Wastewater SCADA maturity curve





Basic

Manual operation of pumps, blowers, and chemical dosing systems

Local control panels for equipment operation

Data

Paper-based record keeping and reporting

Monitoring Daily operator observations

Alarms local to equipment

Strategy

Technology



Ad hoc

Local control modes for individual process units

Local Programmable Logic Controllers (PLCs) for simple control loops

Data loggers for regulatory compliance reporting

Basic monitoring of key parameters (e.g. flow rates, tank levels)

Basic alarm systems for critical parameters



Integrating

Automated monitoring of multiple treatment processes

Feedback control loops (e.g. DO-based aeration control and chemical dosing)

Remote monitoring/telemetry capabilities for operators

Basic trending and reporting functions

Basic alarm systems with operator notification systems



Optimizing

Fully automatic monitoring and control of major treatment processes

Advanced control strategies (e.g. cascaded ammonia and DO aeration control)

Operator decision support systems (e.g. dashboards for KPIs such as power use per unit flow)

Comprehensive historical data management and basic analysis

Alarm rationalization (e.g. prioritized and categorized alarms)



Leading

Advanced process optimization using multiple data sources (e.g. predictive aeration control leveraging influent loading)

Predictive strategies based on equipment performance data (e.g. abnormal current vs flow vs pressure)

Advanced data analytics for process troubleshooting and optimization

Integration with Laboratory Information Management Systems (LIMS)

Predictive alerts and alarming (e.g. aeration system back pressure to trigger diffuser cleaning)



Pioneering

System-wide proactive control using artificial intelligence and machine learning

Digital twin integration for process simulation and optimization (e.g. online biological and hydraulic models)

Prescriptive analytics driving autonomous decision-making across treatment, maintenance, and resource optimization with full system integration

Full integration with asset management, GIS, and hydraulic modeling systems

Prescriptive tasks to prevent alerts or alarms (e.g. pump performance running off curve, recommend maintenance)