

To Manage You Must Measure

SUEZ Water Westchester

Design & Management of District Metered Areas

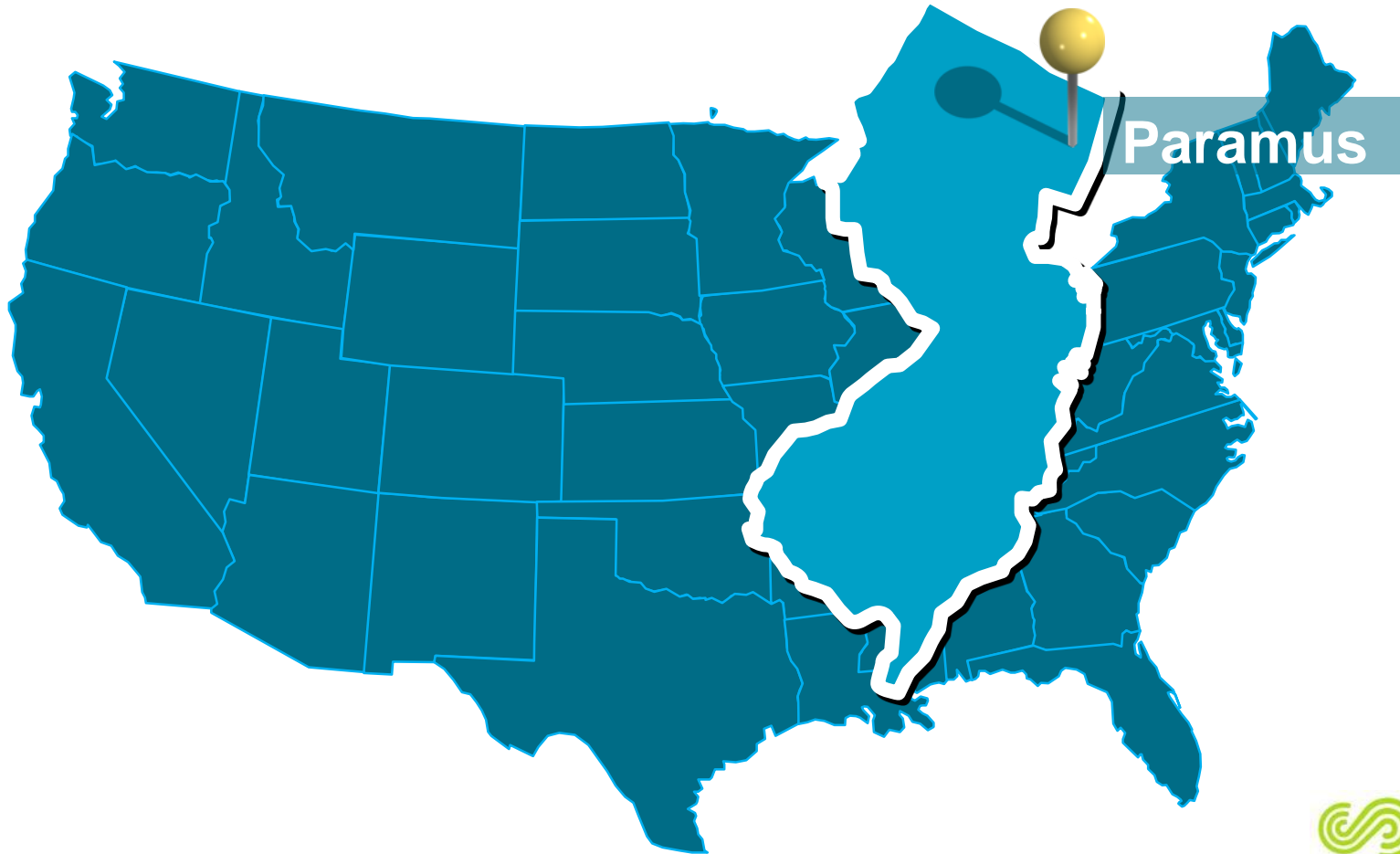
Keith Kolkebeck



Who Am I

- **Director, Technical Services**
- **15+ years of operational technology experience**
- **Joined SUEZ in 2007**
- **Responsible for operational technology strategy for SCADA, GIS, Smart Water DMA, and Operational Reporting.**





Can you Identify the Street(s) with a Leak?

HINT: There is more than 1



Here?



How about here?





What about downtown?



Here?

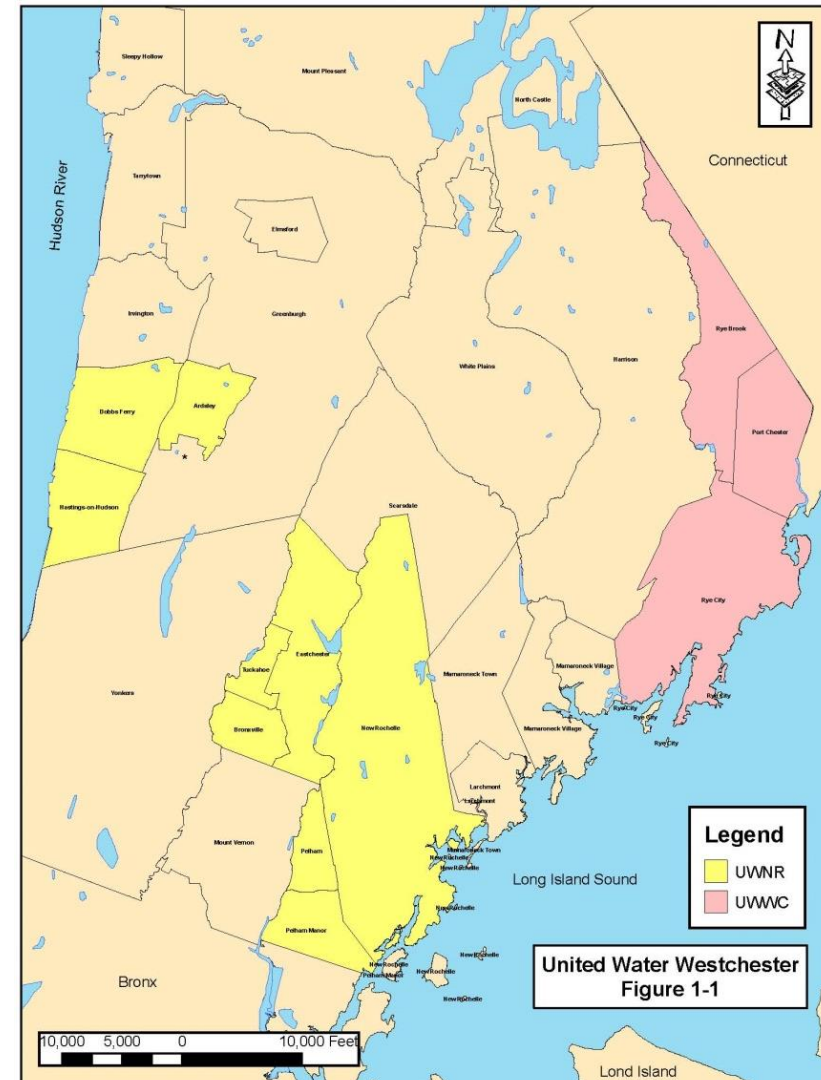


Did you find them?



Westchester System Overview

- Located North of NYC
- 100% Purchased Water
 - 7 Total Connections
 - Fluctuating Incoming Supply Gradient
- 7.0 MGD Average Day Demand
- 16.8 MGD Peak Hourly Demand
- 12,000 Service Connections
- 168.0 Miles of Pipe
- 4.5 MG Pumped Storage System



\$2,100/MG



So.....

A 100 GPM leak that does not surface costs:

- **\$302.4/day**
- **\$2,116.8/week**
- **\$9,072/Month**
- **\$110,073/Year**



52 MG Water Wasted



Operational Challenges

- **High Degree of Non-Surfacing Leaks due to System Topography**
- **Availability of System Operating Data**
 - Inefficient Deployment of Resources
- **Low Resolution Production/Consumption Data**
 - Poor Water Loss Audits
- **High Levels of Water Loss (Leakage)**

Importance of Efficient System

- **Tangible Benefits**
 - Direct and Immediate Cost Savings
 - Production Costs: Energy, Chemicals, etc...
 - Purchased Water Costs
- **Intangible Benefits**
 - External Perception
 - Regulatory and public Perception
 - Environmental Impact, Saving the Resource.

How Do We Manage?



Non-Revenue Water Program Overview

- **Initial Evaluation – Components of Water Loss**
 - Nature of Water Loss Drive Remediation Actions
 - Characters Nature of Water Loss
 - Efficient Deployment of Resources
- **High Resolution Data Across Smaller Regions**
 - System of DMA's Created
 - Identify Anomalies
 - Align the Production and Consumption Data
- **Goals**
 - Leak Detection Efficiency
 - Establish Real Loss Baseline

DMA System Design

- **DMA System**

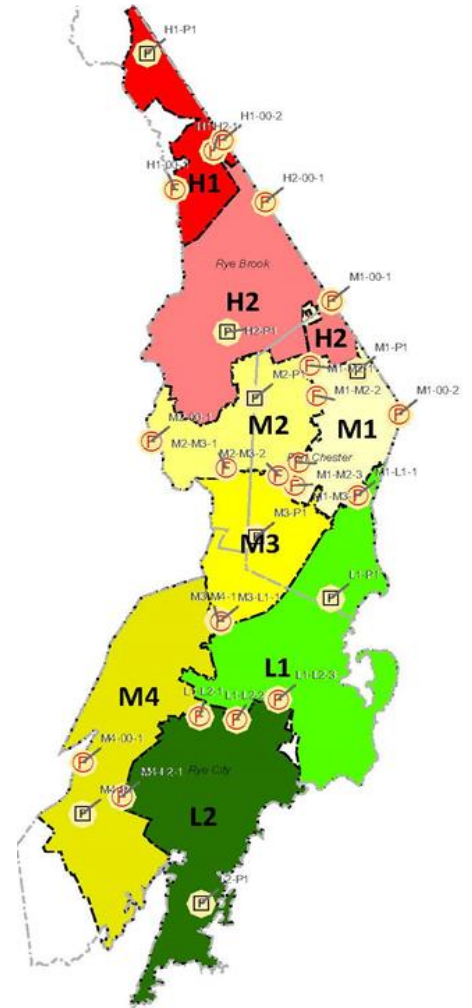
- Isolated Production Zone
- Viewed as Independent System
- <3,000 per Zone

- **Boundaries**

- Natural Boundaries
- Existing Pressure Zones

- **Meter Size and Placement**

- Weighted Average Accuracy of 1% for Ave. Demand Flows
- Down Sized Meters for Accurate Flow
- Hydraulic Model Evaluation



DMA Meter Site Design & Installation

- **Direct Bury Open-Tube Meters**
 - Siemens MAG 8000
 - Avoid Expensive Meter Pits
- **Site Prep**
 - Planned Shut downs
 - Field Improvised Meter Locations
 - Meter Orientations is CRITICAL
- **Electronics**
 - Underground Enclosure
 - All Components Battery Powered
 - Easy Access

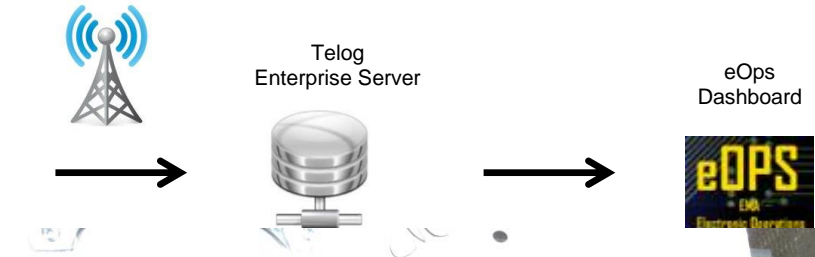
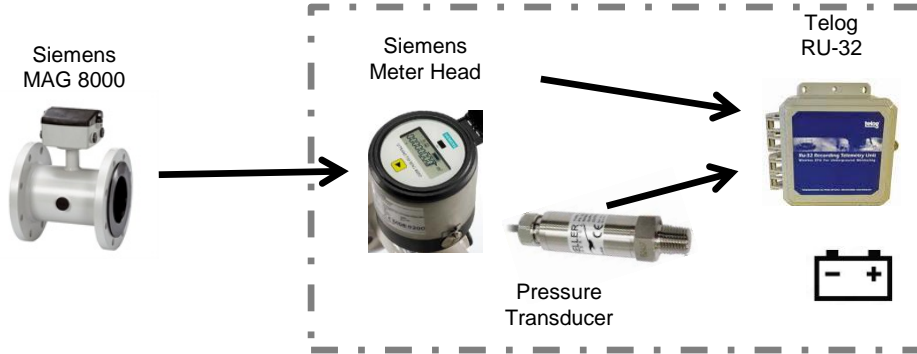


We Must Measure



DMA Data Collection

Equipment & Data Flow



Data Management

- **Data Capture**
 - Pressure
 - Positive and Negative Flow
- **Data Resolution**
 - Minute Level Readings
 - Transmitted once every 24 Hours
 - Logger Holds ~7 days of data
- **DMA Mass-Balance Calculation (in eOPS)**
 - Establishes Draft for Each DMA Zone
 - Meters are Bi-Directional.



Now We Manage



DMA Data Processing & Evaluation

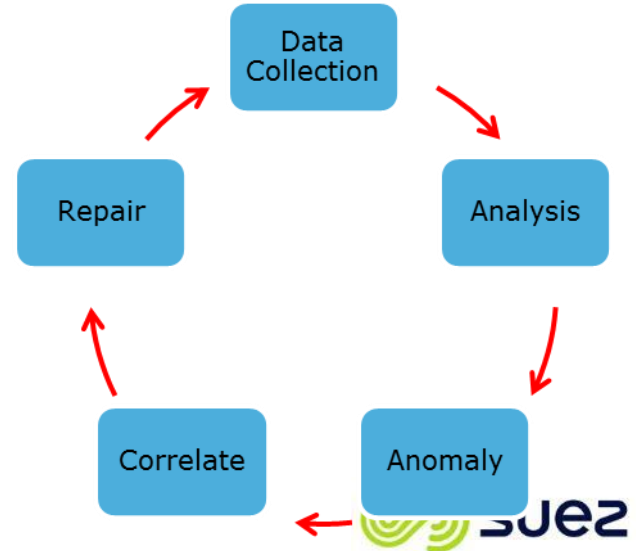
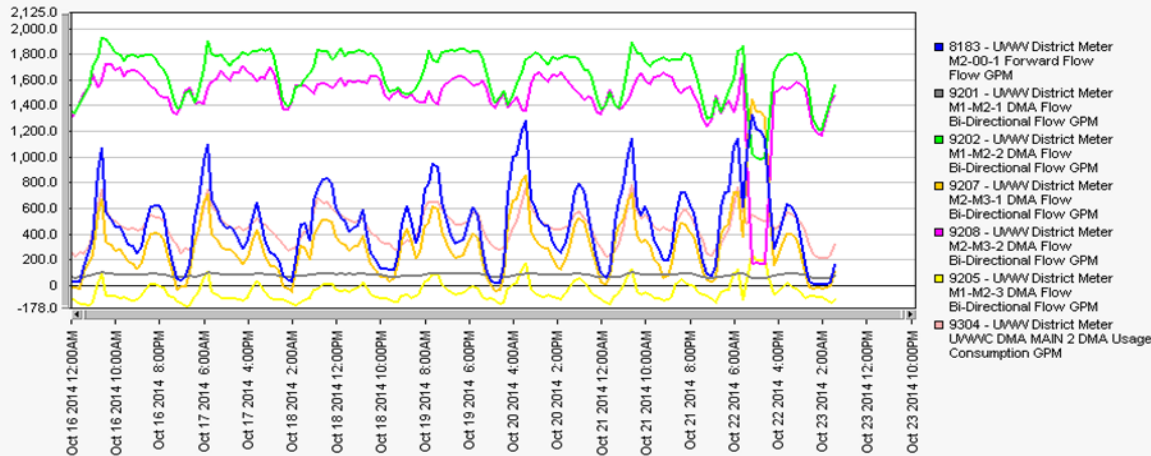


- **Standard Leak Life-Cycle**
 - All Leaks Are Non-Surfacing for Some Amount of Time
 - Storm Drains & Wetlands
 - Rock & Soil Conditions
 - Frozen Ground Conditions
 - Little Opportunity to Improve Find-to-Fix Time
- **Focus on Event-to-Find Time**

DMA Data Processing & Evaluation

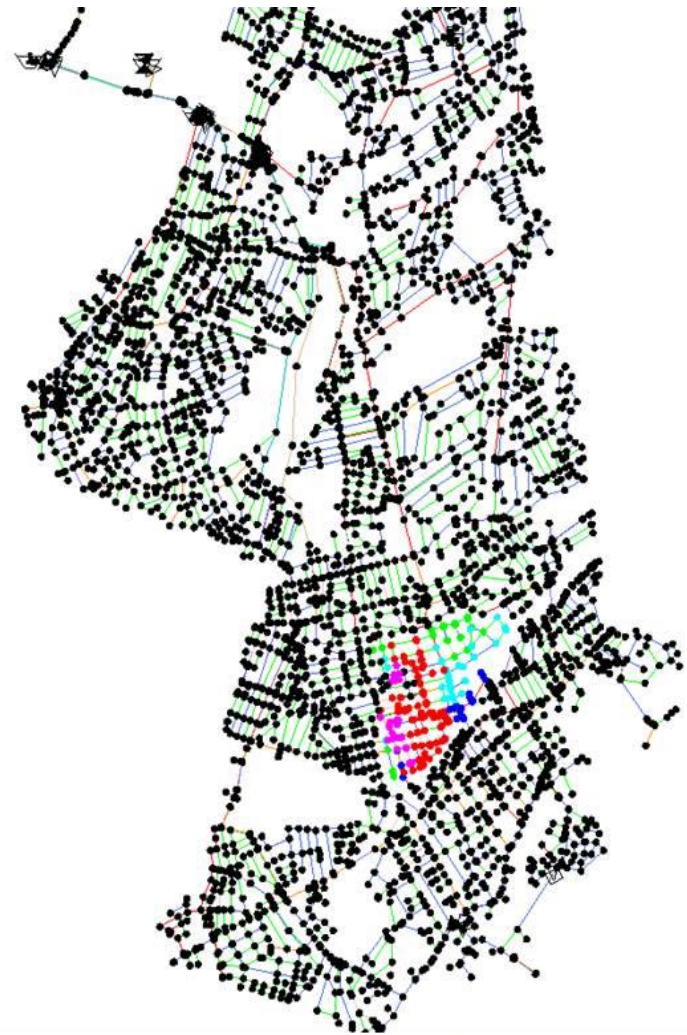
- **Real-Loss (Leakage) Targeting**
 - DMA Specific Reports
 - Determine if Baseline Flow is High
 - Monitor Overnight Flows and Patterns
 - Identify Localized Leaks that have not surfaced

UWWC DMA MAIN 2
DMA Calc: (+) M2-00-1 (+) M1-M2-1 (+) M1-M2-2 (-) M2-M3-1 (-) M2-M3-2 (-) M1-M2-3



Data Processing & Evaluation

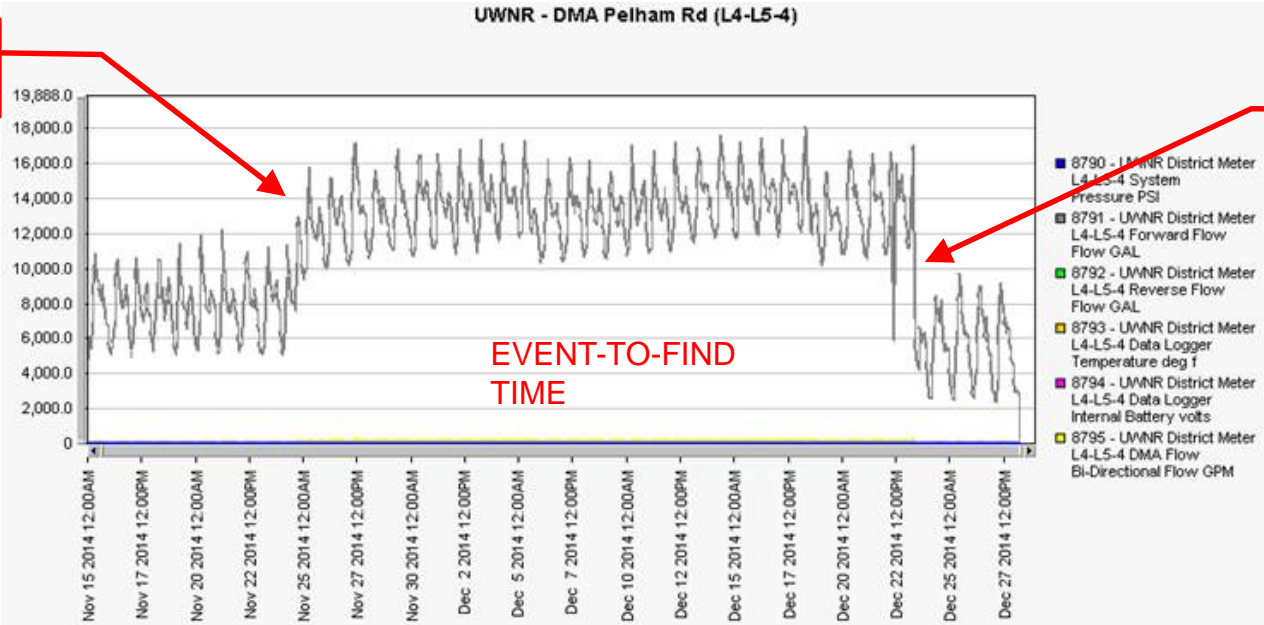
- **Drill-Down for Leak Localization**
 - Draft Indicator at Minimum Flow Period
 - Model Analysis of Individual DMAs
 - Generate Heat-Map of Suspect Region
 - Localize, Correlate, Repair
- **Stubborn Leaks Require Additional Data**
 - Pressure Logger Data Collection
 - Isolation Testing
 - Local Leak Loggers



DMA Data Processing & Evaluation

- 150 gpm Leak (216k gal/day) - ~\$500/Day
- 6" Private Fire Service Line
 - Storm Drain Prevented Leak from Surfacing
 - Potential for Leak to Run for Long Durations
 - Winter Weather & Frozen Ground Conditions are Contributing Factors

LEAKAGE IDENTIFIED



LEAKAGE RESOLVED

Results



Results

Start of the Program (2013) to End of Year 2015

- **SWNR**

- 5.5% NRW Reduction
- 275 MG/Year Not Wasted
- \$577,500/Year

OVER 500 MG/YEAR NOT WASTED

- **SWWC**

- 8.3% NRW Reduction
- 251 MG/Year Not Wasted
- \$527,100/Year

Benefits

- **Better Monitoring of Interconnections**
 - Check on Billable Meters
- **Better Optimization of System Operations**
 - Put the team on the leaks
- **Led to Other Improvements**
 - Production Meter Calibration and Maintenance for Non-Source Meters

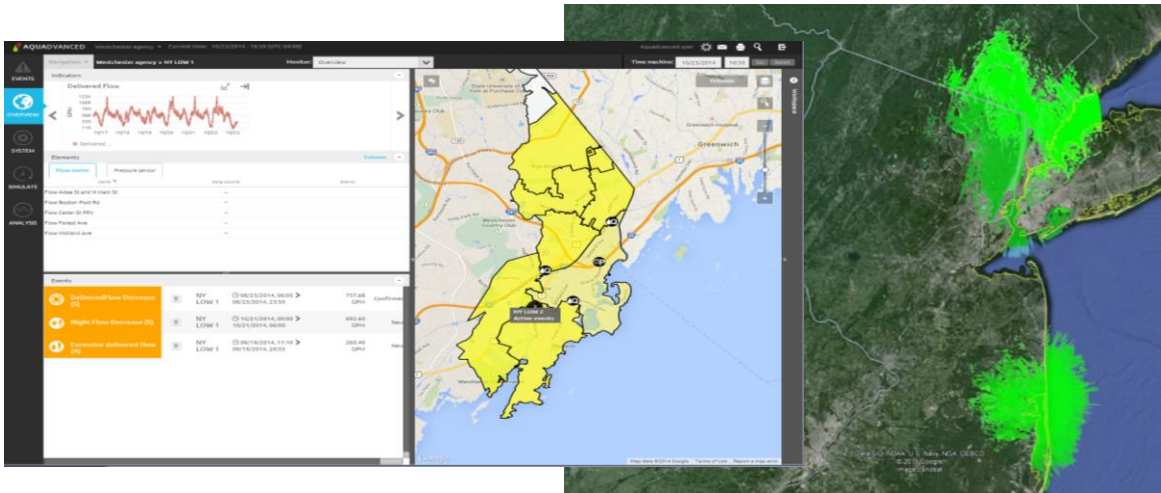
Technology Lessons Learned

- **Murphy's Law**
- **Need to be flexible with the design**
- **Maintenance: Introduced over 60 new assets.**
- **Short Term Life of Internet Of Things**
 - Technology advances rapidly.
 - But costs are going down



Incorporate New Technologies

- AMI – Customer consumption data
- Fixed and Temporary Leak Loggers
- Reduce installation costs with insertion flow meters
- Aquadance – operational dashboard



Take a ways:

1. **Did You Find 3 Leaks?**
2. **DMAAs Provide Detail**
3. **Data Evaluation/Management**
4. **Time to Find Event**
5. **Good Practices**
6. **Technology Changes**

