



**ERIE COUNTY WATER AUTHORITY**  
**INTEROFFICE MEMORANDUM**

January 5, 2024

To: Terrence D. McCracken, Secretary to the Authority

From: Leonard F. Kowalski, PE, Executive Engineer *LFK*

Subject: Non-Revenue Water Loss – 2024 Analysis & Planning

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**General Overview**

The intent of this memo is to provide an update on recent efforts that have been put forth based on the revisions that were made to the Comprehensive Strategic Plan in June 2023 with respect to non-revenue water loss. After the Strategic Plan was revised the Engineering and Production Departments further investigated technologies currently being utilized throughout our industry, we investigated both well-established technologies and newer technologies. One of the newer technologies is satellite leak detection. Due to our large geographic service area, we determined this was the best way to narrow down where to start investigating for non-surfacing leaks. In support of this effort, two Board actions were taken in 2023 to transfer funds and execute the contract to allow the first scan to be performed prior to the end of 2023. The other technology being investigated takes the traditional “lift and shift” acoustic format and combines it with modern day software to provide a user-friendly tool.

We are early in the process of evaluating these technologies and our goals during the evaluation phase are to determine the viability of the technology being implemented and what level of effort from current staff is required to properly implement these technologies. As of right now, we do not know how many man-hours will be required to review, investigate, and repair leaks based on the data provided, therefore it is premature to try and establish measurable goals based on work processes that are currently being implemented and vetted by the operations staff. Once everyone has had time to work through the process, which I envision will take several months, we can then determine the overall level of effort for our current workforce and also attempt to quantify a return on investment. 2024 will be utilized to collect and analyze data that will help us develop a plan that will be implemented in the future.

Below you will find more information on the initial reviews of each technology. The Authority piloted the “lift and shift” equipment in the third quarter of 2023 and purchased the equipment in the fourth quarter, which has provided us with an increased comfort level with the technology. We are still in the initial phase of vetting the satellite data and have nothing to report at this time. The final item mentioned below is the hydraulic model which will serve as a long-term tool to help manage leaks throughout the system through pressure management. This is in the very preliminary stages and will be further investigated in 2024.

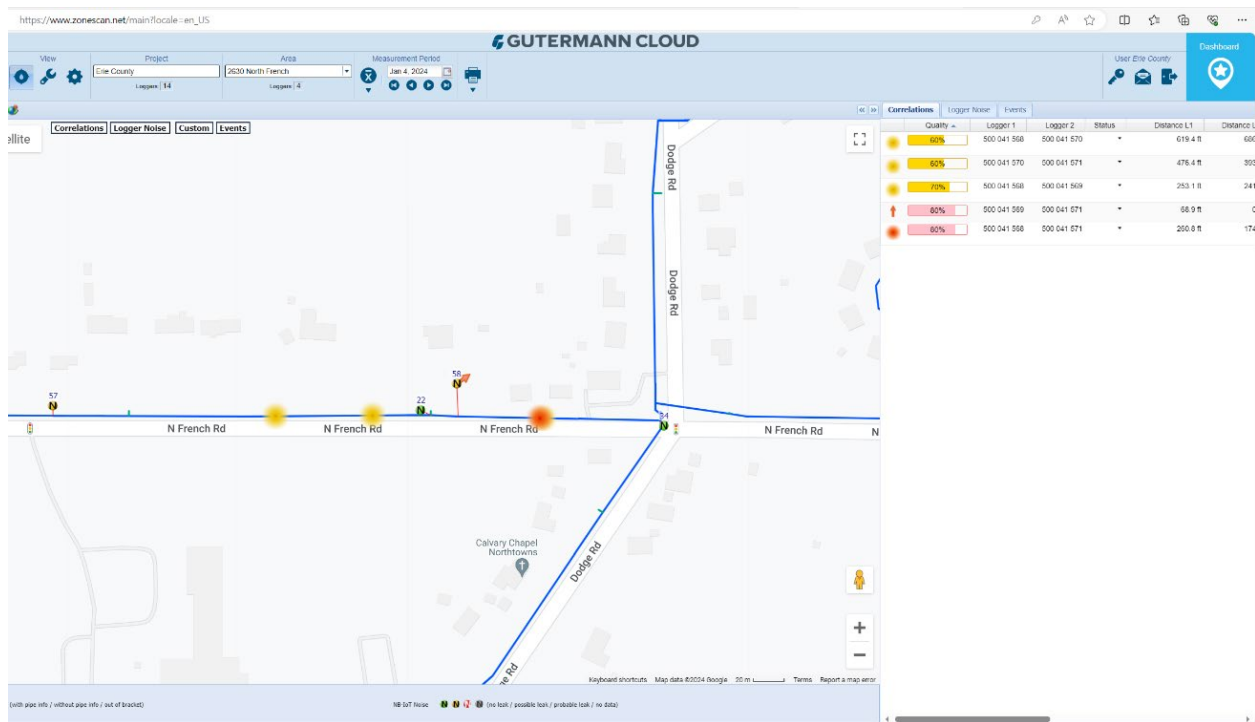
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## Additional Information

### “Lift and Shift” - Zonescan Leak Detection:

ECWA procured twelve Zonescan leak detection loggers from Gutermann for use in reactive and proactive leak detection. The Zonescan technology uses a movable network of sensors which “listen” to the mains and accurately locate leaks. The Zonescan platform integrates with the ECWA GIS to allow us to deploy loggers on valves, hydrants, and services within our system to acoustically correlate leak locations. The information is provided in a user-friendly format via a website, see below for an example:



Zonescan enables staff to deploy loggers in the following scenarios:

- In locations where we are confident there is a non-surfacing leak for which we cannot determine a precise location using our current technology.
- In locations where water is surfacing, causing issues for homeowners but the leak cannot be located using traditional methods.
- On critical mains to proactively analyze for non-surfacing failures.
- Into quadrants of neighborhoods to scan for potential leaks. These areas are identified by Authority staff based on historical leak locations where identification is difficult due to topography and geology.
- To scan sections of mains in areas of scheduled road improvements to identify and repair any discovered leaks in advance.

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Although not implemented at this time, the Authority does plan to deploy the Zonescan loggers in areas identified by the satellite leak detection technology. The loggers typically need several days to a week to collect data and zero in on a leak.

The loggers will enable us to improve reactive leak detection by pinpointing known non-surfacing leaks while proactively deploying within the system to locate unknown non-surfacing leaks.

- Deployments to Date:
  - Deployed at seven locations of suspected long standing leaks that could not be pinpointed.
  - The system successfully located five leaks which could then be repaired.
  - Deployed at a location in the Town of Amherst where Town staff believed there was a water main leak due to puddling in the roadway however, no chlorine residual existed. Zonescan loggers were able to confirm that the issue was not a water main leak and after further investigation by Town of Amherst staff, a failing sanitary forcemain was the cause of the problem.
  - Neighborhood deployment in the location of an ongoing resident complaint (over the last 3 years) with no success in finding a leak. Loggers were able to locate the leak within 48 hours from deployment.

Asterra Satellite Scan:

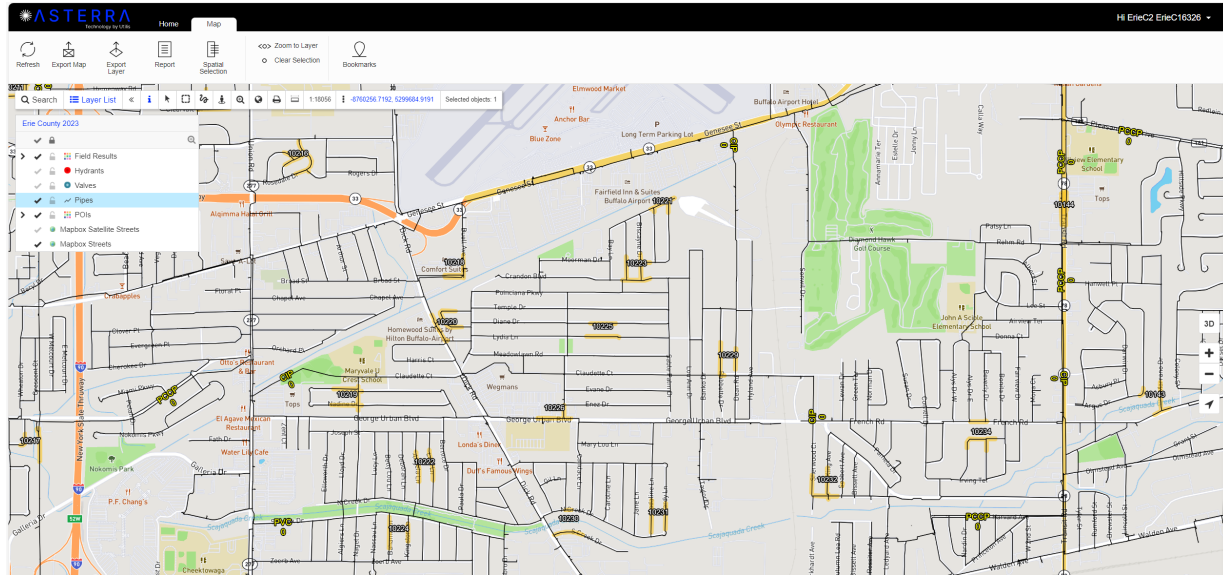
ECWA entered into a contract with Asterra USA to perform two satellite image scans of our entire transmission and distribution systems. Following the scans, Asterra uses an algorithm to analyze the data for points of interest within the system that exhibit characteristics of non-surfacing leaks. This technology is able to differentiate potable water from groundwater and wastewater.

- Initial satellite image scan was acquired on 12/08/2023. Asterra analyzed the data and provided a report to ECWA on 12/20/2023. The initial scan resulted in approximately 670 points of interest.
- ECWA Engineering and Line Maintenance staff are currently reviewing the report and prioritizing physical response and/or Zonescan deployment. ECWA is coordinating these results with system knowledge of suspected leaks as well as the results of the assessment of the transmission mains between Sturgeon Point and Windom.

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Below is an example of the points of interest provided.



### Updated Hydraulic Model:

ECWA along with Brown and Caldwell have built a fully calibrated, state of the industry, hydraulic model using the ECWA GIS Data as a foundation for the Model. This model allows ECWA staff to more accurately predict system performance under existing conditions as well as future conditions such as system growth and improvements. In addition, the model can now be used to run extended period simulations where system operations and performance can be observed over several days, not just a single point in time. This process is critical in identifying and controlling our nonrevenue water loss in two primary ways:

- Completing simulations of outages along a single segment of pipe and determining the impacts that isolated main has on the surrounding areas (Pressure, Fire Flow, Supply). In addition, the model can use ECWA pressure data obtained from the SCADA system to calculate the theoretical flowrate of the break. This flowrate can then be utilized to estimate the total water loss for that break.
- Using current actual pump station control schemes programed into the model to simulate how we can better manage system operations including pressures and tank fill rates. This technology allows for the optimization of system controls to determine if current settings can or should be reduced to prevent main breaks. Within the model, new control settings and system operations can be tested to verify that the settings will not negatively impact the system (i.e.: loss in storage capacity, excessively high or low system pressure, significant loss in fire flow, potential main breaks, etc.).

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In addition to the above programs, we continue to improve our processes to accurately account for non-revenue water within our operation and maintenance activities. Water loss volume calculations are now being performed for the following routine and emergency activities:

- Main flushing from repairs.
- Hydrant flow testing.
- Controlled hydrant operations for pressure or water quality control.
- Projected loss from leak repairs to account for water loss for the estimated durations of the leak post-repair flushing.
- Water usage for the construction of new watermains (fill and flushing water); and
- Calculating the total water discharged from tanks which are drained for maintenance or to improve water quality.

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