DIGITAL WATER SOLUTIONS

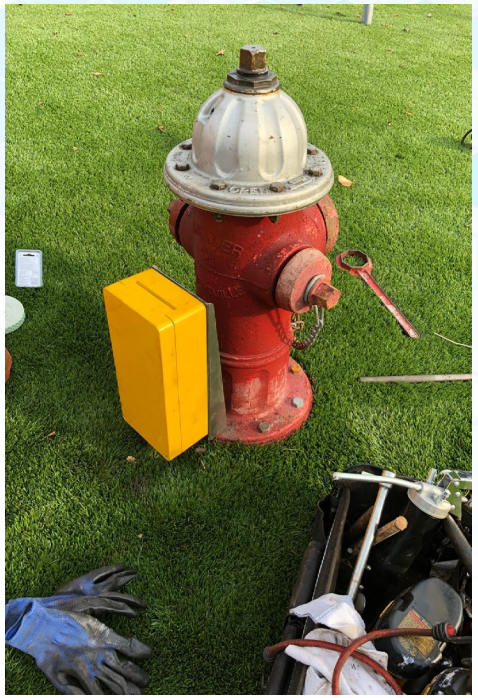
Gaining Visibility into the Water Distribution System

Predicting Leaks + Bursts

November 3, 2020

Today's Discussion

- Brief History
- Results (Benefits)
- Why this Solution?
- Questions



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DIGITAL WATER SOLUTIONS

2015-2019
University of Waterloo
Research Projects

Moving Forward

2009
Patents

2011-2014
SWI Project

2018
Commercialization

What's happening underground?

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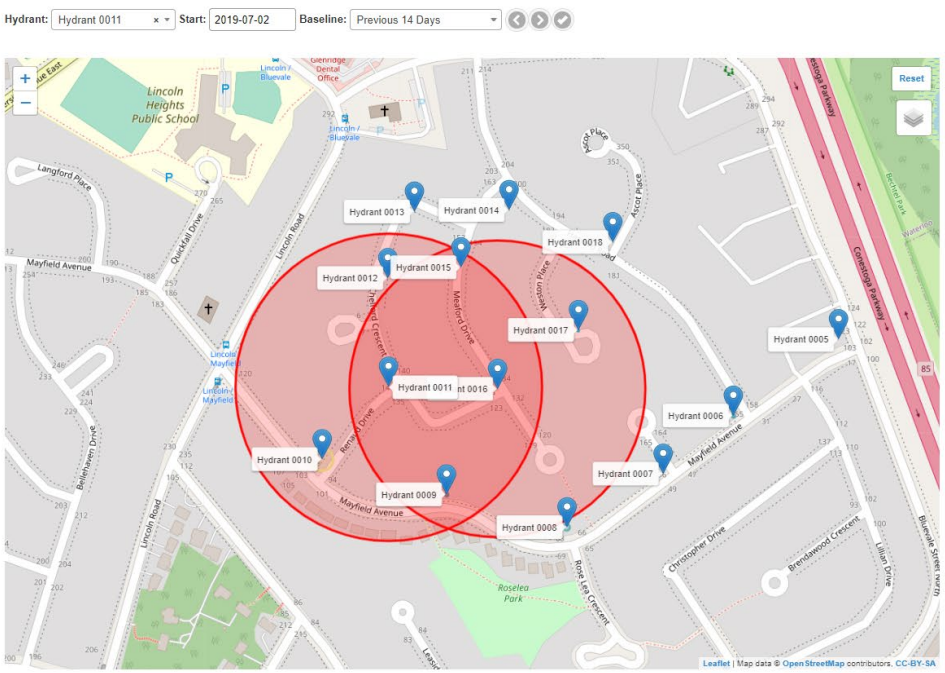
Acoustics ~ 20-25 l/min



Localized to within less than one house!

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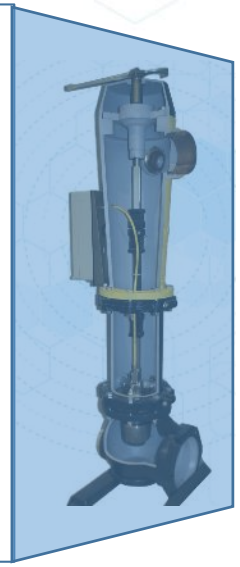
The Technology Stack

- Distribution System Visibility (Parameters)
  - Water Temperature
  - **Pressure**
  - **Transient Pressure**
  - **Acoustics (Leaks)**
- Additional Parameters
  - Battery Voltage
  - Cellular Signal Strength
  - **GPS Location (Localization)**



Cellular APN

Cloud Hosted

API

e.RIS
your information... smarter
VISUALIZE INFORMATION
ANALYZE INFORMATION
MANAGE INFORMATION

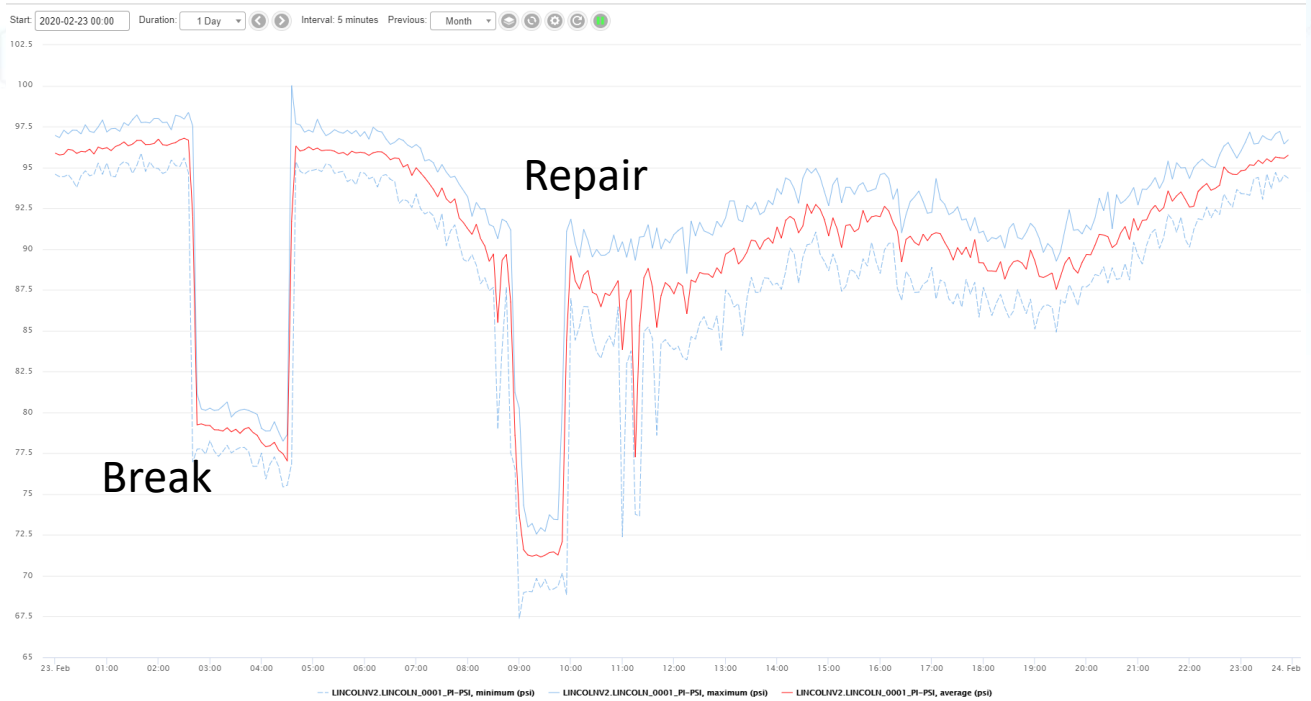
Data Access

DIGITAL WATER SOLUTIONS

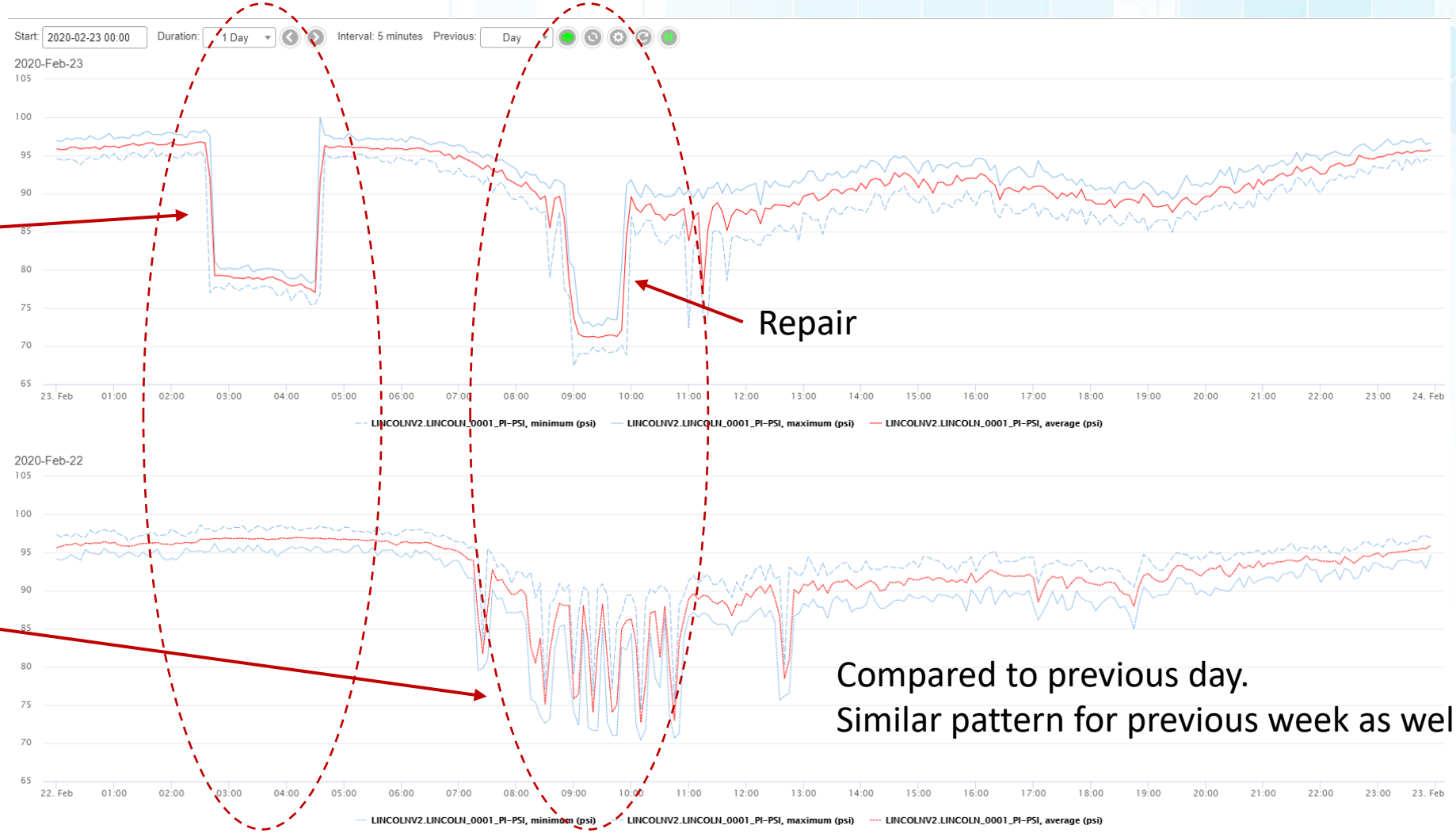
February 23, 2020 – Main Break (Pressure)

Town of Lincoln @TownofLincolnON · Feb 23

Public Notice - Good morning Silverbirch Lane residents. There is a watermain break on your street & too early to knock & let you know. There is low pressure until the fix begins, & then you will be without water until the fix is complete. We apologize for the inconvenience.



February 23, 2020 – Main Break (Pressure)



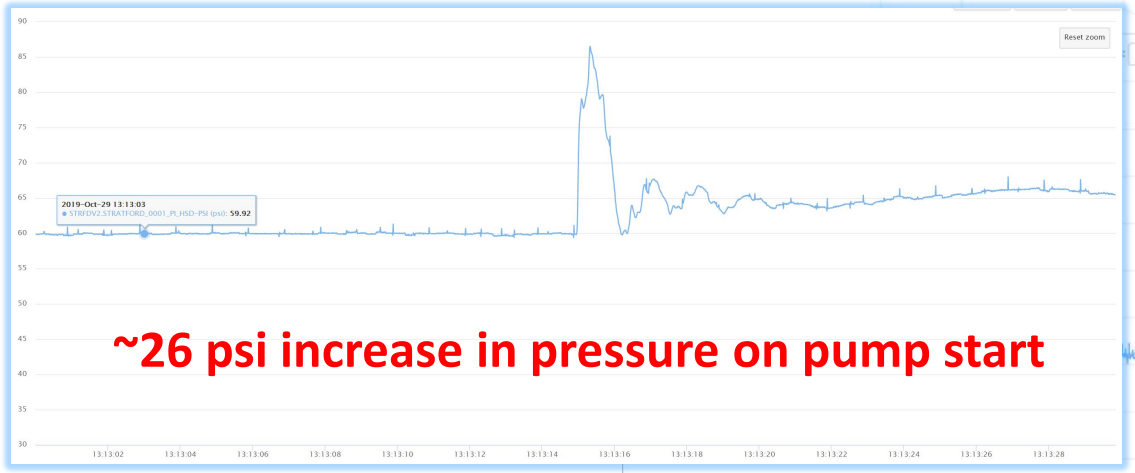
Break

Repair

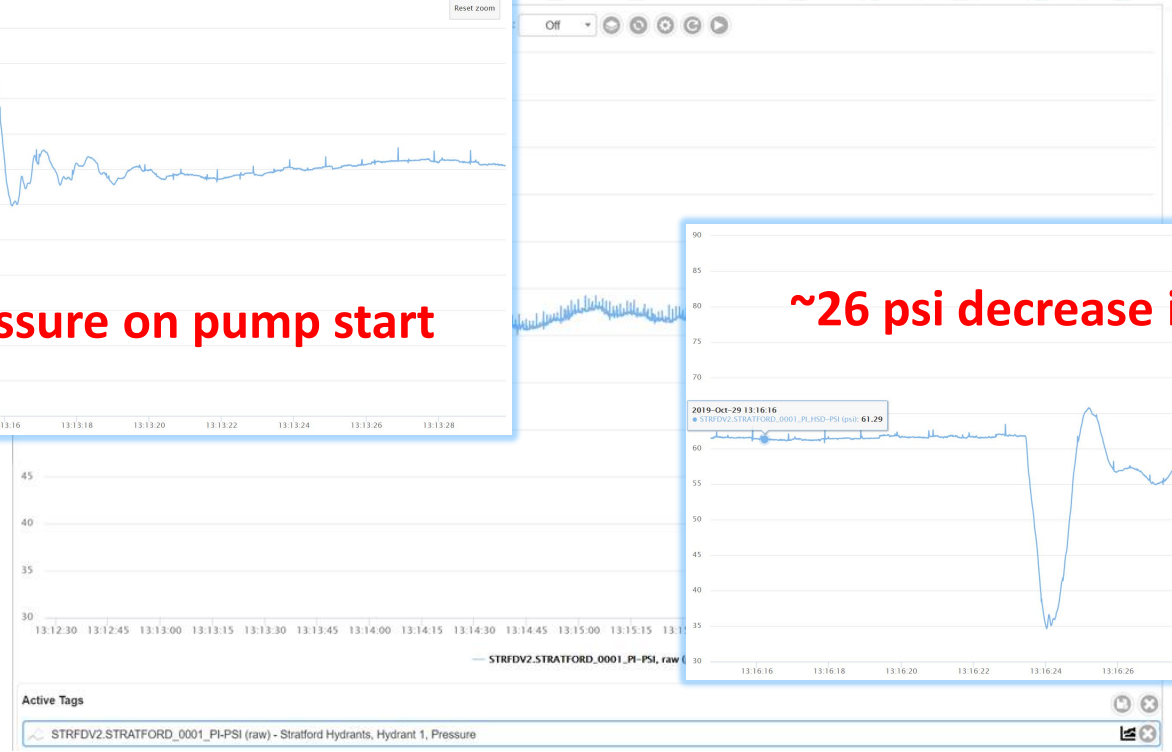
Pump/valve operation

Compared to previous day.
Similar pattern for previous week as well.

Transient Events (Pressure) Characterization

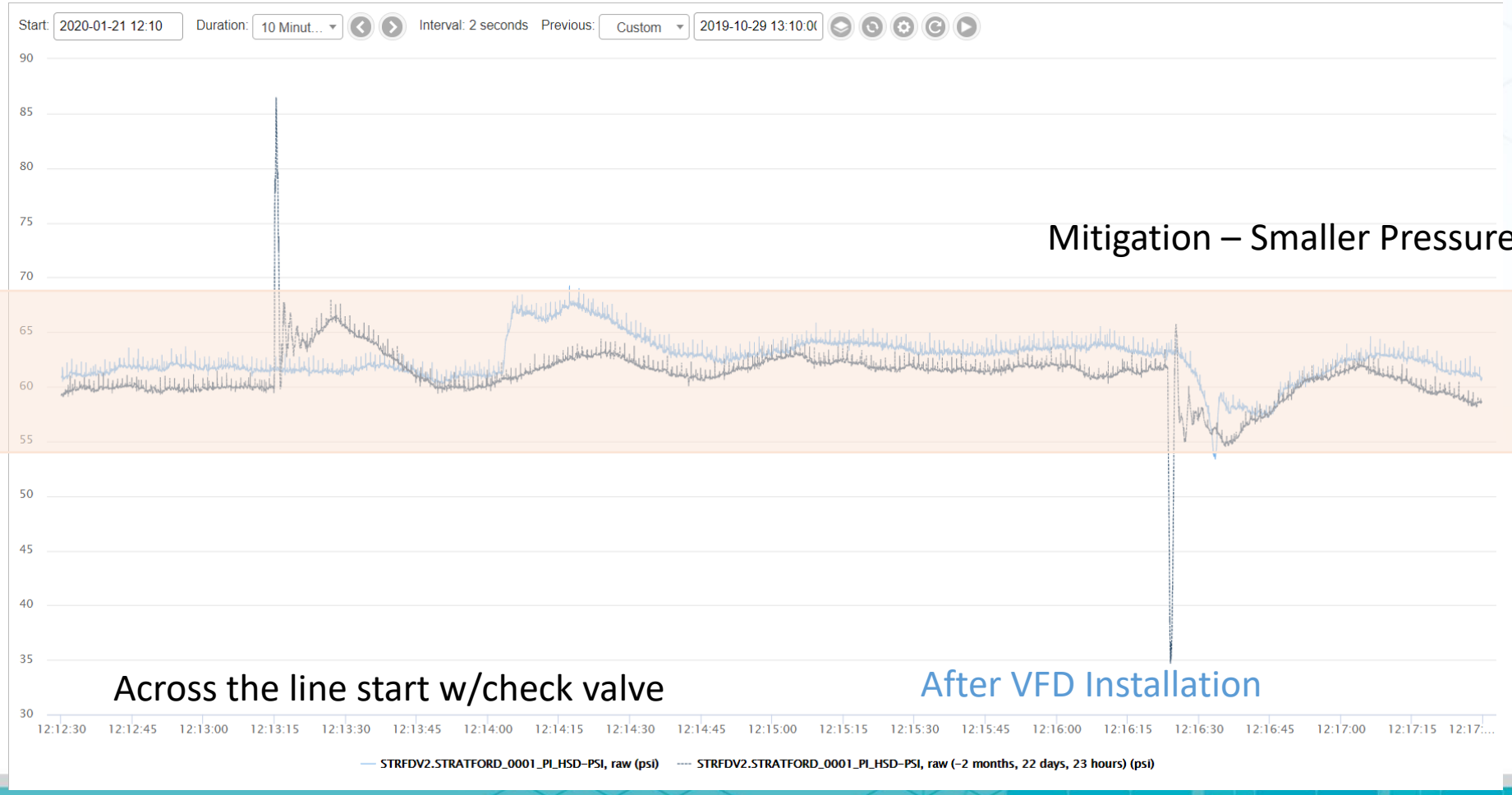


~26 psi increase in pressure on pump start



~26 psi decrease in pressure on pump stop

Transient Events (Pressure) Mitigation



Mitigation – Smaller Pressure Band

Across the line start w/check valve

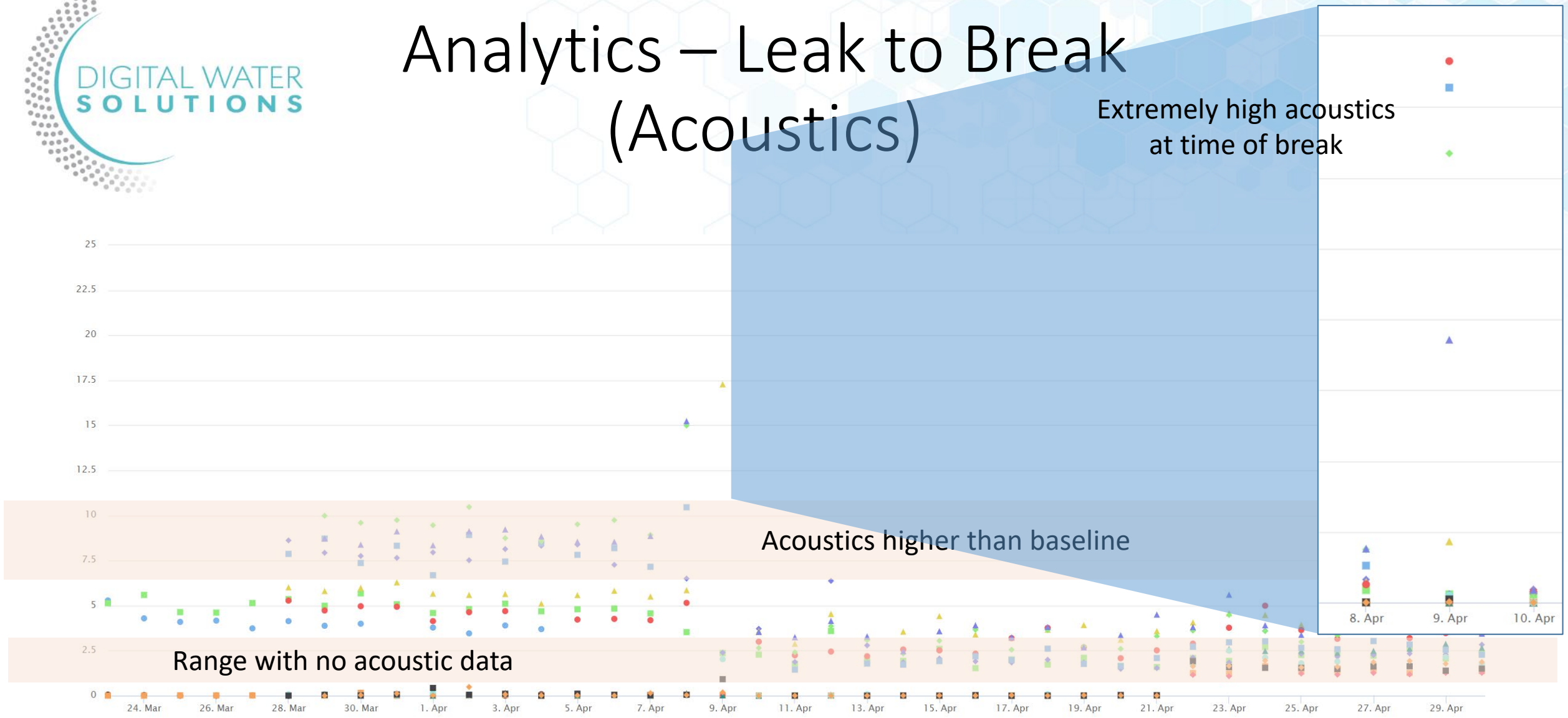
After VFD Installation

Transient Events (Pressure)

Markers identify high speed data collection at the hydrant.

Zooming in shows full high-speed data pattern. (45psi drop)

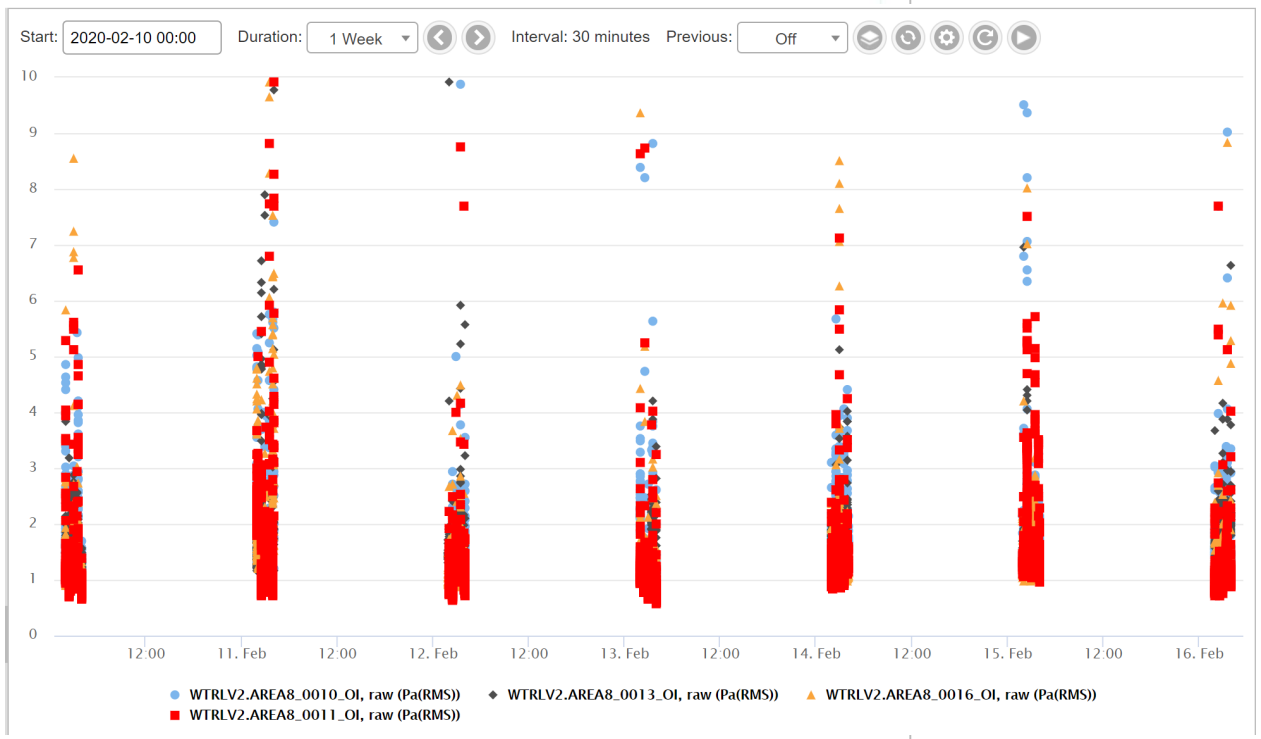
Analytics – Leak to Break (Acoustics)

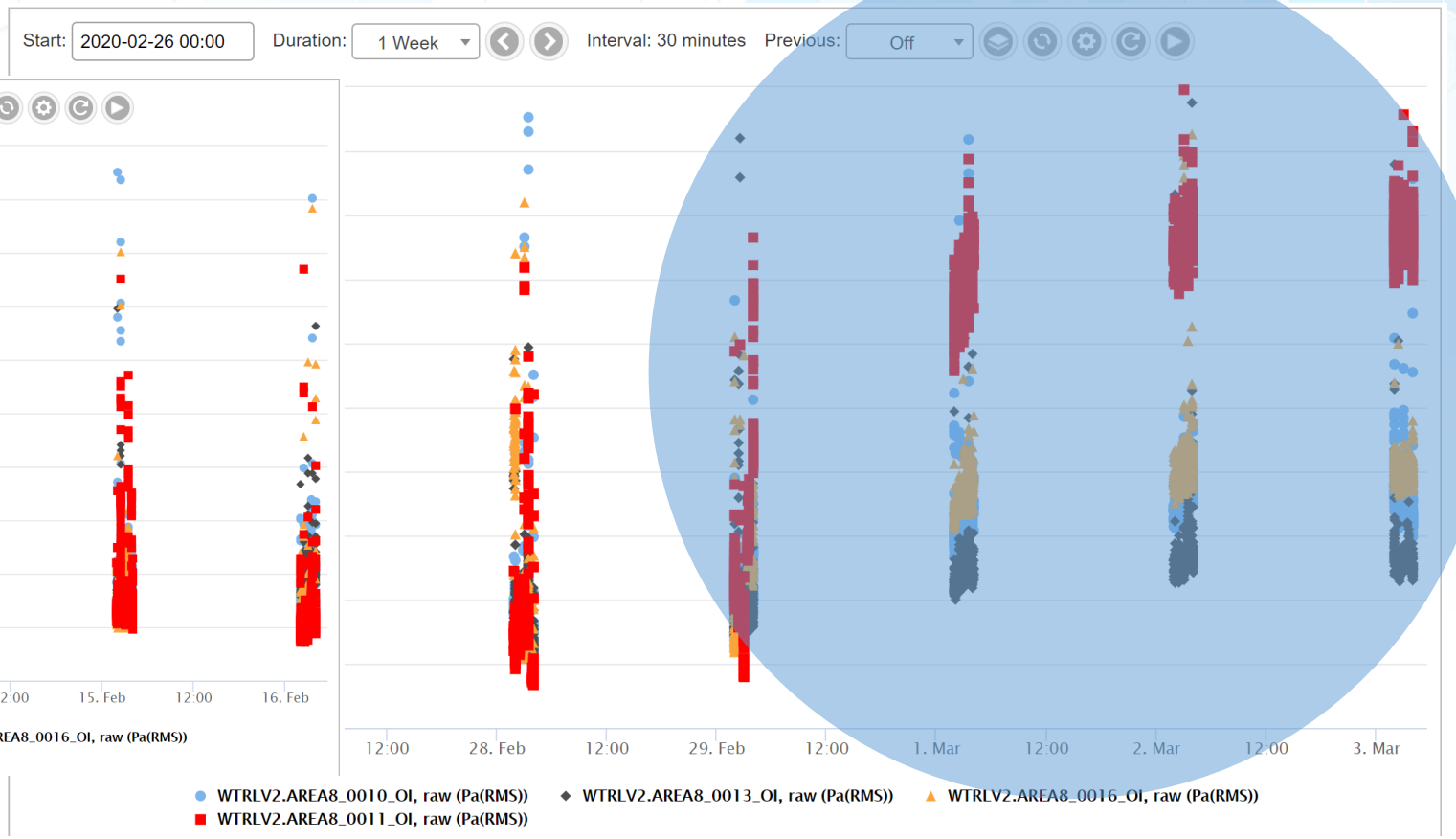


Leak to Break (Acoustics)

April 9, 2019
(Main Break)

Acoustics – Developing Leak Detected

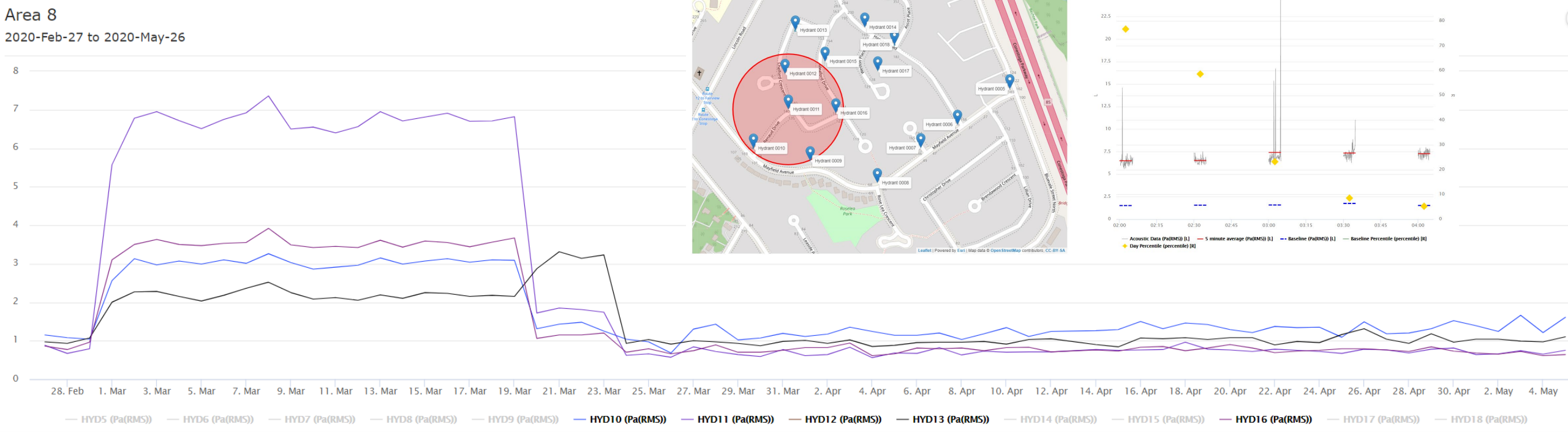


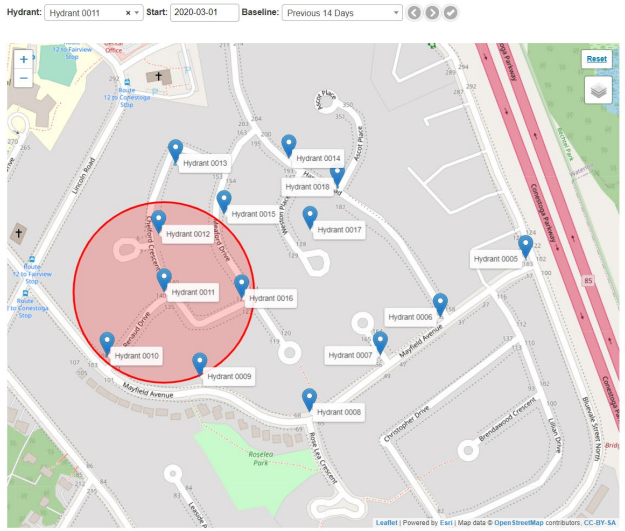


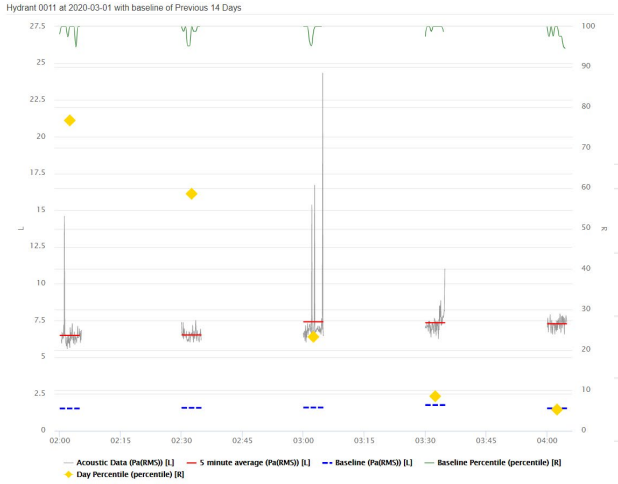
Acoustics – Leak Tracking
Minimum Overnight Acoustic Level

Waterloo / Minimum Overnight Acoustic Level / Area 8

Duration: 3 months Start: 2020-02-27 Send





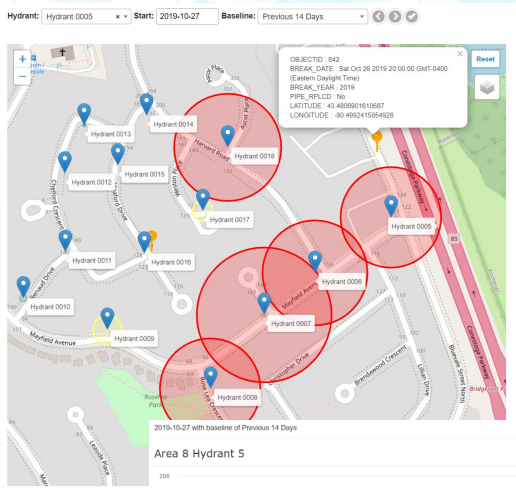


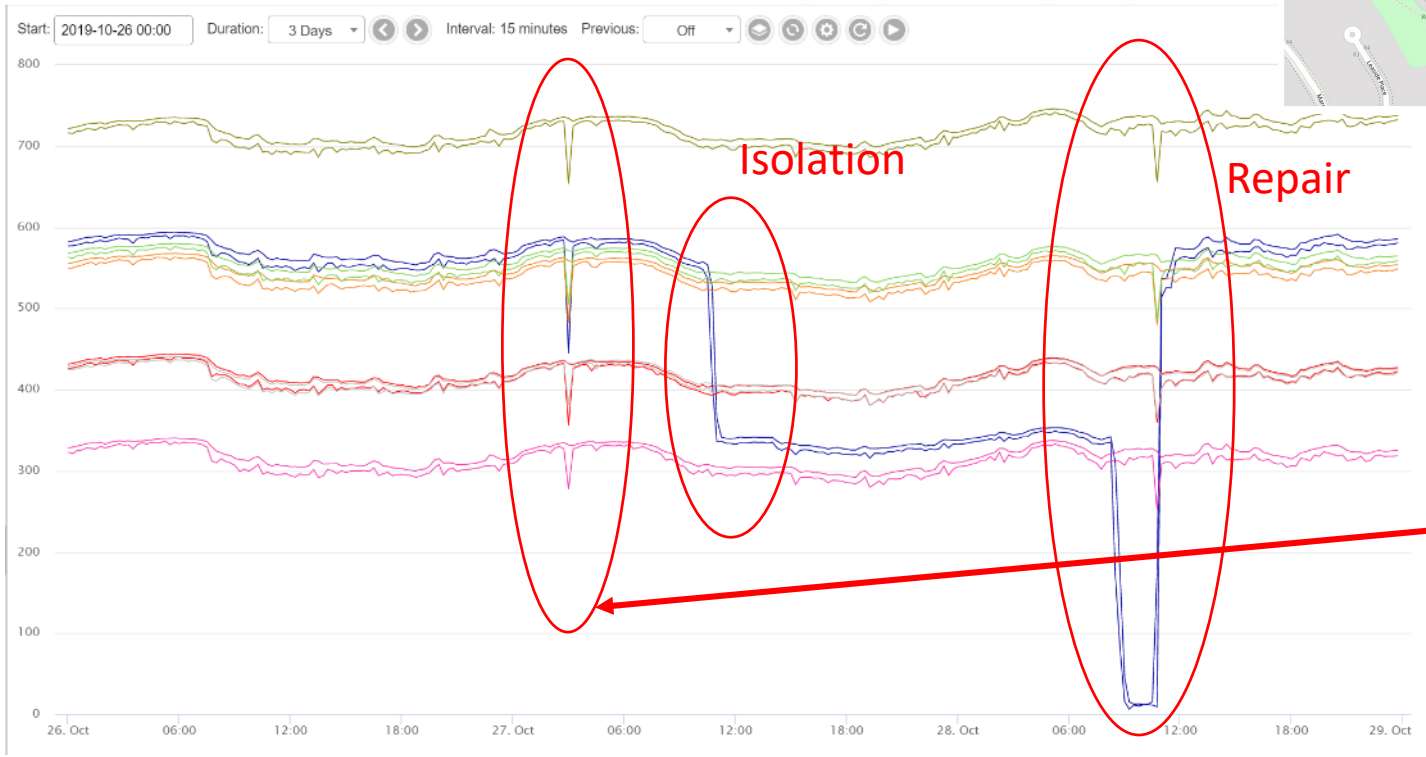
Acoustics – Leak Identification, Tracking + Repair

Acoustics + Pressure Data Powerful Combination

8 psi
(general trend)

Acoustics + Pressure Data





3:08am – Initial pressure drop aligns with acoustics as start of noise profile and leak. Confirmed watermain break.

Use Cases - Summary

- Pressure Monitoring
  - High/Low Pressure Areas
  - Transient Detection, Monitoring, and Studies
  - Pressure Management
- **Main Break Detection and Alarming**
  - Elevated Tank/Reservoir (out of service)
- **Leak Detection and Water Loss Reduction**
  - Compliments DMA Implementations
- Unusual Usage
  - lawn sprinklers, large industrial users, water theft
- Hydraulic Model Calibration
  - Both EPS (steady-state) and transient
- Operational Optimization and Troubleshooting
  - Compliments SCADA/DMA Data
  - Pump and valve operation
  - Temperature Monitoring and Management

How can LIFT help?

- Partners
  - Pilot Scale Implementation
  - Data Integration – SCADA + GIS
  - AI/ML Use Case
  - Event Management Trial
  - Trial in a Difficult Area of the System
  - Develop ROI Metrics

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