
Beyond the GIS Wall: Non-Traditional uses of GIS (at a water utility)



War Eagle!

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Format for GOOD Presentations

- 🌀 10 Slides
- 🌀 20 Minutes
- 🌀 30 Point Font

- Guy Kawasaki

Non-Traditional uses of GIS (at a water utility)



Traditional uses of GIS (at a water utility)



You tell me . . .

Traditional Water Utility Organization

Finance

IT

Human Resources

Business

Customer Service

Meter Reading

Engineering

Operations

Maintenance


Production

Water Meter Manufacturers

- ① Making meters since late 1800s
- ① Meter Reading Operations . . . **Low-Tech**
- ① Now delivering Meter Reading SYSTEMS
 - AMR
 - AMI
- ① Meter Reading Systems need/allow GIS
 - Why?

Encoder Registers and RF Endpoints

E-Coder®(R900)™



Basic Meter Reading PLUS Leak, Tamper, and Reverse Flow Detection and Data Logging

ProRead™ and Third Party Encoder



Basic Meter Reading

E-Coder® Solid State Absolute Encoder



Basic Meter Reading PLUS Leak, Tamper, and Reverse Flow Detection

Acoustic Leak Sensor



E-Coder®(R450)™



Basic Meter Reading PLUS Leak, Tamper, and Reverse Flow Detection in one wireless package

Cello Cellular Data Logger



R900™ Wall and Pit RF MIUs



R450™ Wall and Pit RF MIUs



Field Data Collection Hardware

R900™ Walk-by AMR



R900™ Mobile AMR



R900™ Fixed Network AMI



R450™ Fixed Network AMI



System Management Software

N_SIGHT™ Software Suite



N_SIGHT™ R900™ and N_SIGHT™ R450™


Intelligent Data and Analytics System

N_SIGHT™ IQ™



Billing/CIS System

Billing/CIS System



Automated Meter Reading


AMR



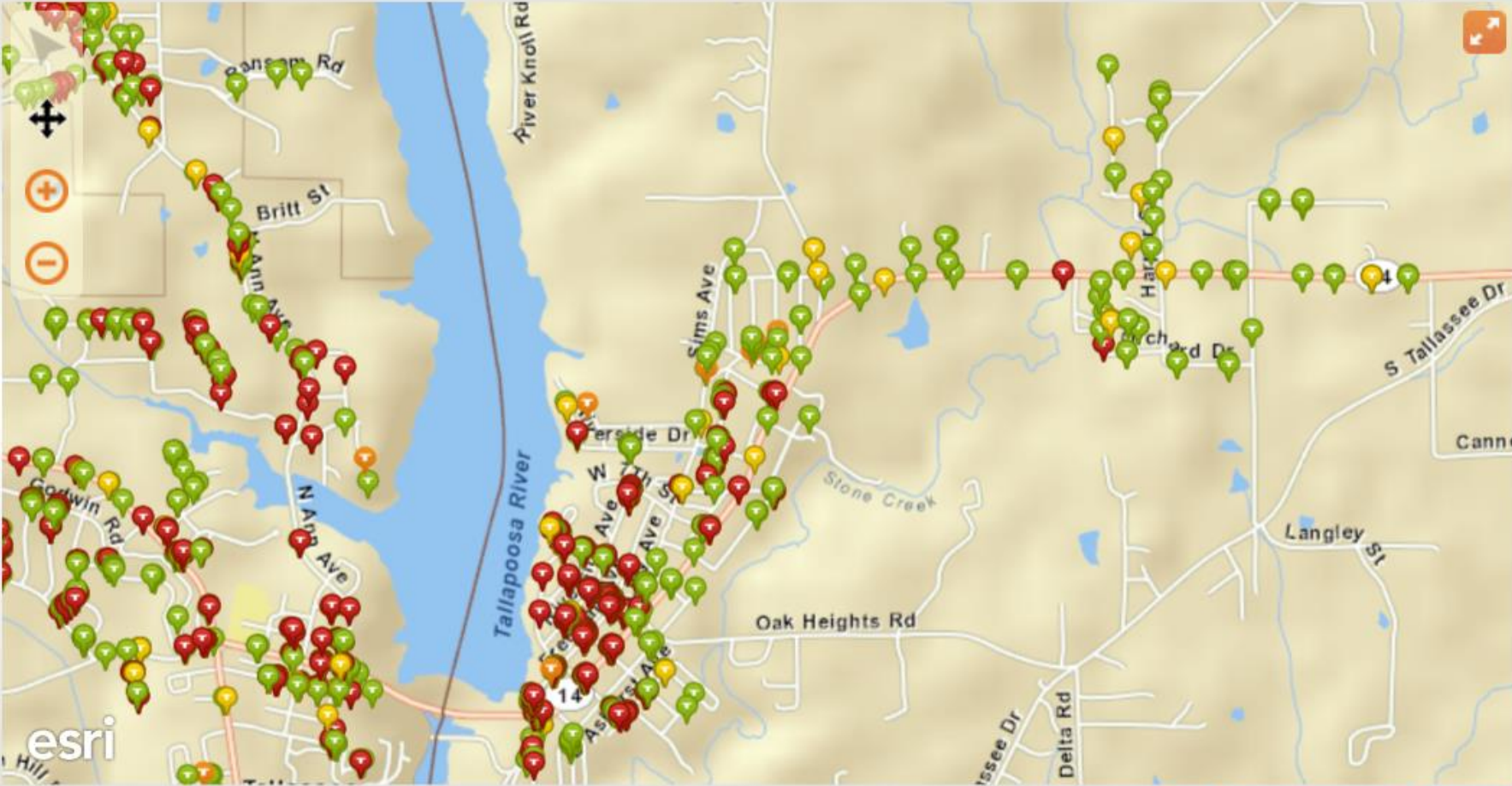
What is AMR?

- ① Walk-by with Handheld Device
 - BYOD
- ① **Ride-By in Car or Truck**

Now . . .

Routes **Meters (All)**  **Data Logging** **RF Test** **Unload** **Settings**

GPS Tracking Off Travel Center Bread Crumbs Layer **Map** ▾



esri

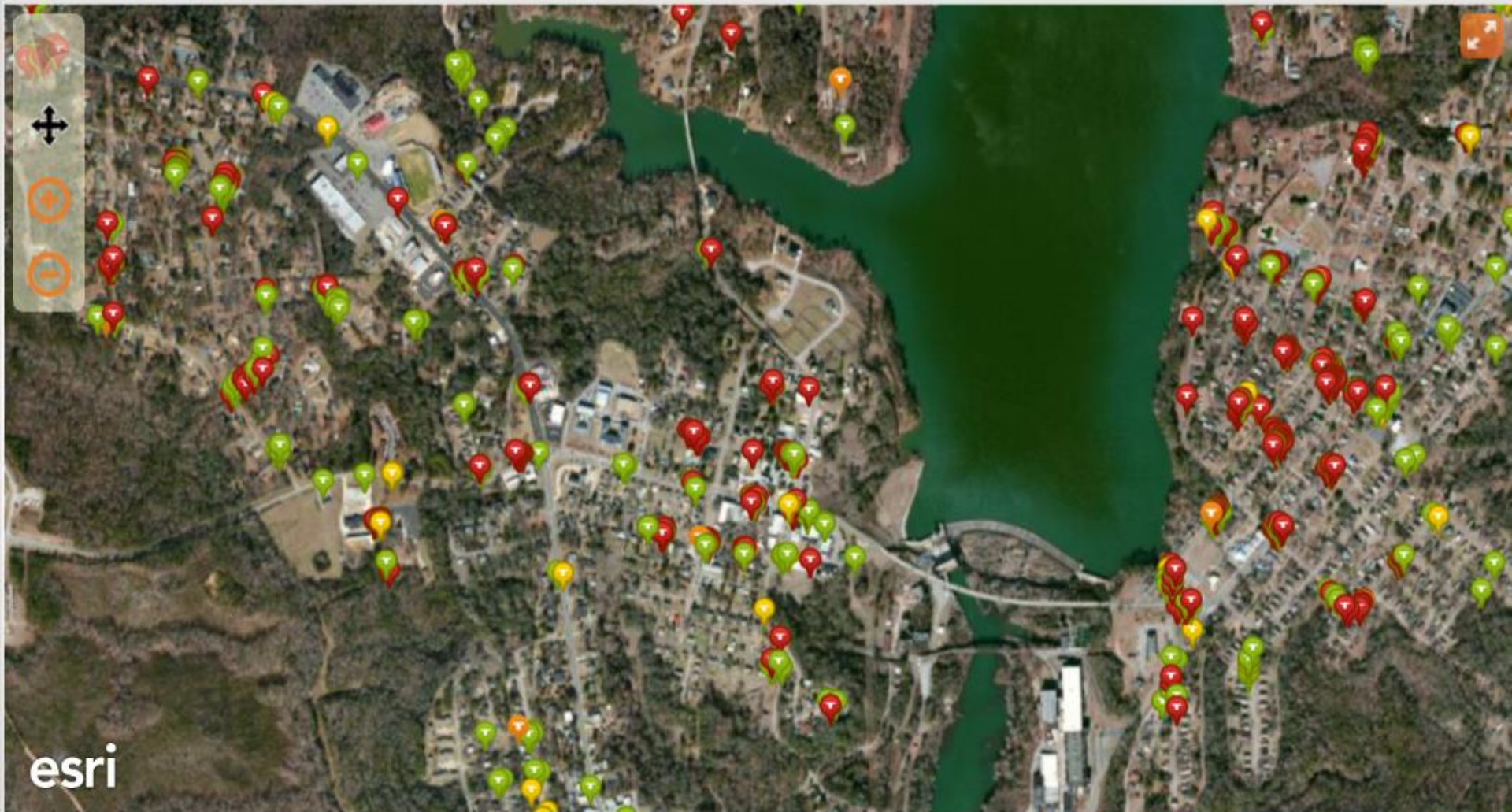
MIUs: 3675, Captured: 2423 (65%), Missed: 1252



Stop **Filter** **Help**

Now . . .

Routes | **Meters (All)** ⋮ |  | **Data Logging** | **RF Test** | **Unload** | **Settings**

GPS Tracking Off Travel Center Bread Crumbs Layer Tallassee_Satellite



  MIUs: 3675, Captured: 2423 (65%), Missed: 1252 Stop Filter Help

Then . . .

NEPTUNE MX900 - ARB UTILITY MANAGEMENT SYSTEMS 11/06/2008 11:26 AM

Route Import | Route Selection | Missed Reads | Captured Reads | **Map View** | System Check | Route Export

Map View GPS Mode
 OFF Center Travel Track

The map displays a network of roads and utility lines. A prominent road, Goodner Mountain Rd, runs diagonally from the top left towards the center. Other roads include Dillashaw Branch, Lake, Liles Ln, Karen Cir, Great Creek Cir, and Advent Cutoff Rd. A blue shaded area labeled 'Liles Lake' is located in the upper middle section. A series of blue dots, representing data points, are plotted along a route that starts near the bottom center and moves towards the right side of the map. The map background is a light green color.

Map View controls on the left:
Map: + - Hand Arrow
Pts:
View:

Benefits - Mapping with AMR

- 📶 Real-time visual status of read and unread meters
- 📶 Real-time visual indication of meters that require more attention, such as:
 - Leak or Reverse Flow Flags
 - Consumption Flags (consumption higher or lower than expected)
- 📶 Route Optimization
 - Analyze Route vs Time

Past Challenges



MapInfo

- Required utility to install ALL of North America on their laptop . . . \$ \$ \$
- Large file sizes/Lengthy install process



Most meters not geocoded

- No geocoding option
- Customers were required to have coordinates already in their CIS
- Could not use Neptune mapping

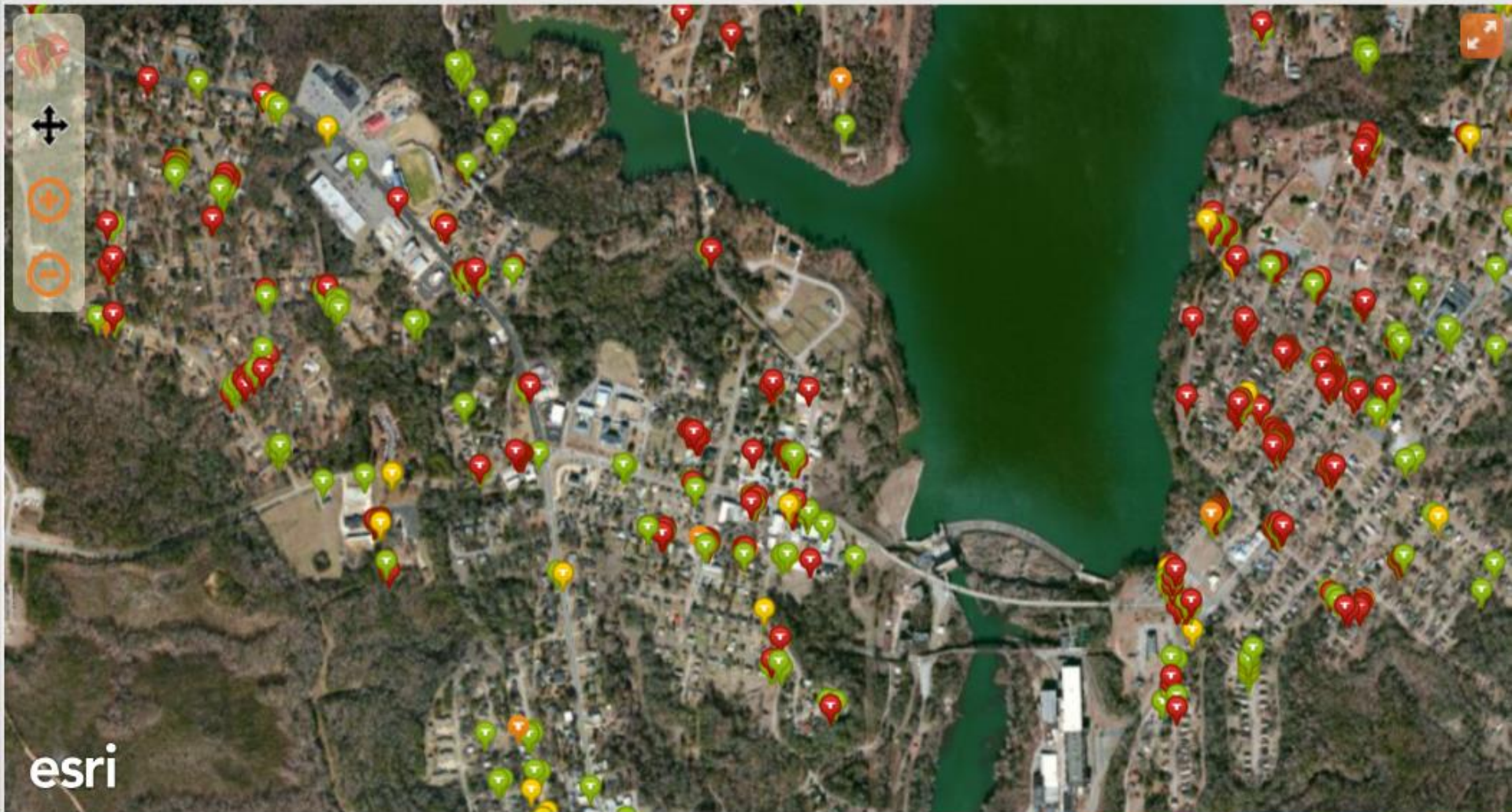
Past Challenges



- ❶ **Poor User Interface**
 - Lack of detail
 - Low quality visuals
- ❷ **Map Updates a Pain!**
 - DVDs, Thumb Drives, Flash Drives
 - Not efficient!

Now . . .

Routes **Meters (All)** ⋮  **Data Logging** **RF Test** **Unload** **Settings**

GPS Tracking Off Travel Center Bread Crumbs Layer Tallassee_Satellite



  MIUs: 3675, Captured: 2423 (65%), Missed: 1252 **Stop** **Filter** **Help**

Then . . .

NEPTUNE MX900 - ARB UTILITY MANAGEMENT SYSTEMS

11/06/2008 11:26 AM

Route Import | Route Selection | Missed Reads | Captured Reads | **Map View** | System Check | Route Export

Map View GPS Mode: Center Travel Track

Map

-
-
-
-

Pts

-
-


View

The map displays a utility network on a light green background. A dashed line represents 'Goodner Mountain Rd' running from the top left towards the center. A solid line network branches out to the right, including 'Dillashaw Branch' and 'Lake'. A vertical road 'Great Creek Cir' intersects the network, with 'Liles Ln' branching off to the east. Another road, 'Karen Cir', branches off to the south. At the bottom, 'Advent Cutoff Rd' is visible. Numerous blue dots are scattered along the network lines, representing data points. A small blue lake is also shown near the top center.

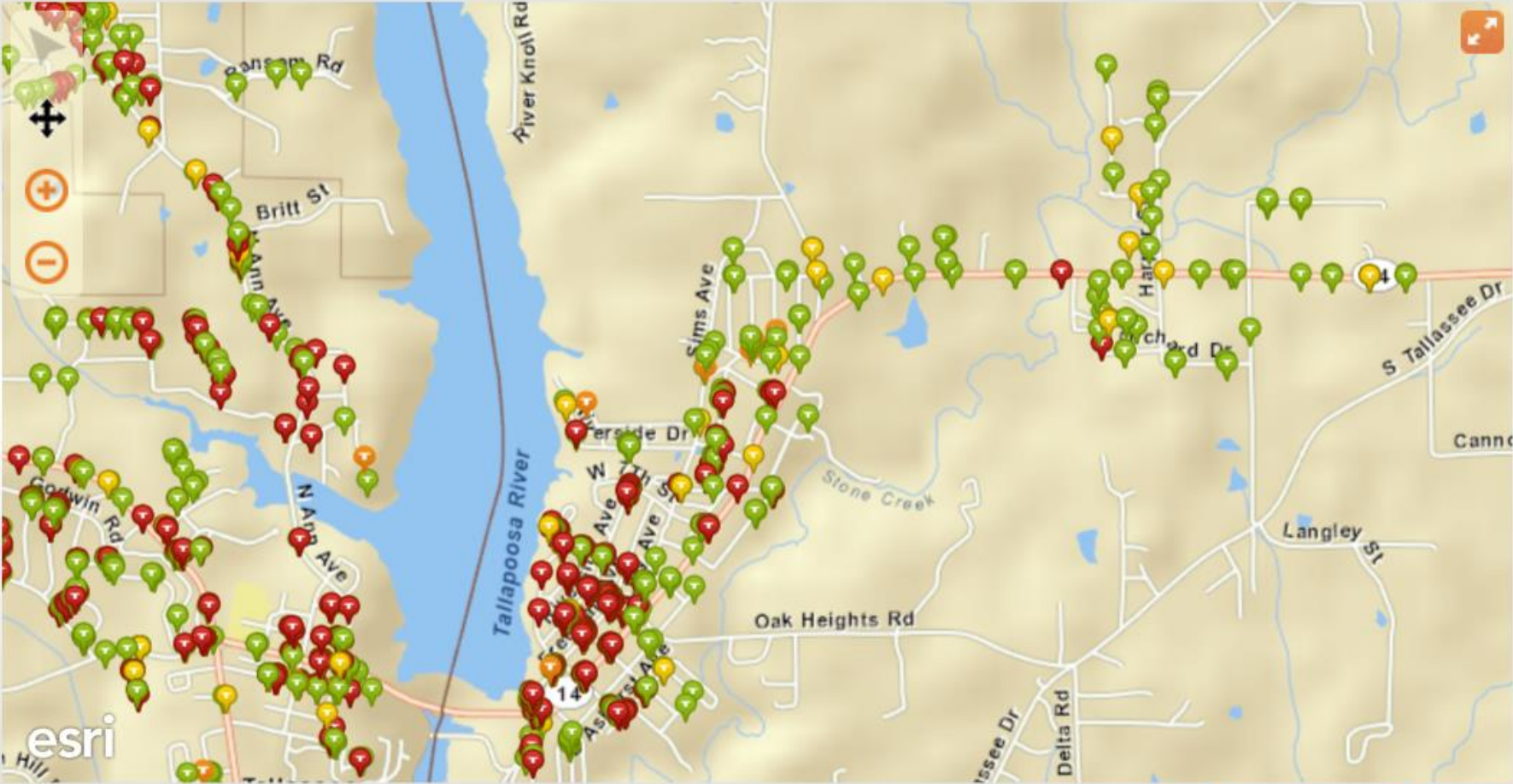
Now . . .

- 📶 **Mapping Easier to Manage**
 - Utilities can now download only their service area
 - WiFi map updates
 - Save Time & Money
- 📶 **Geocoding for Customers**
 - Not necessary to store coordinates in CIS
- 📶 **Modern Attractive User Interface**
 - Easier to use and understand

Now . . .

Routes **Meters (All)**  **Data Logging** **RF Test** **Unload** **Settings**

GPS Tracking Off Travel Center Bread Crumbs Layer **Map** ▾



esri

MIUs: 3675, Captured: 2423 (65%), Missed: 1252

Stop **Filter** **Help**

Advanced Metering Infrastructure

AMI



What is AMI?

- ① SCADA System
- ① View entire meter reading system from office
 - Meters/Radios
 - Data Collectors
 - Alarms & Events

Radio Frequency Propagation Studies – AMI Design



EDX® SignalPro® Legend

EDX® SignalPro®: Test Presentation R900

Boundary
Streets

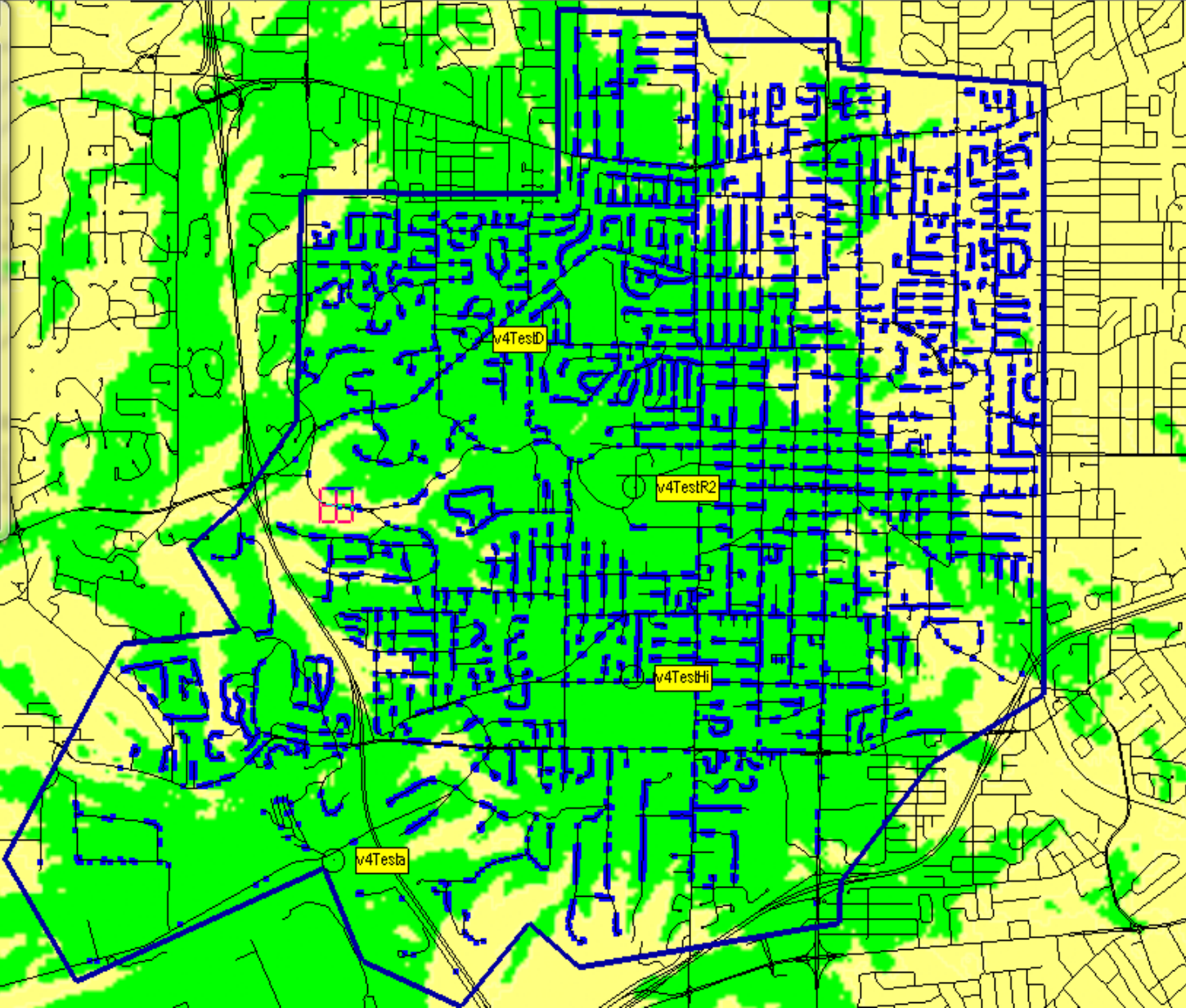
Measurement Data: Meters

Received Power at remote

Display threshold level: -110.0 dBmW
RX Antenna - Type: ISOTROPIC
Height: 4.0 ft AGL Gain: -12.15 dBd

Notes
template:140725_R900

FEET
-2500 0 2500



EDX® SignalPro® Legend

EDX® SignalPro®: Test Presentation R900

Boundary

Streets

Measurement Data: Meters

Received Power at remote

Display threshold level: -110.0 dBmW

RX Antenna - Type: ISOTROPIC

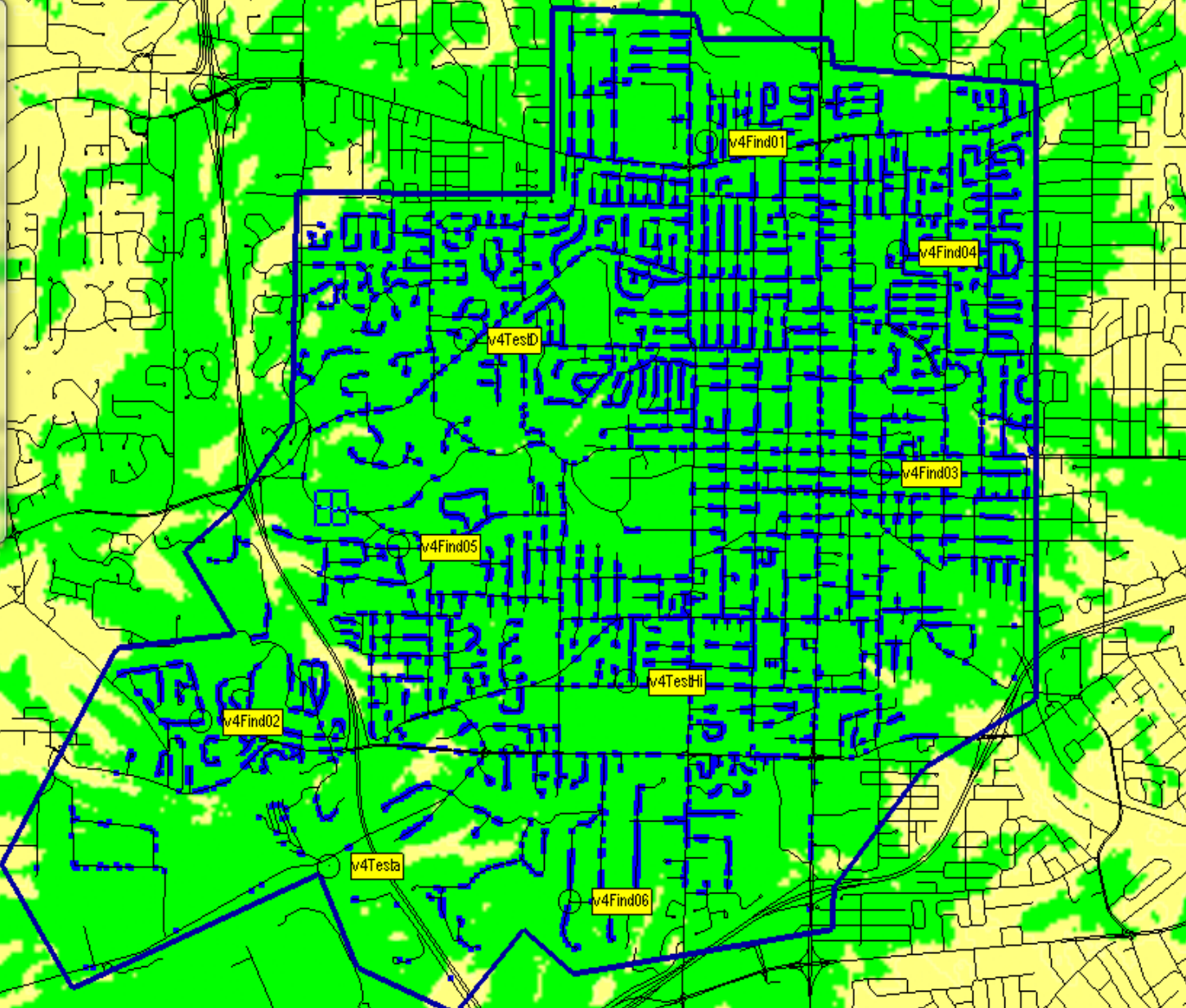
Height: 4.0 ft AGL Gain: -12.15 dBd

Notes

template:140725_R900

FEET

-2500 0 2500



EDX® SignalPro® Legend

EDX® SignalPro® : Kirkwood, MO R900v4 En

Boundary

Streets

Measurement Data: Meters

↑

↓

Meters

≥ -118.1 dBmW

Terrain elevations

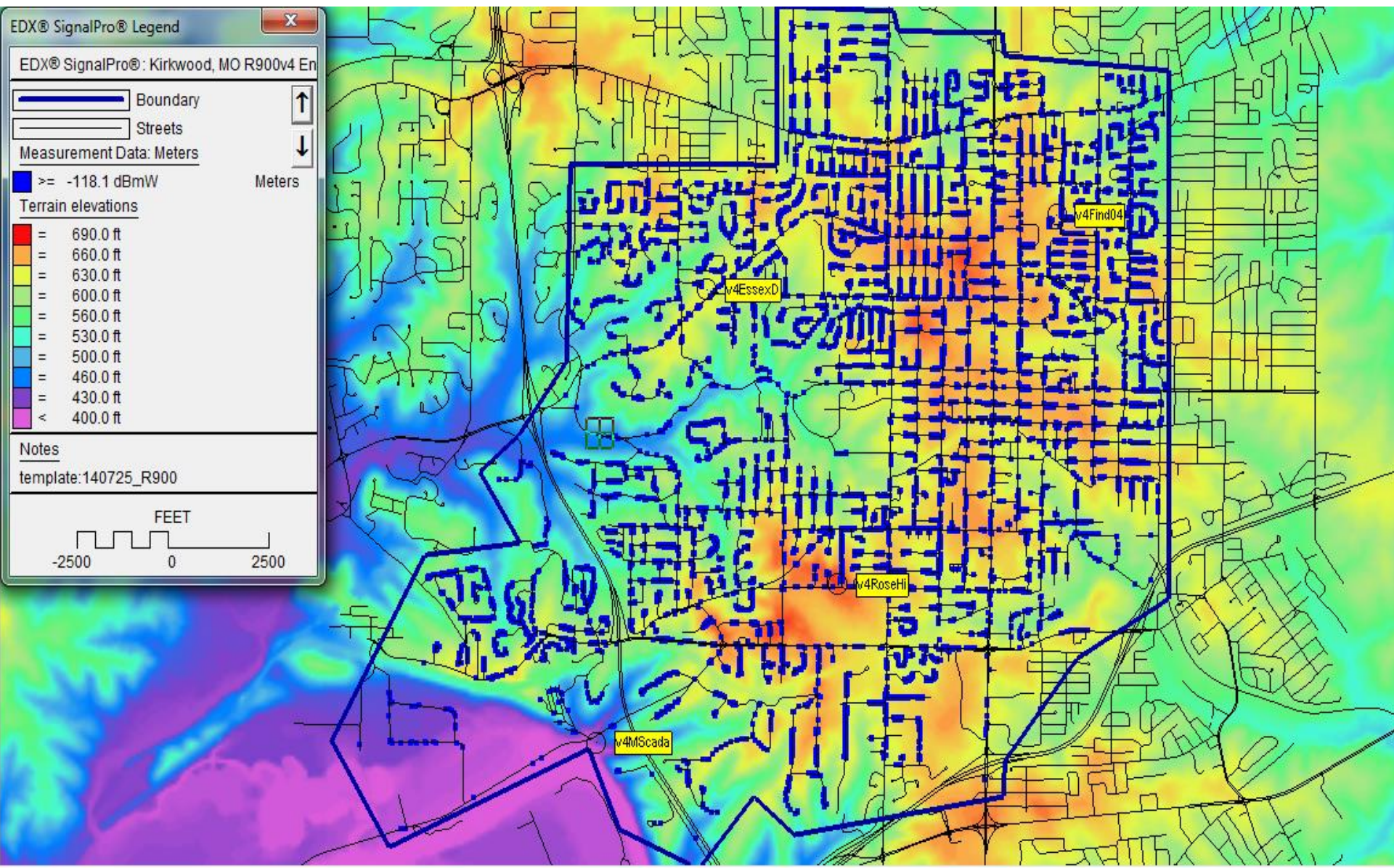
Red	=	690.0 ft
Orange	=	660.0 ft
Yellow	=	630.0 ft
Light Green	=	600.0 ft
Green	=	560.0 ft
Light Blue	=	530.0 ft
Blue	=	500.0 ft
Dark Blue	=	460.0 ft
Purple	=	430.0 ft
Dark Purple	<	400.0 ft

Notes

template:140725_R900

FEET

-2500 0 2500



Features

- View a variety of map layers across the service area
 - Configurable map
 - Search capability
 - Selection tool for easy grouping



Mapping Layers

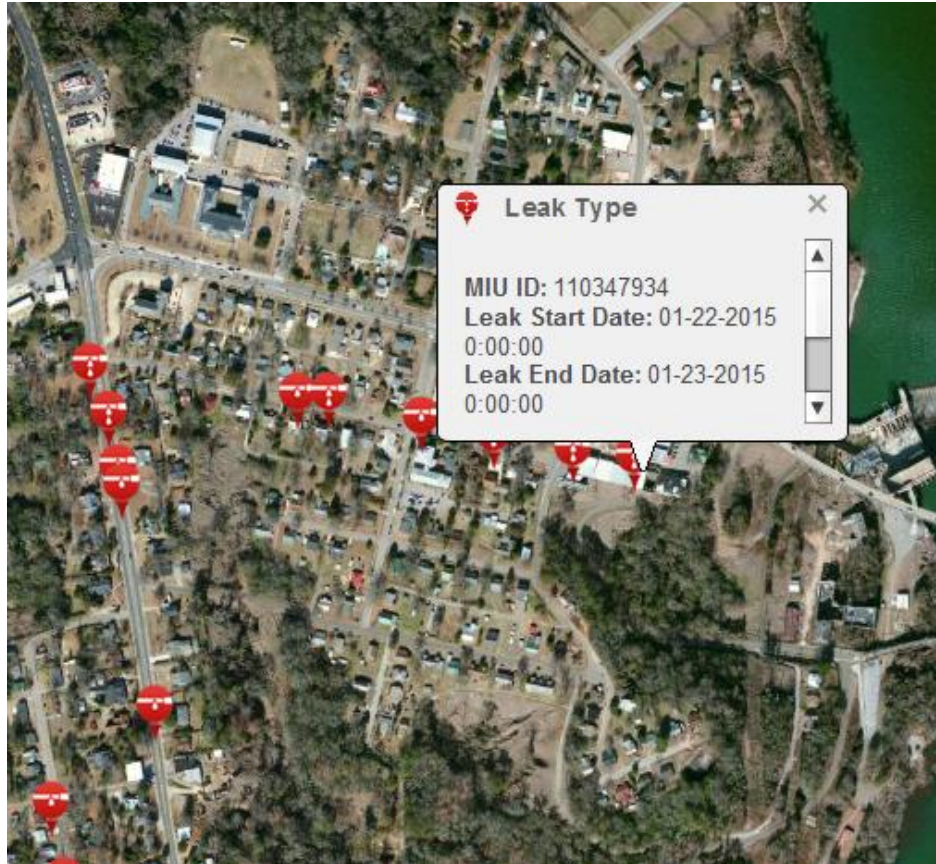
Typical map layers:

- Leak
- Leak Spy
- Reverse Flow
- Meter Status
- Latest Read
- Not Heard From
- Missed
- Zero Consumption
- Soft-Disconnect
- Inactive with Usage
- Collector Types
- Collector Status
- Collector Coverage
- All Endpoints



Improve Customer Service

Identify areas of concern



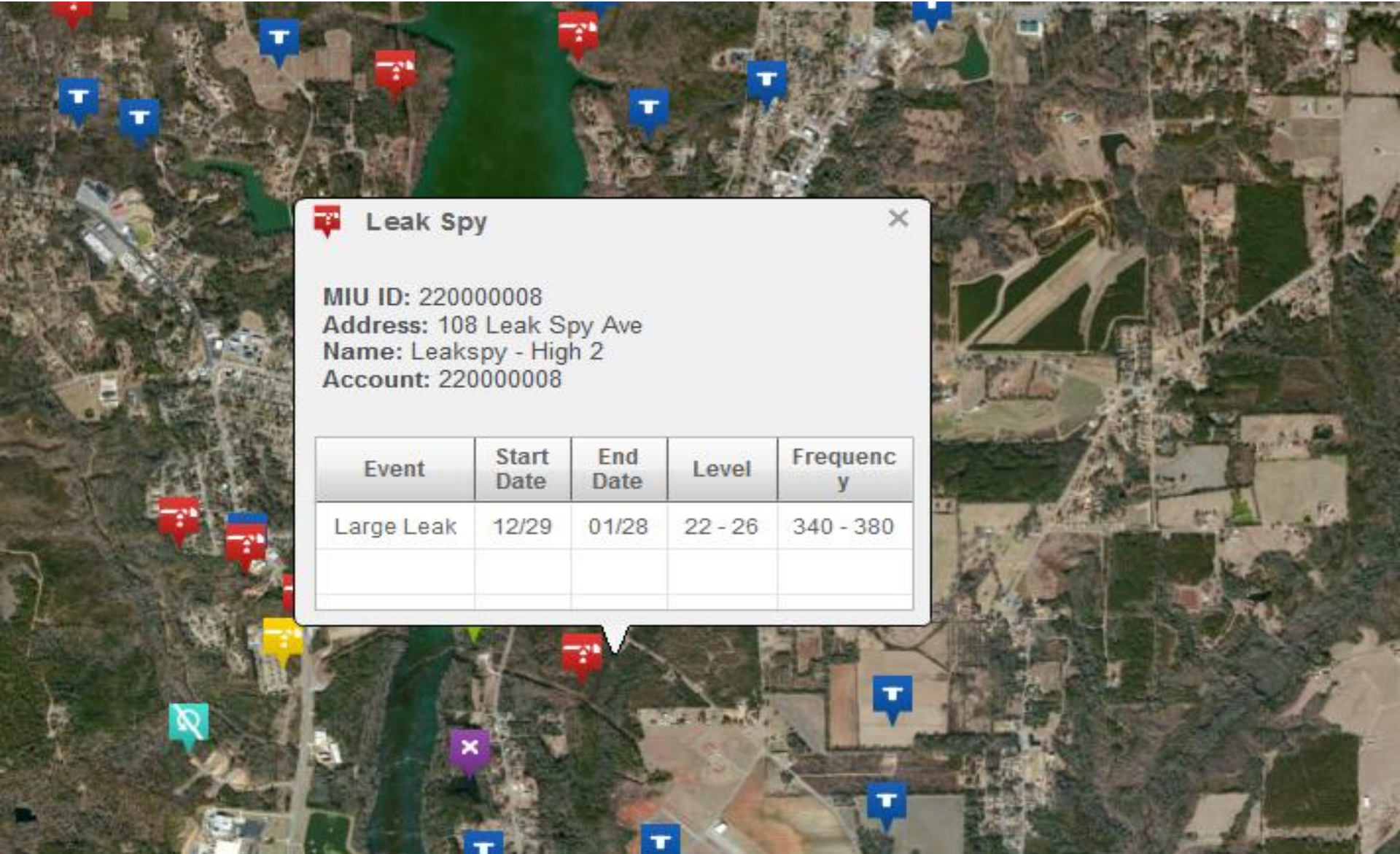
Continuous Leaks

Major Reverse Flows



Detect Non-Revenue Water

Monitor leaks with Leak Spy



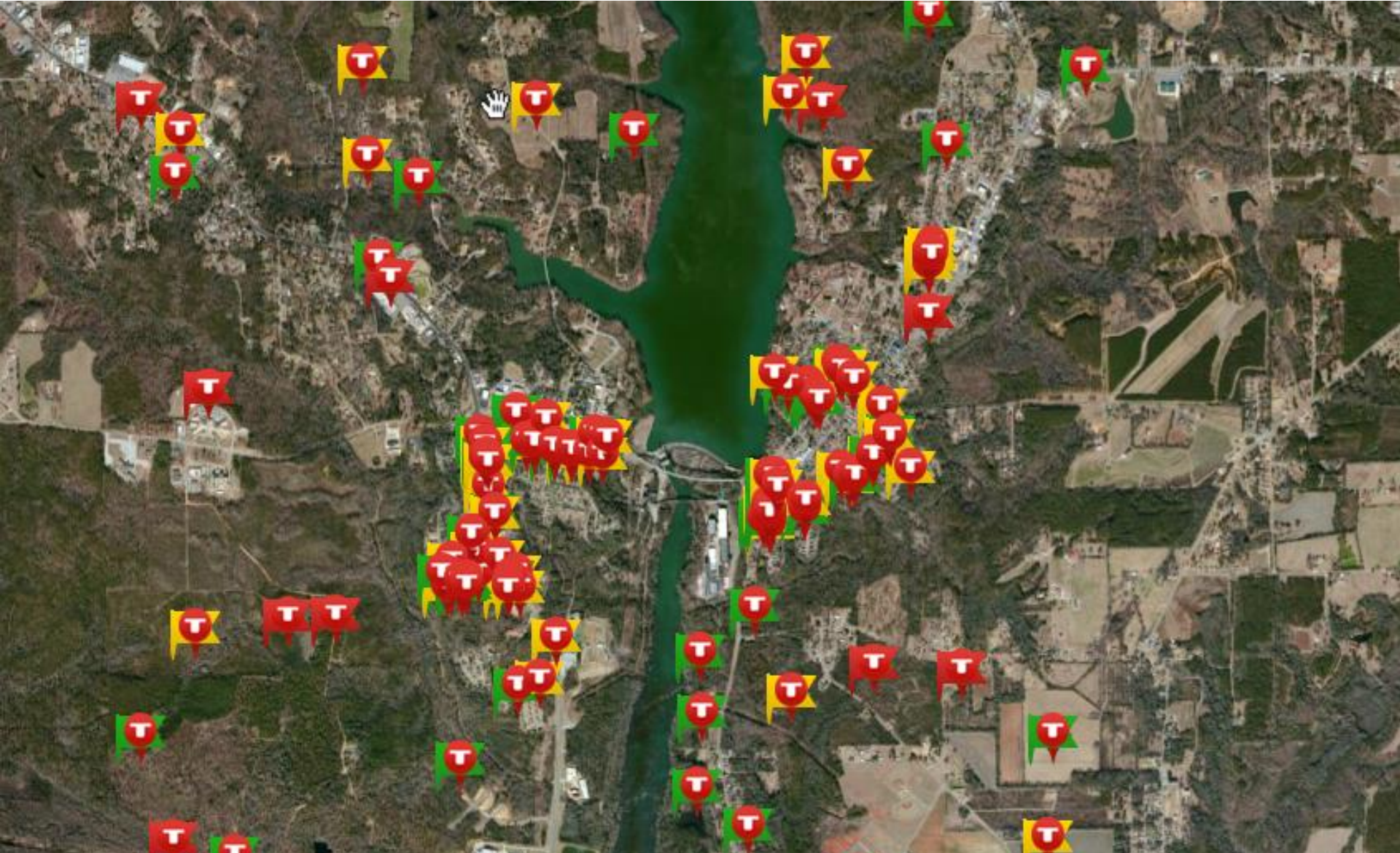
 Leak Spy ✕

MIU ID: 220000008
Address: 108 Leak Spy Ave
Name: Leakspy - High 2
Account: 220000008

Event	Start Date	End Date	Level	Frequency
Large Leak	12/29	01/28	22 - 26	340 - 380

Analyze System Performance

 Gaps in coverage? Add Collectors!



Aerial View

- 📶 Aerial view provides visibility of lot sizes, landscaping, homes with pools



Create Groups



Point Selection

Selection Type * Polygon

Selection Layer * Meter Status

Add to Selection
 Remove from Selection

Clear

17 item(s) found.

Type	Address	Name	IC
MIU	4085 Stratford Park	Joseph Comment	11033
MIU	1351 Old House Drive	John Lujan	11034
MIU	16 Minor Reverse Flow Dr.	Continuous Leak	11034
MIU	5489 Main St.	MB Junior High School	11034
MIU	468 Main St.	Bill Carroll	11034
MIU	111 Leak Spy Ave	Leakspy - High 5	22000
MIU	485 Leak Spy Ave	Leakspy - No Leak 11	22000

Neptune Map

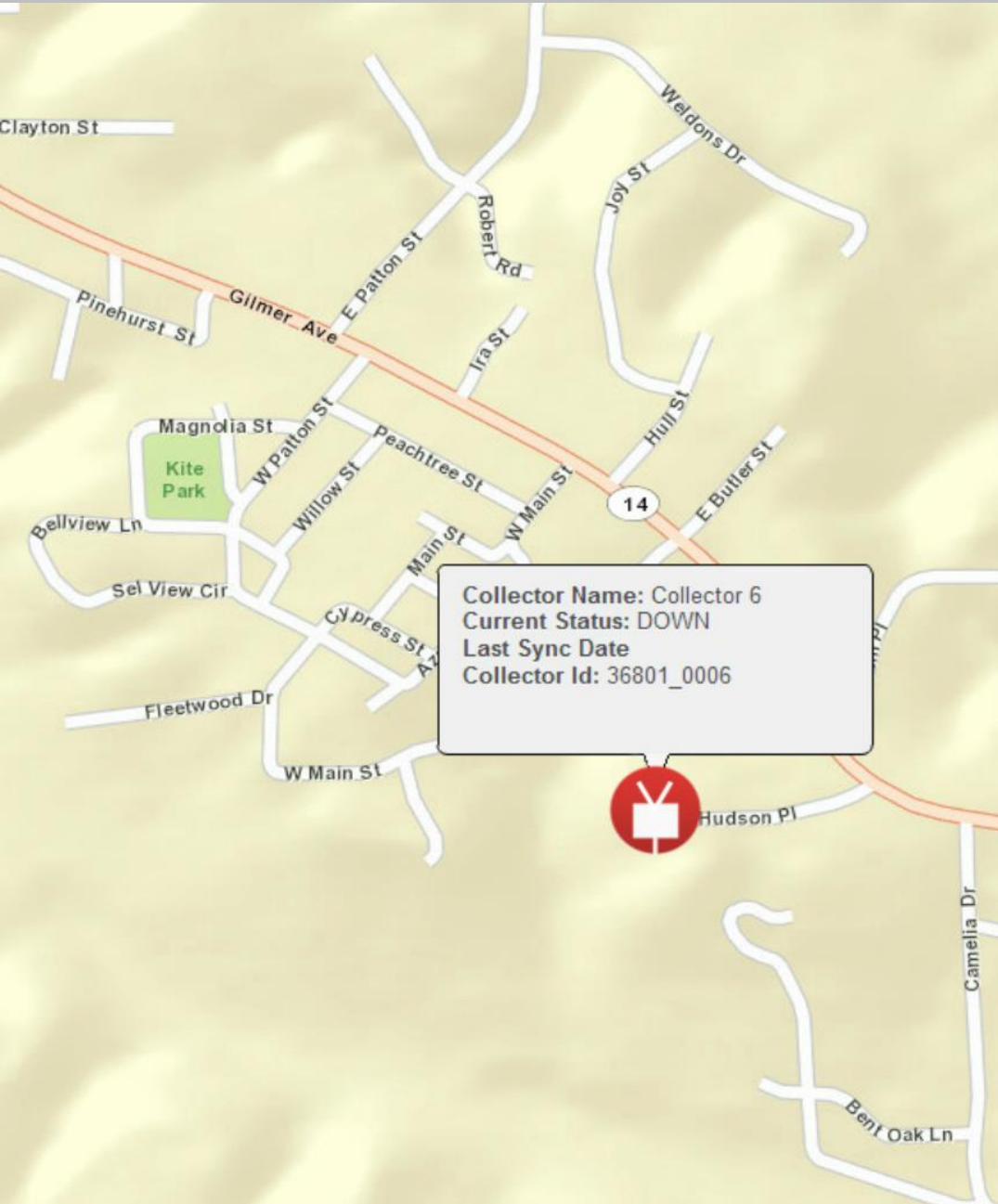
Active Layers

- Selection
- Search
- Meter Status

Status

Send to Groups **Cancel**

Collector Status/Work Order



Point Selection

Selection Type * Point

Selection Layer * Choose layer for selection

Add to Selection
 Remove from Selection

Clear

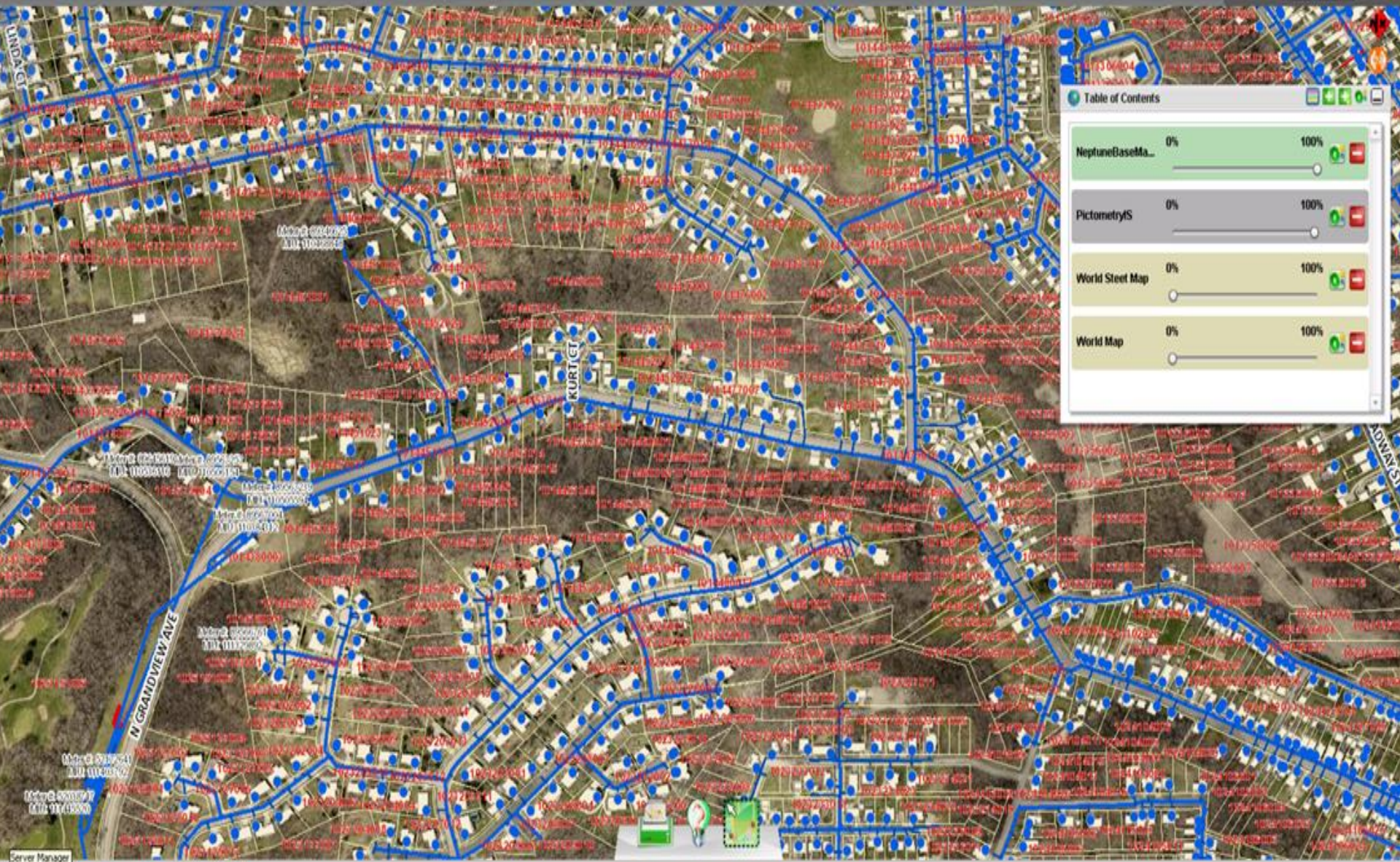
1 item(s) found.

Type	Address	Name	ID
COLLECTOR		Collector 2	36801_0002

Send to Customer Service | **Cancel**

- Send to Customer Service
- Send to Groups
- Send Work Order

Dubuque, IA



Data Integration Business Partners



IDModeling

SeDaRu





 pipes

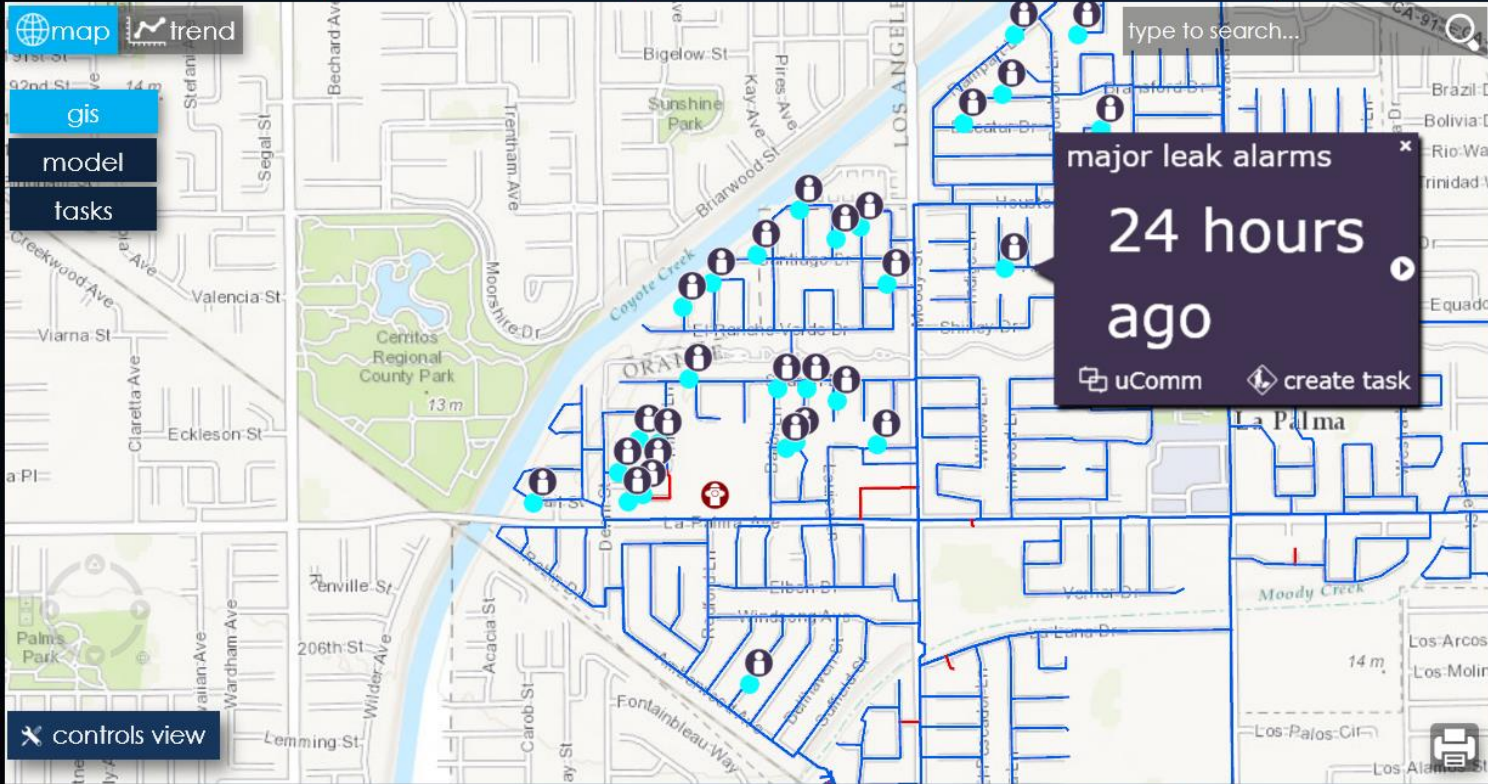
1
 flow tests this month

0
 valves operated today

50
 major leak alarms

 pumps

 tanks



50 major leak alarms

111153882
111162872
111162884
111170534
111175980
111177620
111223646
111162898
111177598
111153760
111153810
111154258
...
34 features

 customer service

 engineering

 management

 maintenance

 operations

old pipes in the system

open hydrant tasks - 40 days ago.

0

valves requiring high torque to operate

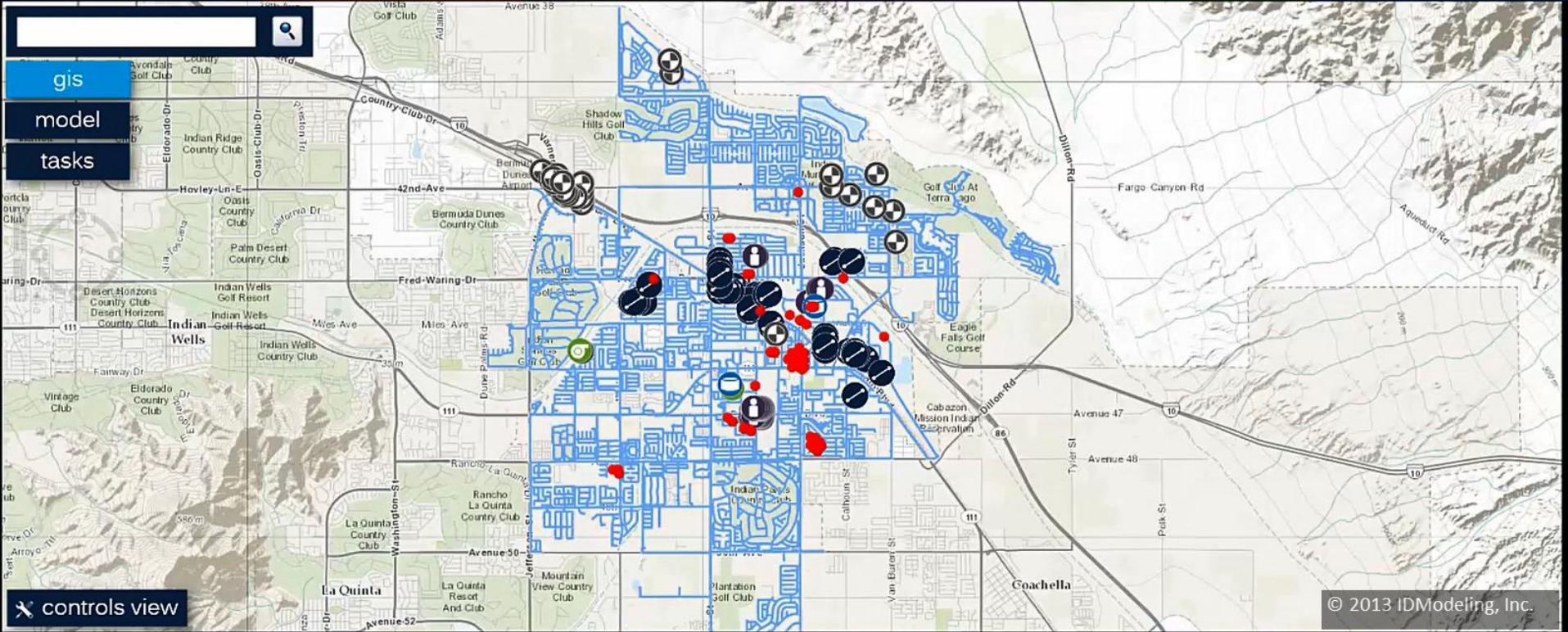
meters with skip codes - 48 days ago.

1

pump stations with total high flow rate

1

tanks with low water level



gis

model

tasks

controls view

management

engineering

operations

maintenance

customer service

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16

pipes

1

hydrants



valves

3

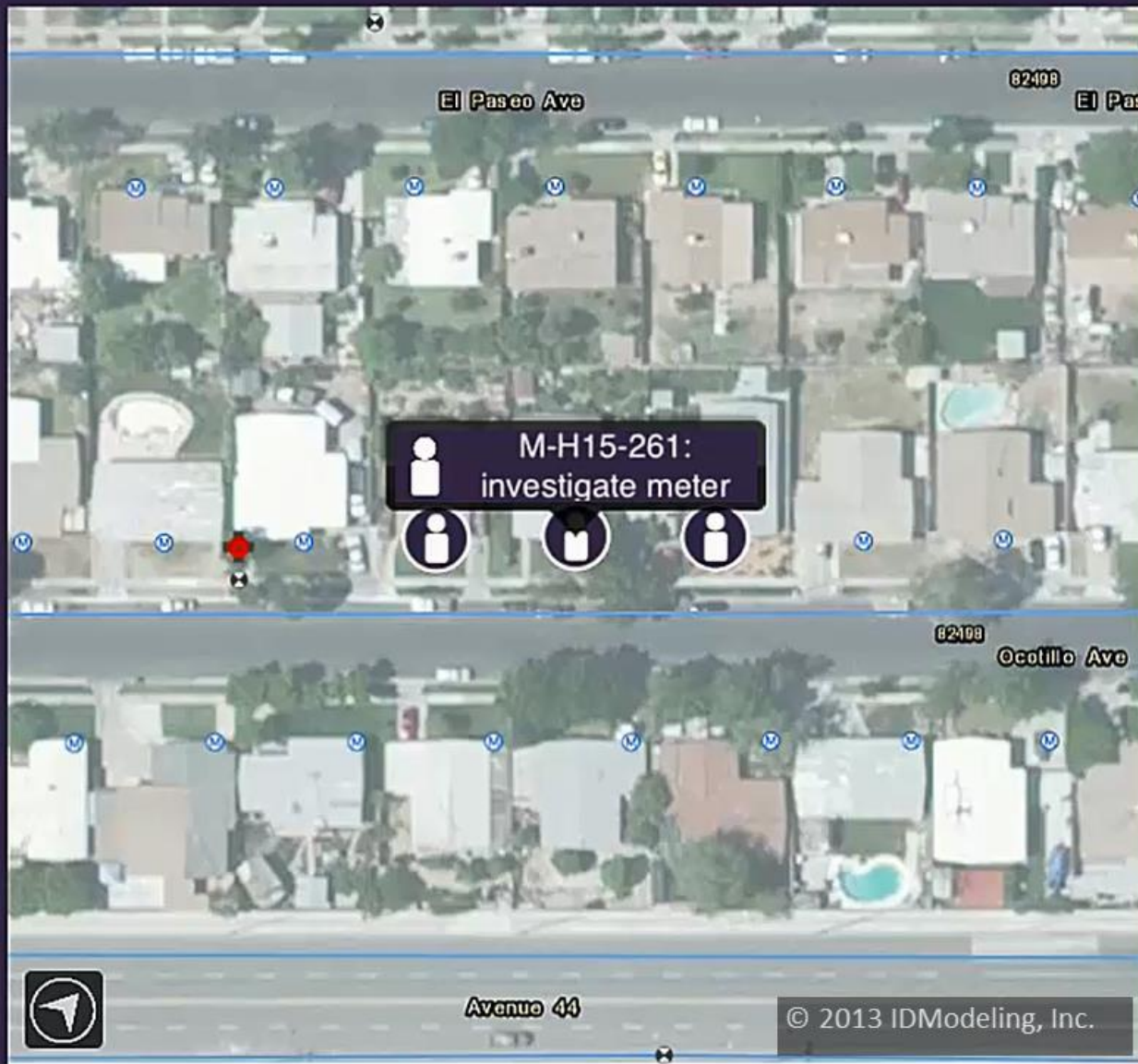
customers



pumps



tanks



M-H15-261

investigate meter

skip code

alarm

Zero Consumption

condition code

action taken

Meter Pulled

Disconnect Customer

date

08/14/2013

pic



comments

Customer pulled meter to bypass. Disconnected.

Cancel

Kevin K.

Done

iWater infraMAP



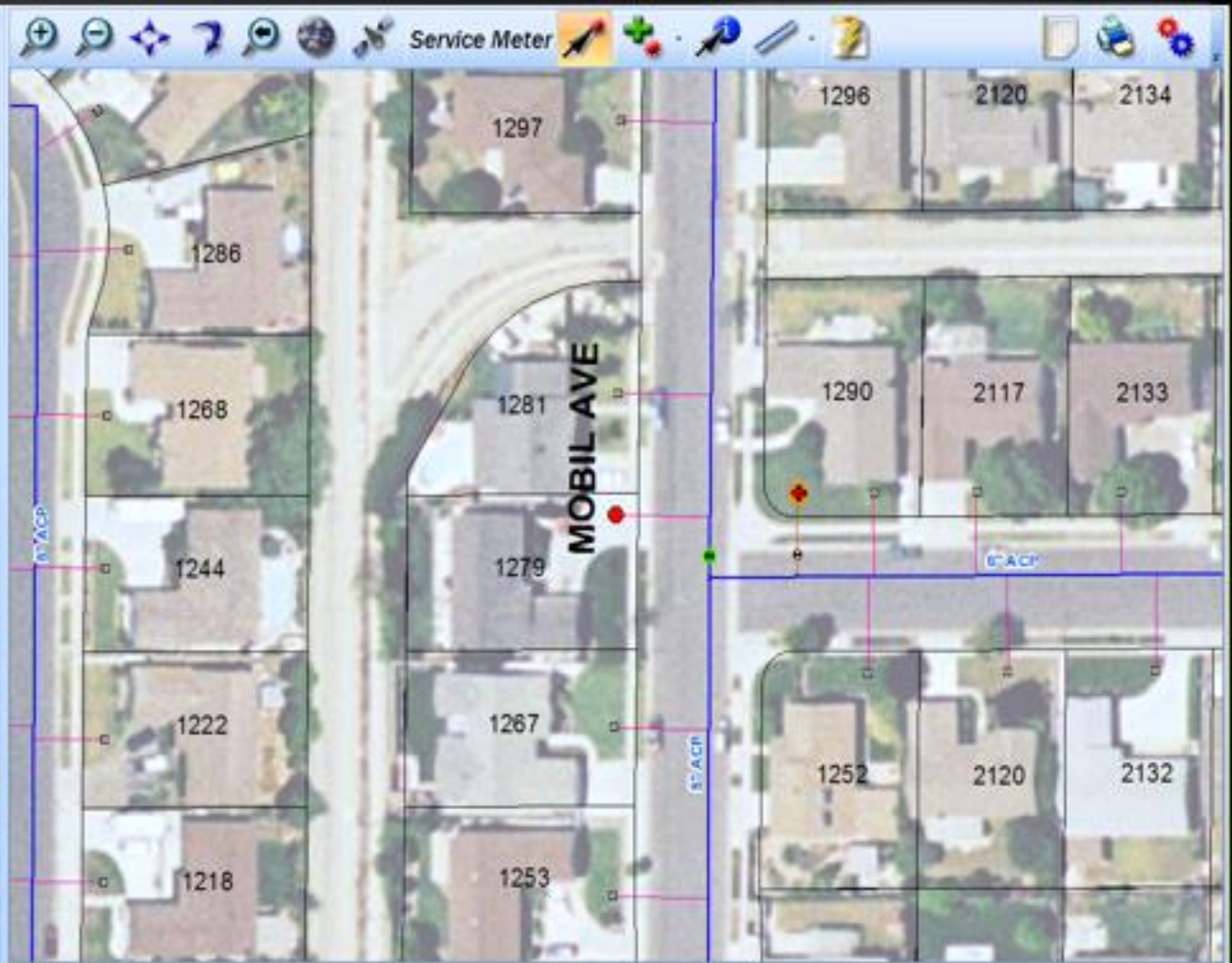
Neptune Dashboard

Show Current View Counts

Meter Service Ops

Create Report

- (2,484) Meters < 15 Yrs Old
- (803) Total Large Meters
- (0) Meters in a Date Range
- (11,792) Total Small Meters
- (7) Tamper Alarms
- (9,622) Needs Changeout
- (1) Backflow Alarms**
- (0) Meters done this Cycle
- (0) Meters done Today
- (10) AMI Collector



Hello ahagee | Sign Out

ServiceMeter

Meter Changeout Set

Date	Description

Save Cancel

[Map](#)

Inspection

Status	Meter ID	Route Number
OK	611-229	1
Type	Customer Name	Account Number
Domestic	JENSEN JOHN-CHRISTIE	657892
Diameter	Read Status	Critical Customer
3/4"	OK	
Manufacturer	Backflow Device	Meter Picture
Neptune	No	
Radio Number	Old Serial #	Serial Number
4567234		

ServiceMeter

Business Analytics and Intelligence

BA/BI



State of the Industry

- 🌀 ***We are surrounded by data, but starved for insights!***
- 🌀 Report Centric BA
 - What is Happening? (current)
- 🌀 Analysis Centric BA
 - Why is it happening? (future)

Meter Reads/Data

- ③ 30,000-point water utility/100,000 population
- ③ 1 read per month/30,000 records per month
- ③ 1 read per hour/**262,800,000 records per year**

Dashboards

Currency = USD

- US\$
- £
- €
- A\$



YTD Revenue

\$419M



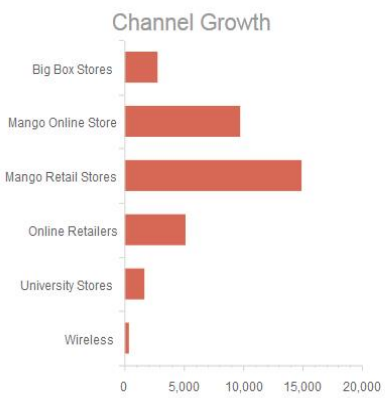
YOY Growth

12.7%



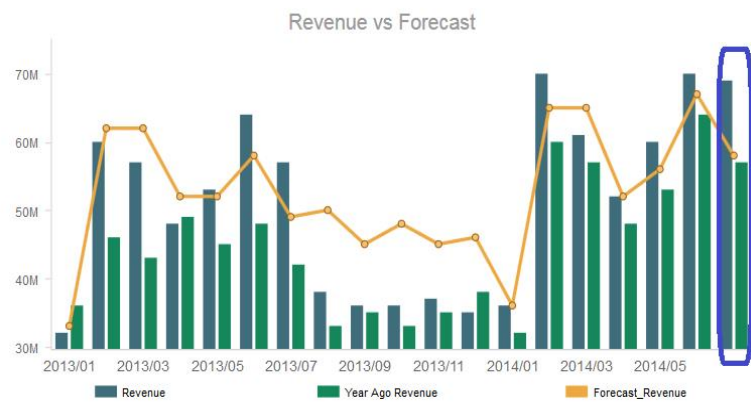
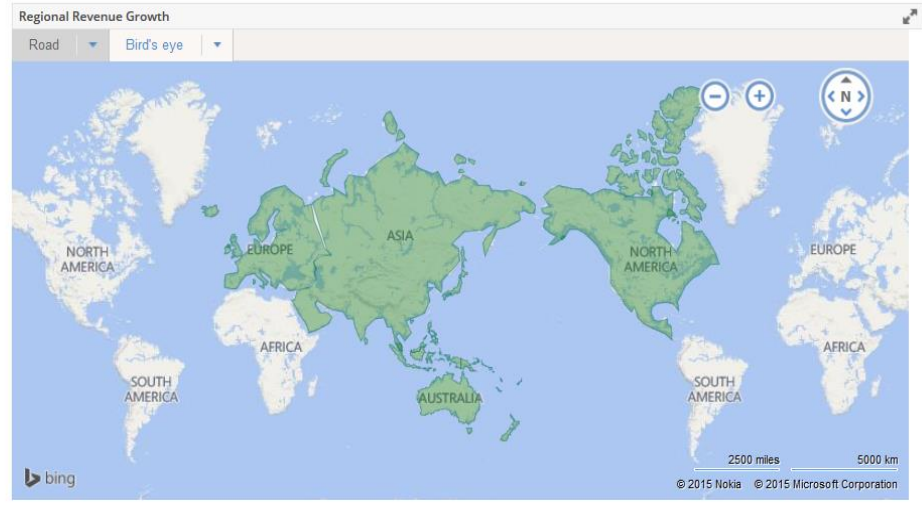
Pct of Forecast

105%



Time Analysis

Time Analysis	Revenue
Last 30 Days	\$13,184K
Previous Month	\$70,108K
Previous Year QTD	\$56,785K
Current MTD	\$69,470K
Current QTD	\$69,470K
Current YTD	\$418,673K
Previous Quarter	\$182,434K
Previous Year	\$553,754K
Previous YTD	\$371,331K



Drill Down/Performance

Year = 2014 Product Category = Mobile Phones Retail Region = Asia Pacific Retailer Country = Australia Currency = USD

Year

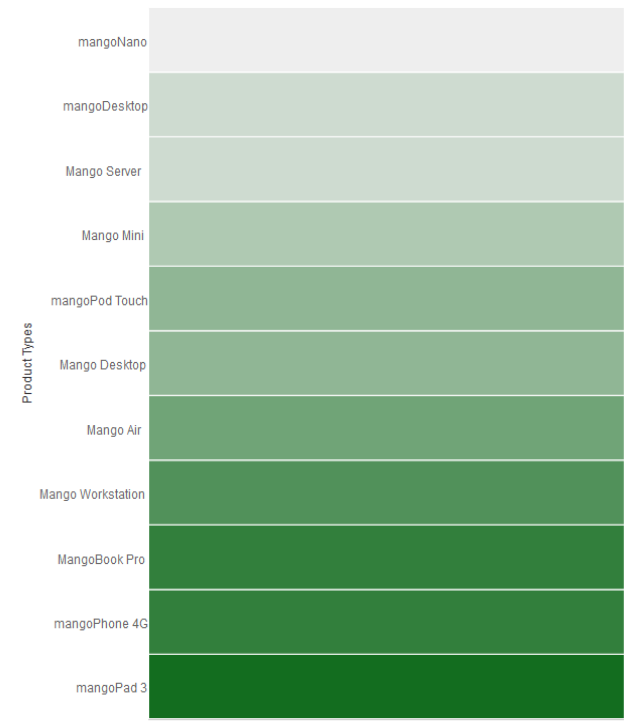
- All
- 2014
- 2013
- 2012
- 2011

Product Category

- All
- Desktops
- Mobile Phones
- MP3 Players
- Notebooks
- Tablets

Retailer Country

- All
- Australia
- China
- Hong Kong
- Japan



Mango Retail Stores

That's It!

- 📶 Questions?
- 📶 Comments?

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