



# Data Driven Solutions

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✓ **Prevention**



**1X now**

**VS**

✗ **Failure**

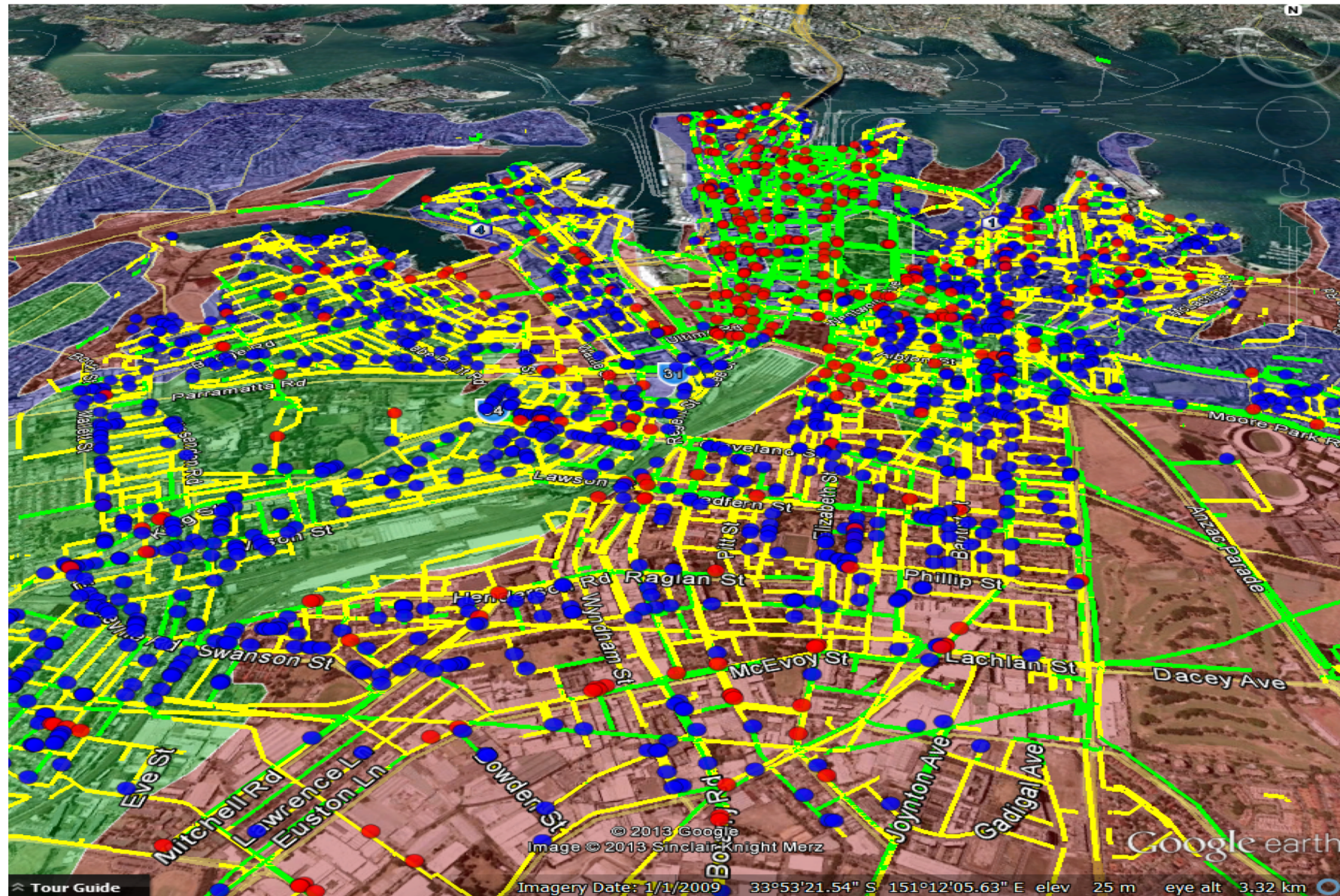


**10X then**

**to preserve and extend the service life of infrastructure assets  
for maintaining the quality of life in society and efficiency in  
the economy**



# Critical Water Main Failure Prediction





# AI/Data Analytics with Smart Sensing

## Process

Sensing



Signal Processing



Interpretation



Alarm

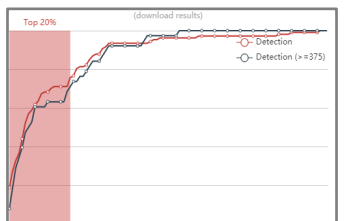
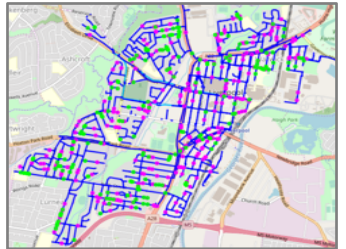
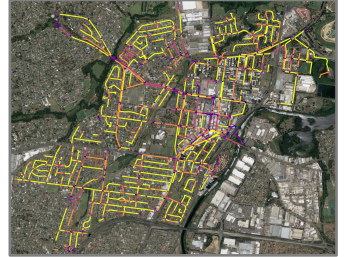
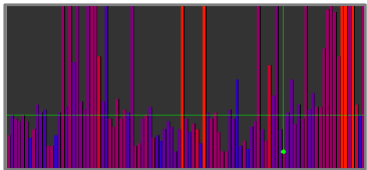
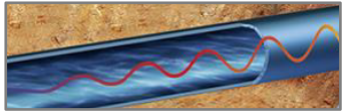
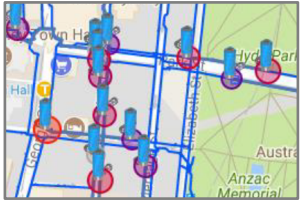
## AI/Data Analytics

- Sensors deployment optimisation
- Risk map generation

- Data cleaning for noisy or invalid data
- Data matching of sensing data and failure records
- Feature engineering for better information extraction

- Signatures and patterns discovery
- Correlation analysis of failures
- Integrate with analytics tool (e.g. GIS layers, pipe attributes)

- Evaluation on the detection results
- Reduce false alarms and improve detection accuracy





# Priority List Map for Sydney CBD

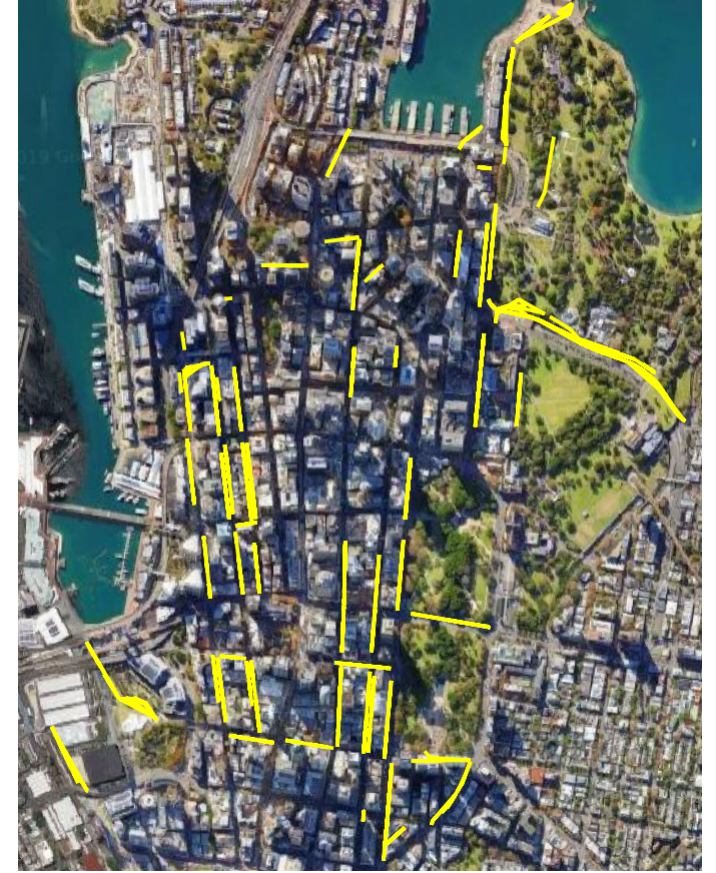
## Based on Advanced Sensing



top  
1%

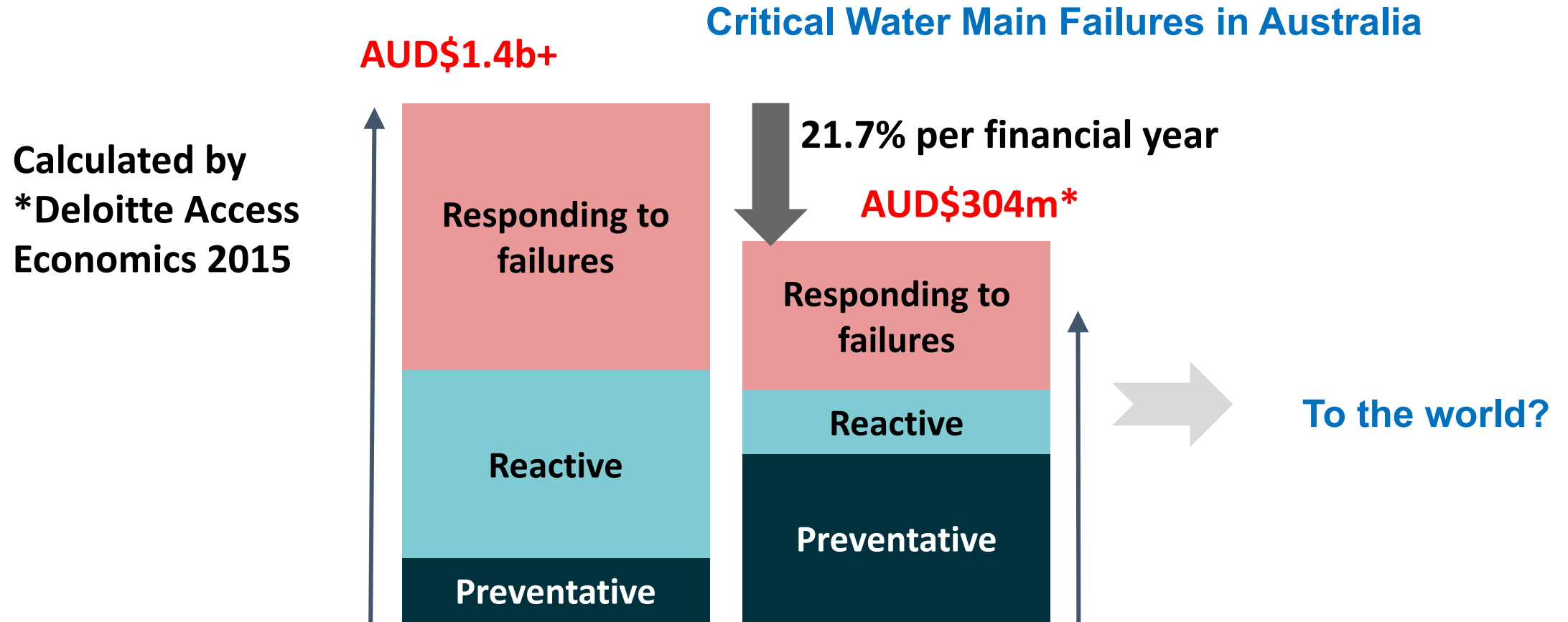


top  
2%



top  
3%

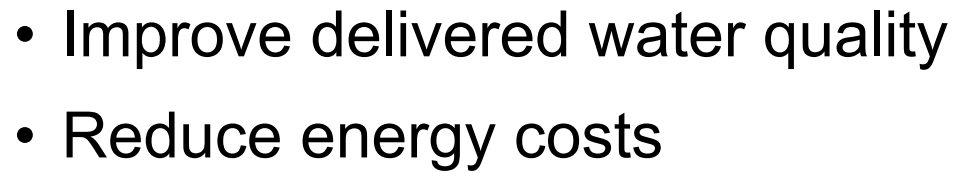
# Failure Prediction Accuracy Changes the Equation



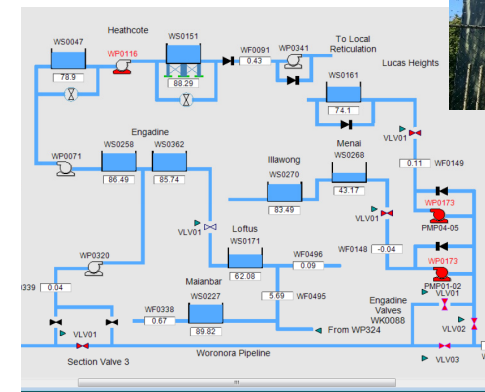
Water Mains are small part of Australian >100billion buried assets in water industry



- Improve delivered water quality
- Reduce energy costs



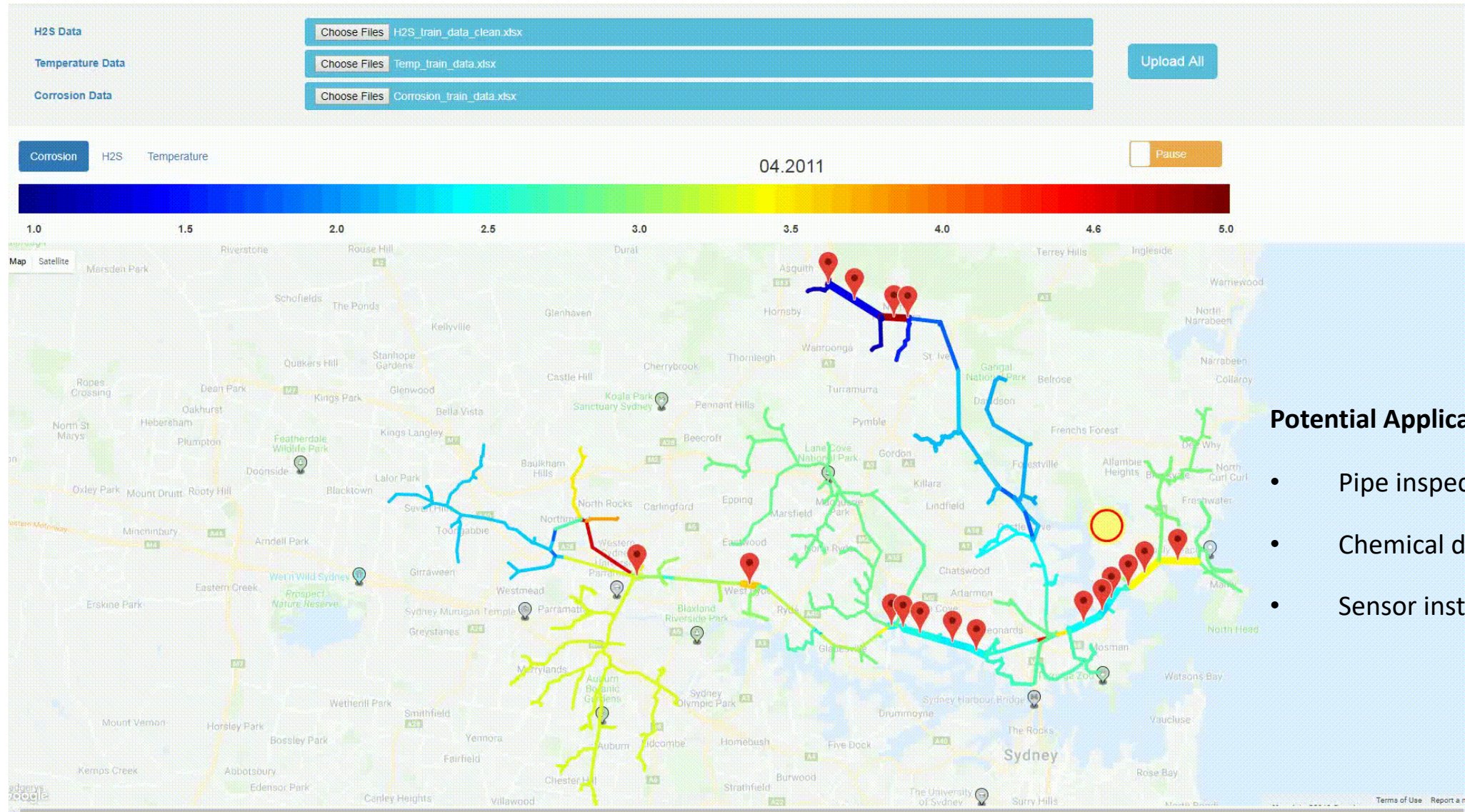
An aerial photograph showing a large concrete dam with a spillway, situated in a lush green forest. A large reservoir of blue water is visible behind the dam, with a small boat on the surface. The surrounding area is densely wooded, and some buildings are visible on the left side of the image.



## Consumers



# AI Based Sewer Chemical Dosing Operations Toolkit



## Potential Applications:

- Pipe inspection prioritization
- Chemical dosing optimization
- Sensor installation recommendation



# Practiced in 30+ Global Water Utilities

- Australia's Leading Science Award Australian Museum Eureka Prize for Excellence in Data Science 2018
- Industrial and Primary Industries Markets, Victoria iAwards, 2019
- Research Innovation Award 2018 (National Award, Australia Water Association)
- Research and Innovation, NSW iAwards, 2017
- Fang Chen, Water Professional of the Year, 2016 (Australia Water Association)



Australian Museum Eureka Prize for Excellence in Data Science



Fang Chen, AWA Water Professional of the Year 2016



AWA Research and Innovation Award 2018

Sydney  
**WATER**

 **Melbourne  
Water**

 **Yarra  
Valley  
Water**

**WESTERN  
WATER**

 **SA Water**

 **UKWIR**

 **QUEENSLAND  
Urban Utilities**

**KWR**

 **Water Supplies Department**  
The Government of the Hong Kong Special Administrative Region



**Thank you!**

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