

PROJECT TYPE

A web platform for IoT water loss management

TECHNOLOGIES

Node.js, Python, React, TypeScript, PostgreSQL, PostGIS, TimescaleDB, Redis, AWS IoT Core, MQTT, LoRaWAN, NB-IoT, OPC UA connectors, Gradient-boosted anomaly models, REST API, Docker, Kubernetes

DURATION

18 months

TEAM

1 System Architect / Team Lead
 1 Business Analyst
 3 Backend Developers
 1 Frontend Developer
 1 Data Engineer
 1 ML Engineer
 1 QA Engineer

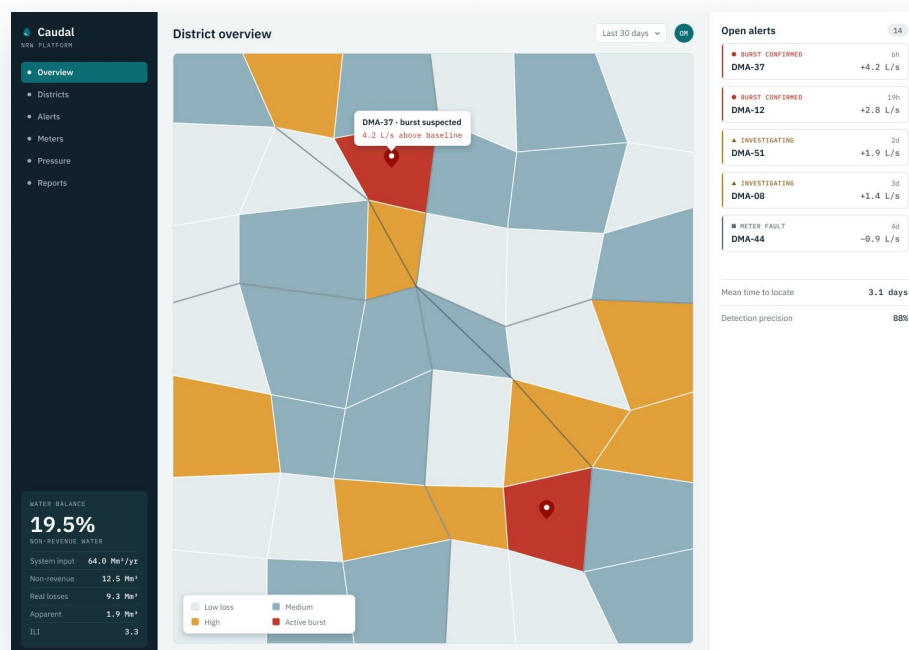
IoT platform for non-revenue water reduction

A web platform for IoT water loss management, district metering analytics, predictive burst detection, and meter performance scoring, integrated with the existing SCADA, GIS, billing, and work order systems.

Project background

The Client supplies 1.15 million people through 450,000 connections and 6,200 km of distribution mains. The network grew by extension over decades and had never been divided into measured districts, so losses could be counted at the system level but never located.

Leak detection was conducted as a contracted manual survey, covering about 1,240 km per year on a five-year rotation. A burst in a district surveyed last season could run until it surfaced or a customer complained. Locating one took 21 days from the first sign to a marked position on the ground. Meanwhile, 31% of the meter fleet had been in service for 12 years and was under-registering consumption by an unknown margin, and the regulator was moving from estimated to audited loss reporting.



Project Distinctive Features

- ✓ District metered area analytics across 84 zones built on the existing GIS and telemetry

- ✓ ML burst detection reaching 88% precision, flagging bursts a median of 4 days before the first customer report
- ✓ Meter under-registration scoring that targets replacement by measured error instead of installation age
- ✓ Pressure modulation control that holds a minimum service pressure while reducing break frequency

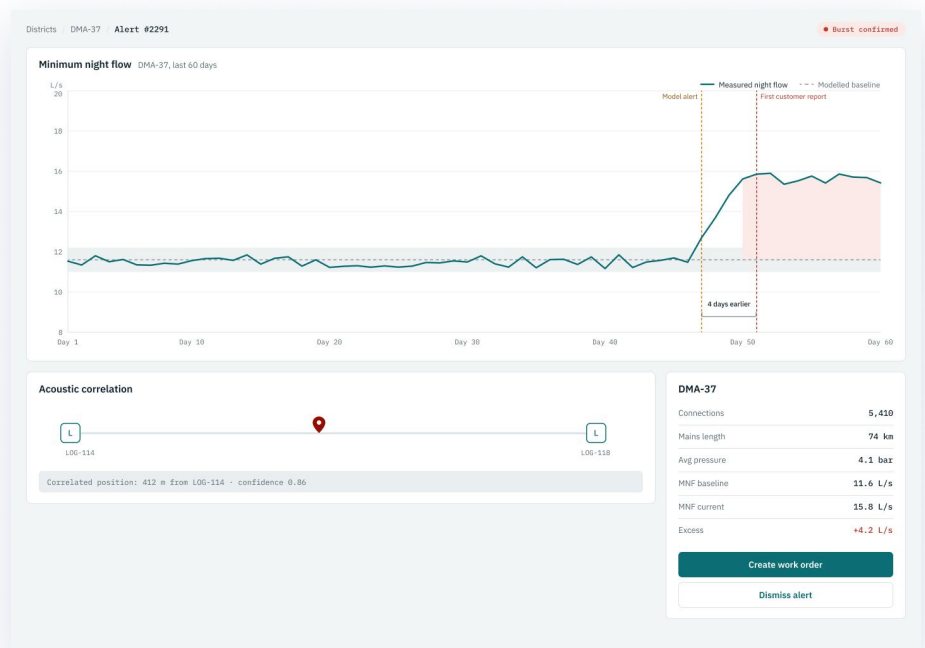
Business challenge

The Client wanted to:

- ✓ Locate losses at the district level rather than counting them across the whole system,
- ✓ Find and fix bursts in days instead of weeks,
- ✓ Decide meter replacement based on measured under-registration rather than installation age,
- ✓ Reduce the break rate on aging mains without a replacement program,
- ✓ Report an auditable IWA water balance to the regulator from live data,
- ✓ Keep the existing SCADA, GIS, billing, and work order systems in place.

Our solution

SumatoSoft built a loss management platform that divides the network into 84 measured districts. District meter flow, zone pressure, acoustic logger signatures over LoRaWAN, and smart meter reads over NB-IoT land in an ingestion layer on AWS IoT Core and are written to a time-series store alongside the network topology held in PostGIS.



A nightly water balance runs for each district, comparing the minimum night flow with the modeled legitimate night use. Gradient-boosted models learn each district's signature under weekday, seasonal, holiday, and pressure variation, then flag deviations that point to a developing burst. Confirmed alerts are passed into the work order system, with a leak position correlated to the nearest logger pair. A separate model scores every meter in the fleet for under-registration probability, and pressure modulation setpoints for 26 districts are controlled from the same interface.

Customer's benefits

Over the 18-month rollout, the Client achieved the following:

- ✓ Non-revenue water down from 28% to 19.5% of system input, recovering 5.4 million cubic meters a year,
- ✓ Burst localization has been reduced from 21 days to 3, with the whole 6,200 km under continuous acoustic monitoring,
- ✓ Real losses down from 83 to 57 liters per connection per day, and the Infrastructure Leakage Index from 4.8 to 3.3,
- ✓ Mains breaks down from 24 to 17 per 100 km per year, removing 434 repairs from the annual workload,
- ✓ Meter replacement retargeted from 140,000 units by age to 24,000 by measured error,
- ✓ €3.9M in recurring annual benefit against a €5.28M program, paid back in month 25.

What's happening with the project right now?

The platform runs across the full distribution network. The Client is extending district metering into two adjacent municipal systems taken on under a regional consolidation, and pressure modulation is being commissioned in a further 18 districts. SumatoSoft supports the platform and is building a pipe-failure risk model that ranks mains for replacement using break history, material, soil, and pressure exposure, so capital renewal follows measured risk.