HYDROMAX USA

Advanced Water, Wastewater and Gas Data Collection

Leaks can be detected from space

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UTILIS

Leaks can be detected from space

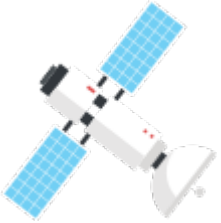
water

Water Infrastructure Asset Management

Satellite Based Leak Detection

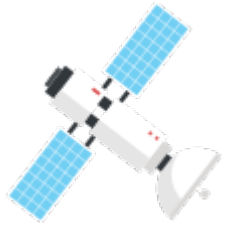
Hydromax USA and Utilis LTD come together to bring water utilities proven satellite scanning technology to accurately find leaks within their water infrastructure.

Using the same satellite technology to look for water on other planets, Hydromax clients will now have the capability to locate network water loss over thousands of square kilometers — all through aerial scans from space. This solution can accurately pinpoint leaks within a 6 meter radius, saving significant labor costs associated with finding leaks using today's current leak detection technology.



This technology uses multispectral aerial imaging – taken from satellite-mounted sensors – to spot leakage in underground distribution and transmission pipes. The raw imagery is processed by algorithms looking for a particular spectral "signature" typical to drinking water. After calculating and adjusting any distorting factors, the information is integrated to Hydromax USA's client GIS water network models and project management dashboards. The system generates locations of water leaks which can be integrated by Hydromax into existing CMMS models or can be presented in a mobile web application displaying the leak location and size within the clients existing GIS. Hydromax USA can provide technical support to the utility's teams for final correlation or perform the correlation on the leaks identified. The result? Leaks are found without the time and manpower of system-wide field based acoustic surveys.

…AND OUR PARTNER, UTILIS LTD
THE LEADER IN WATER LEAK DETECTION SATELLITE TECHNOLOGY



UTILIS SOLUTION is a cost-effective method for detecting fresh-water leaks in urban water supply systems, utilizing a patented, one-of-its-kind remote-sensing technology providing leakage locations with pinpoint accuracy, regardless of material or demographic density.

UTILIS EXPERTS in geophysics, hydrology and water network management, have managed numerous projects across the globe, including in the U.S., South America, Australia, the EU and Israel, and has yielded highly-successful, proven results.

Since its inception, Utilis has conducted vast research, gaining expertise in analysis of urban water networks that through a unique set of micro-parameters provide a remarkably accurate solution.

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The Problem Addressed – NRW

- Huge amounts of water and millions of dollars are lost
- Significant resources are invested to reduce NRW (people, technology, money)

- Current leak detection solutions:
  - Acoustic Audit: Annual (multi-year) system-wide approach
    - Inherently inefficient – survey segment by segment
    - Dependent upon the “ear” of the technician
    - Frequency missed “new” leaks

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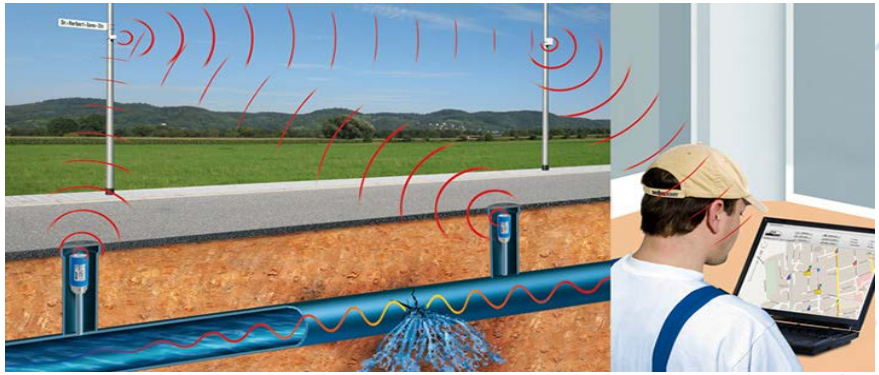
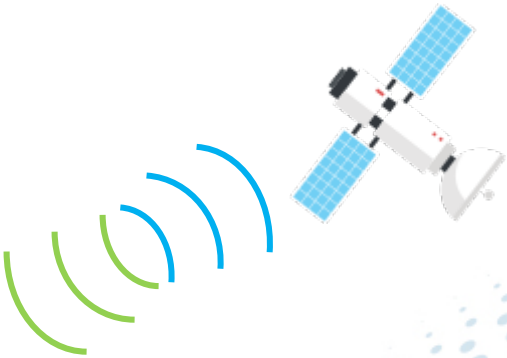
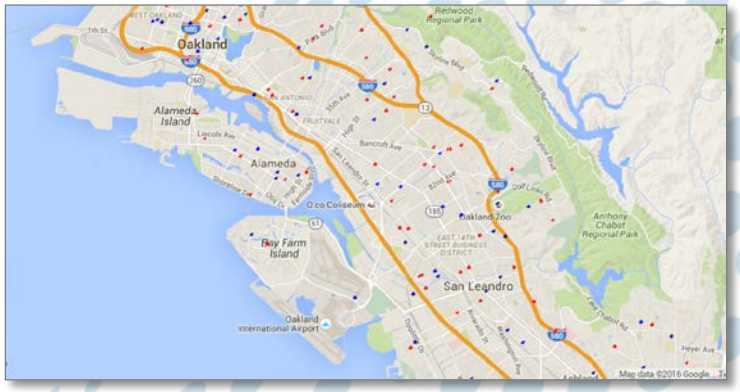
    - Frequency missed “new” leaks
  - Loggers: fixed network or lift-and-shift
    - Expensive hardware deployed ~500 feet
    - Limited battery life requires reinvestment



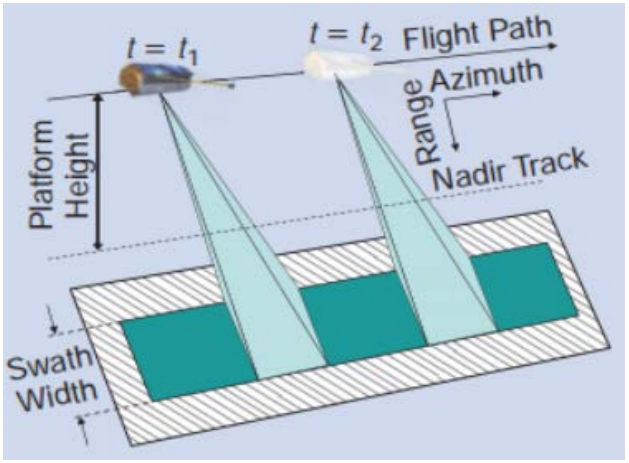
Imagine for a minute…

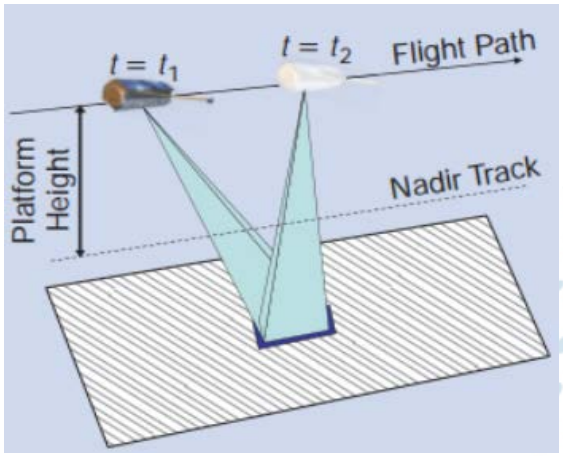


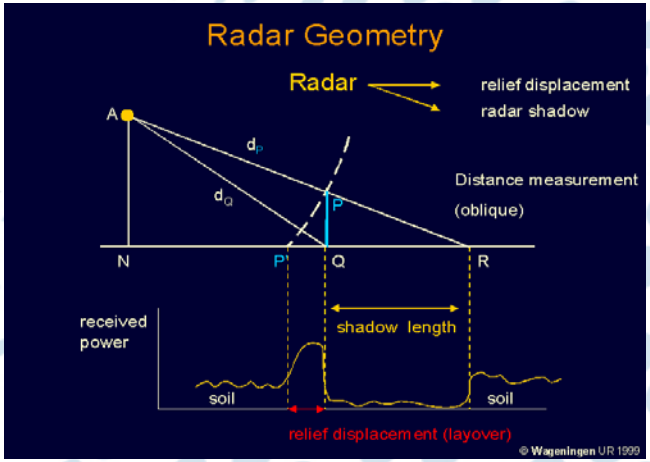


Densely urbanized and tall buildings

- Minimum off-nadir angle:
  - spot-light (3x1) mode 7.3
  - high sensitive (6x3) mode 17.5
- Observation Direction: L/R

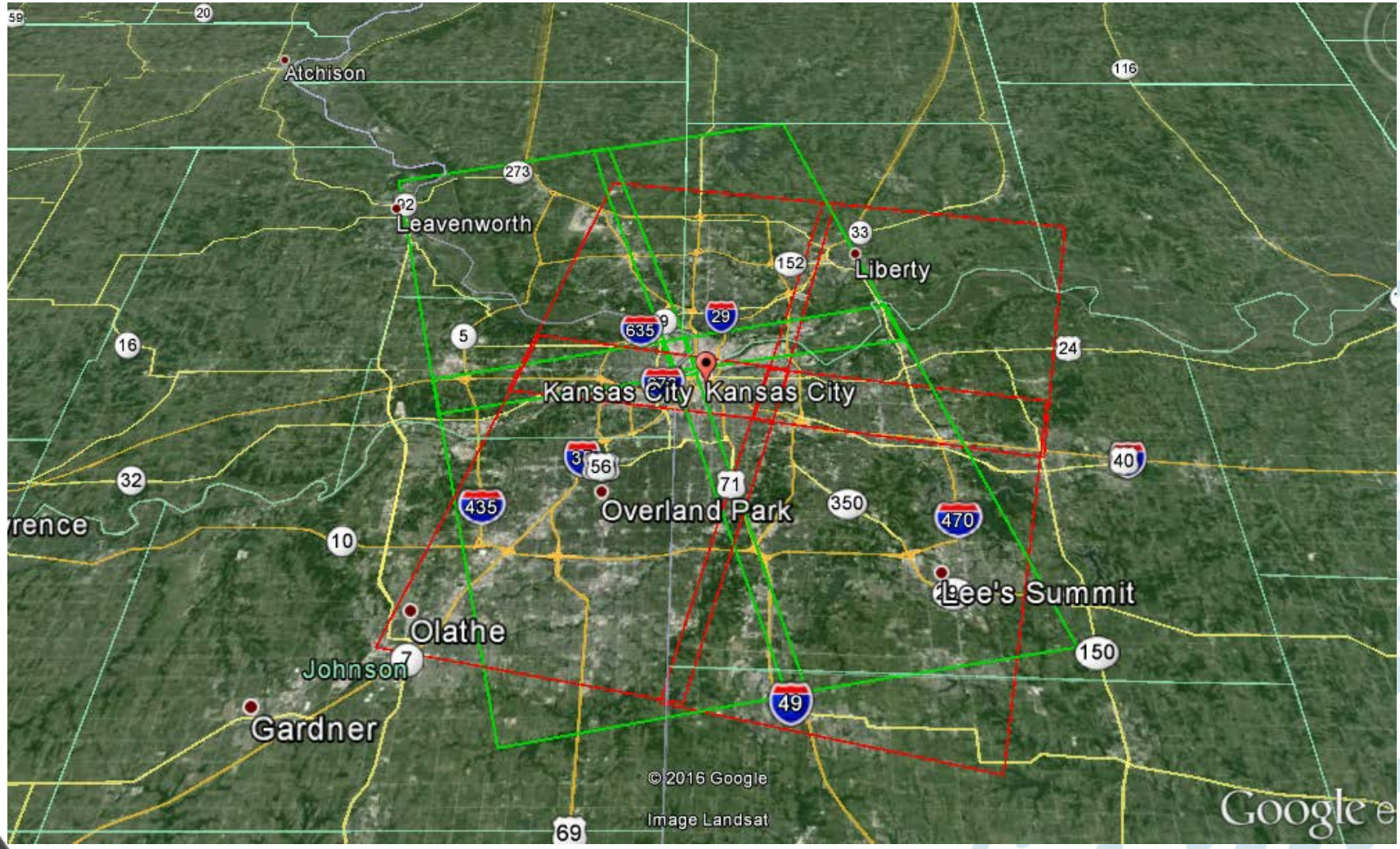






Satellite Coverage

Example



Satellite Coverage

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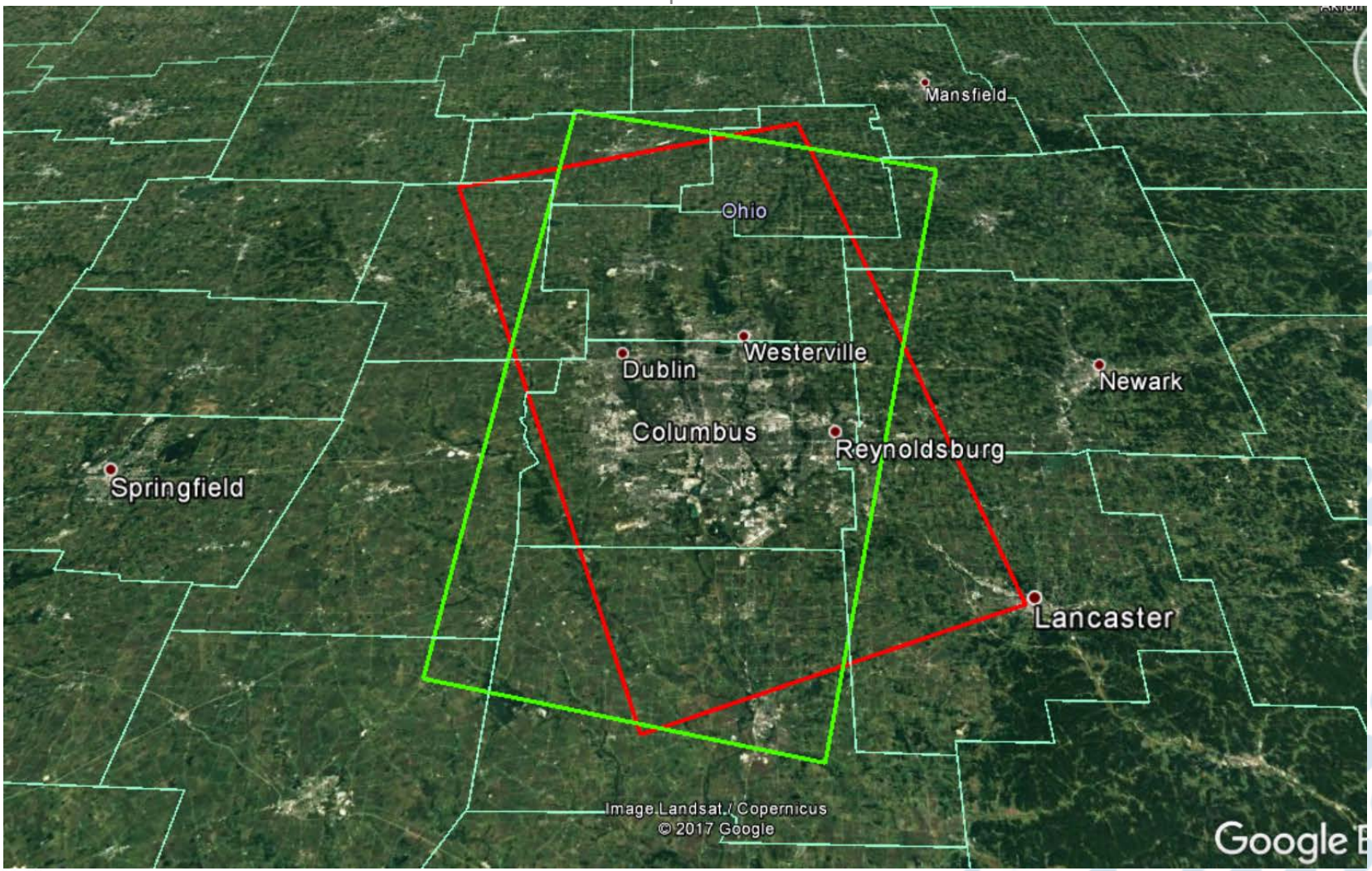
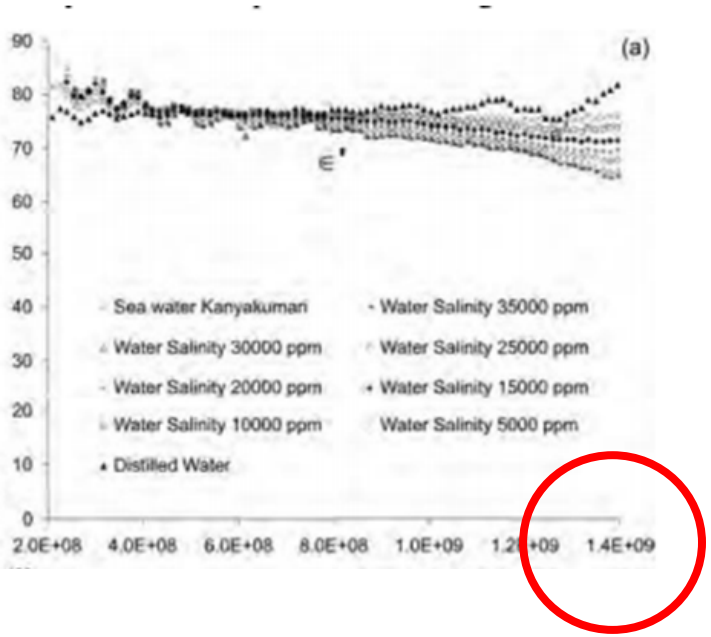
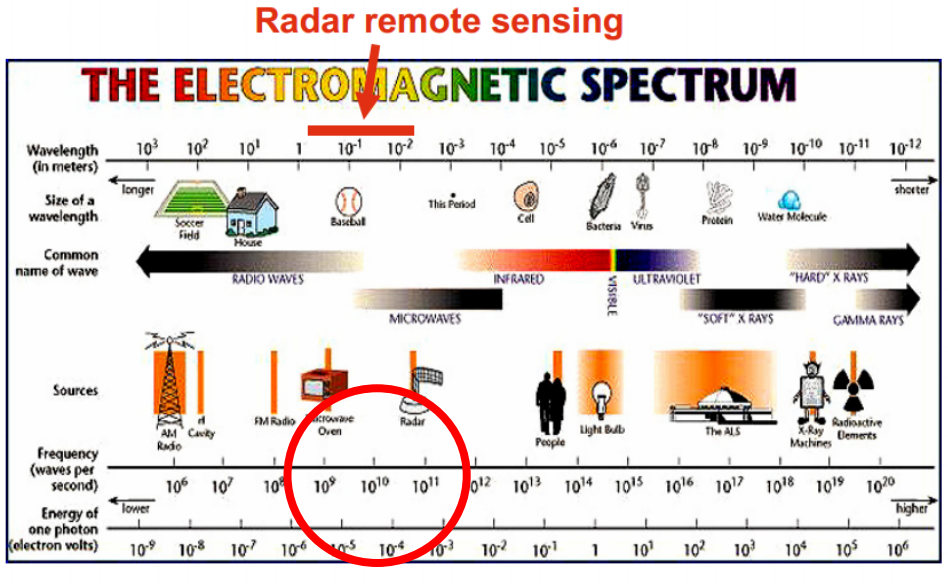


The Secret Sauce

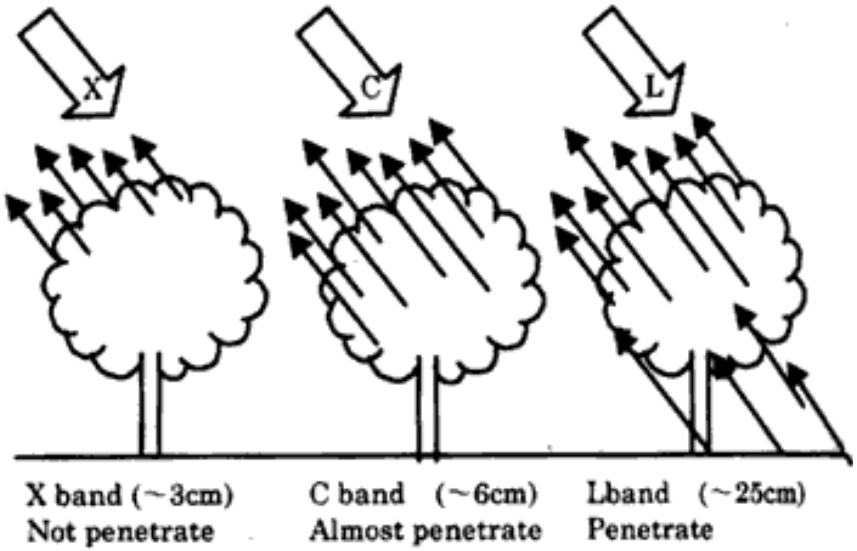
- Geo-referencing
- “Noise” cleaning
- Filtering
- Dielectric constant – chemical signature

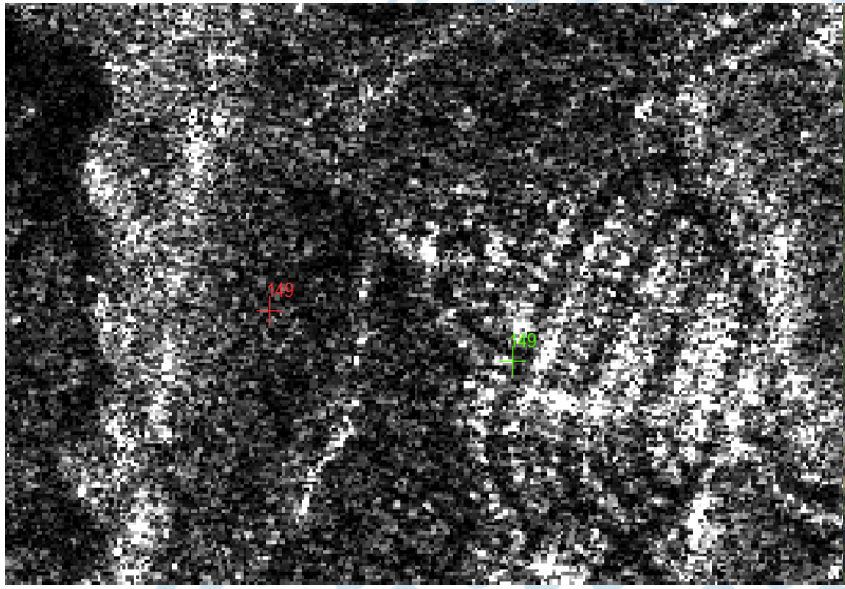




SAR

- The images depict the same location at a point in time, however when viewed through SAR the clouds suddenly disappear.
- The left diagram demonstrates the different penetration of different wavelength. The X band does not penetrate the tree tops. The C band is improved but still is affected. The L Band penetrates everything.





Solution Technology

- Advantages of remote sensing (L-band, 1.3 GHz)
  - All weather capability
  - Day and night operation
  - Sensitivity to dielectric properties
  - Sensitivity to man made objects
  - Subsurface penetration

- Dr. Thuy Le Toan
  Co-Chair of BIOMASS Mission Advisory Group
  Centre d'Etudes Spatiales de la BIOsphère (CESBIO)

How We Do It?

1

Satellite Spectral Image Acquisition

Raw images of the area taken by a SAR operating in the L-band are acquired.

2

Radiometric Corrections

Utilis takes the raw data and prepares it for analysis, by filtering bounces from buildings and other manmade objects, vegetation hydrologic objects, and more.

3

Algorithmic Analysis

Using Utilis advanced algorithmic analysis to track the spectral "signature" of drinking water in the ground.

4

Web based app and intuitive UI

Leaks are displayed in user friendly GIS reports, with 6 meter radius accuracy.

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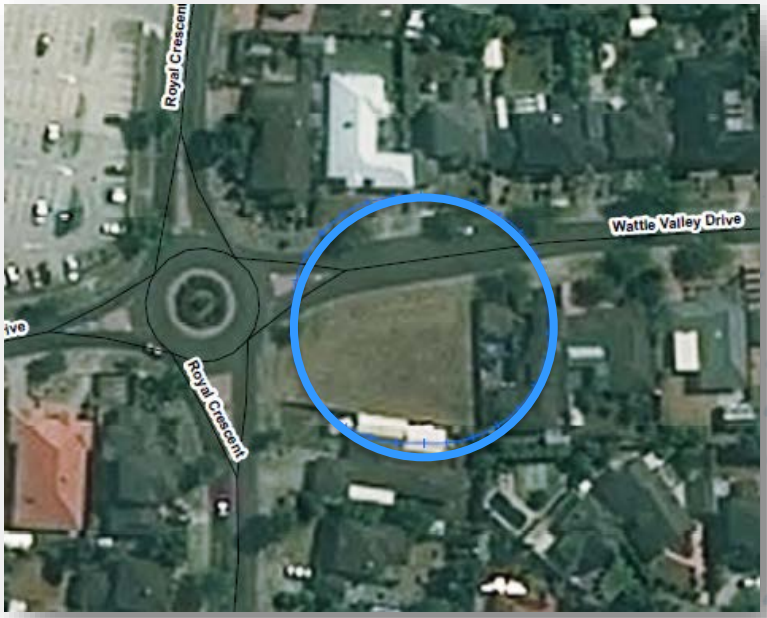
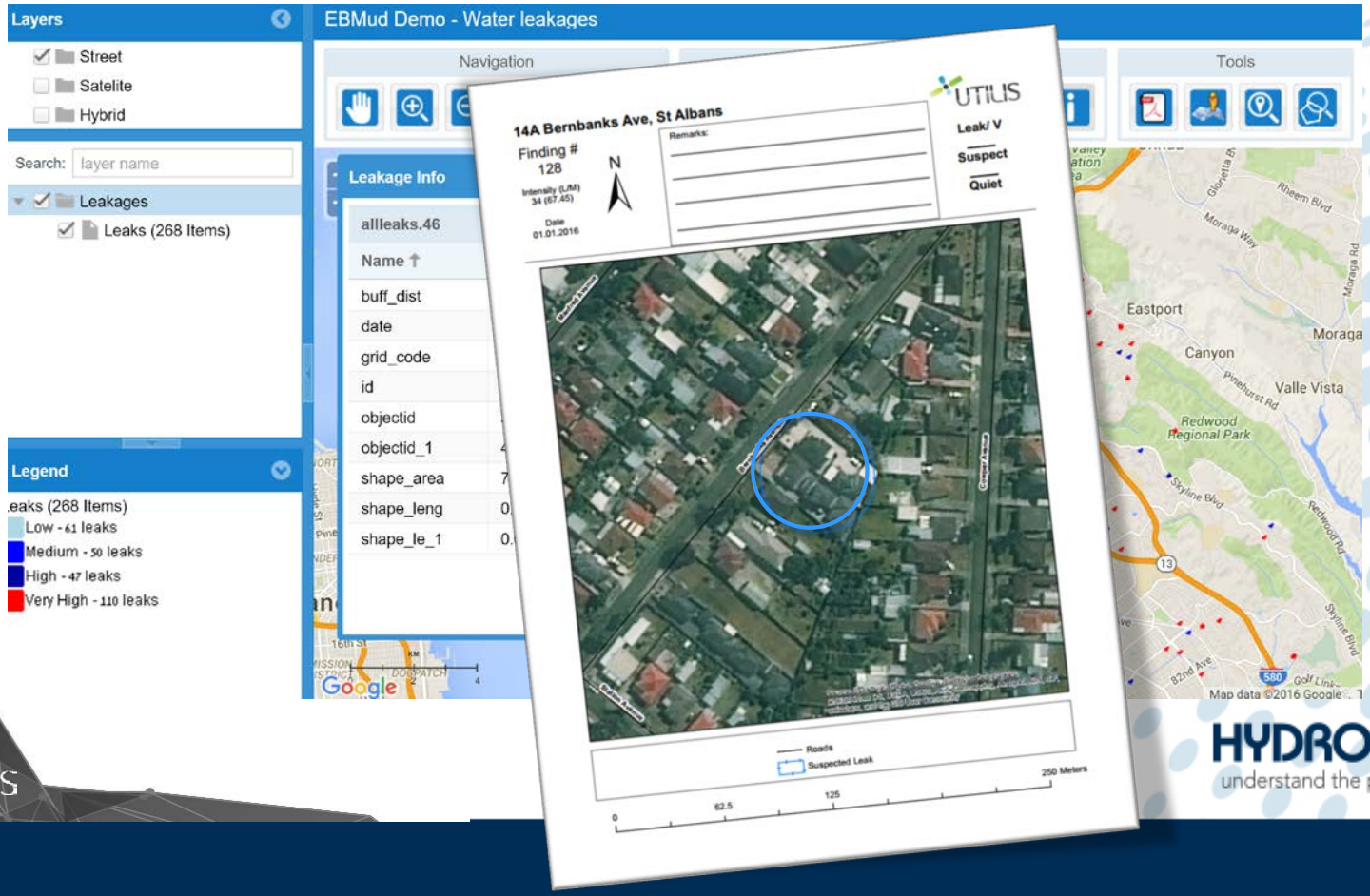
Accuracy and Precision

- We currently use images with pixel size of 6x3 meters. Available also 3x1 meters, will be tested soon
- Findings delivered within a 1-100 meter radius buffer. From the pilots conducted, all leaks found exactly on the address or across the street or one house away
- Due to the high confidence in the location precision, the confirmation process of whether a finding is a leak or not takes 5 minutes on non-plastic pipes.
- Improved accuracy with ongoing surveys refining each clients unique “spectral fingerprint”.

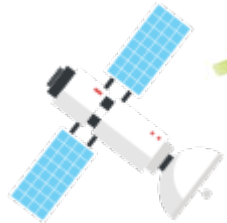


Web Based UI

- The algorithms output is intersected with local infrastructures (e.g. pipe layers).
- This normalized and corrected data is presented graphically over Google Maps.
- Additional information such as leak size is available.
- Alternatively, the report can be delivered in ESRI compatible format.



Delivery Model



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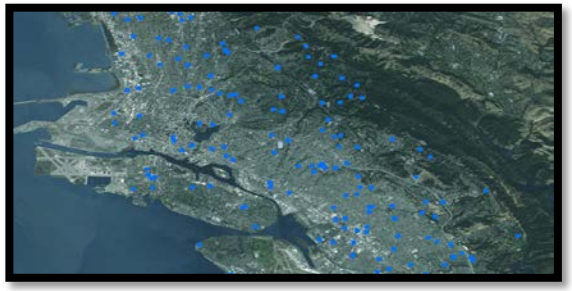
Spectral Analysis



Mapping Integration

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Client Information Management Systems

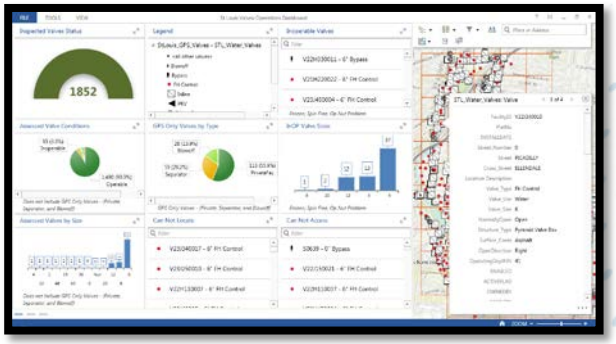
esri

INFOR

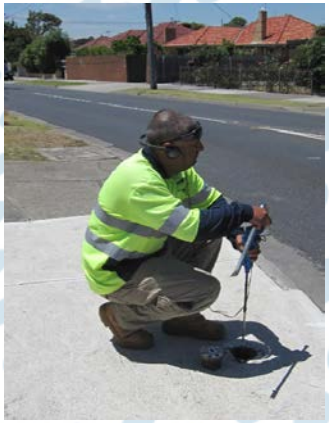
Cityworks®

maximo®

HUSA Infrastructure Dashboard



Field Correlation



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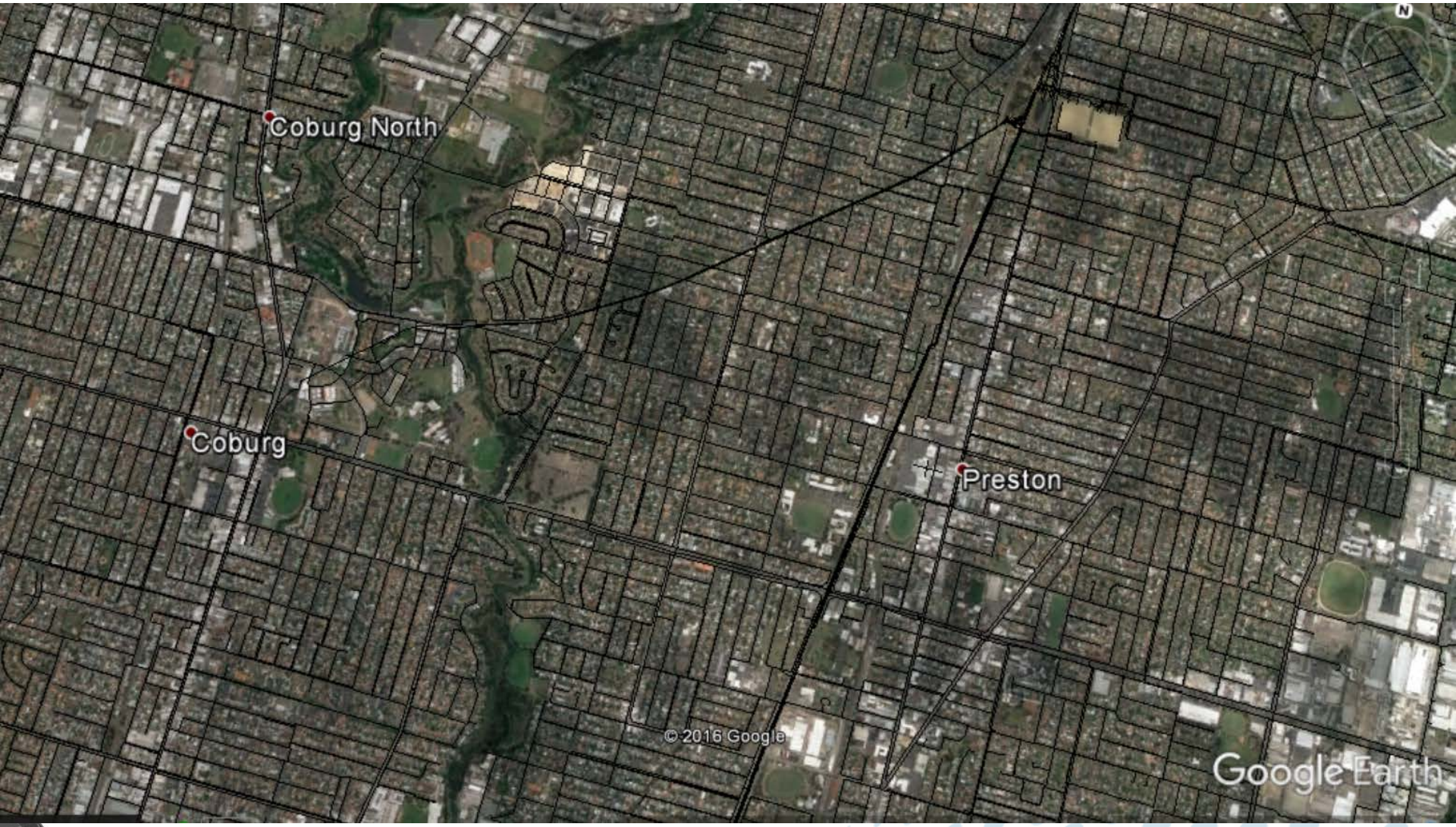
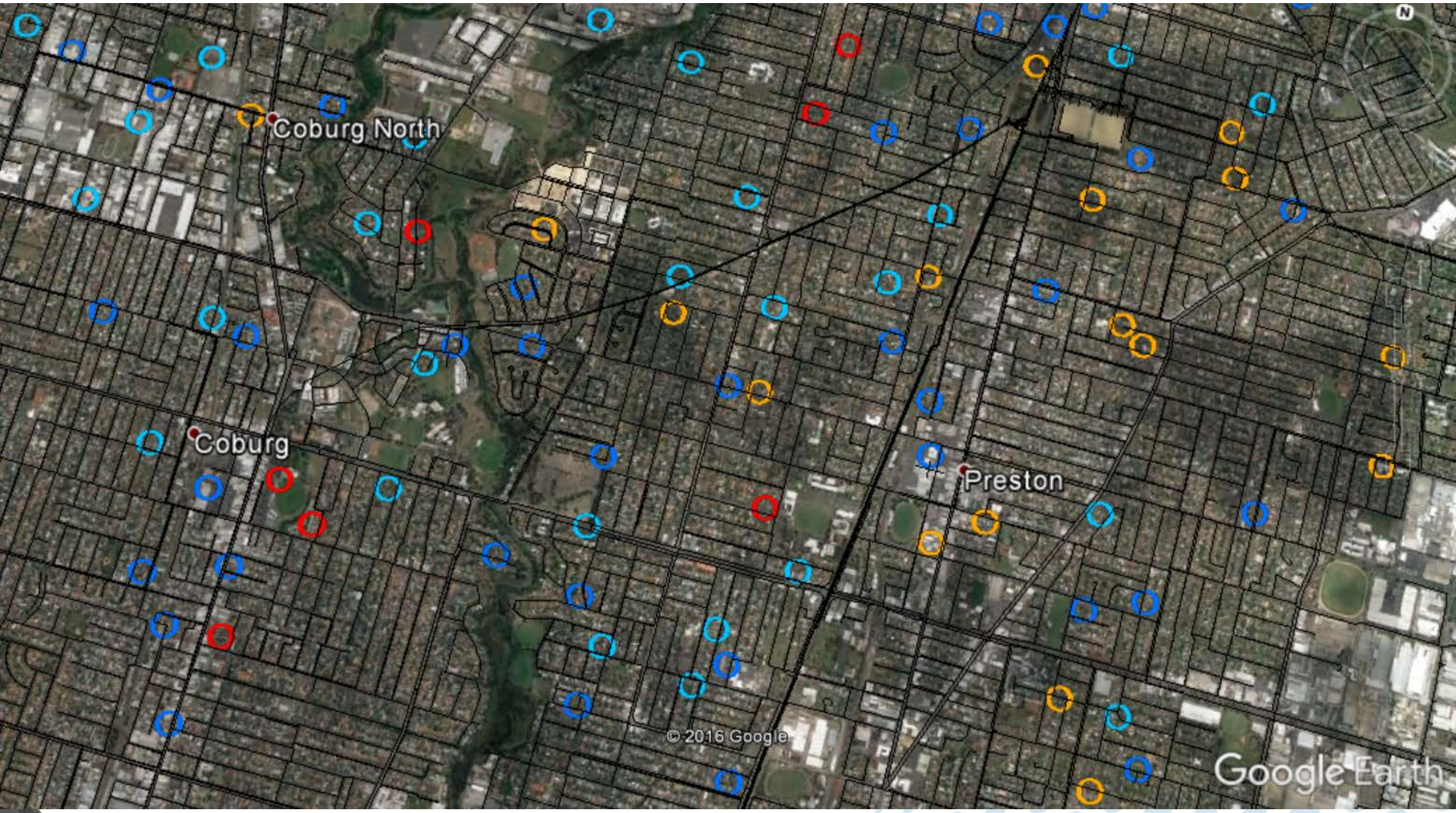
Standard Acoustic Survey

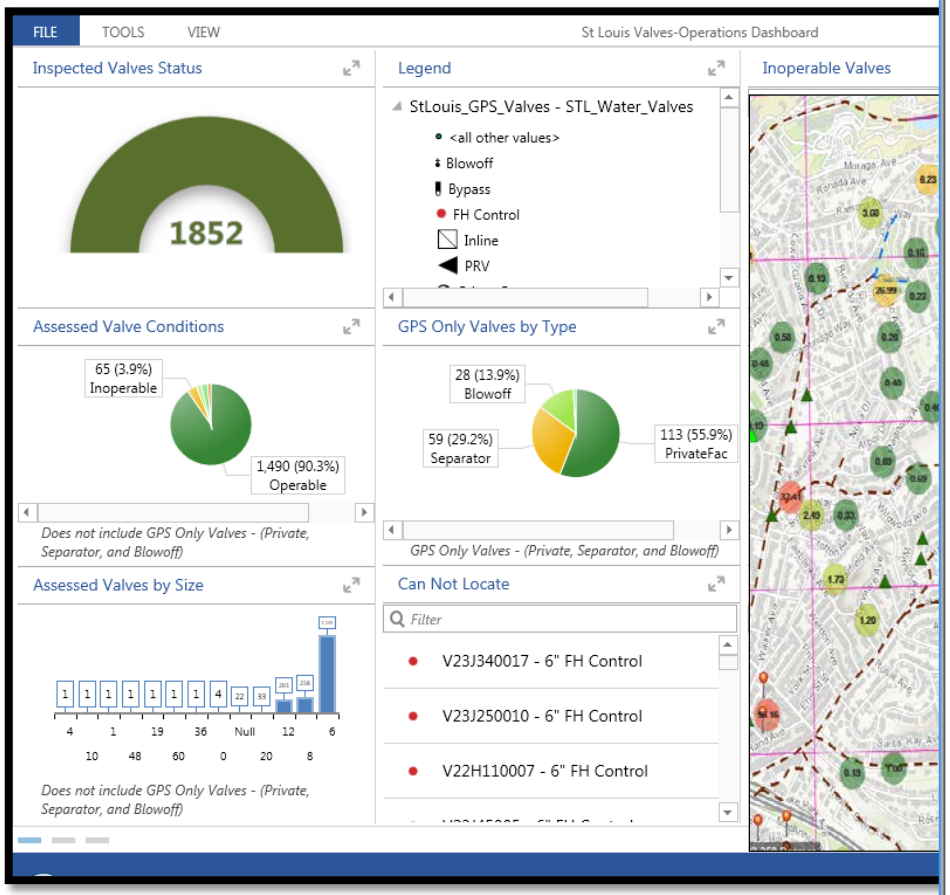


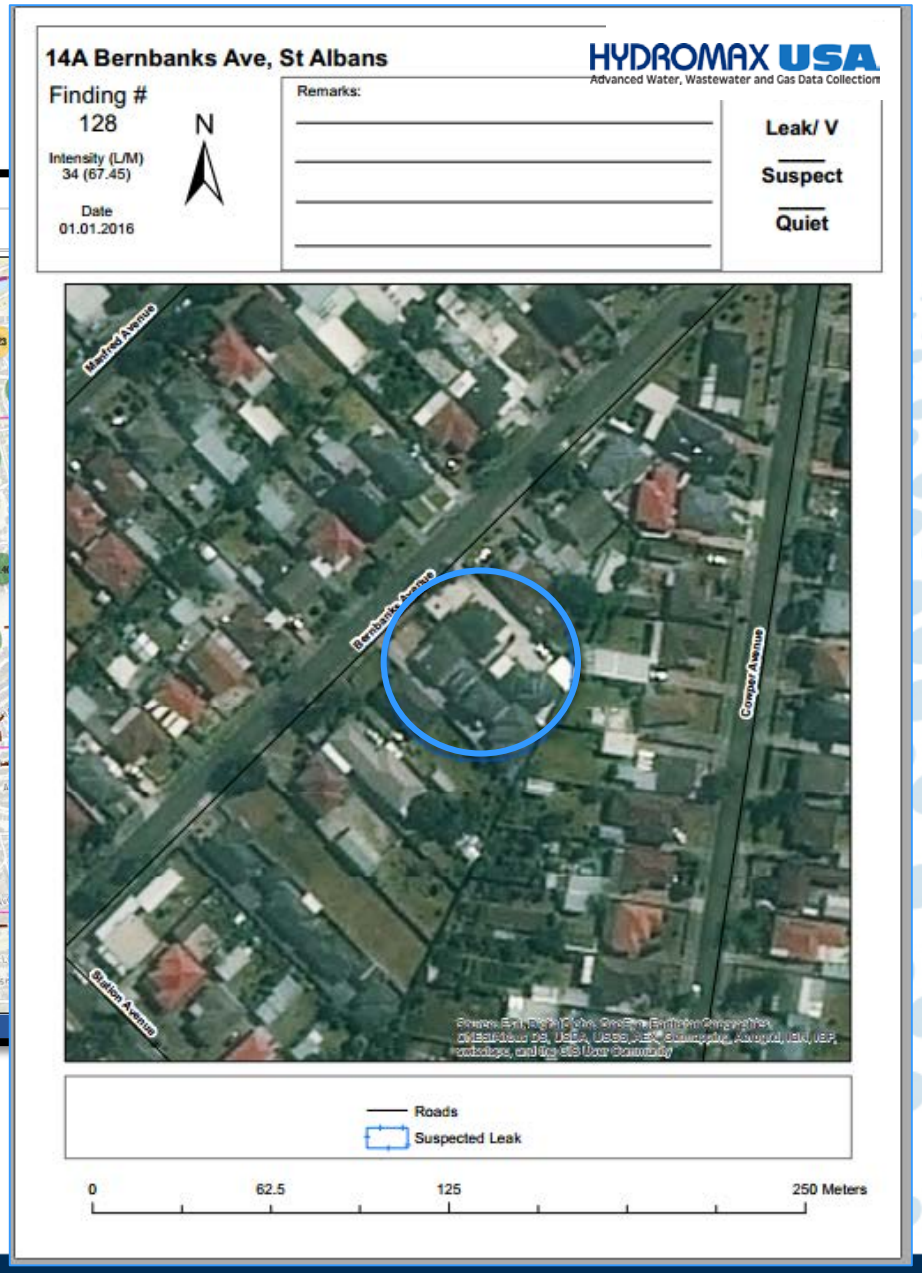
Satellite Guided Acoustic Survey



Web Based UI

HUSA Project Interface





Comparison of Leak Yield

	Standard Acoustic Survey	Satellite Guided Acoustic Survey [Satellite + Traditional Acoustic]
Leaks Found per person / day	<1.16 leaks/day/person	>6.1 leaks/day/person
Territory Covered Per mile per man per day 1 leak every 2.5 – 3.7 miles	per person per day average coverage Metallic 4.0 Miles Plastic 1.0 Miles	per person per day average coverage Metallic 20.0 Miles Plastic 5.0 Miles
Survey Cycle length of time	Every 1-5 years	Monthly Monthly, quarterly, yearly options

Comparison between acoustic survey and satellite leak detection guidance was attained.

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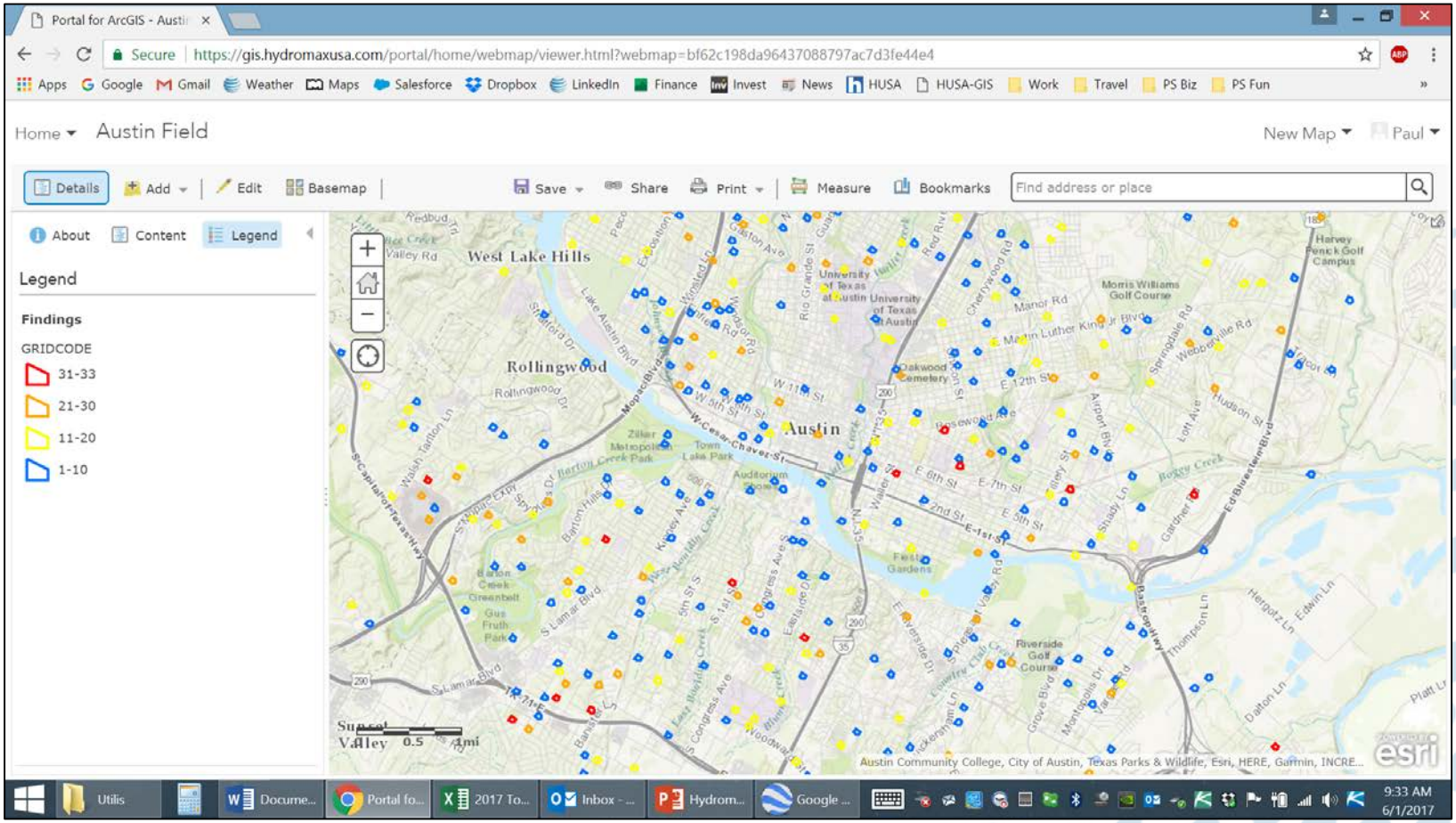
Utilis Solution - Examples

Live GIS



List of Benefits

- The entire system is surveyed up to 12 times a year rather than once every 1-5 years or less.
- Potential leak run times are reduced from upwards of 3-5 years to a maximum of 1 month.
- Priority Leaks can be targeted quickly reducing potential damage and claims.
- NRW will reduce more quickly and stay down.
- Unaffected by weather, traffic, noise, time.
- Reduce carbon foot print.
- **More efficient use of human and financial capital resources.**

Thank You

Paul Schumi

National Sales Manager

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Utilis Solution - Examples

Oakland Ca. Utilis Finding: **Vernon St 268**

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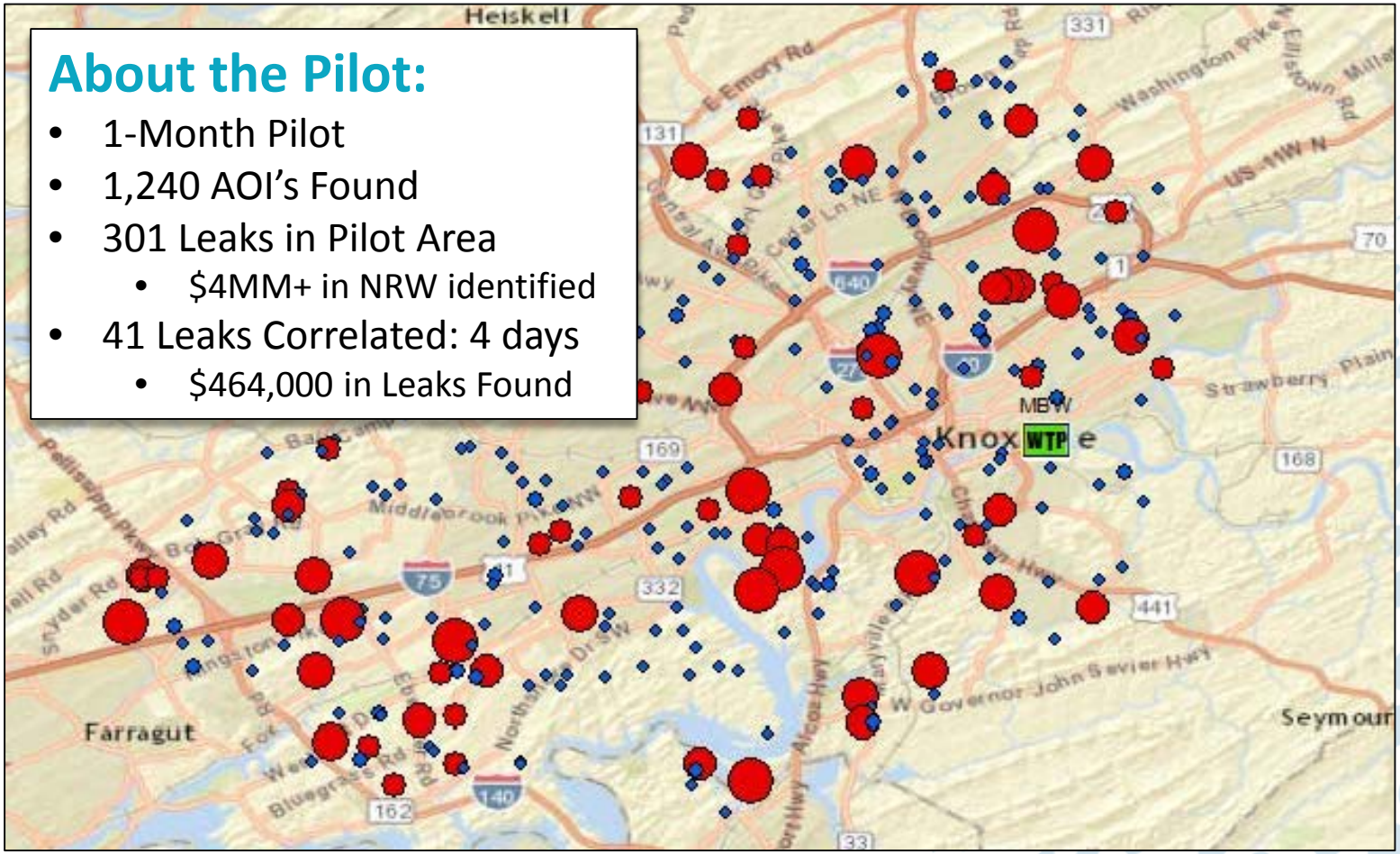
Utilis Solution - Examples

Client Example



About the Pilot:

- 1-Month Pilot
- 1,240 AOI's Found
- 301 Leaks in Pilot Area
  - $4MM+ in NRW identified
- 41 Leaks Correlated: 4 days
  - $464,000 in Leaks Found

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Utilis Solution - Examples