Case Study: Watching Over Kuala Lumpur's Rivers from a Single Screen

How Solution A&C Technology brought 25 remote pumping and treatment sites onto one standardized platform

OPTO 22

Your Edge in Automation.™

Opto 22

43044 Business Park Drive • Temecula • CA 92590-3614
Phone: 800-321-6786 or 951-695-3000
Pre-sales Engineering is free.
Product Support is free.
www.opto22.com

Form 2460-260821

CASE STUDY: WATCHING OVER KUALA LUMPUR'S RIVERS FROM A SINGLE SCREEN

How Solution A&C Technology brought 25 remote pumping and treatment sites onto one standardized platform

At 2:00 a.m., a pump trips at a remote treatment plant. The station keeps running as best it can, but nobody at the operations center knows there's a problem. In a conventional system, that alarm might remain hidden until the next site inspection, along with every other piece of operational data from the facility.

But that approach won't work for the River of Life, a $1.3 billion waterfront revitalization in the heart of Kuala Lumpur, the capital and largest city of Malaysia. Across a growing network of river monitoring and treatment facilities, operators need real-time visibility, not weekly snapshots.

While the operational part of River of Life is underground, the visible part of the project includes landscaping and walkways.

Some remote pumps of the River of Life project are underground and out of sight.

A NATIONAL TRANSFORMATION PROJECT

Kuala Lumpur's River of Life is a national transformation program covering 781 hectares and the confluences of three city rivers, with 63 hectares of water bodies running through the heart of the capital. The goal is to reconnect the city to its waterways and convert an underused urban edge into a vibrant waterfront.

The visible work is landscaping, walkways, and lighting. The less visible and operationally relentless work is keeping the rivers clean.

To accomplish that goal, the city planned to operate a sullage interception network designed to keep wastewater and combined sewer overflows out of its rivers. The system spans three sewage water treatment plants (SWTPs) and 22 remote pumping stations scattered throughout the

urban core, many tucked into underground vaults or compact roadside enclosures.

The Malaysian government contracted Malaysia-based Solution A&C Technology, an Opto 22 OptoPartner for over 30 years, to deploy the new water treatment remote control and monitoring system. One of the key requirements: operations must be visible end-to-end from day one. Every station connected. Every data point logged. Every alarm pushed straight to the operator.

THE WEEKLY DRIVE-AROUND

Without an online monitoring platform, Kuala Lumpur's Operations and Maintenance (O&M) team would have to visit each station every week. Technicians were slated to drive out to each site, read pump running hours, check site conditions, and confirm that nothing had failed since the last visit. With 25 sites in the network, that meant roughly 1,300 site visits per year just to maintain baseline awareness. A pump trip on Tuesday might not be noticed until the following Monday.

Baseline monitoring required about 1,300 yearly remote site visits from technicians.

A live operator view of one of three SWTPs on Kuala Lumpur's River of Life project.

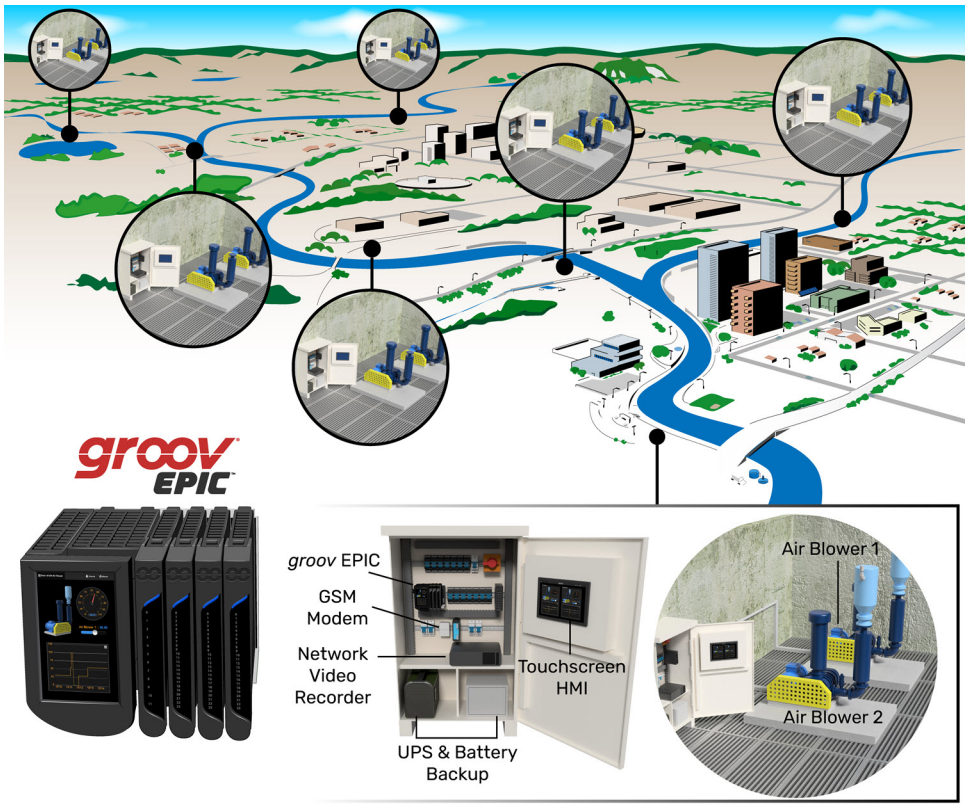
Geography made the problem worse. Stations spread across an urban river corridor, in underground vaults or roadside enclosures, which are not quick stops. A weekly round is a multi-day exercise in driving, parking, opening panels, photographing readings, and getting back into the truck to head to the next station.

If the city could monitor the systems remotely, that weekly drive-around could be eliminated. Solution A&C was involved in designing the network from scratch.

ONE PLATFORM, NOT MANY

With 25 sites to deploy and maintain, Solution A&C Technology needed more than a capable controller. They needed a platform that could be standardized across the entire network. Mixing various PLC brands or even different models would have meant juggling multiple spare-part inventories, training technicians on multiple programming environments, and dealing with multiple support paths.

For Solution A&C Technology, an Opto 22 control system offered a practical path to that standardization. They were familiar with the SNAP PAC system and knew it provided



With *groov* EPIC, the edge connectivity, control, and visualization are combined into a single device for each site.

the flexibility to handle a variety of remote pumping and monitoring requirements while maintaining a consistent programming environment, common hardware architecture, and long-term product availability.

Instead of supporting multiple controller families across the project, the team could deploy a single platform throughout the network, simplifying commissioning, maintenance, troubleshooting, and future expansion.

"The project wasn't just about getting 25 stations online. Somebody would have to maintain those stations for the next 10 or 20 years. We wanted a platform that every technician could recognize the moment they opened the panel," says Chai Ko Fong, Managing Director at Solution A&C Technology.

"We wanted a platform that every technician could recognize the moment they opened the panel."

- Chai Ko Fong, Solution A&C Technology

AN OFFER YOU DON'T USUALLY GET

In 2011, when the project bidding began, Solution A&C Technology specified Opto 22's SNAP PAC platform, which they had successfully deployed on numerous water and infrastructure projects throughout the region. But while the River of Life system was still under development, Opto 22 introduced *groov* EPIC (**E**dge **P**rogrammable **I**ndustrial **C**ontroller).

Unlike traditional controller architectures that separated control, visualization, and edge connectivity into multiple components, *groov* EPIC combined those functions into a single device. The platform included *groov* View—a built-in, web-based HMI—OpenVPN® for secure remote access, and a Linux®-based edge computing environment that gave operators and maintenance staff new ways to access and manage the system remotely.

The control panel was built around a *groov* EPIC processor, with cellular backhaul and field wiring to pumps, blowers, and sensors.

Solution A&C Technology went back to the city with an unusual proposal: upgrade every station to *groov* EPIC at no additional cost.

"We didn't want to hand the customer an older platform just because the contract was already signed, so we absorbed the difference," says Chai Ko Fong.

It was a bet on the new platform—and on the partnership.

INSIDE A TYPICAL SITE

Every site, the three SWTPs and the 22 pumping stations alike, runs on a *groov* EPIC processor. The hardware footprint is consistent across the entire network. That uniformity is the point: one set of skills, one set of spares, and one programming environment—Opto 22's PAC Control, a free flowchart-based development environment.

At the treatment plant in the St. Marry precinct, for example, *groov* EPIC manages a complete sullage interception process:

- Three sets of CSO (Combined Stormwater Overflows) pumps lift collected runoff and graywater from intake sumps into a balance tank. Each set runs duty and standby pumps for redundancy.
- From the balance tank, dual feed pumps move water into a bioreactor for biological treatment.
- Aeration blowers maintain dissolved-oxygen levels in the bioreactor. A digital sensor reports continuously.
- Treated water passes through a media filter before discharge.
- Sludge pumps, intake and output ventilation fans, and a plant sump pit support the treatment process.

Every pump and blower reports run status, trip alarms, current draw, and auto/manual mode back to the EPIC. Float switches drive level-based start/stop logic. Pressure switches protect the pumps from abnormal operating conditions. Ultrasonic level sensors and magnetic flow meters report process variables to the controller in real time. The pumping stations follow a simpler version of the same pattern.

The St. Marry plant overview in *groov* View shows CSO pumps, balance tank, bioreactor, blowers, and ventilation status on one screen.

ONE SCREEN, EVERY STATION

Each *groov* EPIC hosts *groov* View, the local HMI that is reachable from any browser on the plant network or remotely through a dedicated VPN connection. Each *groov* EPIC also reports its data to a centralized instance of *groov* View running on the city's servers. Operators see the same screens at the local panel or at the central server. With *groov* View on *groov* EPIC, there is no parallel HMI software to license, install, or maintain.

Trend pages plot weeks of pump trip-on-off behavior, dissolved oxygen, and balance-tank levels alongside the live status of every CSO pump, feed pump, blower, and ventilation fan. The system records date, time, pump and blower control modes, equipment status, and sensor readings for trend analysis and reporting.

The network backhauls over cellular (GPRS, GSM, HSDPA) and broadband to the city's servers and a central monitoring portal. Each *groov* EPIC handles its own local control loop even if the cellular link drops; the data resynchronizes when connectivity returns.

ALERTS THAT REACH THE OPERATOR

According to Cheng Chen Hoong, Project Manager at Solution A&C Technology, "Any abnormal event triggers an alert, which is sent directly to the operator's phone. Power failure, pump trip, water level high, and enclosure door alarms trigger both SMS notifications and Telegram messages to registered users."

Four weeks of pump trip-on-off trends and dissolved-oxygen behavior for one treatment plant, available continuously through *groov* View.

Operators can get immediate updates on their mobile devices thanks to *groov* View.

Now, a pump failure at 2:00 a.m. surfaces immediately, not on the following site visit. Instead of starting the week with a punch list of unknowns, the O&M team starts it knowing exactly which stations are healthy, which are alarmed, and which need attention.

OPERATIONS TODAY: 1,300 SITE VISITS A YEAR, GONE

The new control and monitoring system now displaces roughly 1,300 site visits per year. The O&M team now makes site visits on demand instead of on schedule, only visiting sites when something actually needs hands-on attention.

"With the current online monitoring system, operators can receive real-time alerts via SMS or through *groov* View, allowing for quicker response and more efficient system

management. It significantly reduces manpower costs on routine site visits, also enhancing overall system performance and operational efficiency for the 3 SWTPs," says Chai Ko Fong.

Standardization paid off the way Solution A&C Technology predicted. One product. One programming environment. One spare-parts inventory. One set of skills for the city's team to learn and maintain.

Continuous trending across the deployment lets operators see longer-term behavior: which pumps are cycling more than expected, where dissolved oxygen is drifting, or when a station is approaching a service interval. The team works from data, not from guesswork between visits.

"[The current online monitoring system] significantly reduces manpower costs on routine site visits, also enhancing overall system performance and operational efficiency...."

- Chai Ko Fong, Solution A&C Technology

A REFERENCE DESIGN FOR WHAT'S NEXT

The platform built for River of Life has become Solution A&C Technology's template for similar work across Malaysia: flood mitigation, river cleaning, and pumping-station automation. The operational profile is the same: many sites, one owner, every minute matters.

"We carry this same design into every project now. The customer gets a proven system. We get faster deployments," says Chai Ko Fong.

For Kuala Lumpur, the result is the kind of infrastructure the public never sees but the river benefits from every day.

ABOUT SOLUTION A&C TECHNOLOGY

Solution A&C Technology is a Malaysian system integrator and automation specialist serving the water, building automation, pharmaceutical, and flood-mitigation sectors. They specialize in industrial automation, instrumentation and control, web-based automation, SCADA systems, web-based telemetry, remote monitoring systems, and more. The company has been an Opto 22 partner for more than 30 years. For more information, please visit: https://www.solutionact.com.my

ABOUT OPTO 22

Opto 22 was started in 1974 by a co-inventor of the solid-state relay (SSR), who discovered a way to make SSRs more reliable.

Opto 22 has consistently built products on open standards rather than on proprietary technologies. The company developed the red-white-yellow-black color-coding system for input/output (I/O) modules and the open Optomux® protocol, and pioneered Ethernet-based I/O.

Famous worldwide for its reliable industrial I/O, the company in 2018 introduced *groov* EPIC® (edge programmable industrial controller). EPIC has an open-source Linux® OS and provides connectivity to PLCs, software, and online services, plus data handling and visualization, in addition to real-time control.

groov RIO Ethernet-based edge I/O modules, introduced in 2020, include I/O and IIoT software in a compact industrial package that goes anywhere.

All Opto 22 products are manufactured and supported in the U.S.A. Most solid-state SSRs and I/O modules are guaranteed for life.

The company is especially trusted for its continuing policy of providing free product support, free online training, and free pre-sales engineering assistance.

For more information, visit opto22.com or contact **Opto 22 Pre-Sales Engineering**:

Phone: **800-321-6786** (toll-free in the U.S. and Canada) or **951-695-3000**
Email: systemseng@opto22.com

OPTO 22 www.opto22.com
43044 Business Park Dr. Temecula, CA 92590-3614

SALES sales@opto22.com
800-321-6786 • 1-951-695-3000

SUPPORT support@opto22.com
800-835-6786 • 1-951-695-3080