

WATER QUALITY MONITORING SYSTEM

SOLUTION ARCHITECTURE

- 1. REAL TIME WATER QUALITY MONITORING AND ALERT SYSTEMS, APPLICATIONS AND SUSTAINABLE MONITORING USING OPEX BUSINESS MODEL Water India 2011, Water Purification, Recycling & Supply February 10-12 2011, New Delhi, India TriTech Trittech Group Limited SysEng (S) Pte Ltd
- 2. Abstract The paper covers the following:
 - o Methodology and setup in Water Quality Monitoring System, a Real Time Monitoring and Alert System (RTMAS).
 - o Considerations for sustainable operation in water monitoring applications, using the OPEX (Operational Expense) Model
- 3. System Setup and Methodology of Real Time Water Quality Monitoring
- 4. Real Time Water Quality Monitoring and Alert System System Setup and Methods Illustrates the System Setup based on 2 applications we have deployed in Singapore:
 - o Remote Monitoring of Reservoirs Water Quality profile.
 - o Remote monitoring of Total Suspended Solid (TSS) in drainage and catchment.
- 5. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile The Challenge: Water quality in reservoirs varies at different depths. Water quality at deeper level can deteriorate extensively even when the surface water still shows normal values. Thus it is important for the clients to know the water quality variation of the entire depth from surface to bottom.
- 6. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile The Solution: The Profiler Station is a fully automated system designed for measuring the entire vertical column of water qualities of the reservoir. These stations continuously winch the water quality sensors to various pre-programmed depths every 20 minutes. (programmable interval)
- 7. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile The 5 main components of Reservoir Profile Monitoring system • Water Quality Sensor • Profiler Station • Wireless network • Data processing and publishing server • Alert system
- 8. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile
- 9. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile
- 10. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile

- 11. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile* Electronic Control Module Solar Power System Winch Head Module Multi-parameters Sensor Unit Floating Platform Structure Inside the Profiler
 - 12. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile* Deployment – 1 Transport and assemble
13. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile* Deployment – Tow and install
- 14. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile Data processing & Hosting Server and Alert System
 - 15. System Setup and Methods Remote Monitoring of Reservoirs Water Quality Profile Web-base Access
 - 16. System Setup and Methods Remote Monitoring of Total Suspended Solid discharge The Challenge: Municipal reservoirs are in higher risk of pollution as it within the vicinity of highly populated areas. One major pollution source is urban construction sites discharging silt contain water into catchment drainage network which may eventually end up in municipal reservoir(s).
 - 17. In Singapore, legislation requires that all construction sites to pre-treat any used water to below 50mg/l of TSS, before it is discharged into open public drain. • Code of Practice on Surface water Drainage, Clause 6.3 (part of effective earth control measure ECM) System Setup and Methods Remote Monitoring of Total Suspended Solid discharge
 - 18. • As a preventive measurement, wireless TSS monitoring stations are setup at drainage canals near potential source of pollution discharge. • When the TSS readings exceed their limits SMS alerts are send out to inform various stake holders for immediate attention. System Setup and Methods Remote Monitoring of Total Suspended Solid discharge
 - 19. System Setup and Methods Remote Monitoring of Total Suspended Solid discharge
 - 20. Real Time Water Quality Monitoring and Alert System Considerations in Sustainable Water Quality Monitoring Total Cost of Ownership (TCO) of Water Monitoring System
 - 21. Time Water Quality Monitoring and Alert System Considerations in Sustainable Water Quality Monitoring Ownership Risks - Increasing Operation Cost / Hidden Cost: • Repair cost are not accurately forecasted (especially after warranty period) • Increasing maintenance cost due to wear and tear, bio-fouling, weathering. etc. (dependent on skill level in maintenance) • Equipment obsolescence • Maintaining and training of manpower in diversified areas of skills required in water quality monitoring • Others... This

Hidden Cost in Ownership Risks are often under estimated or left out. If it is un-planned for, the system will not sustainable due to the increasing operation

- 22 Real Time Water Quality Monitoring and Alert System Considerations in Sustainable Water Quality Monitoring Stake Holder Water Resources and Treatment Key Objective: Formulation of timely water qualities control strategies. Water Quality Monitoring System Ownership Risk Real Time Water Quality Data CAPEX (Capital Expense)
- 23. Real Time Water Quality Monitoring and Alert System Considerations in Sustainable Water Quality Monitoring Stake Holder Water Resources and Treatment Key Objective: Formulation of timely water qualities control strategies. Water Quality Monitoring System Ownership Risk Real Time Water Quality Data Service Provider Water Quality Monitoring OPEX (Operational Expense) Service Model
- 24.. Total Cost of Ownership (TCO) of Water Monitoring System Real Time Water Quality Monitoring and Alert System Sustainable Monitoring with OPEX model
- 25. Real Time Water Quality Monitoring and Alert System Conclusion • Water quality monitoring system requires detail planning in both system setup and operation considerations. • To ensure sustainability of monitoring, the Critical operation resources need to be plan before execution: • specialized manpower • facilities • equipment and redundancies/spares • A service-support organization structure • An option for sustainable monitoring operation is OPEX service model, which stake holder can leverage on the service provider's establishment and focus their limited resources on result analysis and formulation of water qualities control strategies.