

## Case Study: PUB

A signature projects under PUB's Active, Beautiful, Clean Waters Programme, Kallang River @ Bishan-Ang Mo Kio Park was transformed from a concrete canal into a naturalised river that is integrated with the adjacent parks to create a recreational space for residents.

In recent years, PUB has encountered cases of polluted discharge (most commonly paint and oil) originating upstream of the river.

When the pollutants flow into the river, they **create aesthetic problems and unwanted public attention.**

The **removal of these pollutants** also poses a **challenge.**

To mitigate these issues, Oneberry Technologies (Oneberry) and PUB embarked on a testbedding project to **deploy a pollution detection and containment system (PDCS).**

Consisting of water quality sensors, closed-circuit television (CCTVs) and a floodgate, PDCS functions holistically to detect, evaluate and contain polluted discharges before they enter the river.

The water quality sensors monitor parameters such as dissolved oxygen, electrical conductivity, pH and ammonium/ ammonia concentration, while optical turbidity and refined oil sensors detect the presence of volatile organic compounds which are found in polluted discharge. CCTVs were installed to monitor visual changes in water quality and the water level in the drain. When water quality measurements exceed acceptable levels, the floodgate would be lowered to contain the polluted water and prevent it from flowing downstream.

To test the efficacy of the system, a prototype was installed at a subsidiary concrete drain along Upper Thomson Road.



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Eight months of monitoring and analysis was first carried out to establish the baseline (set at the 95th percentile) of the various water quality parameters. The PDCS prototype was officially commissioned and tested in June 2017. It was configured to send real-time alerts and visual verification was carried out via CCTV footage. When polluted discharge was detected, the floodgate was remotely operated to contain the flow.

From June to November 2017, a total of 262 incidents were recorded. Of these, there were 154 polluted discharge cases, 89 spike alerts and 19 false negative alerts.

- Spike alerts were incidents where water quality parameters were detected to exceed allowable limits but returned to normal condition within five minutes from the first alert.
- False negative alerts were incidents when discoloration in the flow was observed via CCTV footage but real-time alerts were not triggered.
- In the event of polluted discharge, the floodgate was successfully activated to prevent the polluted water from flowing downstream.

“To improve the sensor performance, we have since stepped up the frequency of calibration and maintenance.” Oneberry and PUB are still operating the prototype system to assess its longterm performance.”

“During the test period, we observed that the sensor performance was affected by the accumulation of sediment around the sensors. This was one of the reasons for the spike alerts,” said Brigitte Capacia, principal investigator of the project.

### Researchers & Affiliations

R. Fantilaga, B. Capacia | Oneberry Technologies  
C. Shen, T. Thiri, T.C. Dang | PUB

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