CASE STUDY

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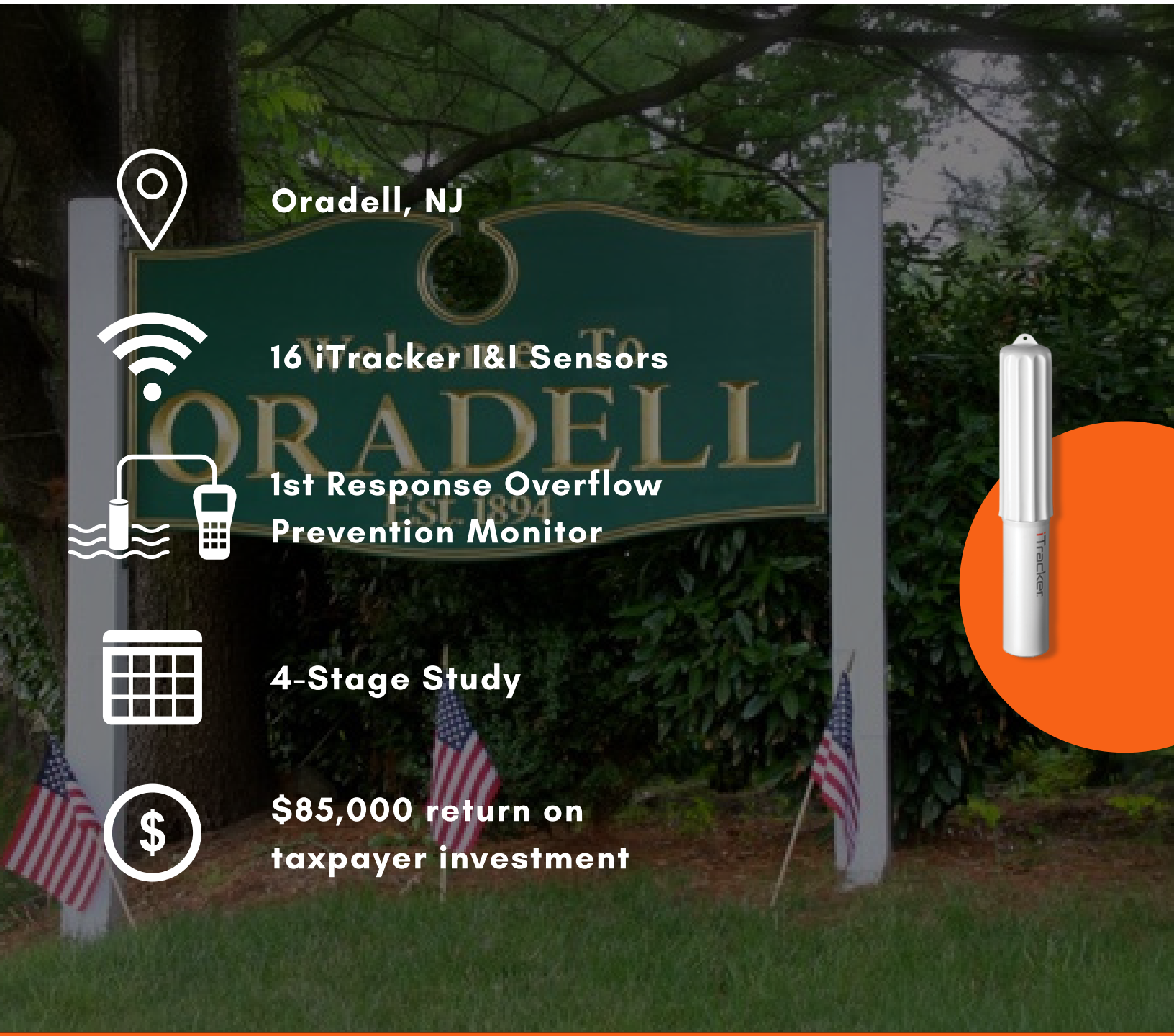

Oradell, NJ

16 iTracker I&I Sensors

1st Response Overflow Prevention Monitor

4-Stage Study

$85,000 return on taxpayer investment

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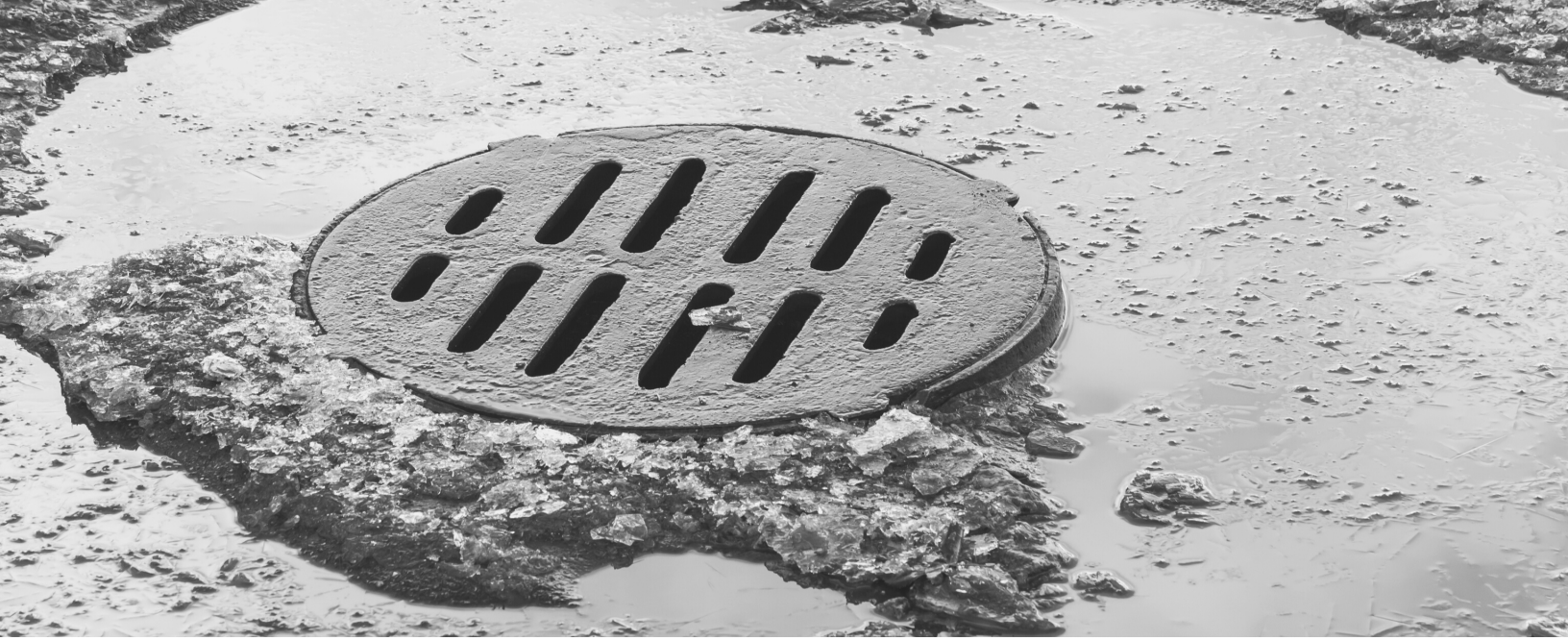


OBJECTIVE

Background

Oradell, New Jersey, is an affluent community with a population of 8,000 located approximately 15 miles northwest of Manhattan. The employees of Oradell's Department of Public Works are responsible for the maintenance of the borough's wastewater collection system buried beneath its 57 miles of tree-lined streets.

After a basement backup caused in excess of $27,000 worth of damage to a long-time resident's home, Oradell wanted to prevent this type of incident from ever happening again.

What We Did

Eastech engineers, along with experienced personnel from Oradell's DPW, initiated a five-person team to implement a fully integrated solution to the community's collection system issues.

The following four areas were selected for immediate evaluation:

- *Basement Back-Ups*
- *Shared Infrastructure Reimbursement*
- *Inflow & Infiltration Detection*
- *Treatment Charge Validation*

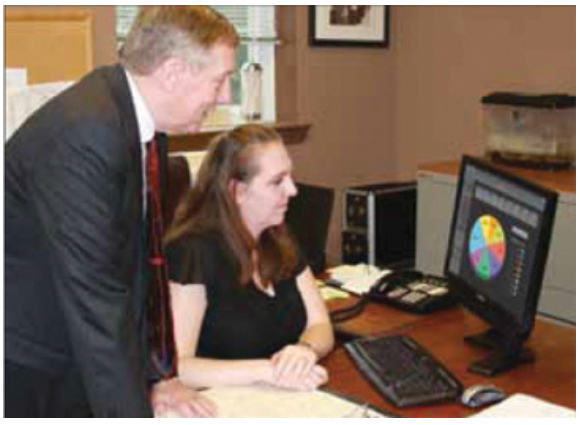


Figure 1: Borough officials review smart wastewater management reports

BASEMENT BACK-UPS

Due to the problems initiated by excessive amounts of fats, oils, and grease, basement back-ups had become a reoccurring concern, for both homeowners and the borough.

For each incident, Oradell was assessed a $1,000 penalty by their insurer in addition to shouldering the unexpected costs for cleanup.

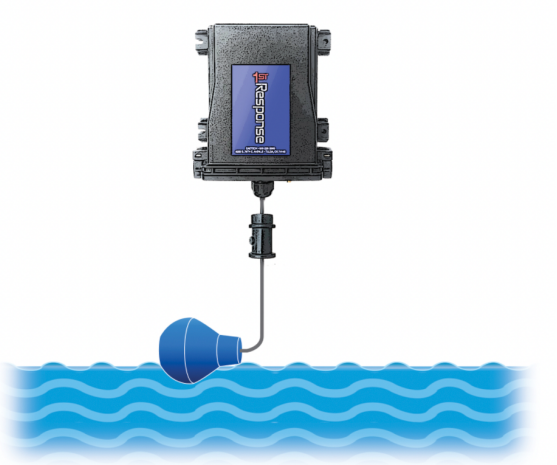


Figure 2: 1st Response Overflow Prevention Monitor

What we did

As a test run, the team decided to select three problematic sites and install cellular-based 1st Response Overflow Prevention Monitors (figure 2) capable of proactively text-alerting operating personnel of an impending backup event.

Installation at each site was completed within 30 minutes without the requirement for confined-space entry. A few months after installation

> **an alert produced by the 1st Response warned the borough of a potentially damaging situation.**

Maintenance crews were immediately dispatched to the scene and discovered that a downstream pipe had collapsed causing blockage to build. Fortunately, the maintenance crews cleared the blockage in time before more residents faced another costly incident resulting in thousands of dollars in damages.

The 1st Response Overflow Prevention Monitor Offers:

Non-confined space installation

Zero maintenance

Maximum 7 year battery life

Cellular alerts

SHARED INFRASTRUCTURE REIMBURSEMENT

Two separate wastewater lines from adjoining communities traveled through Oradell on their way to the Utility Authority's treatment facility. The two lines included the discharge from 105 homes and two country clubs. Since both lines had never been monitored, there consequently was no plan in place for reimbursement to Oradell of either neighboring community's treatment charges.

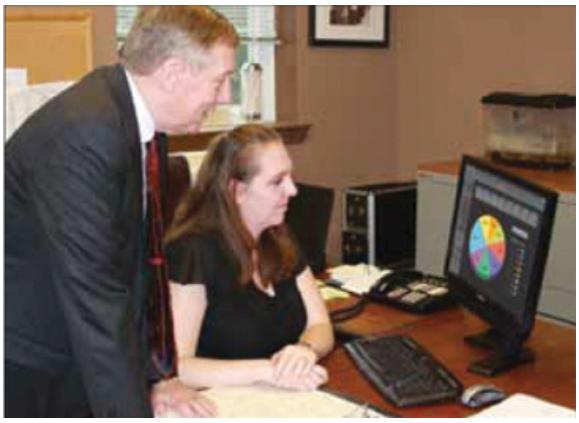
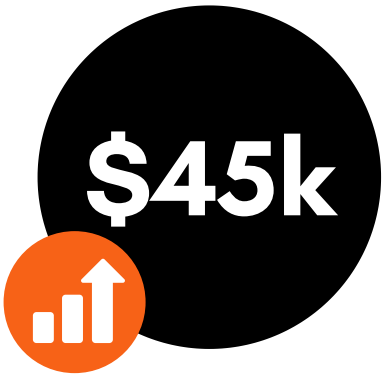


Figure 3: Borough officials review smart wastewater management reports



What we did

A pair of High-Performance Billing Meters were installed at the entry point from each neighboring community to determine reimbursement charges for the wastewater emanating from each neighboring town.

Within a few weeks of collecting data from the meters, it was quickly determined that annual revenue would increase between $45,000 - $55,000 due to the installation of the billing meters and collection of data.

Both meters would pay for themselves within their first four months of operation.

I&I DETECTION

The installation of a temporary High-Performance Billing Meter in tandem with the Utility Authority's main billing meter for the community showed that of the total annual charges incurred for wastewater treatment, 45% were due to Inflow & Infiltration (I&I).

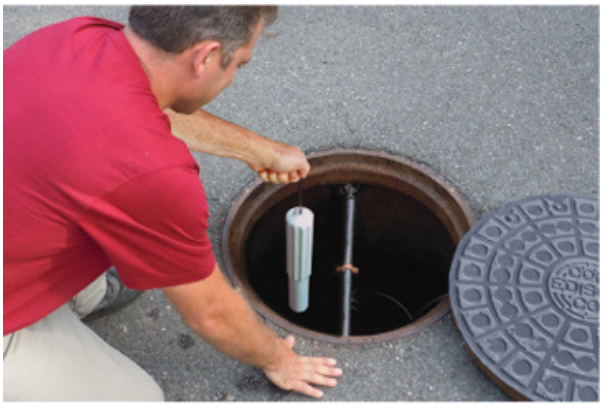


Figure 4: iTrackers become fully operational in 15 minutes without confined-space entry

What we did

The team began by employing a new and highly cost-efficient technology from Eastech that was capable of detecting, measuring, and locating I&I without the requirement for confined-space entry nor periodic maintenance (figure 4).

In an 8-hour workday, 16 iTracker I&I Micro Detection Sensors were installed within a 7-linear mile basin of the community. iTrackers are capable of pinpointing areas specifically responsible for high volumes of I&I to within manhole segments of 300'.

It was discovered at one of the locations to have an excessive amount of groundwater. Normally, this section of the street, which only had 28 homes, had an expected annual treatment cost of $4,000. However, the excessive volumes of groundwater increased the cost to $23,000.

Remediation of this small area alone would result in annual treatment cost savings of nearly $19,000.

BILLING VALIDATION

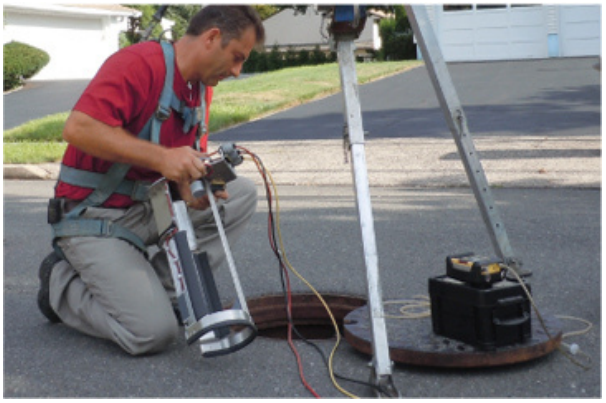


Figure 5: NIST traceable Billing Meter monitors flow from neighboring communities

The Utility Authority billing meter is a combination Parshall Flume/ Ultrasonic Level Sensor. This type of meter is incapable of directly measuring flow but rather determines volume strictly by ascertaining level.

When levels rise above the hydraulic measurement capability of the flume, the treatment charges also keep rising in relation to level rather than actual flow. This is exactly what transpired in 2011 during Hurricane Irene.

As the level in the flume rose, the daily volume calculated by the level sensor increased to 8.2 MGPD (max. pipe carrying capacity is only 3.8 MGPD) or a charge to the community of $16,400 resulting in a physically impossible single day billing increase of $8,800.

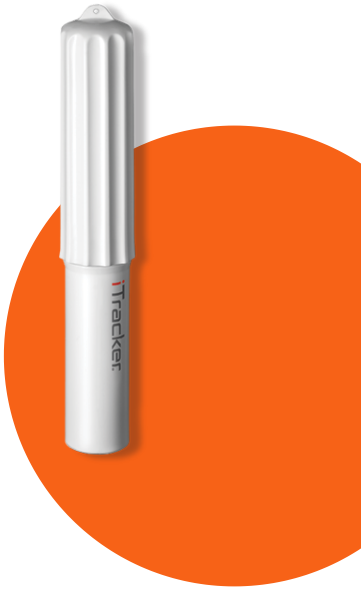
According to Oradell Borough Administrator Laura Graham, “Oradell is now in the process of permanently installing their own high-performance Hybrid Technology Billing Meter that will not only have the capability of budgeting treatment costs and monitoring overall volumes of I&I, but will ascertain flows under all conditions so that incidents involving major storm events will never again burden the community with unnecessary expenses.”

RESULTS

Oradell Mayor Joseph Murray had this to say about America's first smart wastewater management system:

> ***In addition to increasing our revenue stream each year by $85,000, Oradell is proud to have been the initiator of a project that will not only benefit our current and future residents for years to come, but will also provide a roadmap for other communities to follow when struggling with funding issues involving the protection and maintenance of our country's aging wastewater infrastructure.***

Oradell stands as a prime example of how a forward-thinking community was able to initiate America's first smart wastewater collection system. In addition to self-funding the entire process, they were able to provide local residents with a "Return On Taxpayer Investment" of over $85,000 annually.



$85K

return on
taxpayer investment

GLOSSARY

Base Flow - Wastewater directly discharged by the population upstream of the iTracker® I&I Micro Detection Monitor

GWI - Abbreviation for 'Groundwater infiltration.' Water entering the collection network from saturated soil.

I&I - Inflow and infiltration

Infiltration - Surface water that enters the wastewater collection system after seeping through the soil.

Inflow - Water running directly into the sewer through open manholes, downspouts, and other openings or gaps not covered by soil

Peak - Level/Flow Values based upon maximum one-hour averages.

Population - Refers to the number of residences contributing to the sewer shed upstream of the monitored site. iTracking® technology utilizes the population to estimate the average amount of flow expected on a typical dry day to establish dry day Base Flows.

RDII - Abbreviation for "Rain-Derived Inflow and Infiltration." RDII is rainwater that enters the collection system.

Peak Delta Q - Increase in wastewater volume from the typical dry day average volume to the peak volume during a rain event expressed as a multiplying factor relating to volume. (EXAMPLE: Normal Dry Day Average Volume designated as 1. If Peak Volume shows an increase of 5x over Normal Dry Day Volume, **PEAK DELTA Q** is 5.)