



# Innovative tools and applications for the leak detection



Vladimir Pavlita  
Regional Sales Manager





# Badger Meter – Company Overview



120 Years of Operations



Present in Over 70 Countries



9 Global Manufacturing Sites



2,500+ Employees



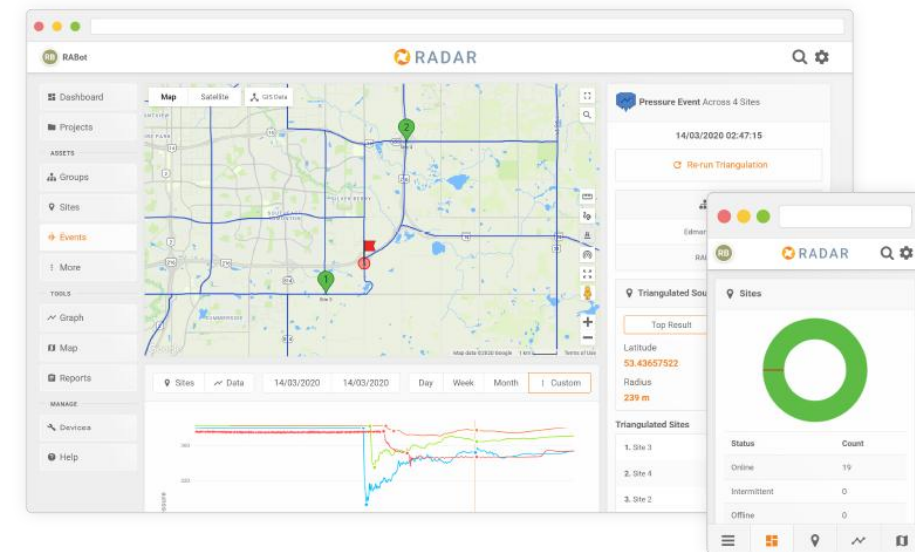
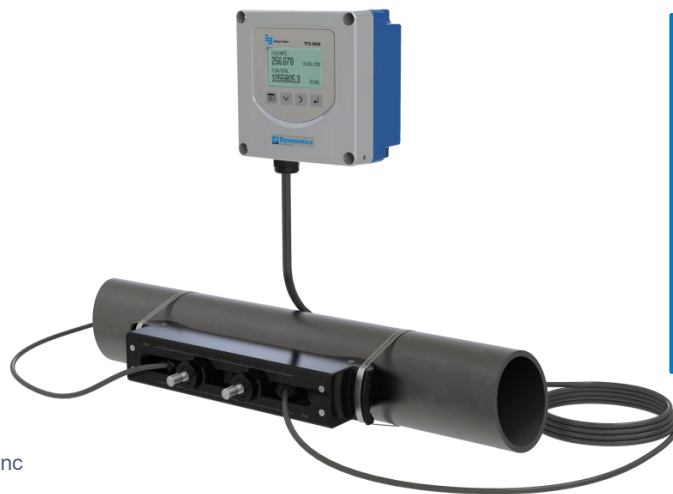
5 Global R&D Centers



You Can't Manage What You Don't Measure

# Leak Detection Tools for Water Networks

- ✓ Flow trends for DMA's
- ✓ Turbidity & Organics peaks
- ✓ Chlorine drops
- ✓ Electrochemical changes
- ✓ Pressure transient monitoring for pipelines
- ✓ Acoustic Leak detection for critical trunk mains







# Electromagnetic Flow Meters



**M2000**  
DN6...DN2000

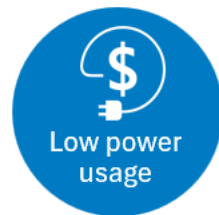


**M5000**  
DN6...DN600  
Battery-powered



UP TO  
20  
YEARS

12 May, 2026 | © Badger Meter, Inc







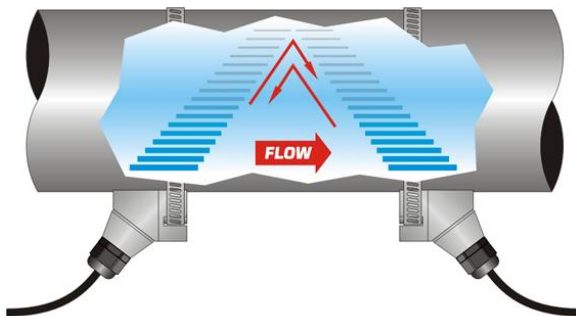
# Ultrasonic Clamp-On Flow Meters



**TFX-500w**  
(DN12...DN250)



**DXN-5P**  
Portable  
DN12...DN3000



# Water quality monitoring in pipes under pressure

## PIPE::SCAN

- Measuring up to 10 parameters
- Turbidity, Colour, TOC, DOC, UV254, UVT
- pH, conductivity, ORP, chlorine, temperature, pressure
- NSF Drinking water certificate
  - EU-DWD in progress
- Operating pressure 1 – 10 bar
- Inlet filter and nano pump for continuous water supply
- Sampling valve
- Hot-Maintenance without stopping water flow



sure UV254 Color Temperature NTU  
FCI EC UVT pH TOC DOC ORP



# Water quality monitoring in pipes under pressure



# Impact of leaks on Water Quality



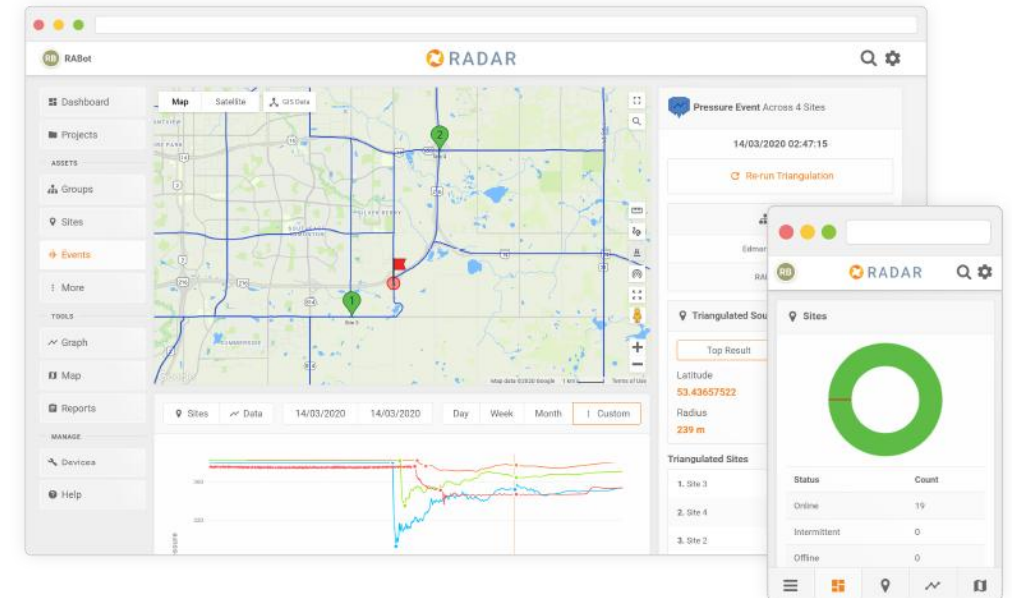
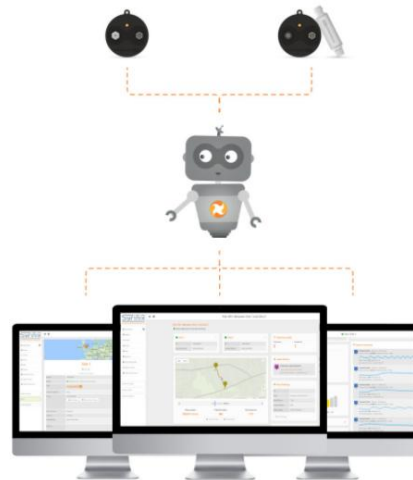


# Pressure Transient & Acoustic Leak Detection



We provide a combination of **network monitoring equipment** with a **cloud-based data platform** and **expert advisory** analysis and management services.

- **Pressure transient monitoring for pipelines**
- **Leak detection for critical trunk mains**
- **Raising Mains pressure monitoring**



# Pressure Transient monitoring



## PIPEMINDER-ONE

Always on pressure monitoring **128 samples/second**

- Basic daily data max, min, avg (1 min readings)
- Automated **burst alerts** including **location** and **size** estimate
- **Event detection** – large users, anomalous behavior
- Sophisticated “zone / threshold” alerting
- 7-day **diurnal reporting** with automated alerts
- Easy **static head analysis**
- Classification of **wave shapes**
- Capability to connect water quality and flow sensors in the field



# Pressure Transient monitoring and Acoustic leak detection

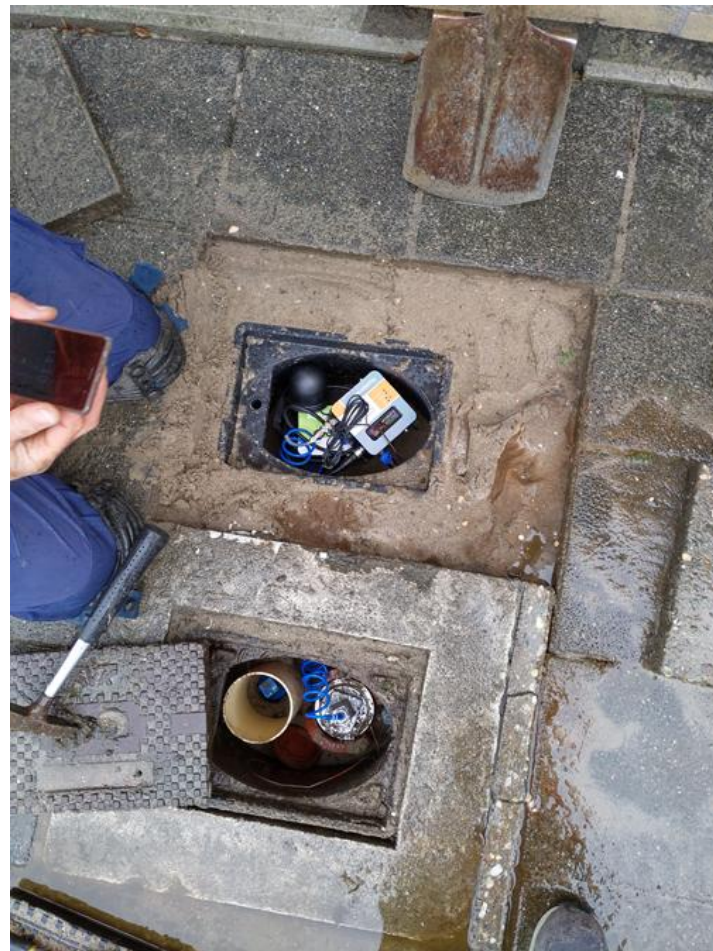


## PIPEMINDER-ONE Acoustic

- All functions of PIPEMINDER-ONE
- Plus
  - Hydrophone for daily **acoustic correlations**
  - Designed to be used for **surveys**, semi-permanent and permanent deployments.
  - Installation typically via a hydrant / wash out or double boundary box

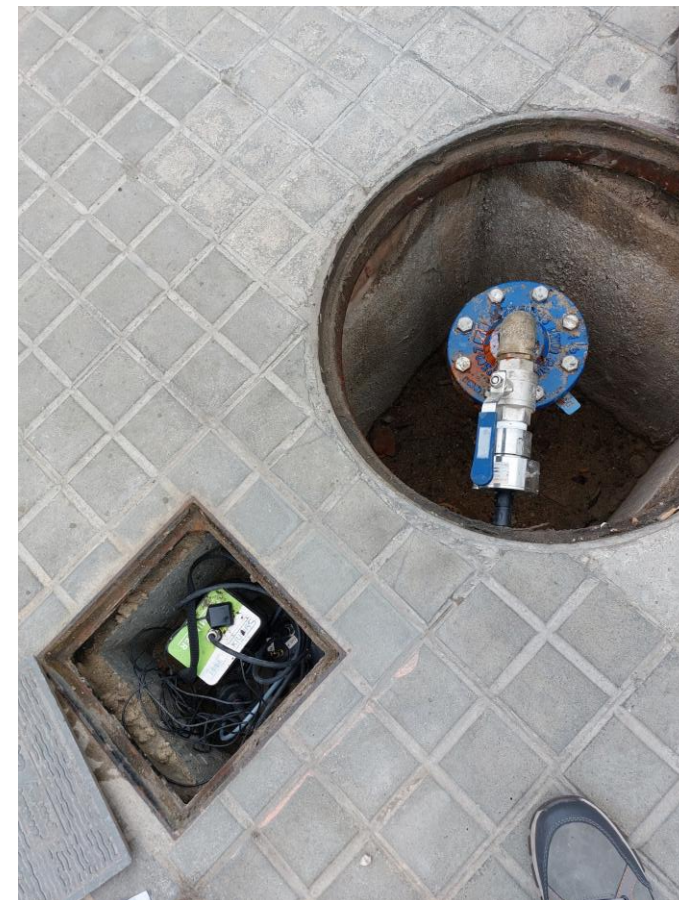


# Installations



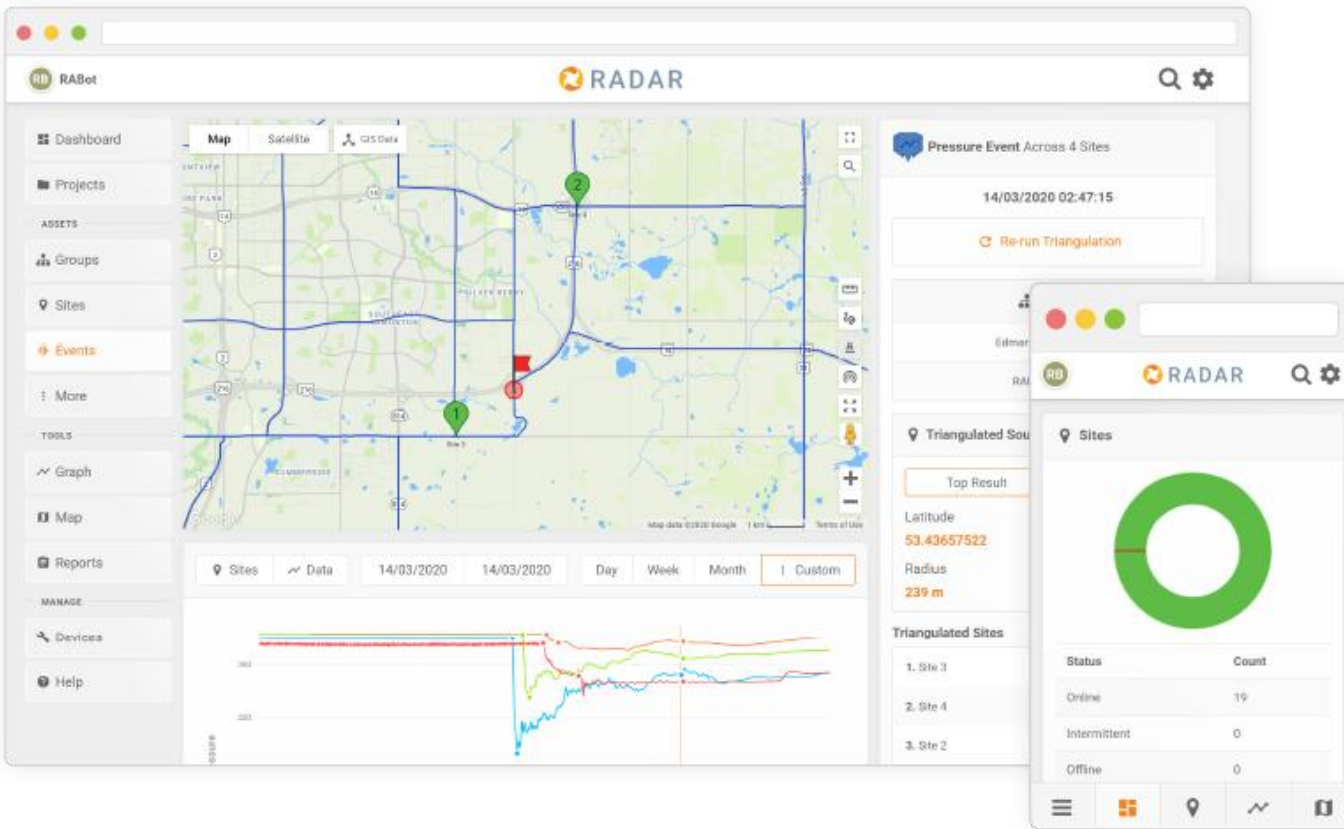


# Installations



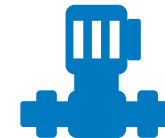


# RADAR Cloud Data Platform



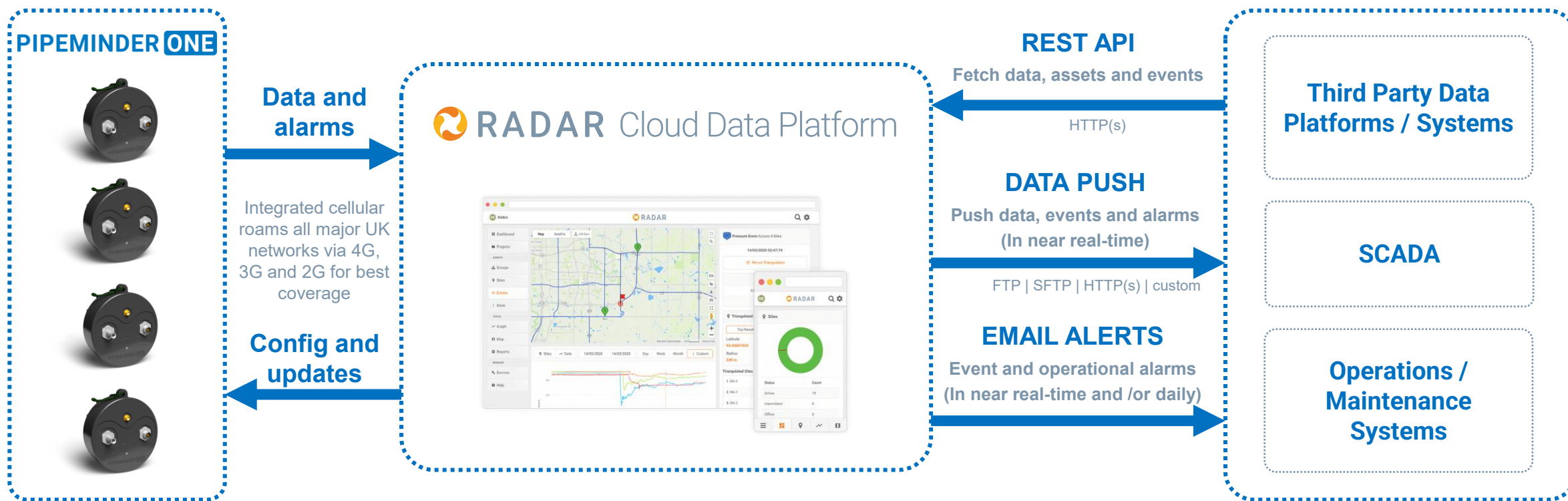
## Secure cloud platform

- Accessible from desktop, tablet and mobile devices
- Remote device configuration
- Visualization
- Dashboards, maps
- Statistical & graphical information
- Event location tracking
- Smart event alerts
- **Pressure monitoring Data**
- **Flow monitoring Data**
- **Water Quality Monitoring Data**





# Data Flow & Integrations

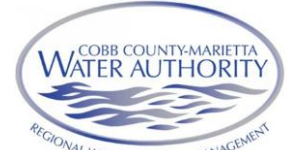
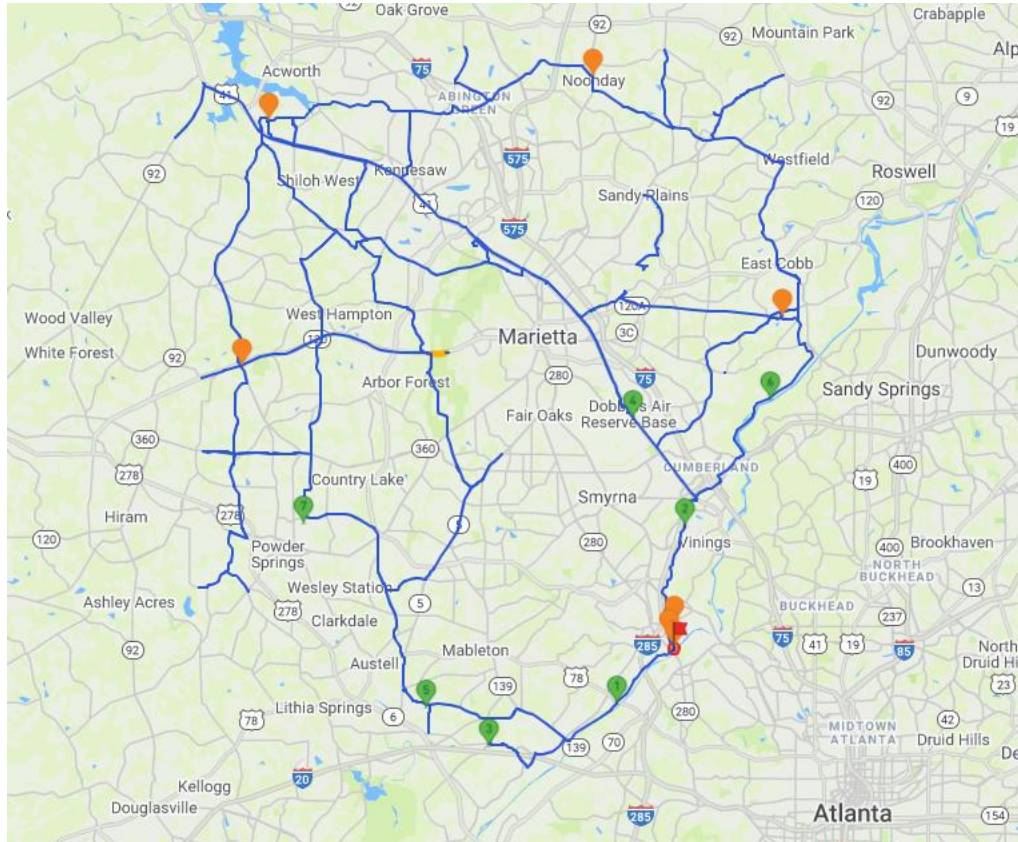


**All time series data, events and alerts from radar can be pushed out in near-real time, and / or accessed via our secure Rest API – setup and managed through the RADAR user interface**

Timeseries data (pressure, S3, flow, water quality) | high sample transient data | burst events | pressure transient events  
Network Pressure Events | Leak Noise Events | Status Changes (Online, Offline) | Low Battery



# Burst and Leak Detection



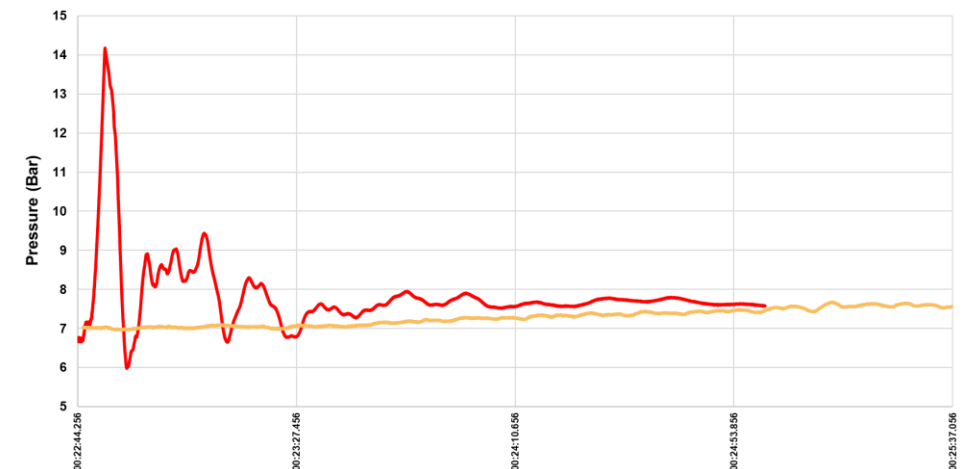
- COBB County Marietta Water Authority is a water wholesaler that operates about 200 miles of trunk mains near Atlanta.
- Following a series of **tapping saddle failures** on their trunk mains the client needed a **solution to identify bursts** and their location to alert operational staff.
- 10 PIPEMINDER pressure transient devices were installed, 5 -10 miles apart around the 75-mile ring main.
- Green markers indicate the devices that picked up the break and were used to automatically triangulate its location.

# Network Calming – Remove/Reduce Transients

south east water

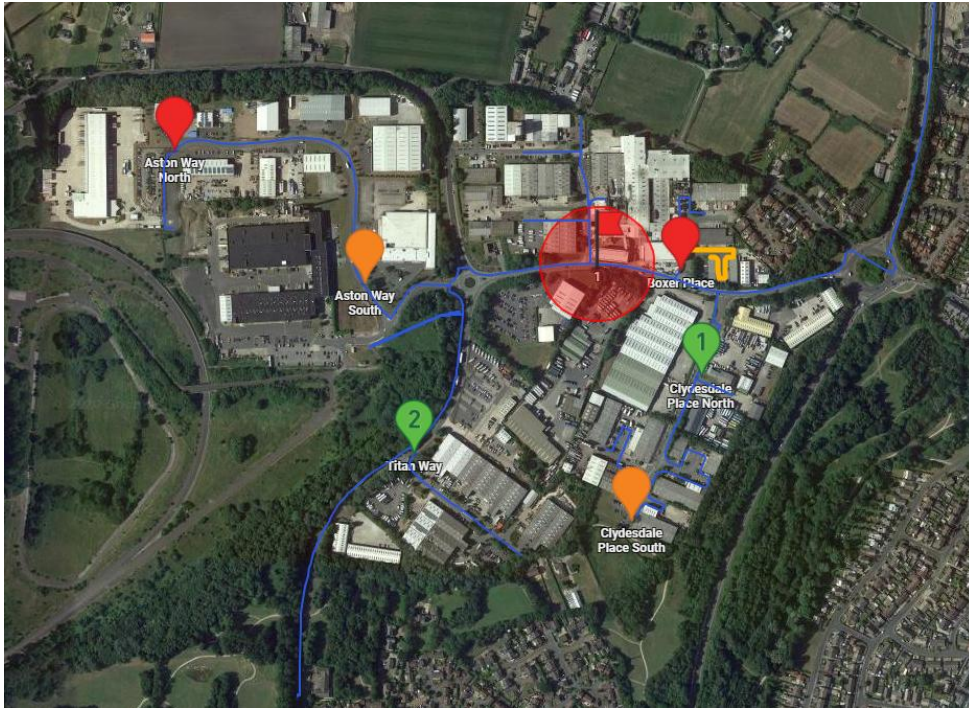


- Graph on left shows pressure monitored at 3 locations on trunk main with high burst rate.
- Old EO valve (red) pressure variation 6-14 bar
- New valve (orange) pressure variation 7-7.5 bar
- Result – No bursts since replacement

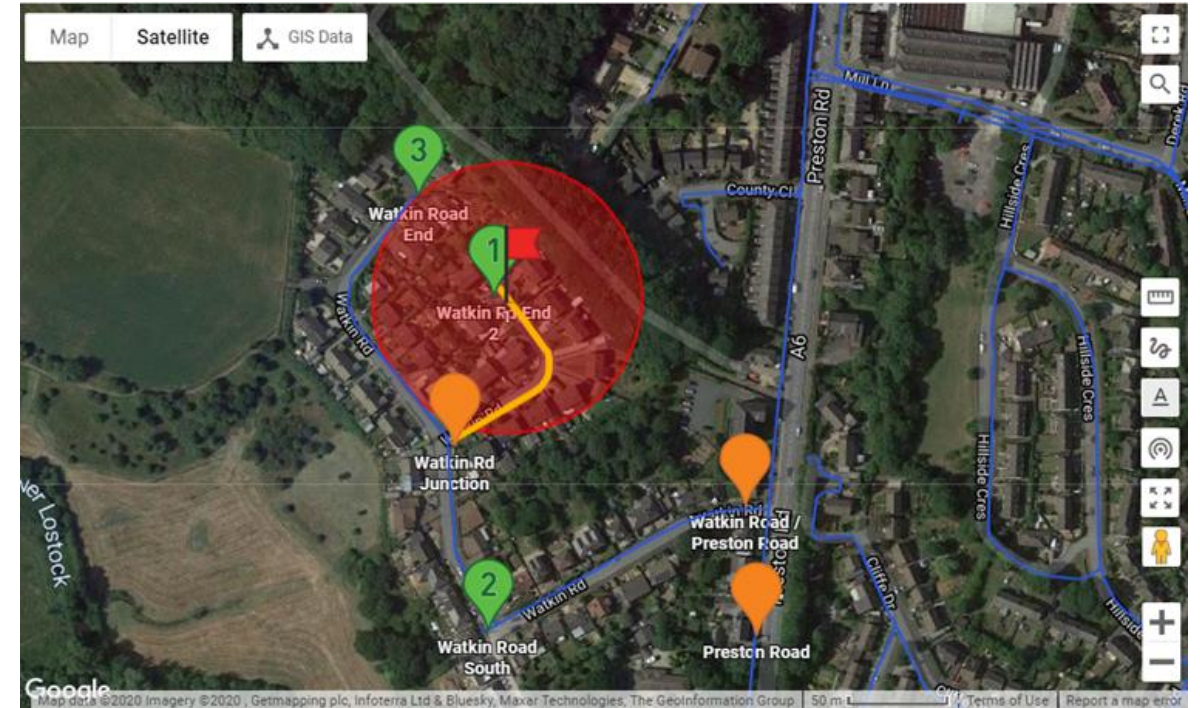




# Network Investigations – Anomalous Activity



DMA of industrial estate with history of leaks and bursts – monitoring identifies a poor valve control causing shock in the system

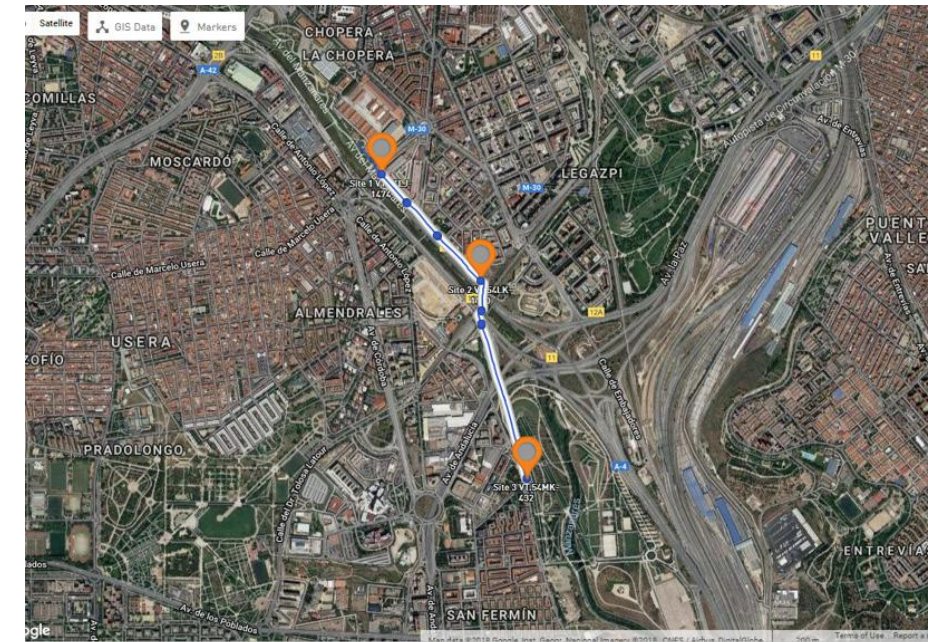


Water theft of a tanker filling up tanks from a hydrant within the housing estate late at night and in the early hours of the morning



# Leak Detection Pilot in Madrid

- In May 2018 Canal de Isabel experienced a large waterpipe burst in Madrid that left around 1M residents without water for the day and leaving a 20m crater that had to be filled in with concrete.
- PIPEMINDER technology was undertaken on four different sections of pipeline, two in urban and two in rural locations.
- The objective of this pilot was to investigate leak detection capabilities on different pipeline dimensions and materials and in both quiet and noisy environments.
- Sensors were installed on air valves in existing chambers





# Urban Area pilot

- Material: PCCP,
- Diameter: 1400mm,
- Pressure: 12 bar
- Two tests: day and night
- Distance between sensors: 643m and 924m
- Three systems were used to enable the detection range
- Leaks were simulated in wash out chambers whilst a correlation was run.

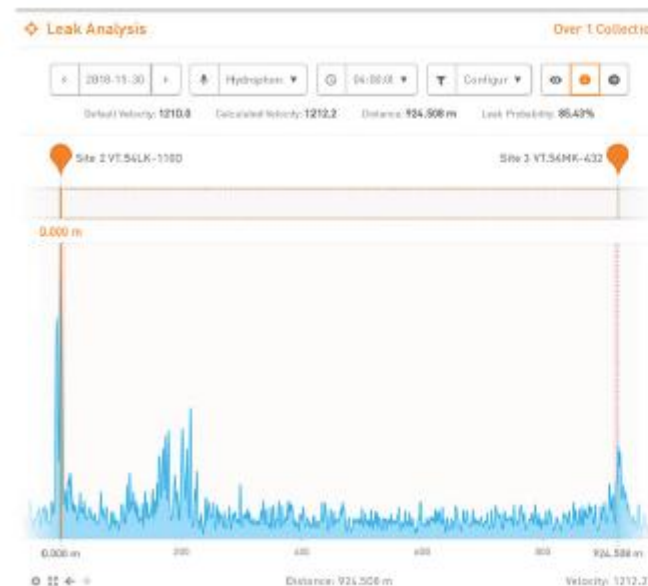


Fig 2 shows Acoustic noise of the leak

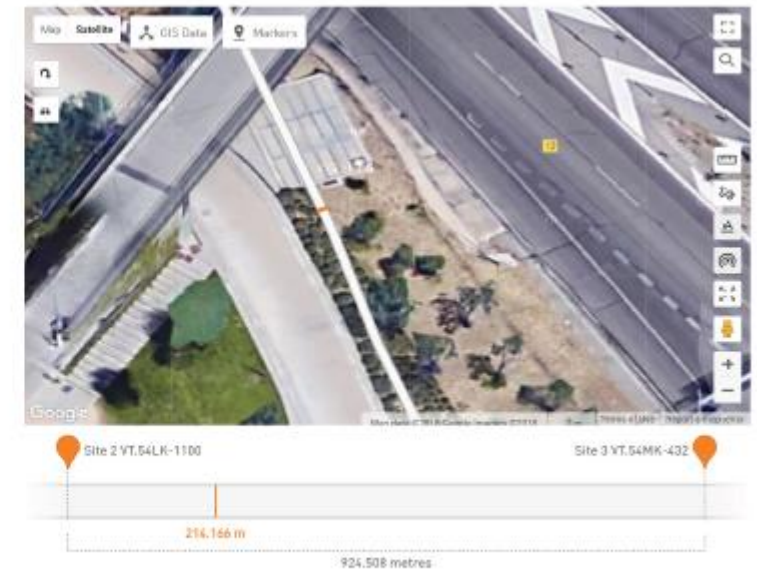
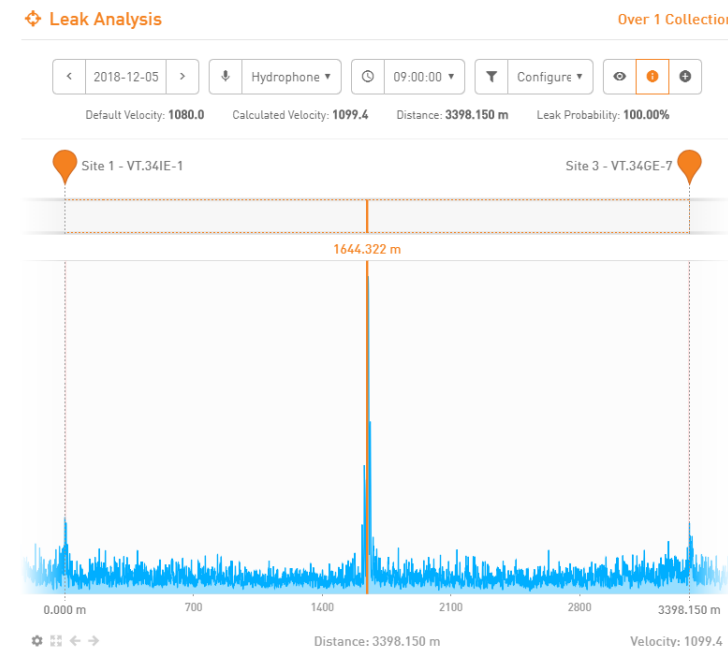
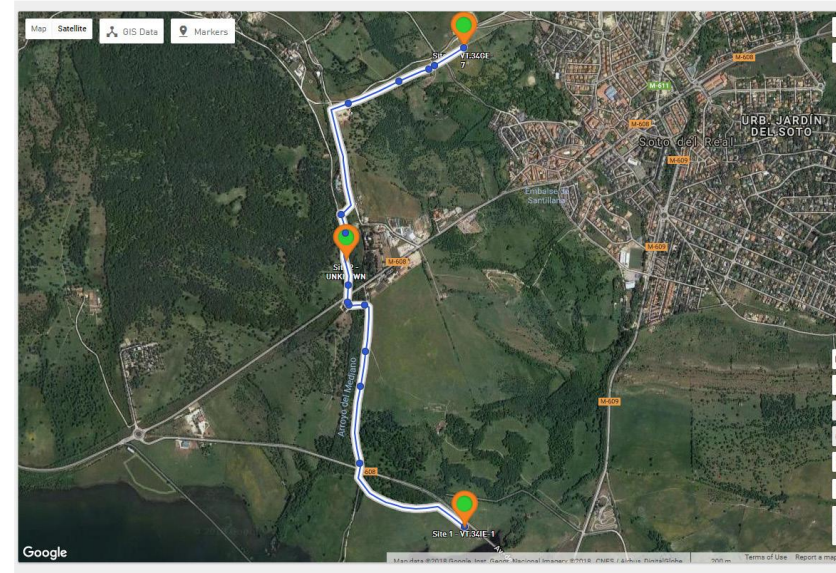


Fig 3 shows indicated position on Google Map View



# Rural area pilot

- conducted to test the limitation of inter-sensor distance and the impact of bends which reduce how far in distance acoustic noise will propagate
- Material: Ductile iron
- Diameter: 800mm
- Pressure: 10 bar
- Distance between sensors: 1.841 m and 1.556 m
- Total 3.398 m
- The result was a positive correlation over a distance more than 3.3km!
- Multiple bends reduce the transmission distance of acoustic noise.
- Leak detected over 3.3km



Canal de Isabel II

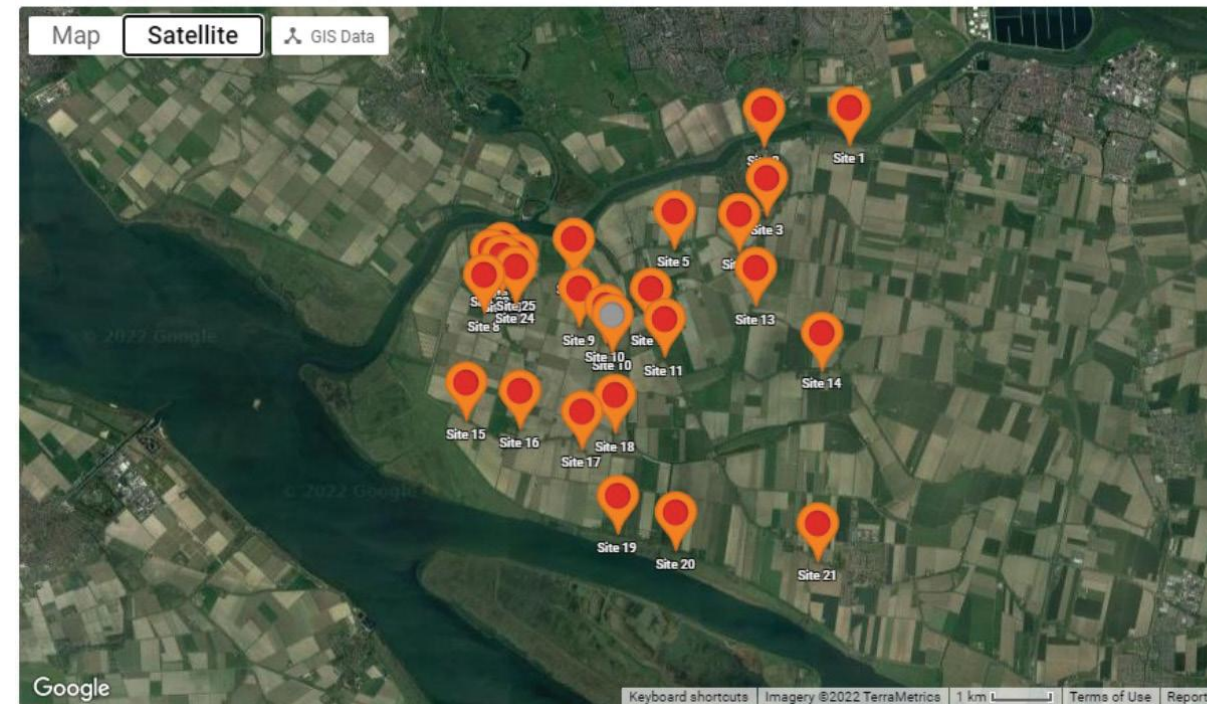




# Bursts and Leaks Reduction in Rotterdam

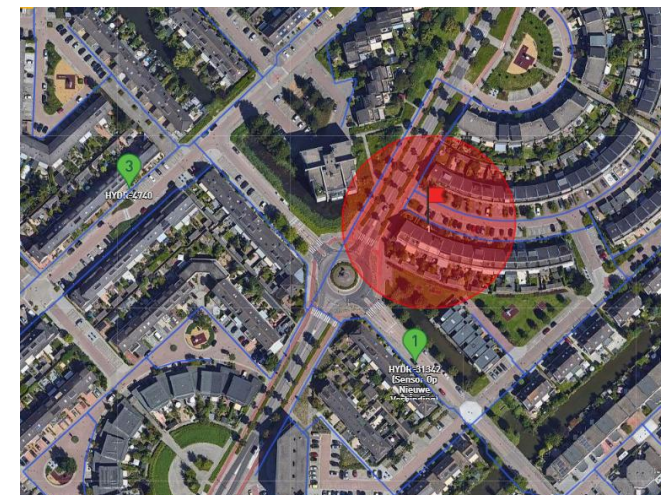


- Evides is a water company that delivers 3.6 billion liters water per week to 2.5 million customers in the Netherlands.
- In the Hoeksche Waard, south of Rotterdam, Evides was experiencing frequent pressure variations resulting in a high rate of non-revenue water and significant repair expenses.
- To investigate and determine the causes, they worked with deployed a series of PIPEMINDER pressure monitors throughout the district metered area.





# Bursts and Leaks Reduction in Rotterdam



- Event detected by 9 monitors (Green)
- 5 monitors used for triangulation
- Numbering indicates time of arrival of pressure transient





# Thank You

**Vladimir Pavlita**

**Regional Sales Manager**

[vpavlita@badgermeter.com](mailto:vpavlita@badgermeter.com)

+420 725 502 635



**Badger Meter**



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