



AQUARIUS

# AQUARIUS Stormwater, TMDL Monitoring & Regulatory Compliance

## City of Lake Oswego Improves Urban Water Resource Management with Real-Time Data Analysis

“Despite governing a small municipality of 37,000, our policy makers want to know that they can trust our environmental data. By using AQUARIUS we can tell them that we use the same methodologies and tools to build our rating curves and process our environmental data as the USGS and Water Survey Canada. That provides credibility for the small fish in the pond.”

**David A. Gilbey**

Water Quality Program Coordinator  
City of Lake Oswego

City of LAKE  
OSWEGO  
OREGON



## About the City of Lake Oswego

Only eight miles outside the City of Portland in Oregon, the City of Lake Oswego is part of the Portland Metropolitan Region and must maintain compliance with a federal National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit, as well as show progress toward meeting Total Maximum Daily Load (TMDL) Waste Load Allocations. While it has a smaller population of 37,000 citizens, it is subject to the same stormwater regulations and water monitoring requirements as larger communities like the City of Portland. The permit requires the City to reduce stormwater runoff and pollution, to manage programs to protect water quality in rivers and streams, and to protect watershed health. In addition to meeting its hydrologic monitoring needs, the City must publish an annual report that includes analyses of monitoring data.

## Challenges: Regulatory Compliance & Growing Volumes of Real-Time Data

The City manages 150 miles of streams and 150 miles of storm pipes. In 2006, during a heavy rain event, infiltration of rain water into its wastewater collection system caused wastewater to discharge into Oswego Lake and the City was fined by the State of Oregon. The Oregon Department of Environmental Quality's (DEQ) Office of Compliance and Enforcement assessed the civil penalty for this water quality violation. DEQ gave the City of Lake Oswego the opportunity to offset the monetary penalty by agreeing to pay for a supplemental environmental project.

Offered by





The stipulation was that the project improve Oregon's environment in some way. The City proposed a continuous hydrologic monitoring program to assist the City in further characterizing the watersheds within the City's jurisdiction.

With all the regulatory reporting requirements of a larger City, but with the staff count of a smaller municipality, the City of Lake Oswego needed to find a way to do more with less. The initial investment allowed the City to move to real-time continuous monitoring with the installation of two stream gaging stations at Springbrook Creek and Lost Dog Creek. The City selected AQUARIUS as its environmental data management platform.

"Prior to AQUARIUS, all of the City's environmental data was stored in spreadsheets. Just preparing the data for analysis was a giant, giant chore. And installing continuous monitoring stations was going to drastically increase the volume of data," said David A. Gilbey, Water Quality Program Coordinator at the City of Lake Oswego. "Anyone who collects stage and discharge measurements, weather data, as well as water quality data knows that collecting the data is only about 5 to 10% of your time and that 50 to 70% of your time is needed for data management, analysis, and reporting. Building our own tools in Excel is possible, but is too cumbersome and time consuming; what's worse is that there is no standardization for these custom tools across the industry. AQUARIUS makes data management much less time consuming and much more efficient."

### Solution: AQUARIUS Time-Series

Today, the City of Lake Oswego's monitoring network consists of six weather stations located around the City, two stream gaging stations, and seven water quality grab stations. All of the data is centralized and managed on the City's AQUARIUS Time-Series.

"I am so spoiled with AQUARIUS. With all the data points that the City collects, we would have needed 3 or 4 more people to perform data management without it," said David Gilbey. "It would take about two and half hours to download continuous monitoring data from each station, go through the data line by line, cut out outliers, save an original file, and process the data grade. That takes three to five minutes with AQUARIUS once you set up your Whiteboards and Hot Folders. The City is now in the process of automating the upload of our contract laboratory data to our database through the AQUARIUS Time-Series. This will save a lot of transcription time and effort. The City is also planning on conducting monitoring of vegetated stormwater facility influent and effluent during our current permit term and using AQUARIUS as our data management platform. Everywhere in the world people are being asked to do more with less and this is a perfect example of how if you give someone the right tools you can do more with less."

The data from the six weather stations is used for stormwater management and for the City's Water Conservation Program. The data will eventually be published on the web to support the City's water conservation efforts with citizens (currently only the latest readings are published on the web). The new system is enabling the City to quantify the effects of urbanization on local streams and, most importantly, it has enabled the City to meet its regulatory monitoring and reporting requirements more efficiently.

### Data Management with AQUARIUS Supports Regulatory Compliance

The City's Stormwater Management Plan (SWMP) is written and implemented to comply with NPDES-MS4 Permit requirements. It includes both permit conditions and best management practices for eight major stormwater program elements, including: illicit discharge detection and elimination, construction and post-construction site runoff control, pollution prevention, and structural stormwater facilities and controls. Each of these elements includes measurable goals and tracking measures that the City must report on in its annual compliance report.

"Along with our stormwater permit, we have TMDLs issued for Springbrook Creek, Tryon Creek, Oswego Lake, Tualatin River and the Willamette River," commented David Gilbey. "The City of Lake Oswego is the Designated Management Agency or DMA for those areas within our jurisdiction, so we are required to manage and implement programs to improve water quality and to show progress toward meeting the load allocations for those areas."

With an urban water resource data management platform like AQUARIUS, the City is able to more effectively track, quantify, and communicate the success of its efforts in meeting its regulatory conditions and operational goals. "Now with AQUARIUS, I can look at the weather station data, overlaid with the gauge data, overlaid with the field measurements and grab sample data. All the data, QA/QC, and analysis are managed in one place," said David Gilbey. "AQUARIUS helps us answer important questions, effectively and accurately, like are we meeting the goals for our stormwater permit? Are we making progress toward meeting the load allocations?"

Previously, the City had to model its Total Maximum Daily Loads (TMDLs) based on assumed runoff characteristics from its watersheds and assumed suspended sediment concentrations. "With AQUARIUS we can quickly model the pollutant loads we are discharging, almost in real time, based on the actual continuous flow data and the turbidity and TSS data that we collect," said David Gilbey. "That is the telltale data that confirms that all our urban water resource management efforts are making a difference. And it's the data that helps us communicate the results of our efforts to taxpayers and policy makers."

## Real-Time Alerts with AQUARIUS Stop Illicit Discharges

"AQUARIUS helps with data management, storage, and analysis to meet our regulatory monitoring and reporting requirements," said David Gilbey, and "it also helps us meet our illicit discharge provisions. The City is required to prevent illegal pollution dumping. AQUARIUS has helped us to identify base line turbidity and to catch unusually high turbidity events."

For years the City had struggled to prove illegal discharges occurring upstream within one of its creeks. "Before AQUARIUS we could never catch it," reported David Gilbey. "Citizens would call and report huge rises in stage and massive amounts of turbidity. Yet it took too long from the time the complaints were called in to the time City staff arrived on site to grab water samples that could observe the high stage and high turbidity."

With AQUARIUS, catching the illegal discharge was easy using its automated notifications feature. By setting a maximum threshold for turbidity, the City received timely warning of the next polluting event. "We actually used the data stored in AQUARIUS to outline to the State of Oregon the frequency and duration of the events that had occurred," said David Gilbey. "We were able to catch and stop the illicit discharges."

## Centralized Data Management Expands Access Across Departments

The City of Lake Oswego has expanded its use of AQUARIUS to 18 named users across the Public Works Department and other offices, who use AQUARIUS to access historical weather data. Project Engineers at the City, for example, can use the weather data in AQUARIUS to better manage roadway construction projects. Access to temperature and precipitation data is critical to road overlay projects.

"AQUARIUS allows us to store the raw data, QA/QC the data, do the analysis, and store the analysis. It does so much more than just collecting and grading data," concluded David Gilbey. "AQUARIUS is truly a data management platform that allows us to manage all our environmental data in one place. We are finding more and more uses for it every year."

## Results

AQUARIUS has enabled the City of Lake Oswego to better:

- Model Total Maximum Daily Loads (TMDLs) & meet stormwater permit conditions
- Track & stop illicit discharges, improving watershed health
- Build accurate & credible rating curves to improve urban resource management
- Better manage City engineering & construction projects with weather forecasting

## WANT TO LEARN MORE?

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