

Digital Water Systems: How SJRA is Applying Digital Transformation Strategies

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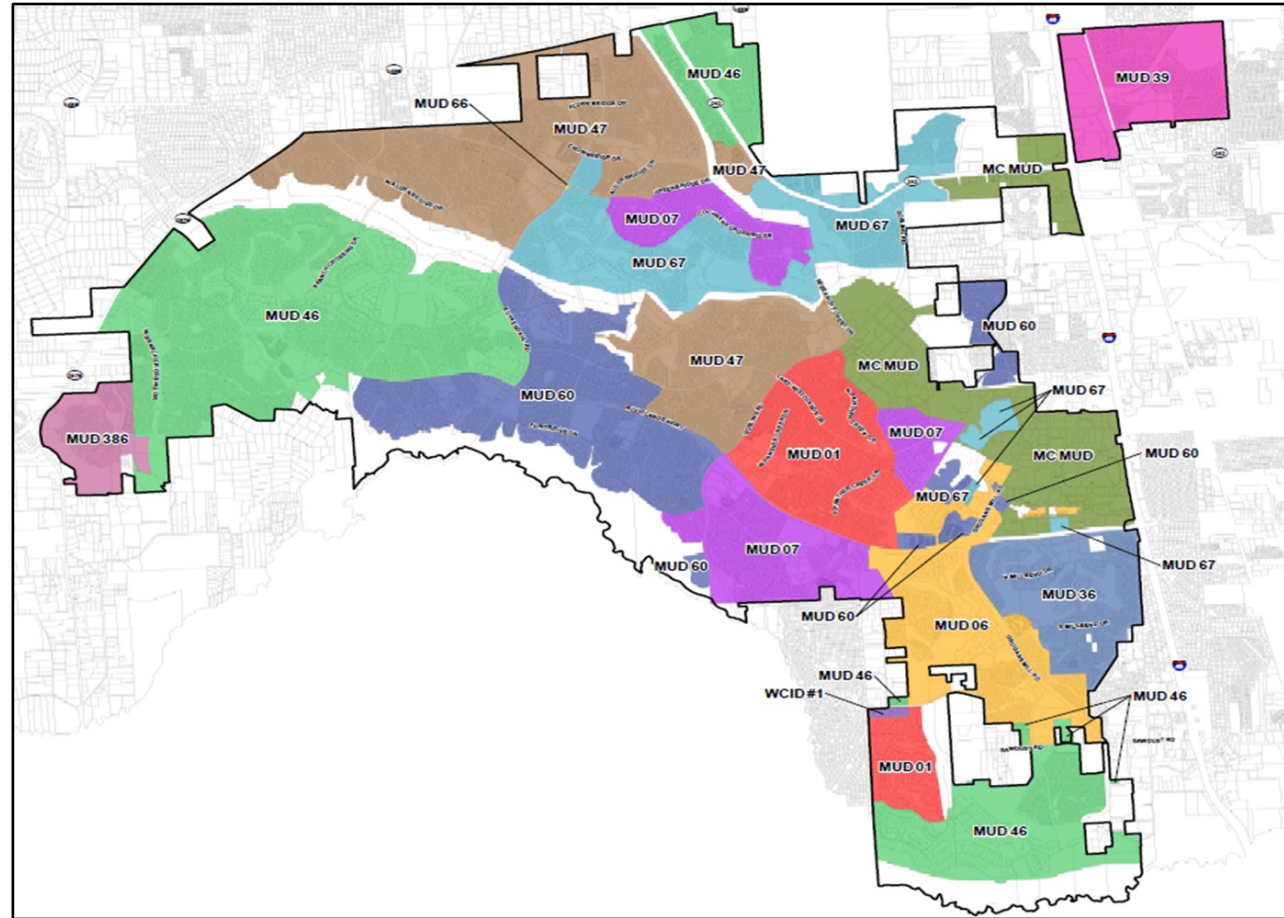


SJRA - Woodlands Division

Wholesale provider of water and wastewater treatment, collection and distribution to a population of 130,000+.

Water

- 5 water plants
- 38 water wells
- 65 MGD production capacity
- ~24 MG storage
- >126 miles of water mains



Wastewater

- 3 wastewater treatment plants
- 14.7 MGD treatment capacity
- 30 lift stations
- >70 miles of sewer mains

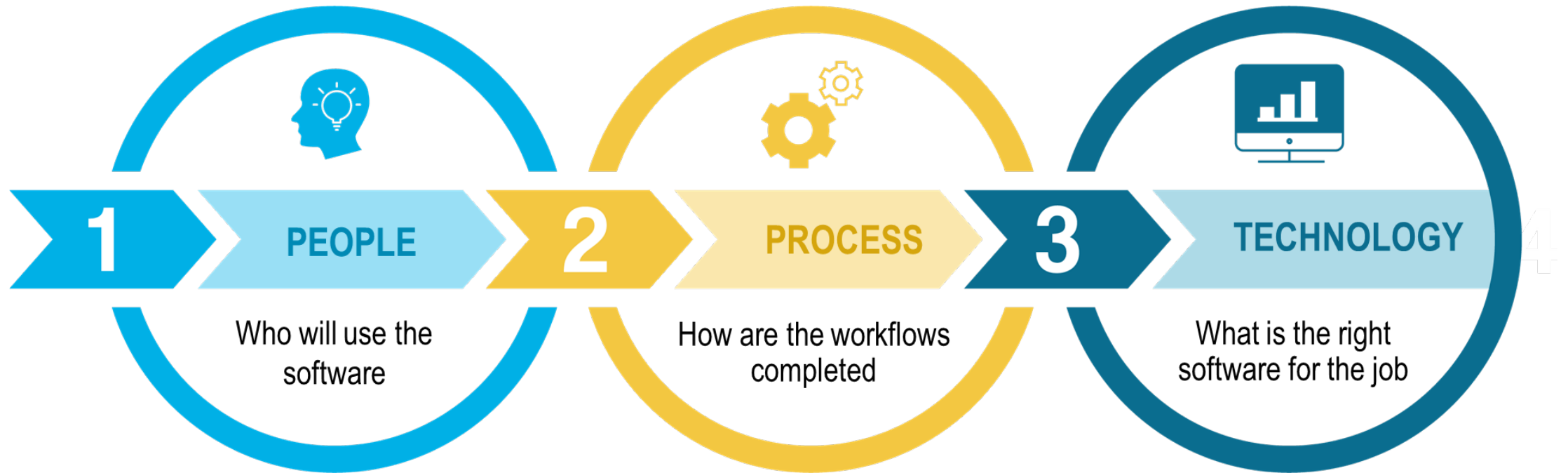
Digital Water Goals



- Utilize existing software for Business Intelligence
- Allow existing software to maintain core functions
- Improve
 - Project planning capabilities
 - Staff efficiency at data review
 - Asset Management

Project Background

Project success is driven by people, process, and then technology



A Digital Water System utilizes data from various software to form a comprehensive review of asset performance and risk.



Asset classification dashboard application

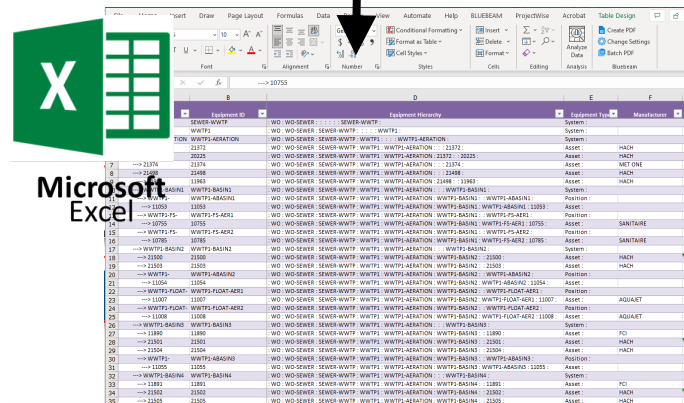
BEFORE

(On Premises)



(On Premises)

Microsoft SQL Server



Microsoft Excel

Difficult to manage. 8,000 assets with multi-tabbed spreadsheet!

AFTER

(On Premises)

Export Selection Set of Asset Information (for nearly 8,000 assets)



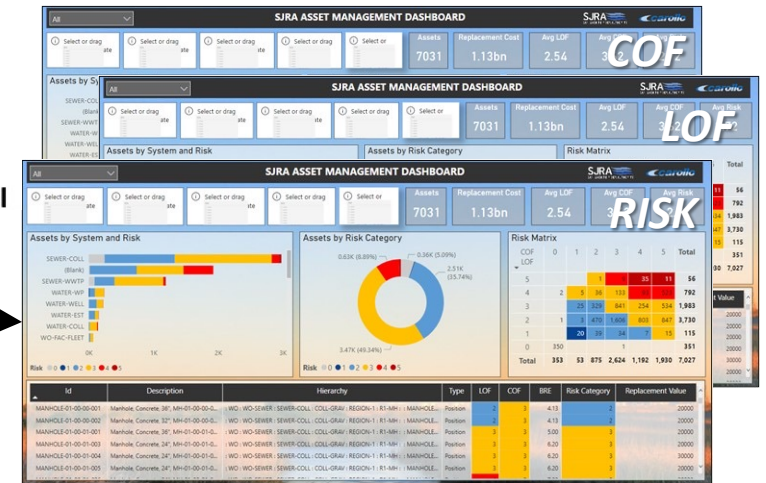
(On Premises)

Microsoft SQL Server



(Cloud)

Power BI



Six Power BI Dashboards Published to Cloud (Filterable Tables, Graphs, & Maps)

(Cloud)

Power BI dashboards accessible with browser. (8 filterable dashboards to Slice-n-Dice all Asset Data)

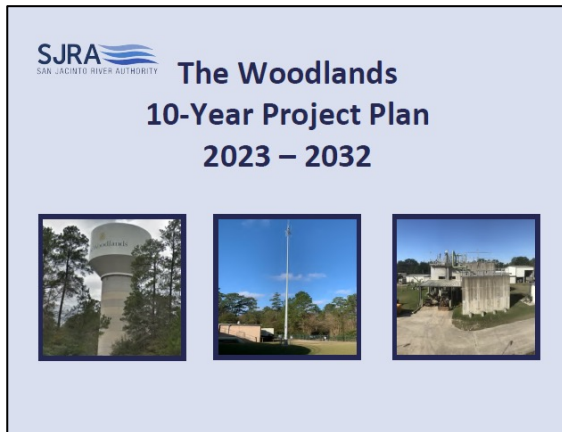
Example of an asset classification dashboard (one of 8 tabs)



Project planning dashboard application

BEFORE (Static CIP)

Spreadsheets for Each of the 70 Projects (made into PDF)



PROJECT NAME	PROJECT ID	FISCAL YEAR	DIVISION
Water Line Renewal	WA23WL	2023-2032	The Woodlands

PROJECT DESCRIPTION/JUSTIFICATION:	PROJECT MAP/PICTURE
The SJRA owns and maintains approximately 120 miles of potable water distribution lines 12-inch and larger diameter in the Woodlands. The existing distribution system contains 47 miles of asbestos cement (AC) lines. Approximately 20 miles of all water lines are more than 40 years old, and the majority of which are made of AC material. Industry asset management practices suggest that AC water lines have the higher frequency of failure, and average useful life of 30 years. Historically, SJRA has experienced an average 3 failures per year, and is trending upward. Due to the aging water distribution infrastructure and increasing rate of failures, water line renewal is necessary to decrease major frequency, improve reliability to end-users and maintain required level of service. This project is part of a phased asset management approach to continuously replace water lines in the system, with plan to replace all AC water lines within the next 20 years. Other projects as described in WA23WL, WA23WL, and WA23WL will accomplish the goal of replacing all of the AC pipe in the system. The AC lines will be replaced with PVC or HDPE lines with an average expected useful life of more than 50 years.	

PROJECT SCHEDULE	DELIVERY	FUNDING
Initiate Core Selection: FY 2023-Q1	Q1	Q1
PS&MO Issued: FY 2023-Q4	Q4	Q4
Final Proposal Docs: FY 2023-Q1	Q1	Q1
Proposals/BOI Received: FY 2023-Q3	Q3	Q3
Contract to Board: FY 2023-Q2	Q2	Q2
Substantial Completion: FY 2024-Q2	Q2	Q2

PROJECT	TOTAL	PREVIOUS	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Planning/Permitting/PS&M	\$ 250,000	\$ 250,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Engineering/Design	\$ 504,000	\$ 504,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Construction	\$ 4,470,000	\$ 1,466,000	\$ 1,004,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
CPE, CM&I, and CM&T	\$ 447,000	\$ 347,000	\$ 100,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Equipment Purchase	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Land Acquisition	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Other	\$ 5,671,000	\$ 4,527,000	\$ 1,004,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	

AFTER (Dynamic CIP)

Power BI Dashboards Accessible with Browser (5 Filterable Dashboards with sliders to analyze Inflation)

Select Category
All

Inflation (Year 1-5)
3.00%

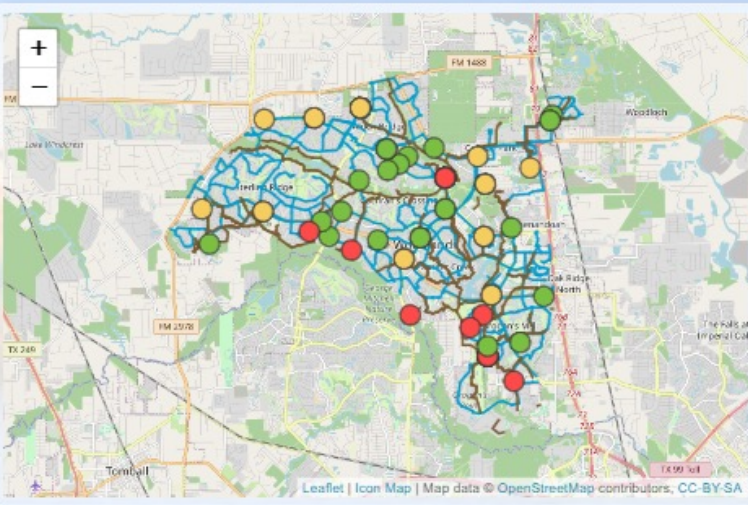
Inflation (Year 6-10)
3.00%



Total Cost
\$329,554,000

- Select Projects
- Use Ctrl for multiselection
- Search
- Select all
 - WA123A
 - WA1WGN
 - WA21WL
 - WA23WL
 - WA23WR
 - WA24WL
 - WA24WR
 - WA25WL

ProjectId	ProjectName	Original Cost	Funding Source	Delivery
WA123A	Abandon Water Well Nos. 1, 2 and 3	\$395,520	R&R	CSP
WA1WGN	Water Well Site Generator	\$631,250	R&R	CSP
WA21WL	Water Line Renewal	\$825,000	R&R	CSP
WA23WL	Water Line Renewal	\$9,529,511	R&R	CSP
WA23WR	Water Well Rehabilitation	\$1,070,400	R&R	CSP
WA24WL	Water Line Renewal	\$19,872,288	R&R	CSP
WA24WR	Water Well Rehabilitation	\$988,800	R&R	CSP
WA25WL	Water Line Renewal	\$6,274,042	R&R	CSP
WA25WR	Water Well Rehabilitation	\$2,274,000	R&R	CSP
WA26WL	Water Line Renewal	\$6,771,859	R&R	CSP



*30% contingency is included with inflation

Example of a project planning dashboard (one of 5 tabs)

Operations management dashboard application

BEFORE

SCADA and LIMS for
3 WWTPs x 35 Parameters

Timeseries from On-line Meters
(e.g., Flow, DO, CI Residual, etc.)



Grab Samples
Lab Data in CSV File
(e.g., BOD, TSS, etc.)

Sample ID	Date	Time	Location	Parameter	Measurement	Units
CF4449-01	6/20/2022	8:15	SIRA #1 AerationBasin 2	MLVSS	1430	mg/L
CF4449-01	6/20/2022	8:15	SIRA #1 AerationBasin 2	MLVSS	1780	mg/L
CF4449-02	6/20/2022	8:15	SIRA #1 AerationBasin 3	MLVSS	2430	mg/L
CF4449-02	6/20/2022	8:15	SIRA #1 AerationBasin 3	MLVSS	2050	mg/L
CF4449-03	6/20/2022	8:15	SIRA #1 AerationBasin 4	MLVSS	2430	mg/L
CF4449-03	6/20/2022	8:15	SIRA #1 AerationBasin 4	MLVSS	2050	mg/L
CF4449-04	6/20/2022	8:15	SIRA #1 AerationBAS	MLVSS	3700	mg/L
CF4449-04	6/20/2022	8:15	SIRA #1 AerationBAS	MLVSS	3090	mg/L
CF4449-05	6/20/2022	8:30	SIRA #1 AerationBAS	MLVSS	9140	mg/L
CF4450-01	6/20/2022	7:20	SIRA #1 Effluent	E coli IDEXX	ND	mpn/100ml
CF4451-01	6/20/2022	7:27	SIRA #1 Effluent	CRD05	2.2	mg/L
CF4451-01	6/20/2022	7:27	SIRA #1 Effluent	TPICP	4.45	mg/L
CF4451-01	6/20/2022	7:27	SIRA #1 Effluent	TSS	1.2	mg/L
CF4451-01	6/20/2022	7:27	SIRA #1 Effluent	Ammonia as N	4.45	mg/L
CF4452-01	6/20/2022	7:40	SIRA #1 Influent	Ammonia as N	4.45	mg/L
CF4452-01	6/20/2022	7:40	SIRA #1 Influent	BOD5	4.45	mg/L
CF4452-01	6/20/2022	7:40	SIRA #1 Influent	TPICP	4.45	mg/L
CF4452-01	6/20/2022	7:40	SIRA #1 Influent	TSS	1.2	mg/L



Microsoft Excel



Microsoft Excel

Simple Graphs, Tables, and
analysis of
SCADA and LIMS Data

AFTER

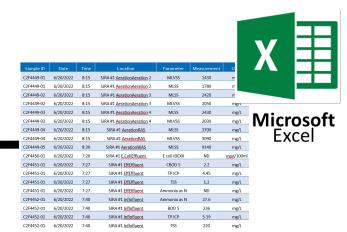
Dynamic Dashboards Accessible with Browser on Desktop (potentially on mobile devices) (Selectable Time Periods, Selectable Parameters)



SCADA Historian

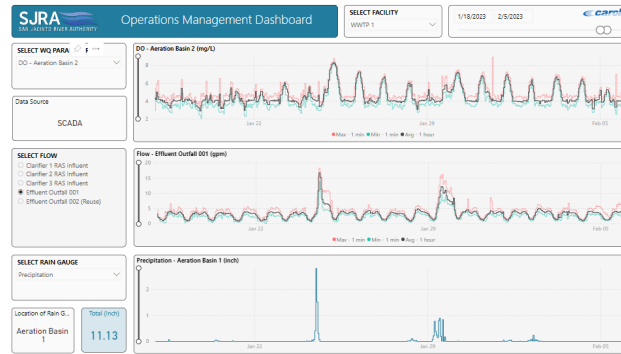


Power BI

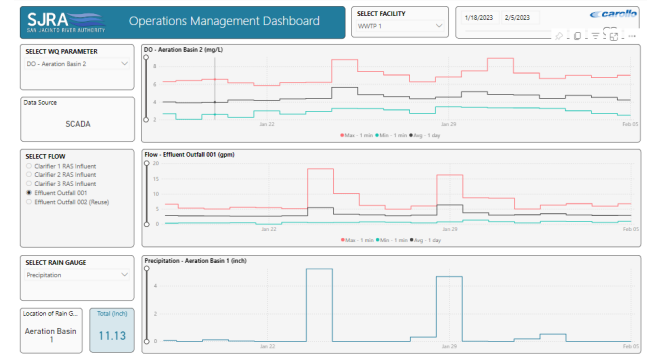


Microsoft Excel

Detailed Dashboard
(Hourly Avg and Minute Min/Max)



Automatic Daily, Weekly, Monthly, and
Yearly Dashboards (Min, Avg, Max)



SELECT WQ PARA
DO - Aeration Basin 2

Data Source

SCADA

SELECT FLOW

- Clarifier 1 RAS Influent
- Clarifier 2 RAS Influent
- Clarifier 3 RAS Influent
- Effluent Outfall 001
- Effluent Outfall 002 (Reuse)

SELECT RAIN GAUGE

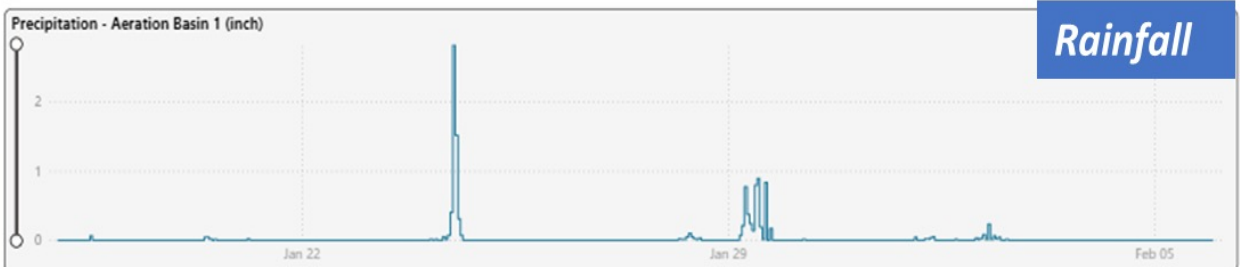
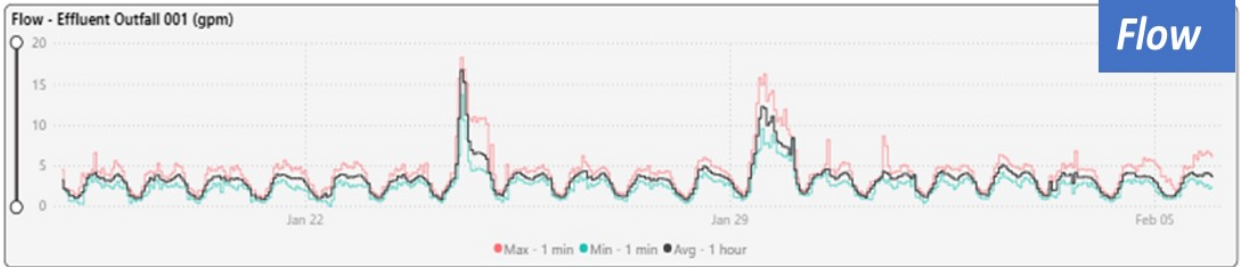
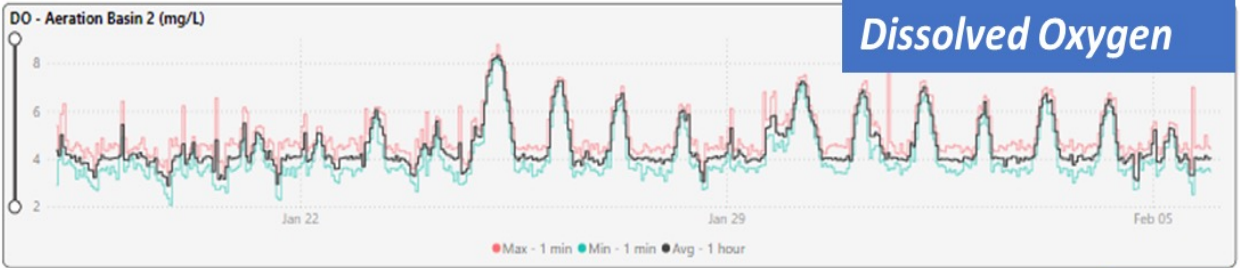
Precipitation

Location of Rain G...

Aeration Basin
1

Total (Inch)

11.13



Selectable hourly data for three
WWTPs x 35 Parameters x 1.3 years

Example of an
operations
management
dashboard (one
of 5 tabs)

Questions?

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