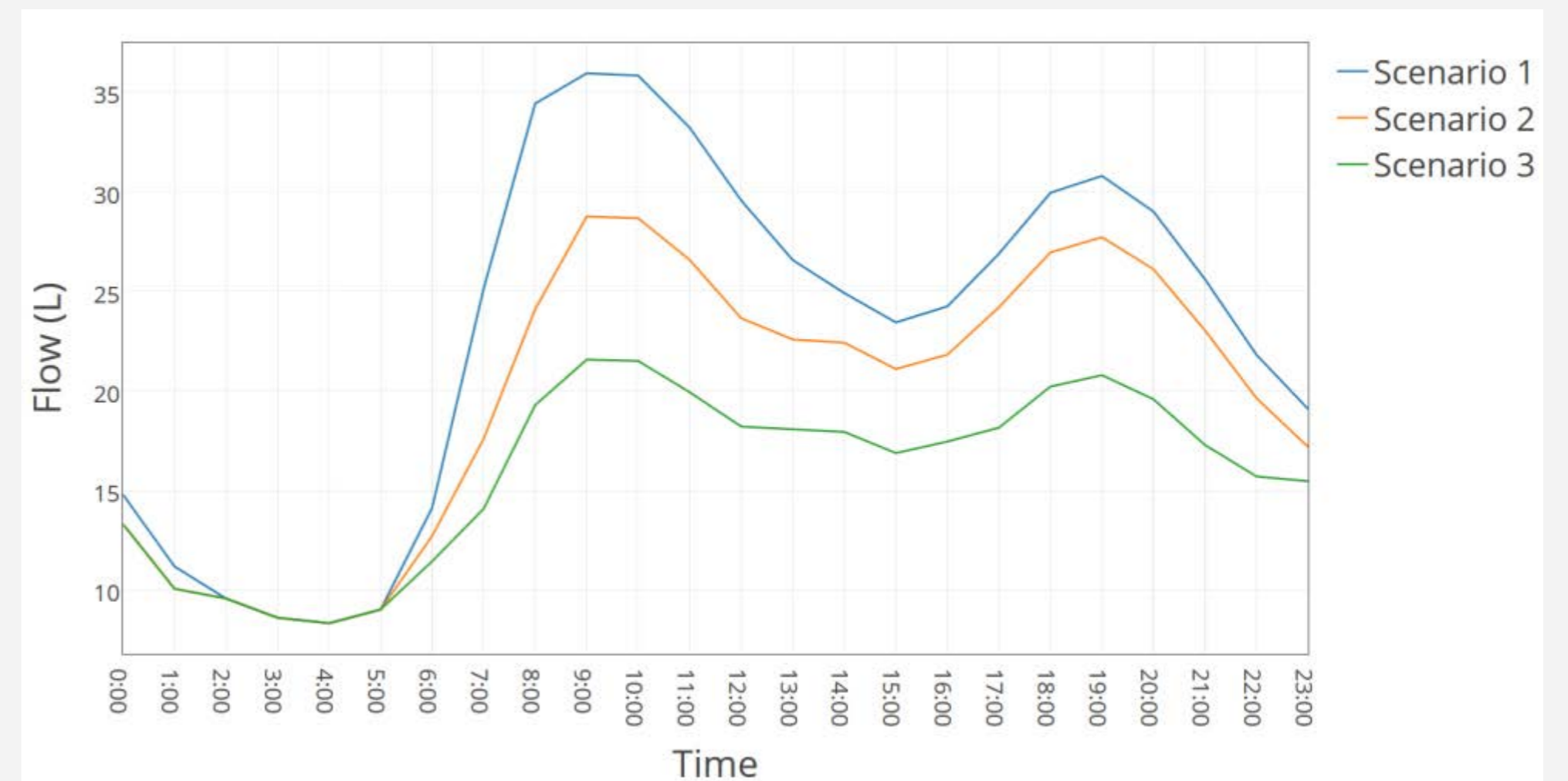


Figure 2: Predicted Australian sewer inflow patterns based on current flow (Scenario 1), improved water efficiency measures (Scenario 2), and both water efficiency and high decentralized water recycling (Scenario 3).<sup>[4]</sup>

## Research Output

- A complex small scale model and a simplified larger scale model will be developed.
- Outputs will include probability of blockages for different scenarios and scales (Figure 3).
- Currently, the small scale model is being calibrated and validated before being used to develop the large scale model.

## References

[1]Chang, N.-B. and Hernandez, E.A. (2008) Optimal Expansion Strategy for a Sewer System under Uncertainty. Environmental Modelling & Assessment 13(1), 93-113; [2] Bureau of Meteorology (2016) National performance report 2014-15: urban water utilities; [3]. Marleni, N., Gray, S., Sharma, A., Burn, S. and Muttill, N. (2012) Impact of water source management practices in residential areas on sewer networks a review. Water Science and Technology 65(4), 624; [4] Yarra Valley Water (2009) Sewerage Design Principles

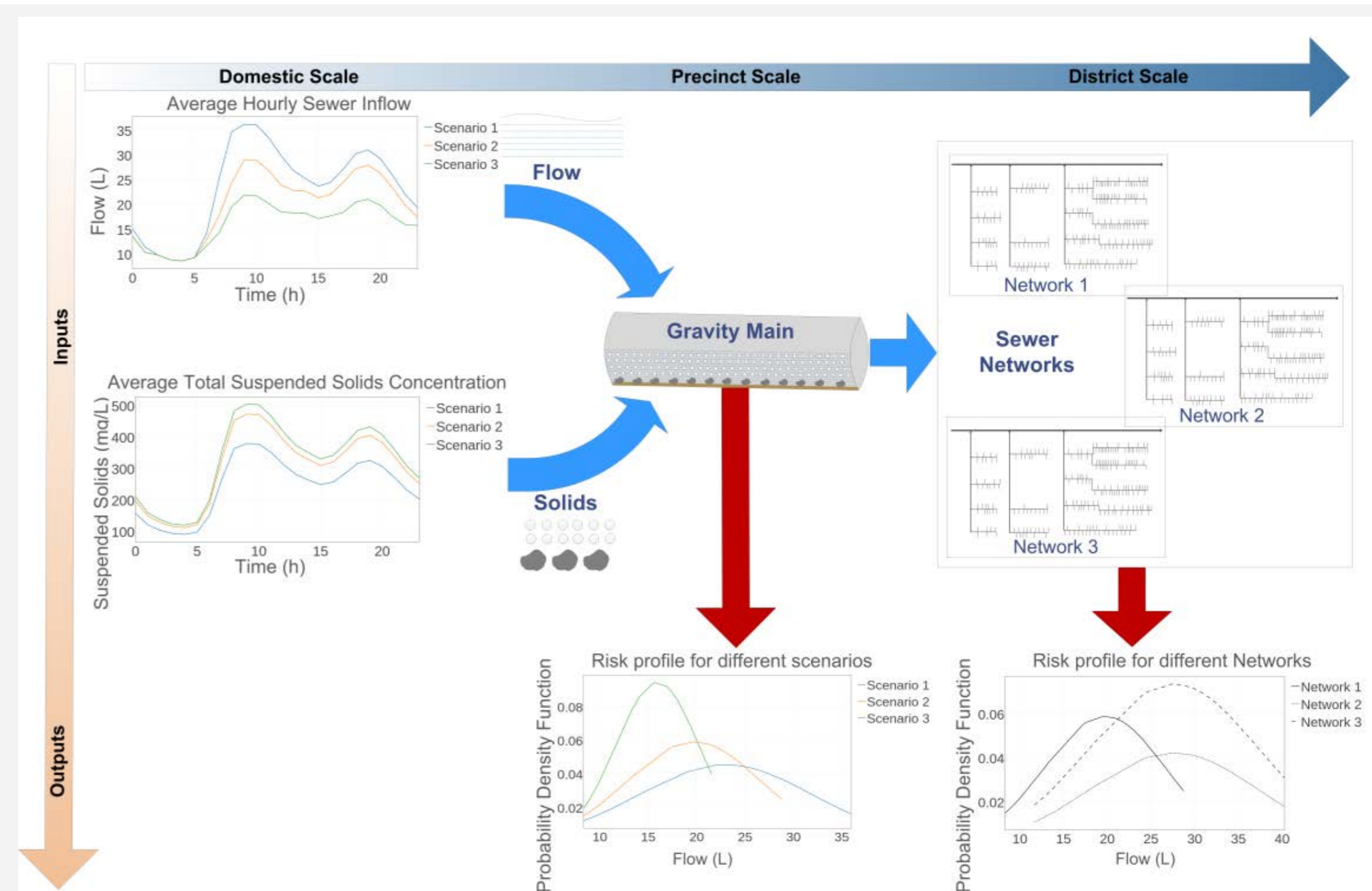


Figure 3: Proposed Network and Local-scale model outputs. For a set of flow scenarios, pollutant concentrations, and network characteristics the model will produce probabilities of solids related blockages occurring.