# UNDERSTANDING AND REDUCING WATER QUALITY RISK ON TRUNK MAINS – QATIUM USE CASE

JAMIE MCMURCHIE

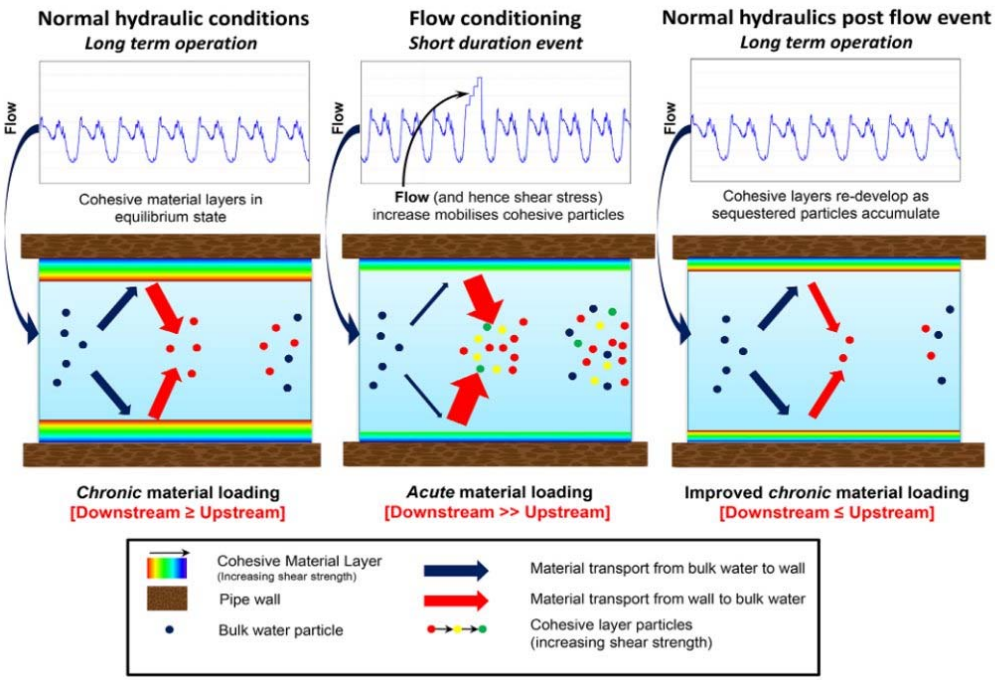
18/10/22

rpsgroup.com

MAKING COMPLEX EASY

# What is Trunk Main Conditioning (TMC)?

- An intervention technique deployed on large diameter clean water mains to ‘condition’ to a new flow regime
- TMC was developed from the ‘Prediction of Discolouration in Distributions Systems’ (PODDS) research at the University of Sheffield (and subsequent VCDM - Variable Condition Discolouration Model research)
- **Technique involves increasing flow in the mains** resulting in increased shear stress on material build up on pipe walls.
- Shear stress removes biofilm that may have accumulated over time.
- Once completed successfully, pipe section can operate within the new flow regime without mobilisation of material and subsequent WQ contacts



# Why is TMC required and why use TMC?

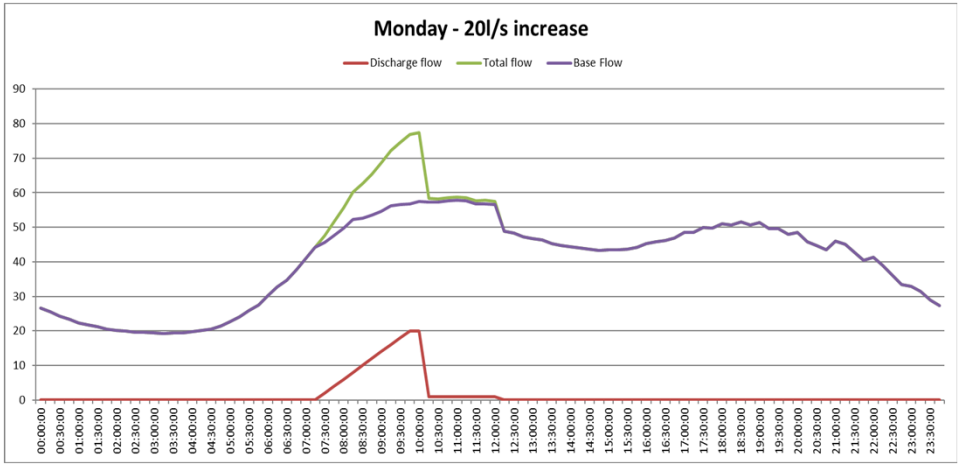
- Traditional ‘flushing’ technique not possible due to pipe size, typical velocity profiles and volumes of water required
- Discolouration in water supply systems through uncontrolled release of biofilm when flow regime altered
- Trunk Mains within zones are assigned a ‘WQ risk score’
- Understanding source of WQ risk and reduce this risk to the network
- Regeneration rate of material accumulation also part of the investigation and delivery of works
- Non-invasive works (OPEX vs CAPEX)
- Prolongs the life of a trunk main and improves asset resilience.

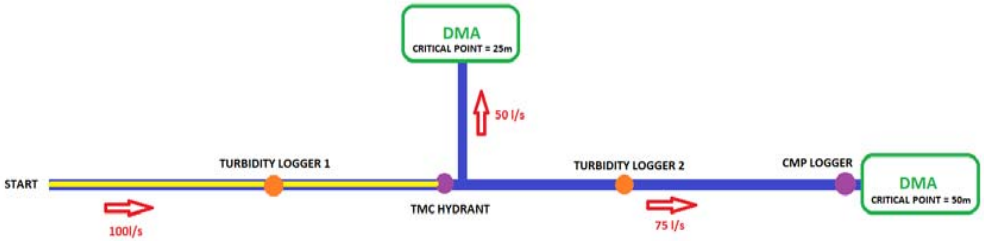
# How is TMC implemented?

- The aim is to take the flow within a main to a new flow ‘condition’.

- Three methods of conditioning:
  - DSR discharge
  - Network Conditioning (altering network config)
  - Hydrant Discharge.

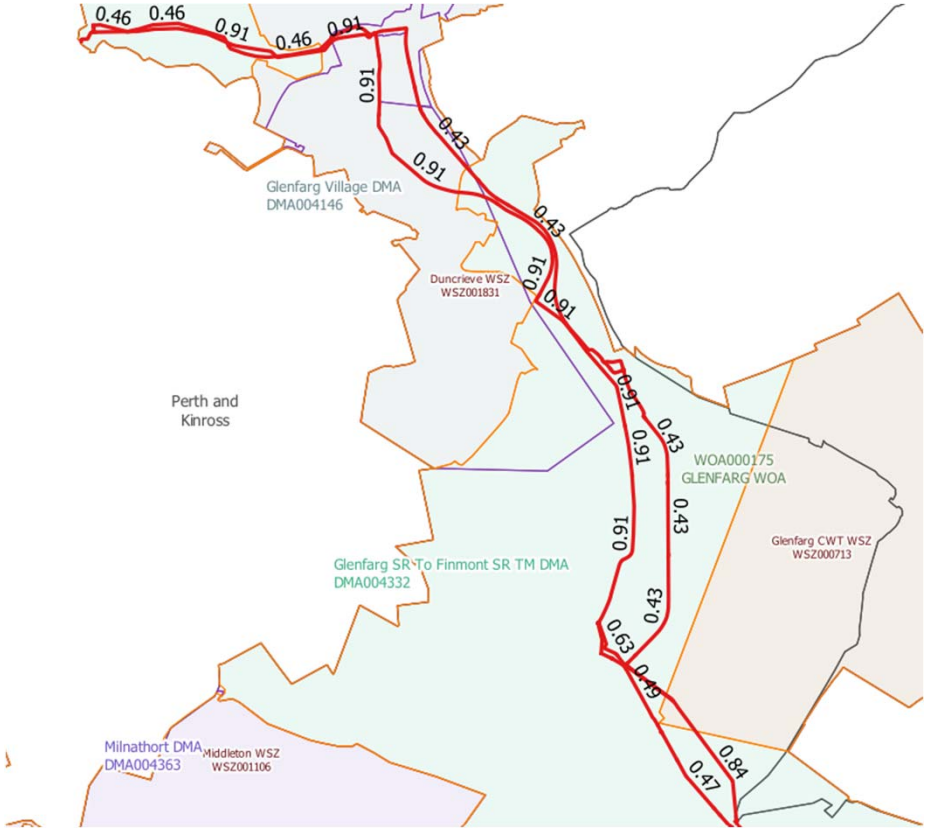
- Turbidity, pressure and flow are monitored throughout



# Network Modelling for TMC

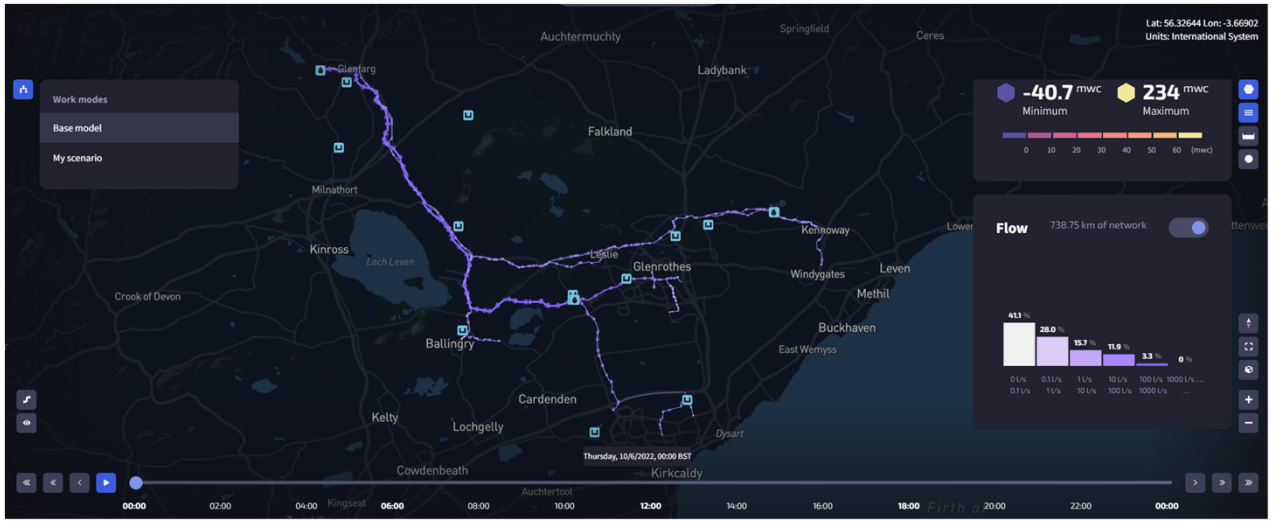
- Modelling typically used for planning purposes.
- TMC modelling used for operational purposes
- Allows for a greater understanding of the network.
- Pipe characteristics allow for greater validity of designs.
- Network altering effects can be reviewed from desktop analysis.



# Qatium

## Background

- An open and collaborative water management platform.
- Bridges the gap between GIS data and hydraulic models.
- Visualises the water networks behaviour.
- Simulates the effects to a network once operations are carried out.



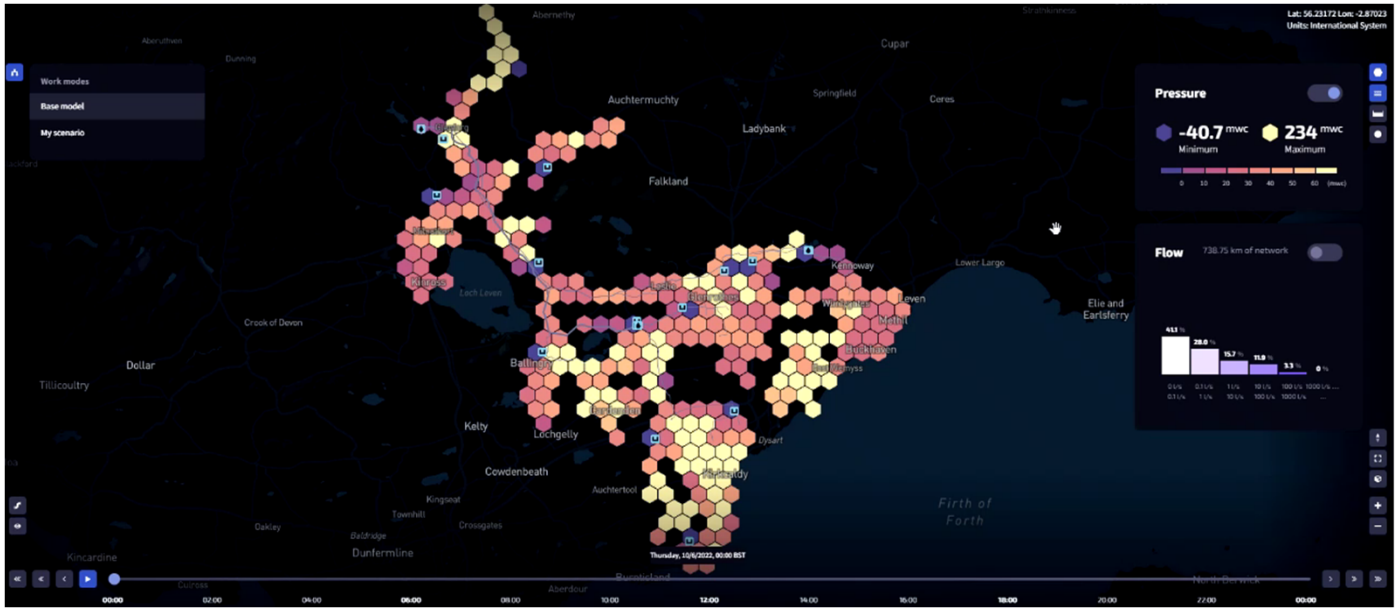
# Qatium

## The Model

- Two Methods of Creation:
  - Build from scratch through GIS datasets
  - Load an existing EPANET INP model

- Models flow, pressures, and controls which are vital to the trunk mains investigation works

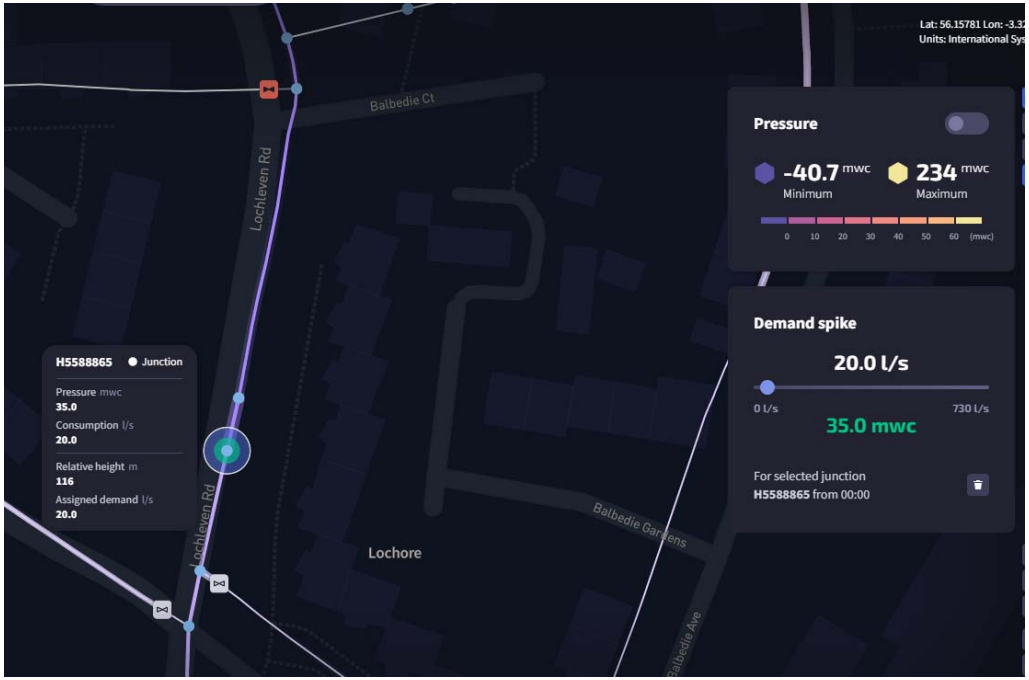
- In depth information can be accessible for every pipe or asset within the model.



# Qatium

## Why we chose Qatium

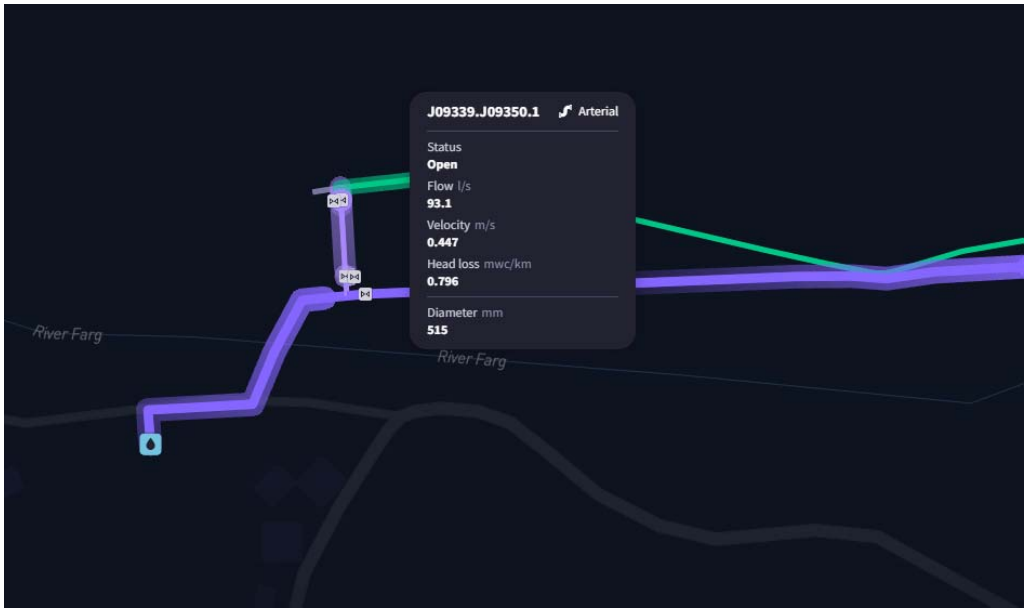
- Allows for instantaneous feedback on changes made to model (simulation carried out ‘in the cloud’)
- No requirement for standalone software installation (browser based solution)
- Effortless access and easy to use interface.
- Ability to toggle on/off network elements, allowing task specific work.
- Operations can be implemented to the model to simulate on-site works.
- Cost effective.



# Qatium

## Use case

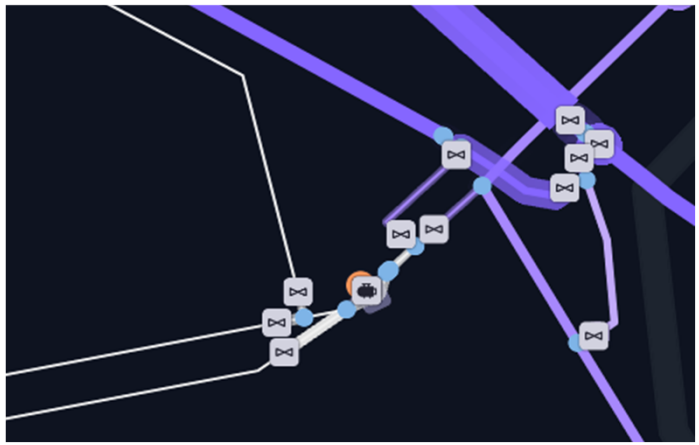
- Complex network with two large diameter, interconnected mains feeding multiple tanks and DMA’s.
- Significant lack of flow meters along the trunk mains.
- Model enables analysis of sectional flows (important in post intervention VCDM model calibration)
- Complex networks required significant operations to be carried out, easily replicated in Qatium

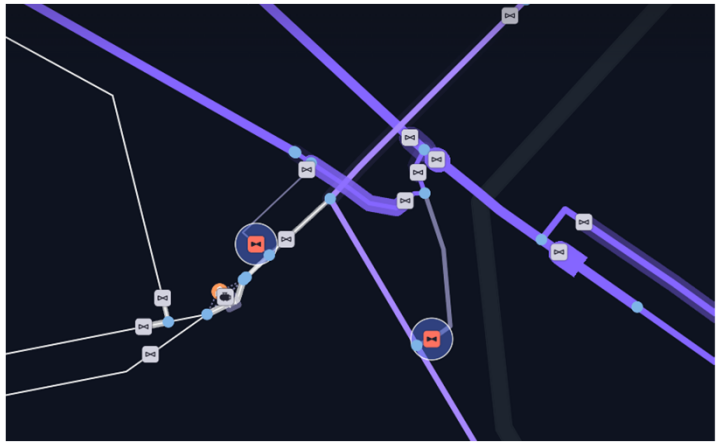


# Qatium

## Conclusions

- Scenario modelling enabled operational impact to network to be understood
- Flow, pressure and tank level changes simulated through the model.
- Model comparisons allowed for effective optioneering.
- WQ risk minimised through sequenced approach to valve operations.
- Provides reassurance to the design team that proposed design won't negatively impact the network or customer experience
- Provides Water Ops staff the same reassurance when seeking Network Access
- Approach has been adopted across the programme of works where complex interconnectivity is prevalent and sectional flow unclear.





# THANK YOU FOR YOUR TIME



MAKING COMPLEX EASY