Aquarius Spectrum
Water Leak Detection & Pipe Assessment

Aquarius Spectrum Ltd.

Water Leak Detection in a challenging PVC piping:
A successful Pilot in Key West Florida

Pilot Background

Founded in 1937, the Florida Keys Aqueduct Authority (FKAA) is the sole provider of potable water for all of the residents of the Florida Keys and presently serves more than 44,000 customers within Monroe County. Potable water is transported to the Keys through a 130-mile transmission pipeline with an additional 649 miles of distribution pipelines which deliver water to the customer's property (http://www.fkaa.com).

In January 2019, the FKAA initiated a pilot with Aquarius to examine the suitability of its technology solution to address the utility's leakage issues. A history of leaks and several suspected active leaks were a good reason to start the project in Simonton Street in which most of the pipes are PVC in the length of 6,963 feet. This area contains high water loss rates – 1,000 gallons of water per hour.

While PVC piping has important advantages in terms of installation and maintenance, in aspects of underground hidden leaks it is one of the main challenges still facing the drinking water distributors everywhere in the world. In the case of FKAA, a number of attempts have been made using other leak detection technologies but to no avail. Undoubtedly, there are real difficulties in identifying these leaks by traditional means which are mostly based on touching the piping from outside and listening to vibrations, and here Aquarius brings a refreshing technology that has been developed for a number of years and is especially suitable for responding to PVC piping. The pilot was carried out by the Non-Revenue Water department in FKAA in collaboration with Aquarius and Trimble Water.

Pilot Description

Aquarius installed 7 hydrophone sensors to cover half of the selected pipeline (see figure 1 below). The sensors were installed 450 to 700 ft. apart on aboveground hydrants (see figure 2) and empty meter boxes.

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Figure 1 – Simonton Street. Pilot coverage

Figure 2 – Typical sensor installation

These hydrophone sensors are part of an overall continuous monitoring system (AQS-SYS) developed by Aquarius. It provides daily picture of the underground hidden leaks from an initial stage of their development. The sensors are equipped with RF technology for optimal synchronization and transmit data to the Aquarius cloud-based software via 3G/4G communication.

Pilot Results

After a couple of days, the AQS-SYS system detected 2 Points of Interest (POIs). In order to finalize and pinpoint the exact locations of those POIs, Aquarius used its iQuarius™ mobile leak detection device (IQ300). See figure 3 below highlighting the POIs.

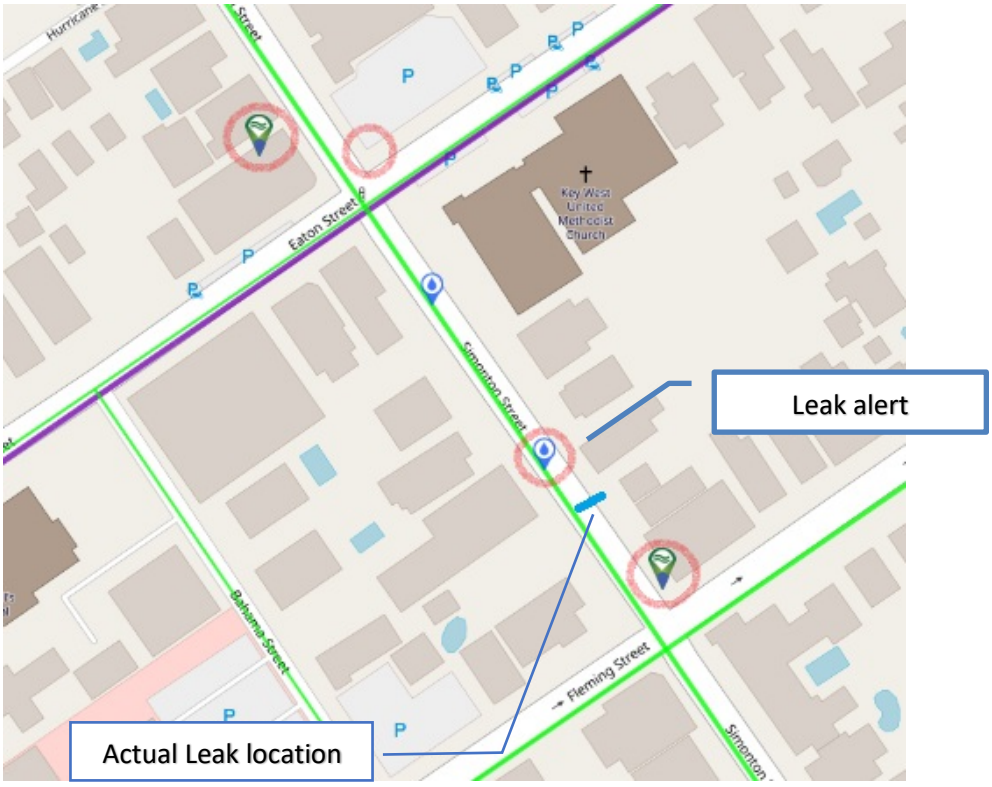

Figure 3 – Underground leak shown in AQS-SYS

The highlighted blue line is a branch, attached from the main to the consumer water meter. Two leaks were found and verified with a ground microphone (see figure 4 below). The digging had found two leaks over the same branch and repaired them using a clamp.

The actual leaks were around 50 feet from the alert location on the system. These leaks were identified by two hydrophones 518 feet apart. The results shown in figure 5 below indicate the average weighted distance from the first sensor on the couple (148 feet from sensor no1). Also, a strong clear leak frequency from 100 to 150 Hz, over the same distance location. Approximately 15 leaks were found using the 7 hydrophones. Thanks to the good results, the FKAA expanded their search territory from a single street to the entire southside of Key West.

Figure 4 – The leak location was found and fixed

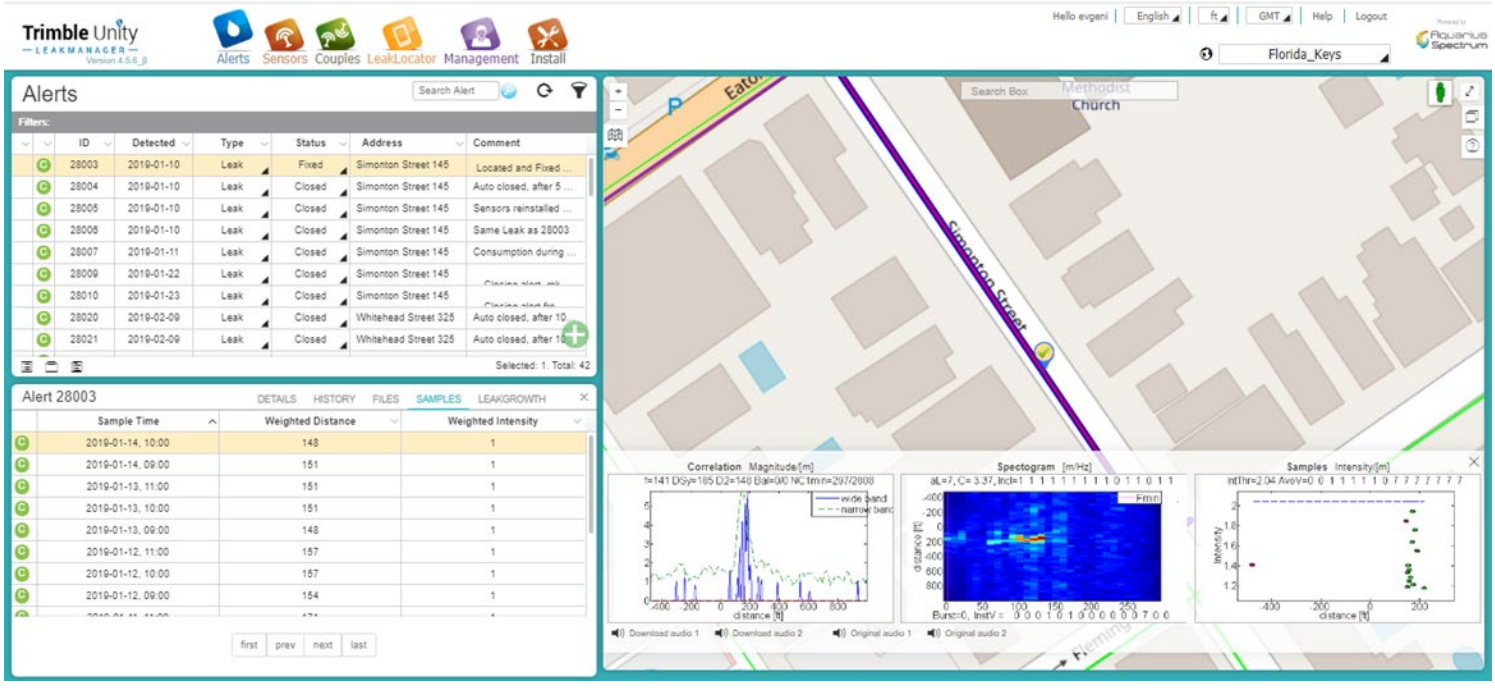

Figure 5 – The leak alert as shown in AQS-SYS