HIGH DENSITY DATA AND WATER DISTRIBUTION NETWORK MANAGEMENT

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The University Of Sheffield.

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The Industrial Doctorate Centre for the Water Sector

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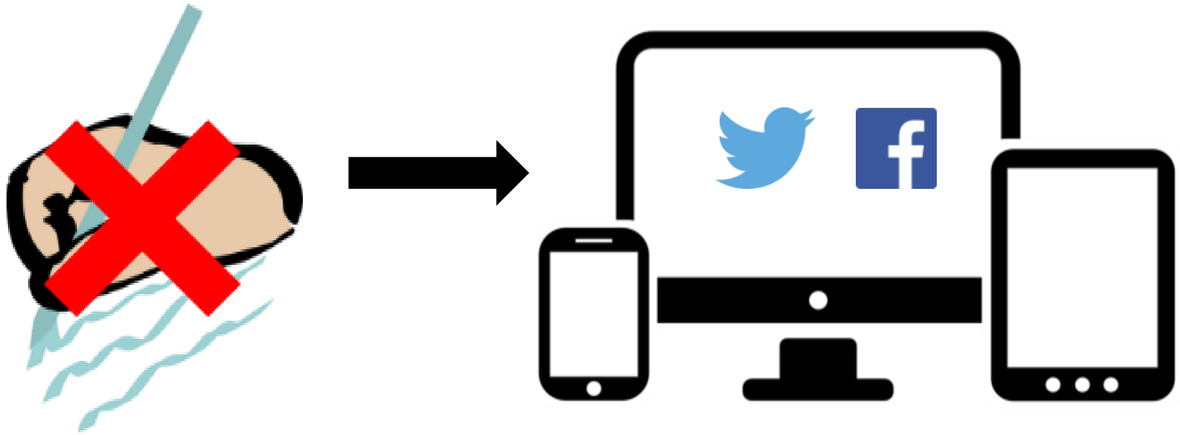
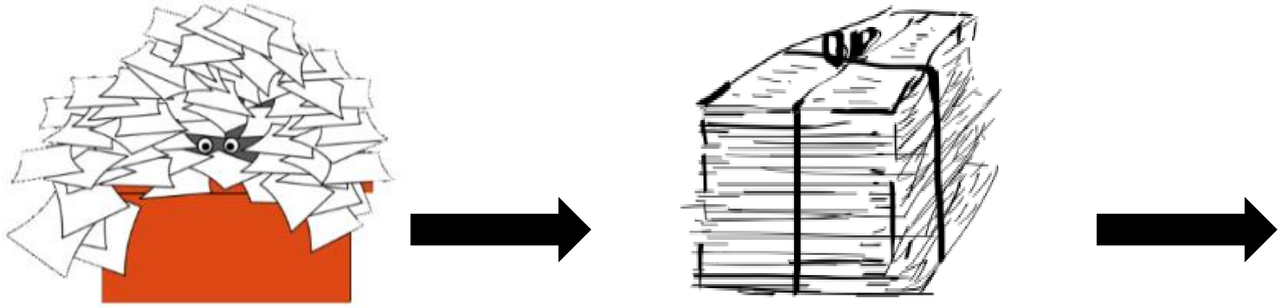
INTRODUCTION





The three big Vs of Big Data:

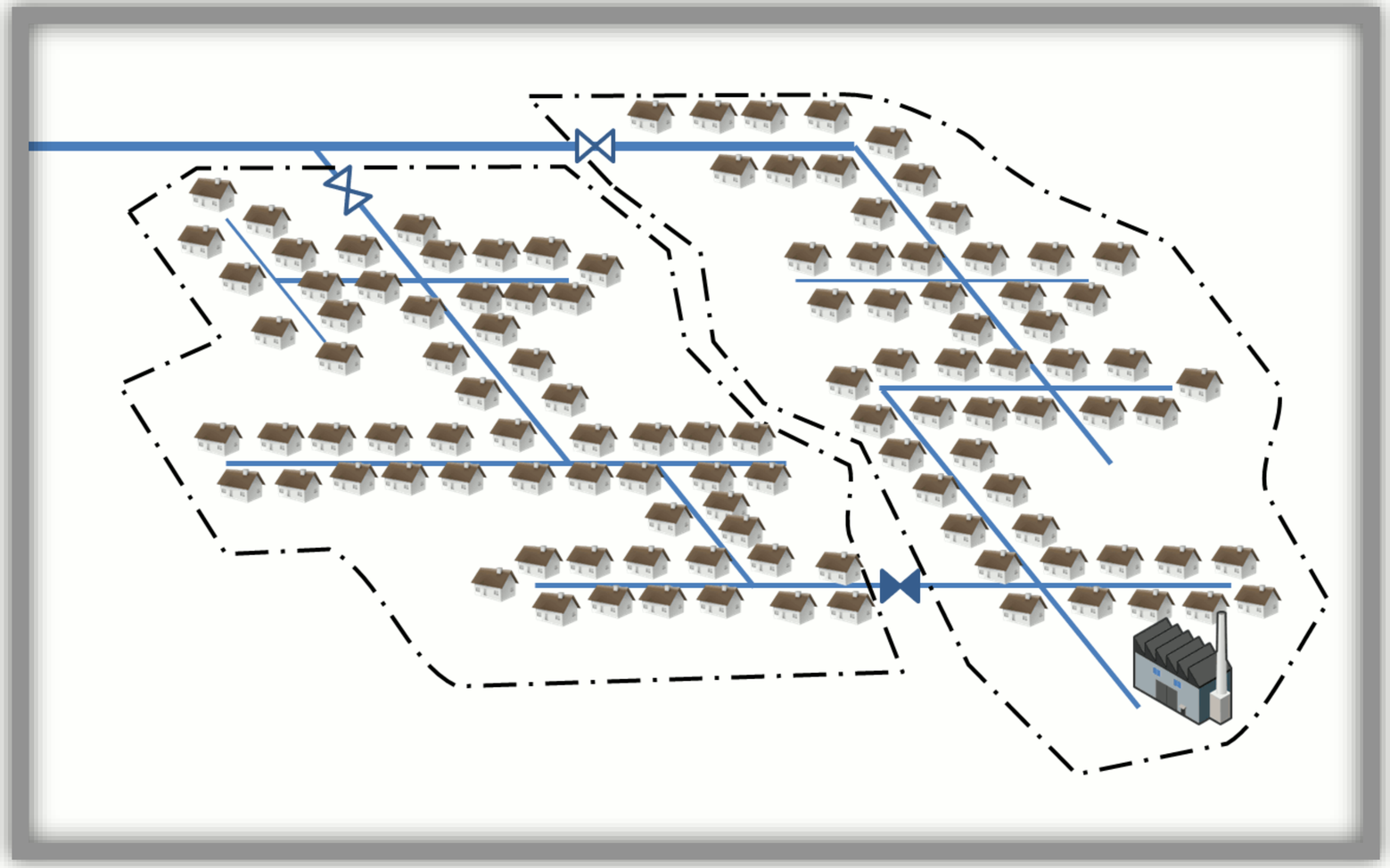
VOLUME

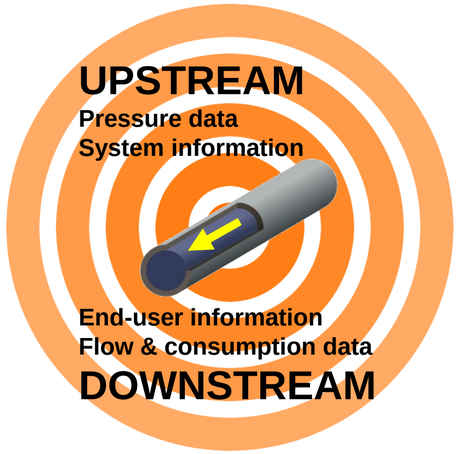
VELOCITY

VARIETY

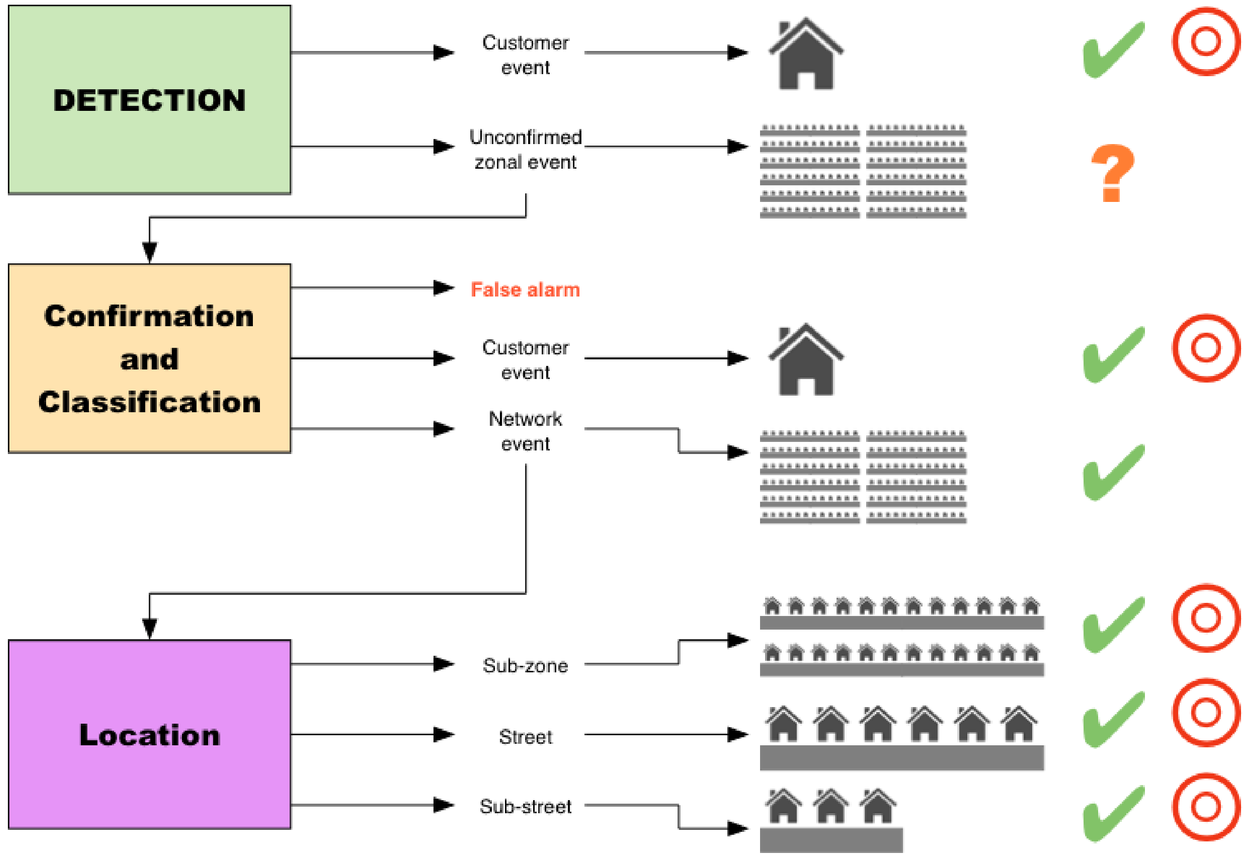
CUSTOMER METERING AND HIGH DENSITY DATA

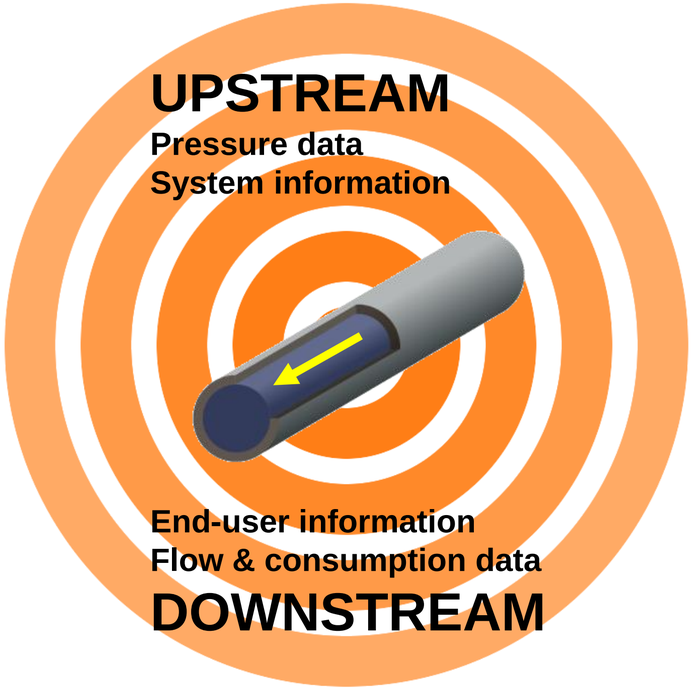
Co-located flow and pressure measurements at the customer boundary box





CUSTOMER METERING AND HIGH DENSITY DATA





1 CHANGE @ EACH SPATIAL POINT → 2 CHECK @ EACH SPATIAL POINT → 2 SPATIAL @ ALL SPATIAL POINTS

COLLECTING THE DATA

Anglian Water based field trial

Sited in the ‘Innovation Shop Window’ - a place where the company can test and showcase its latest innovation projects

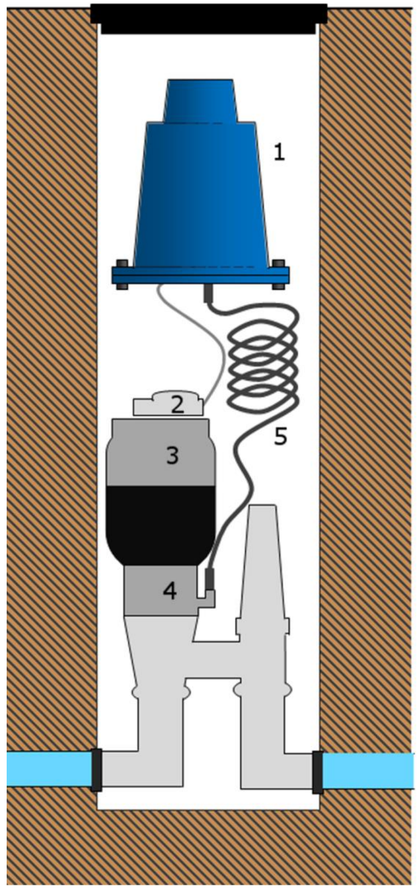
Customer demand driven (CDD) model

A hydraulic network model with all end-users as demand nodes.

Standard **CDD**

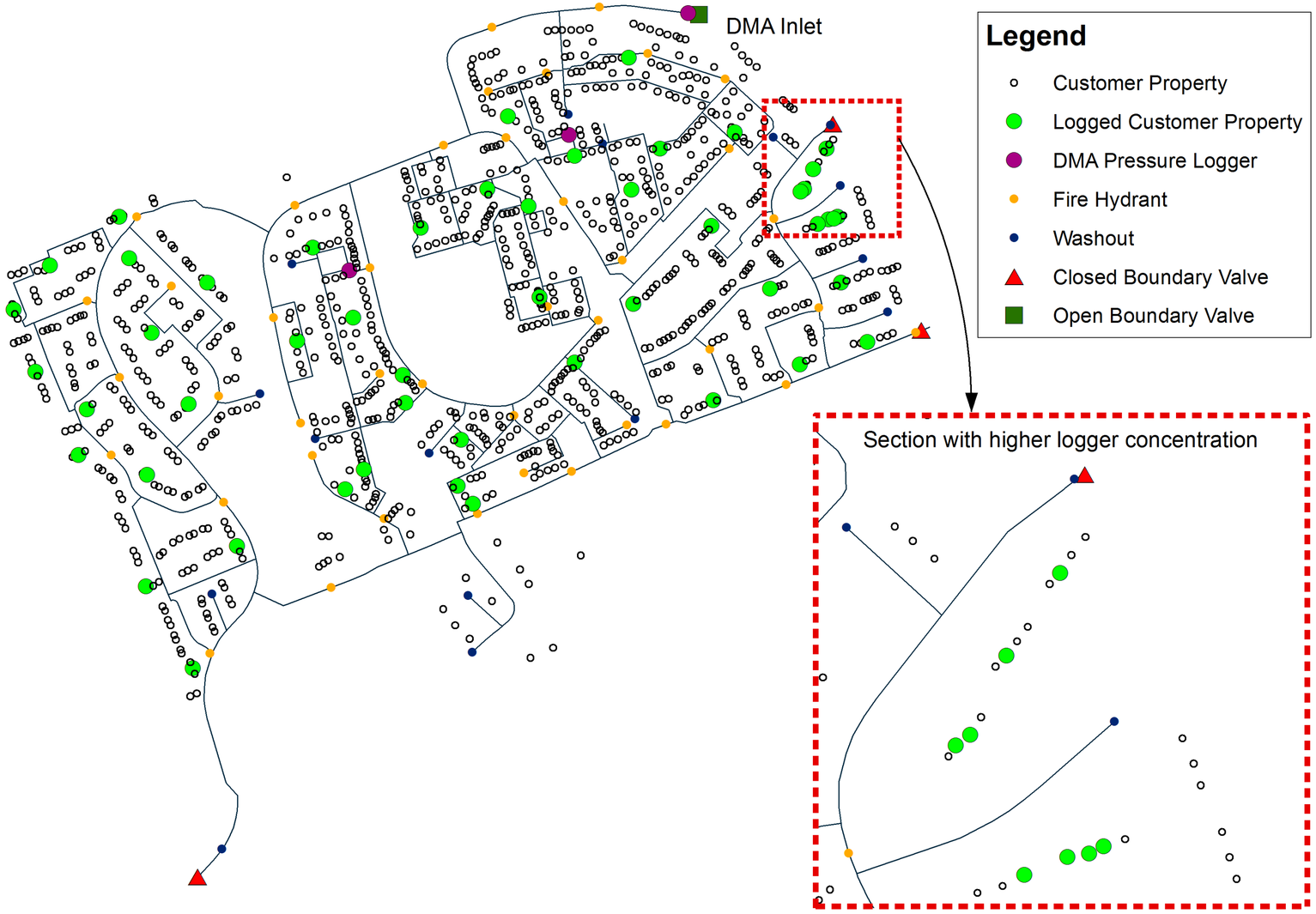
COLLECTING THE DATA - FIELD TRIAL

- Pressure managed DMA
- Mainly residential
- ~950 connections
- Pressure and flow measured at 50 properties
- Run for more than a year
- 15 minute data
- AMR download every 2 months



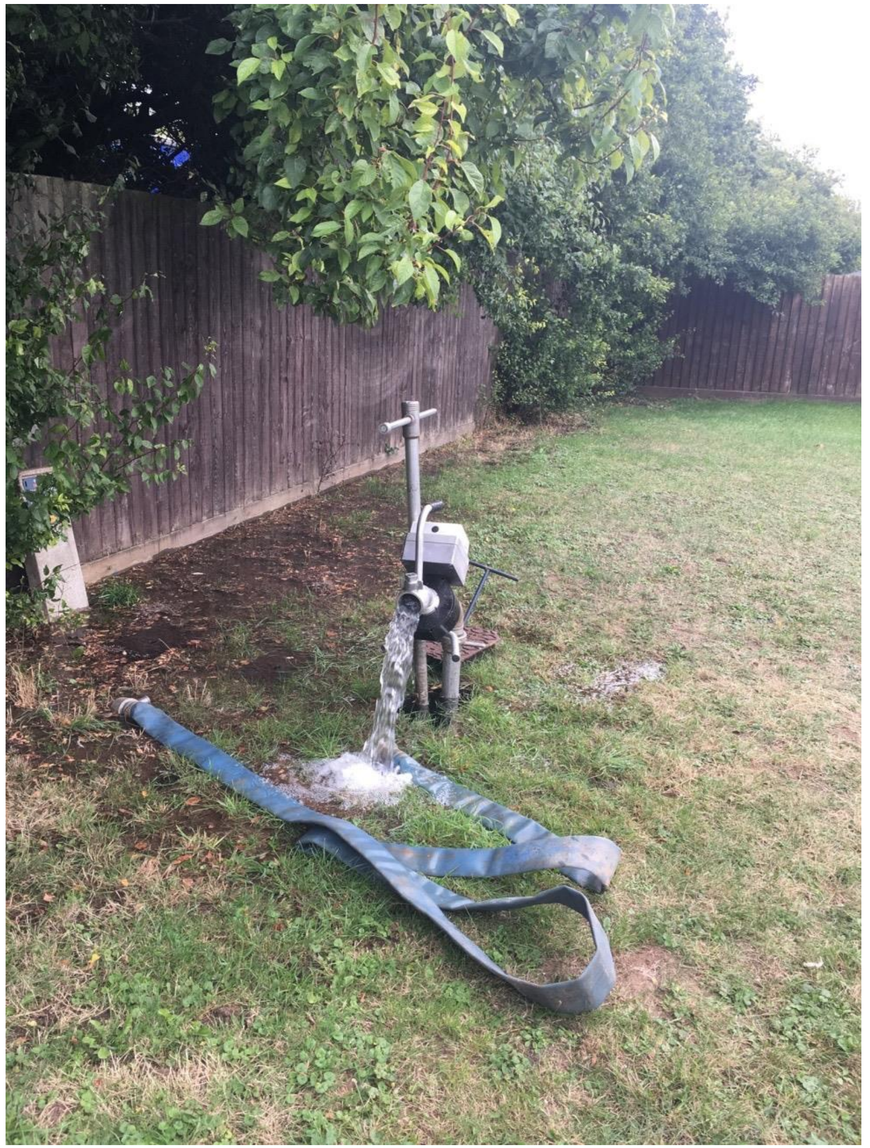
1. Dual channel logger, with internal pressure transducer
2. Pulse head
3. Domestic Water Meter
4. Presure and Flow adaptor
5 Recoil Hose

COLLECTING THE DATA



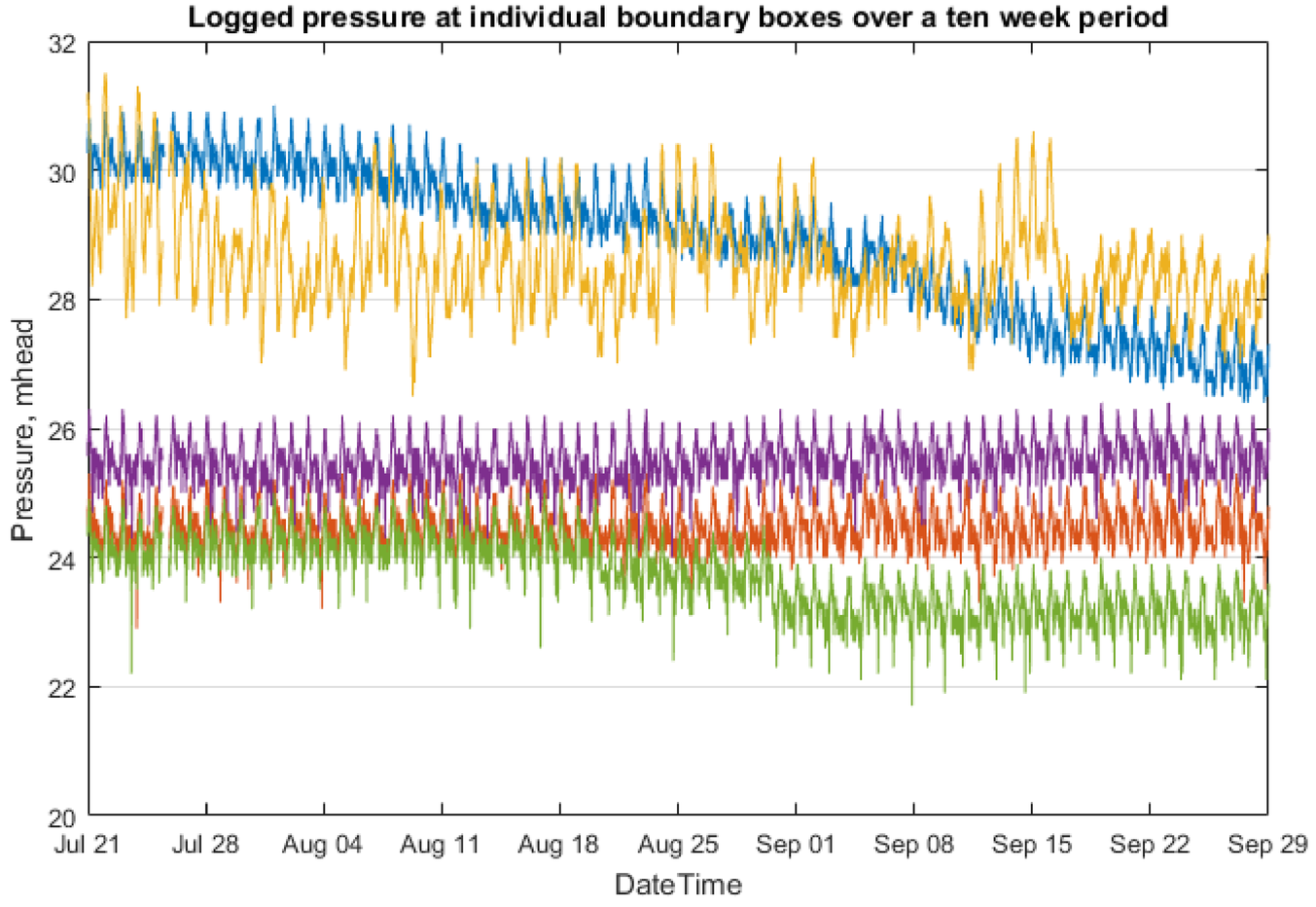
COLLECTING THE DATA

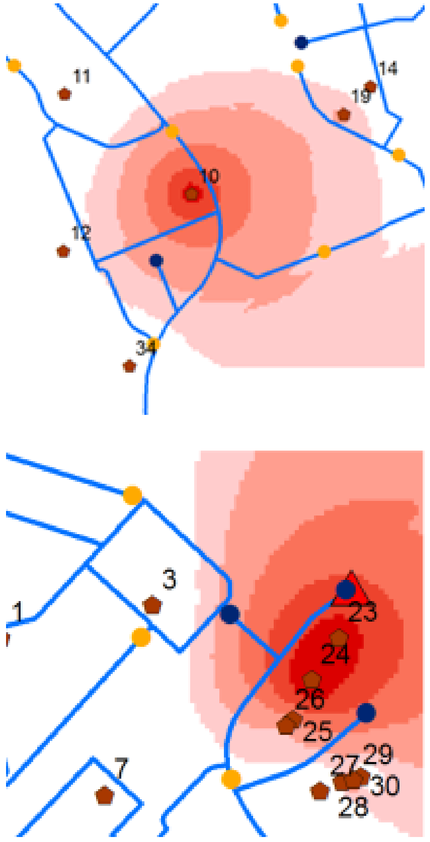
- Engineered leak/burst event simulation
- Hydrant flushing
- Between 0.2LPS and 2LPS at various locations
- Flushing duration 2-6 hrs



VARIATION IN DATA

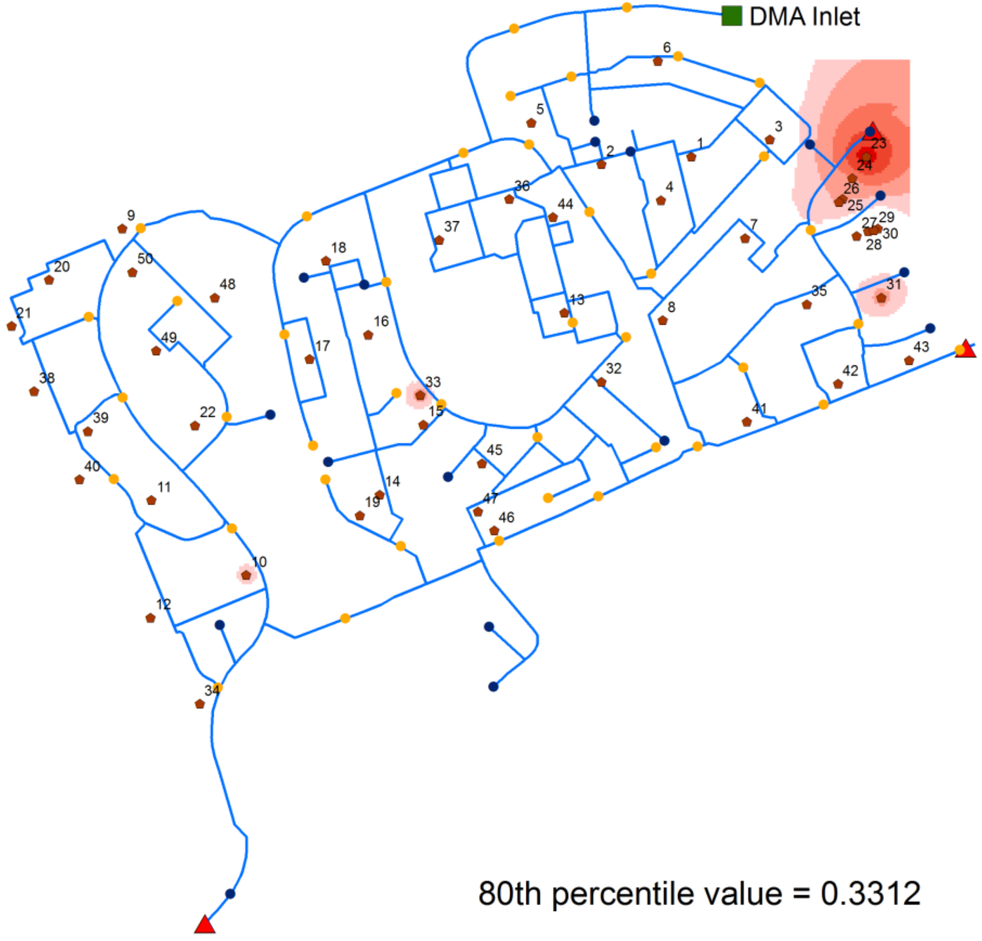
The overall pressure patterns vary from logger to logger





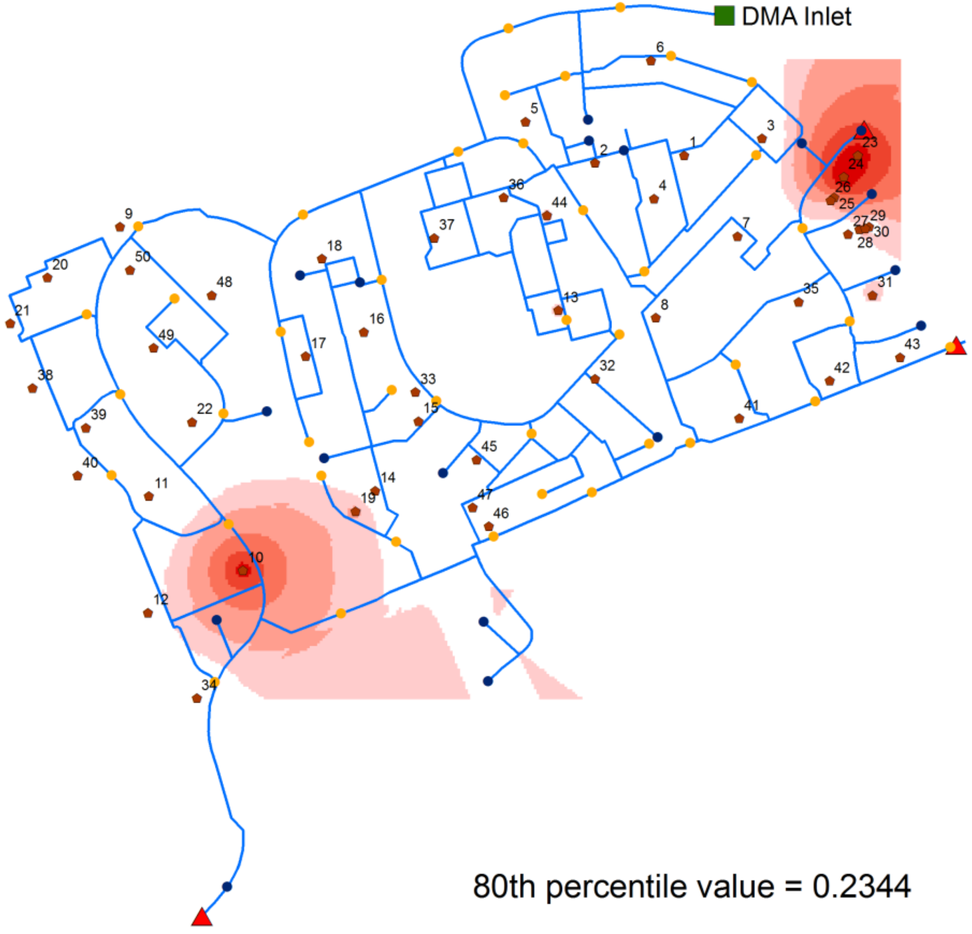
COMPARING BASELINES

Previous day as baseline



80th percentile value = 0.3312

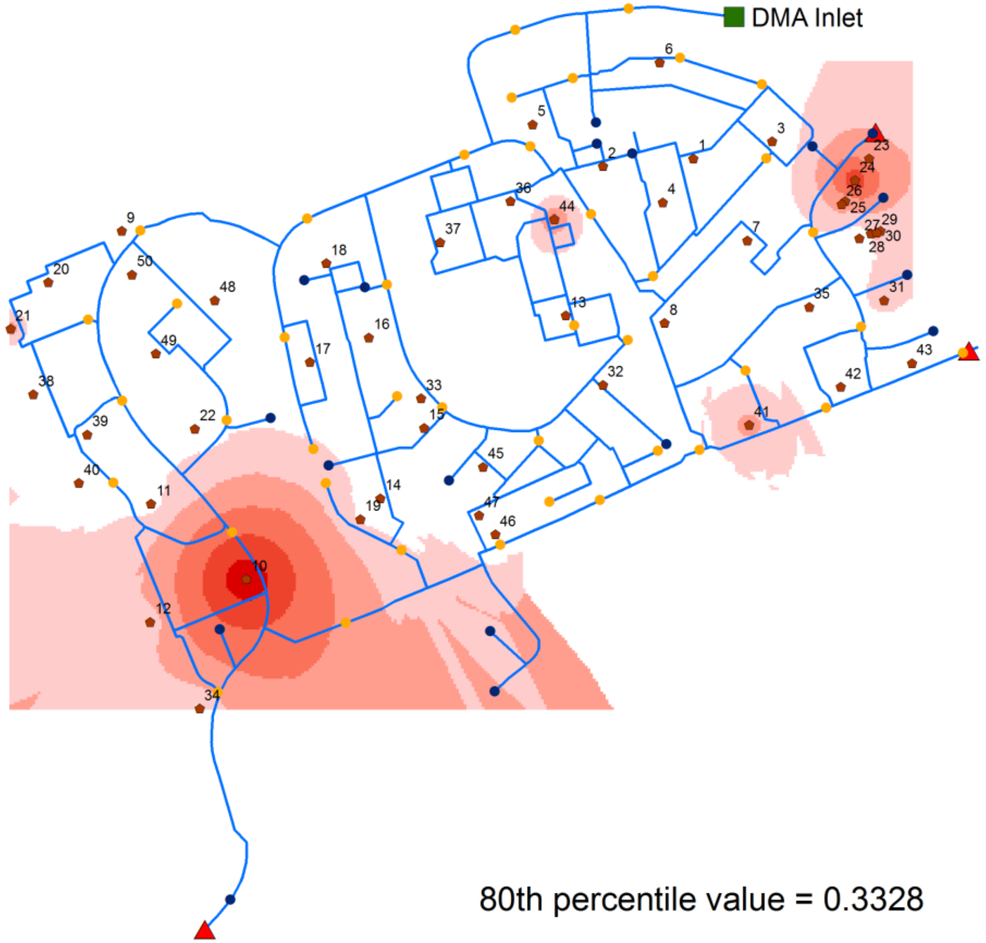
Previous week as baseline



80th percentile value = 0.2344

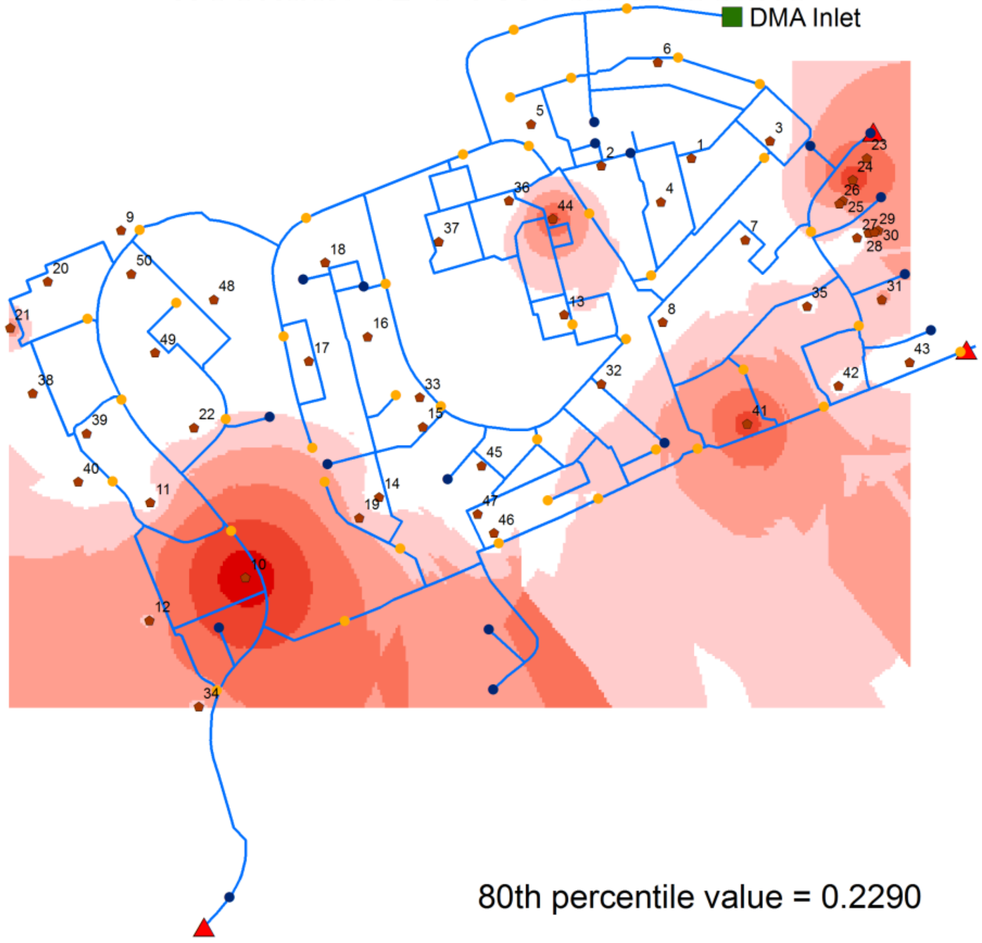
COMPARING BASELINES

Previous month as baseline



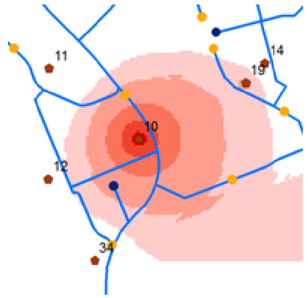
80th percentile value = 0.3328

Previous 4 occurrences of the same weekdav (DOTW) as baseline

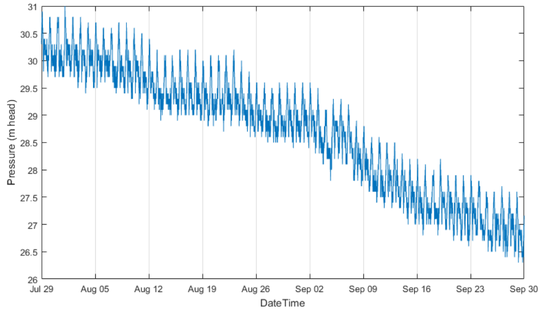


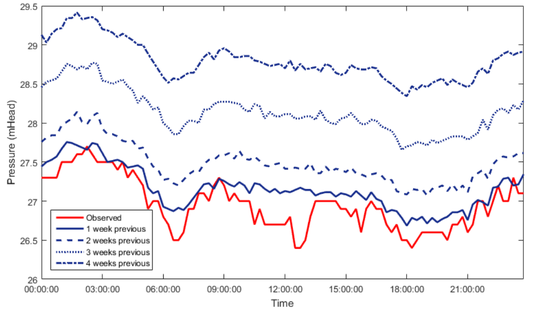
80th percentile value = 0.2290

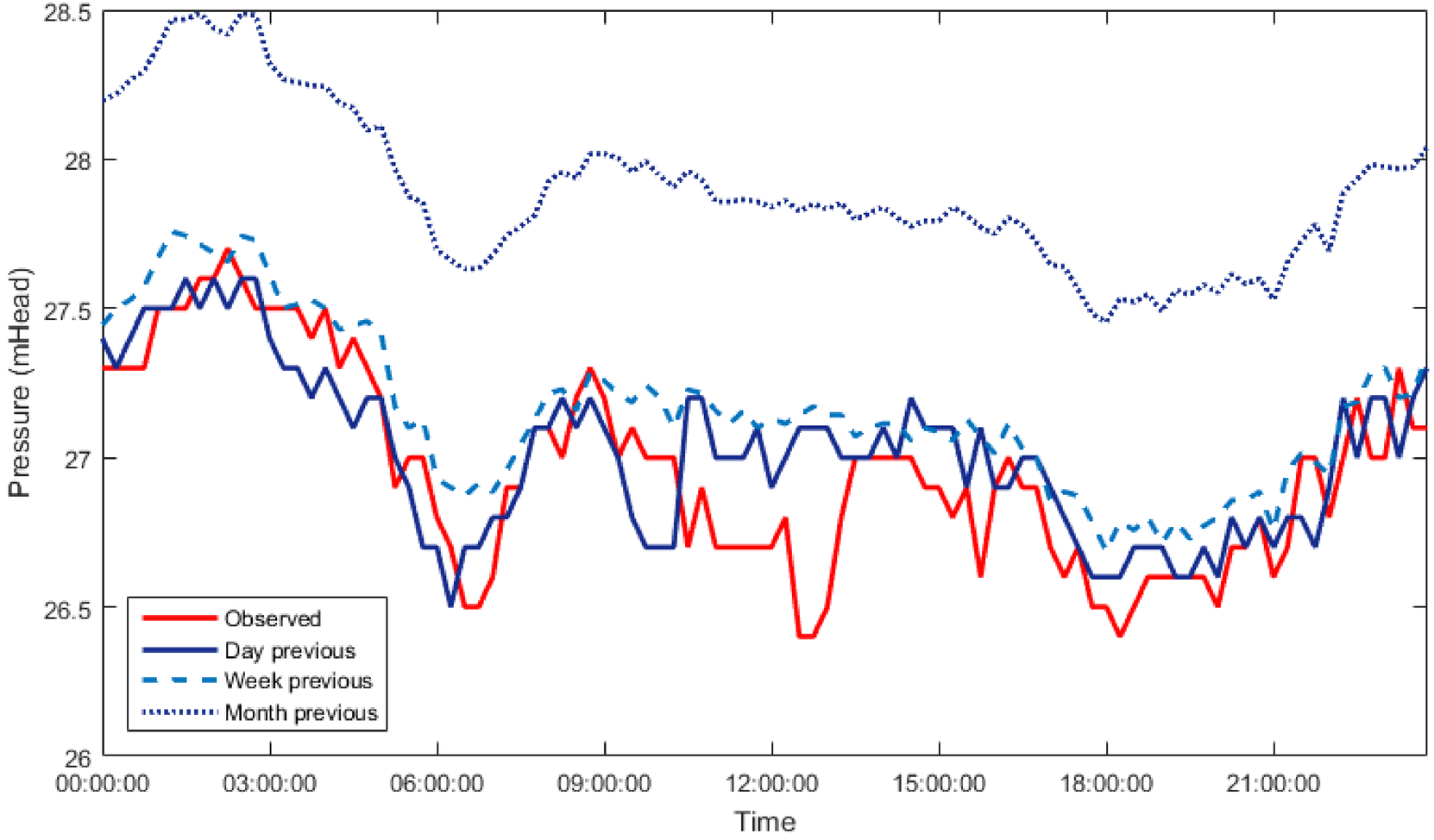
NON-EVENT FACTORS - DRIFT



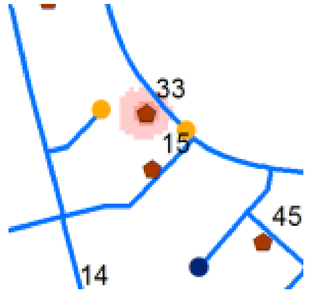
Logger 10



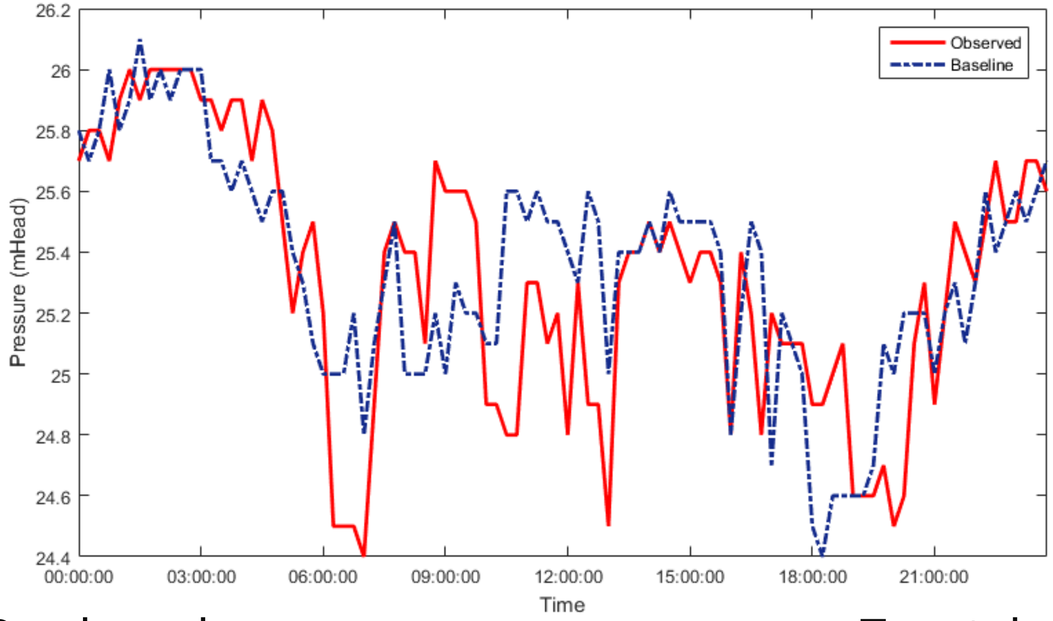


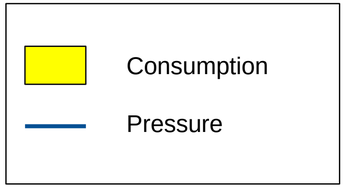


NON-EVENT FACTORS - CONSUMPTION

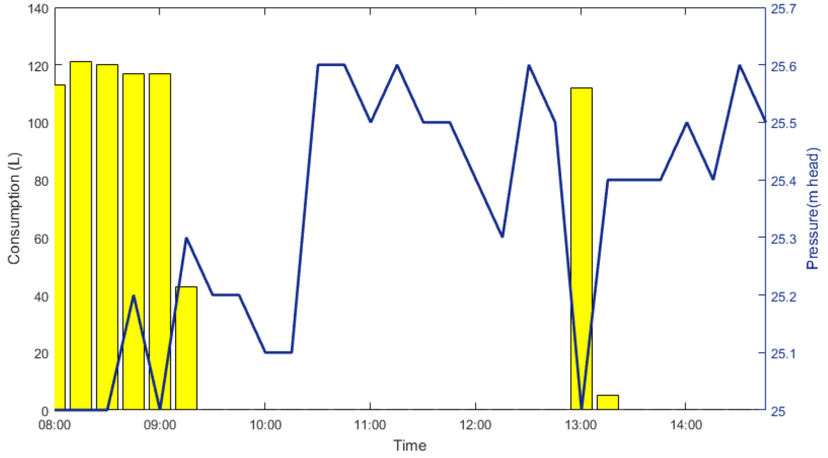


Logger 33

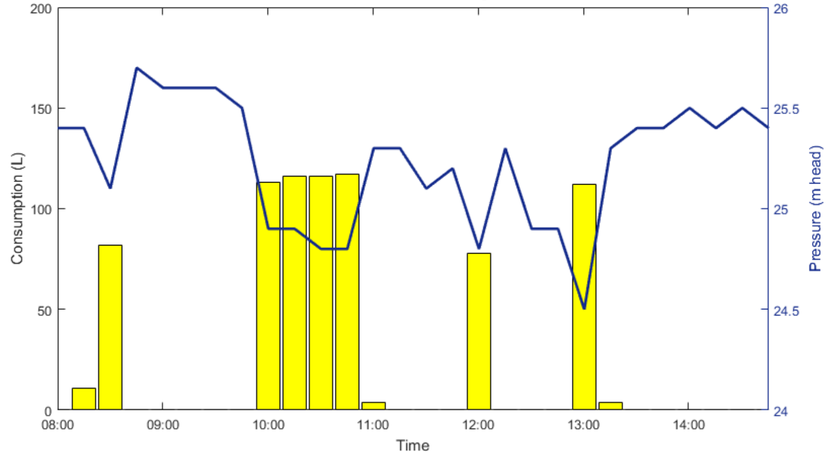




Previous day

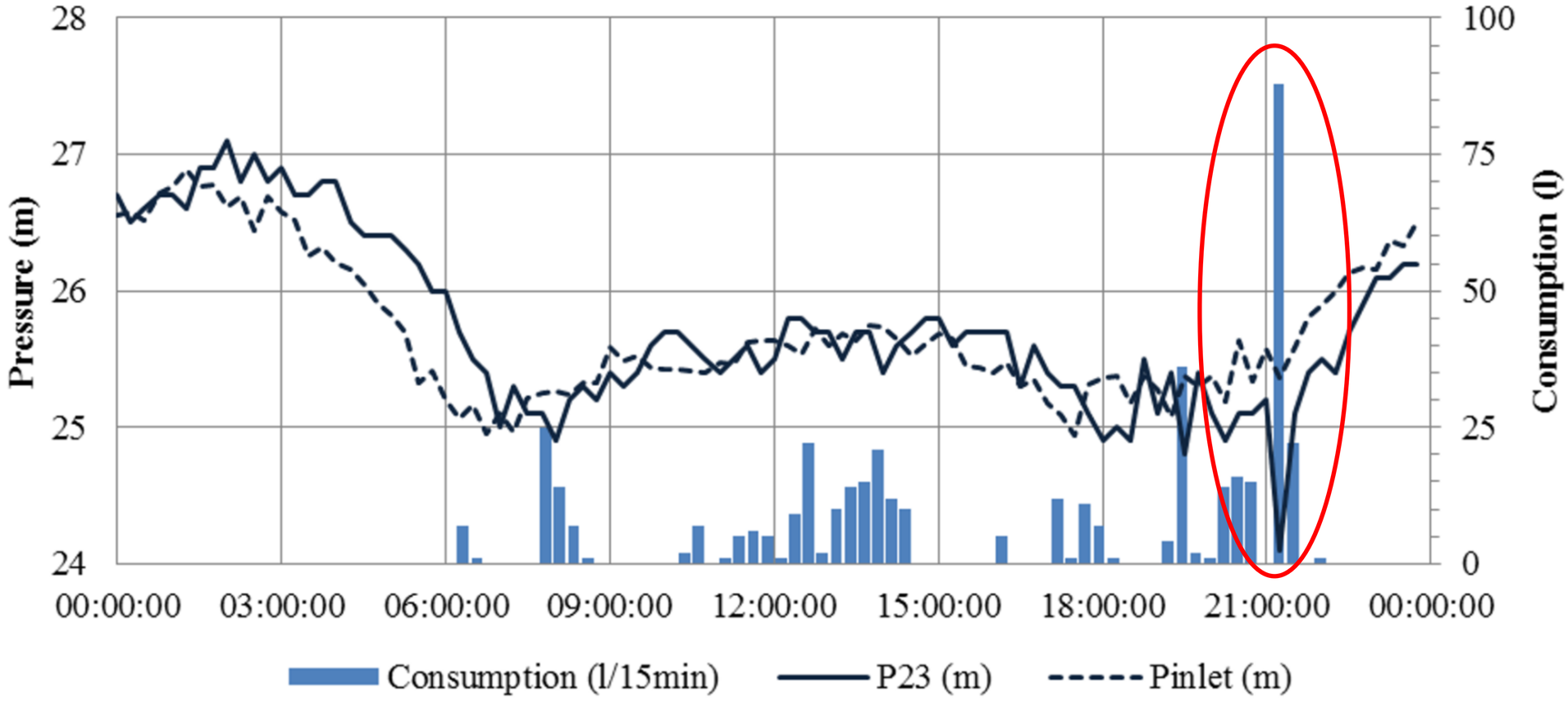


Event day



CONSUMPTION SPIKES

Customer draw off and local pressure variation



CONCLUSIONS

- **Increasing availability and capability of monitoring devices make collecting high density data a reality**
- **Pressure at the customer boundary box can be used to provide information for water distribution network management, such as event localisation**
  - Different baselines yield different results
  - Anomalies may be explained by looking at trends and correlating with other data
  - Further work needed to understand relationship between number of data points spatially and level of localisation (how big/small the search zone is)

ACKNOWLEDGEMENTS

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