

2025 APWA Presentation

Digital Master Plans

Modernizing the Planning & Management of Utilities

November 19th, 2025



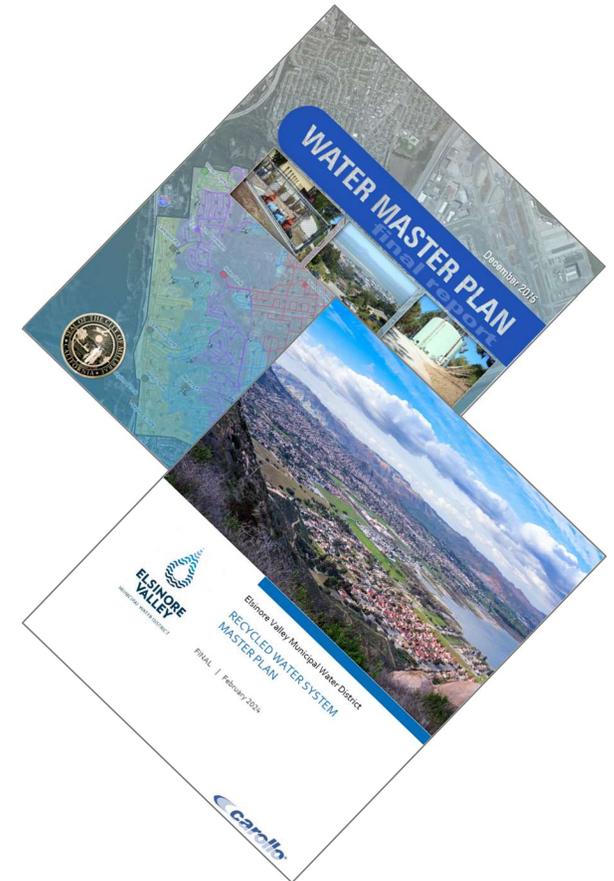
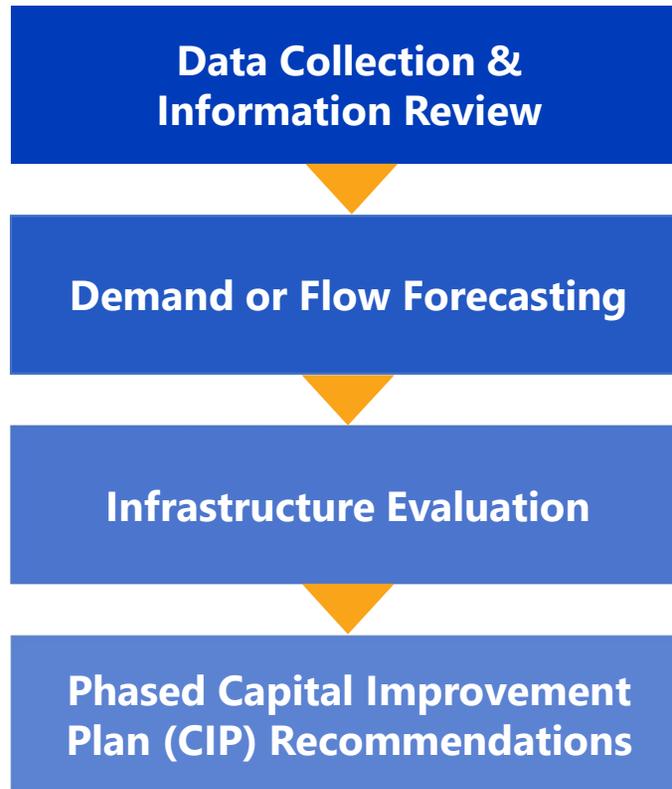
— Agenda

- **Digital Master Plans**
- **Strategic Alignment**
- **Sample Utility Applications**
- **Foundational Steps**
- **Q & A**

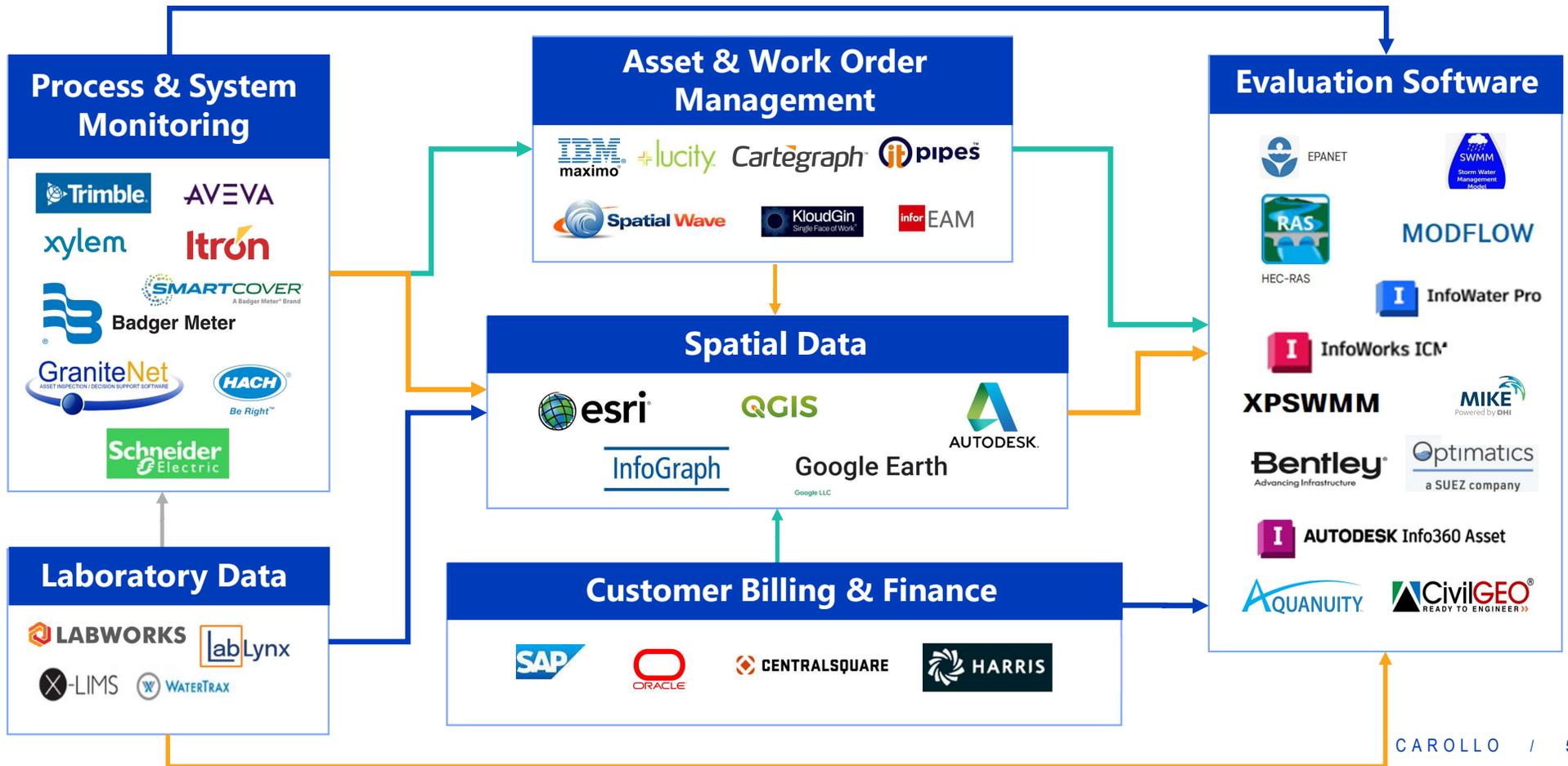
01

Digital Master Plans

Congratulations! You've Completed A Master Plan



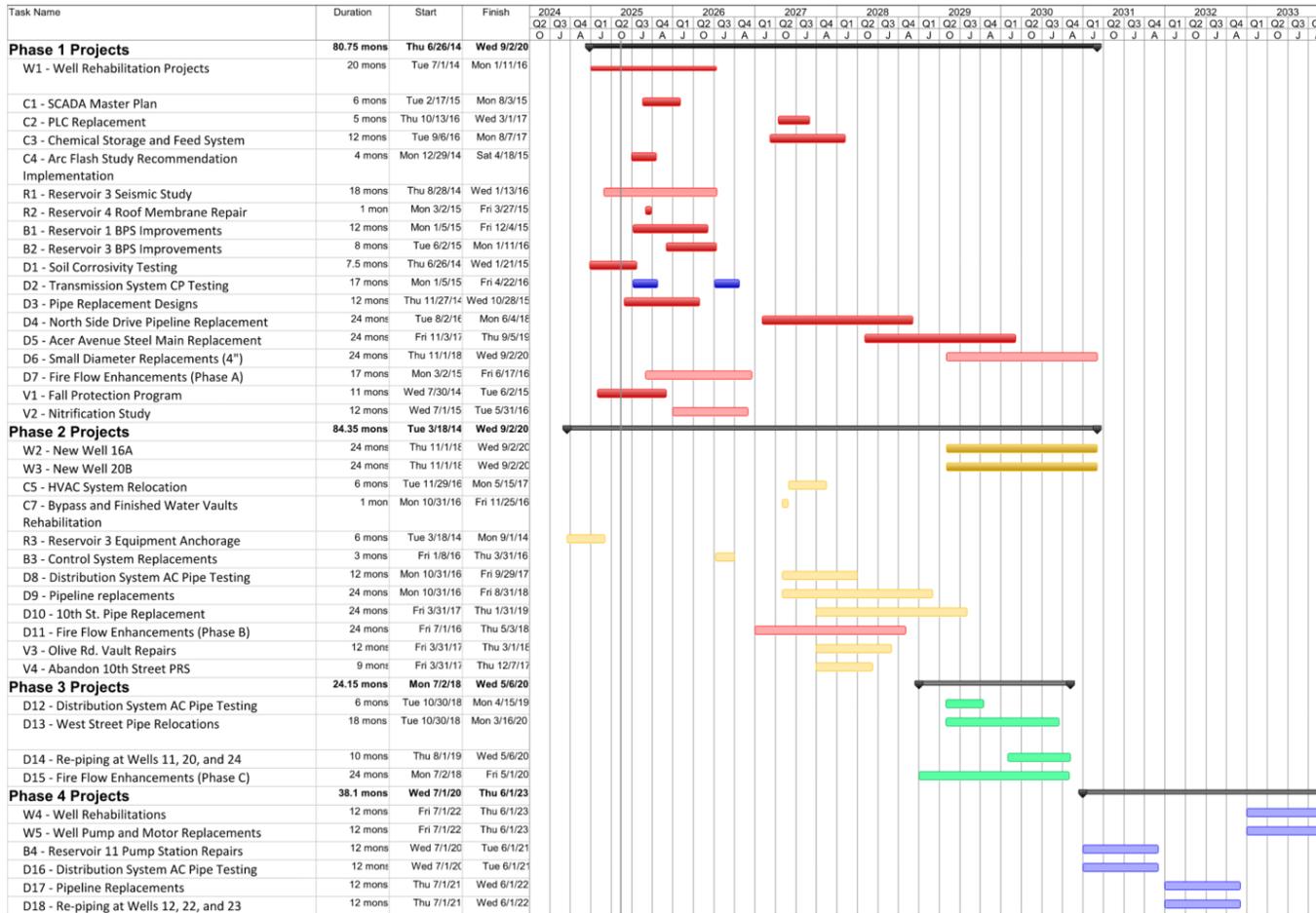
A Data & Technology Intensive Exercise...



...With Collaboration Across Multiple Departments



CIP Scheduled for the Next 10 to 20 Years!

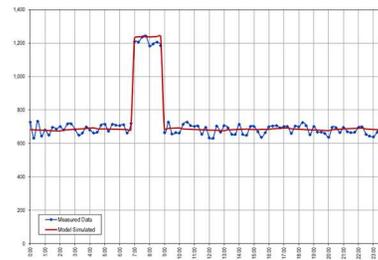
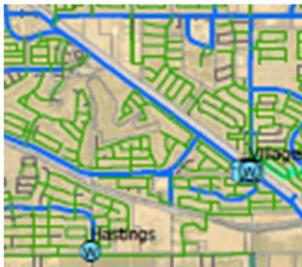


—
Need to Reprioritize Already?



Wait – What Is A Digital Master Plan Again?

Master Planning *tools and approaches* have evolved



1990's

Model Graphical User Interfaces, GIS data for hydraulic models



2000's

SCADA data integration with models



2010's

Decision Support Tools that apply model outputs. Use of automated metering data



2020's

Digital tools that enhance understanding, extend life of master plan. Incorporating AI/ML.

Benefits of Digital Master Plans

- **Direct**

- » **Dynamic** - Reprioritize and Track CIP as needs change.
 - Growth tracking – land use and development changes
 - Other changes: funding, climate/resiliency
- » Improved decision making through interactive dashboards.
- » Enhances Customer Service through data transparency.

- **Indirect - Increased Data Quality and Organization**

- » Encourages Digital Asset Maintenance (Data, Software, Hardware, Security)
- » Breaks Down Silos Across Technology and Departments
- » Improves Organizational Processes
- » Already Ready for Next Master Plan Cycle

02

Strategic Alignment

Effective Utility Management

10 Attributes of Effective Utilities

Product Quality

Employee and Leadership Development

Financial Viability

Community Sustainability

Stakeholder Understanding and Support

Customer Satisfaction

Operational Optimization

Operational Resiliency

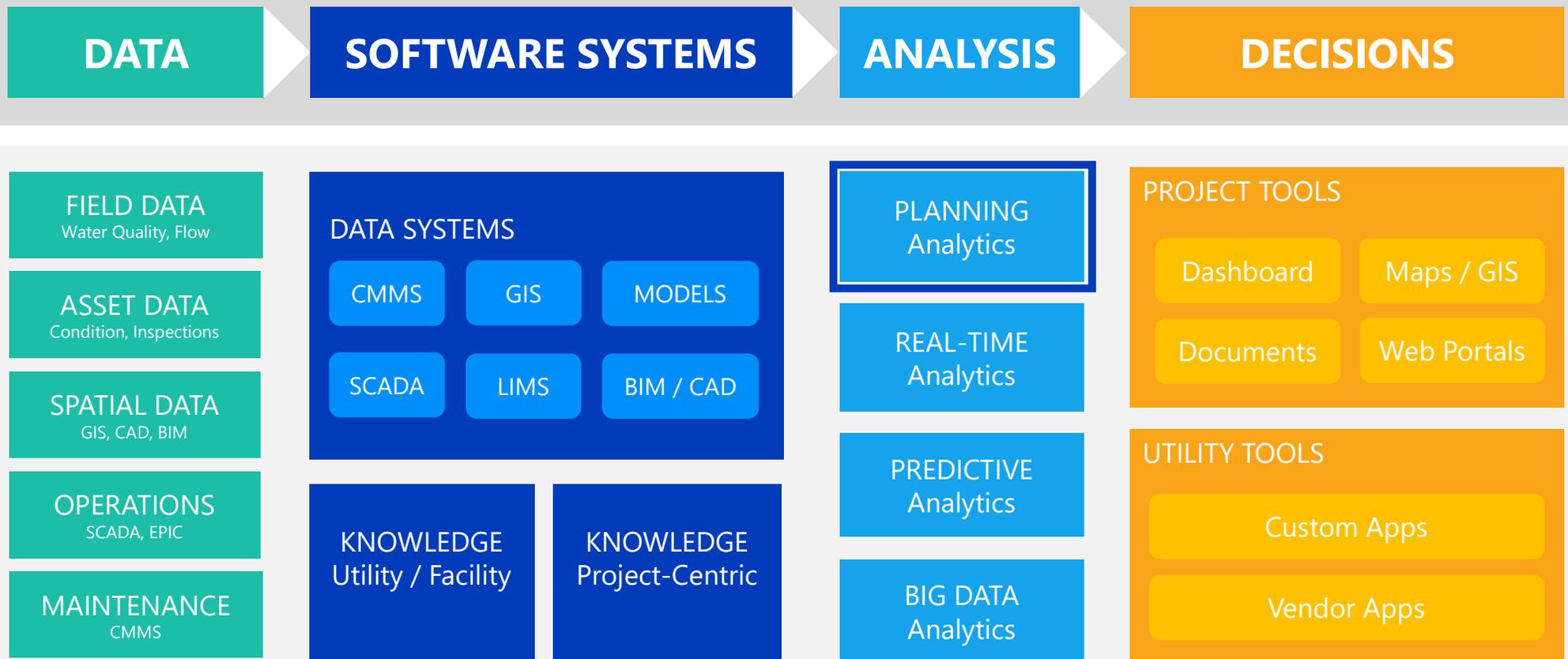
Infrastructure Stability

Water Resource Adequacy

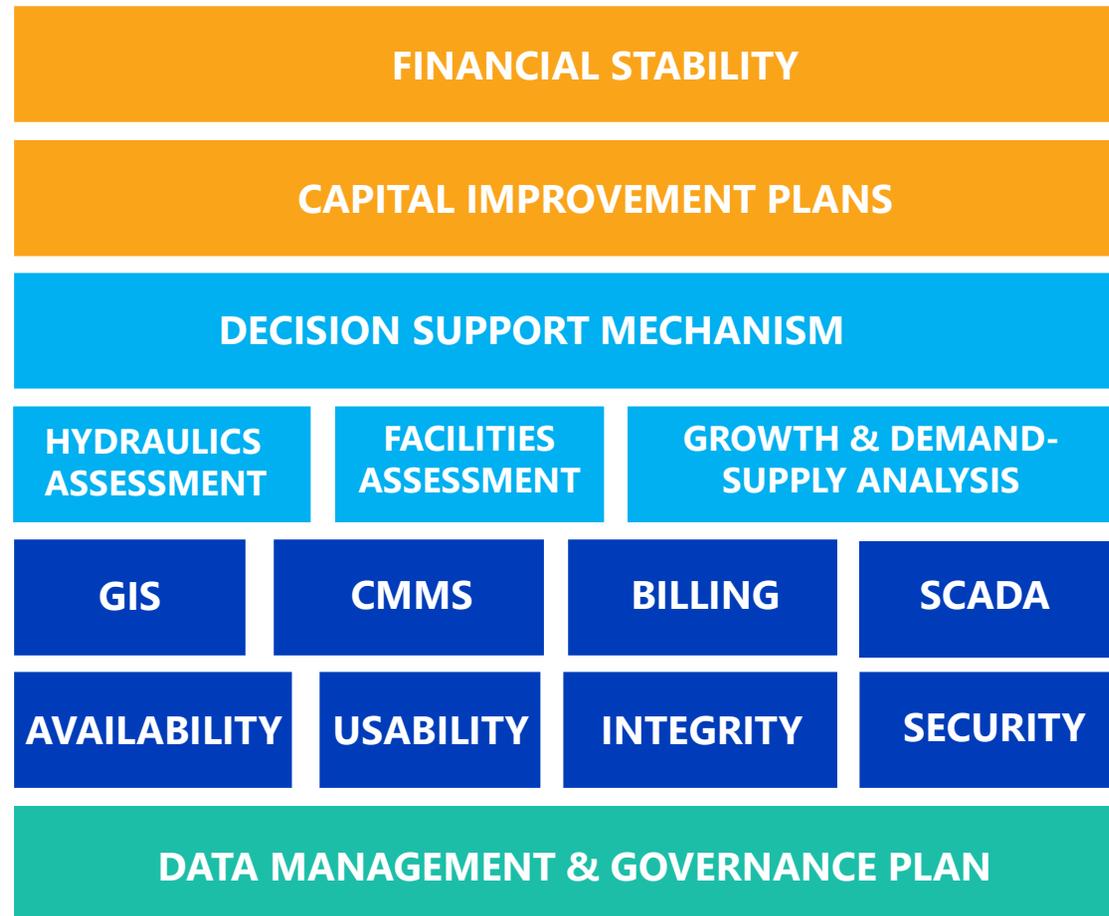


Metrics & KPIs

Digital Platforms Provide the Backbone



Foundation to Financial Stability



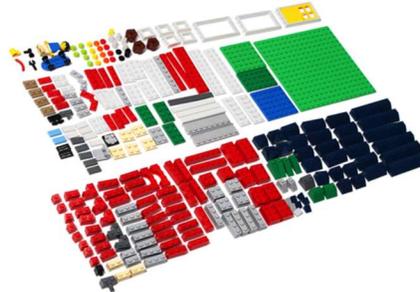
Source: <https://awwa.onlinelibrary.wiley.com/doi/10.1002/awwa.2404>

Data As an Asset



Data Collection

Measure and understand the performance or behavior of something.



Data Visualization

Trended or graphed to be easily understood.



Data Preparation

Cleanse, organize, and combine the data so it's ready to be analyzed.



Data Analysis

Examine the data for insights that matter to a specific audience.



Data Storytelling

Explain your insights with narrative and visuals so they resonate and inspire change.

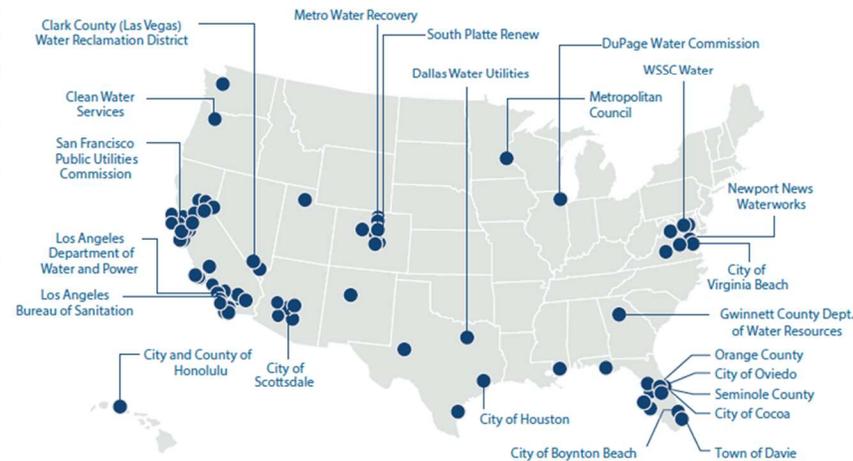
03

Sample Utility Applications

Digital Services Projects

DIGITAL PROJECT TITLE	AGENCY	PRIMARY TECHNOLOGY	STRATEGY	GOVERNANCE	ARCHITECTURE	REQUIREMENTS	DEVELOPMENT	IMPLEMENT
STRATEGIC ROADMAP PROJECTS								
Information and Data Management Strategic Plan (East County Advanced Water Purification)	East County JPA, CA	ALL	●	●	●	●	●	●
Harvest Water Enterprise Management System (Phase 1)	Sac Regional County San. District , CA	ALL	●	●	●	●	●	●
Data Management and Performance Metrics Roadmap	Hillsborough County PUD, FL	ALL	●	●	●	●	●	●
PUD Water Resources Department – Information Technology Master Plan	Hillsborough County PUD, FL	ALL	●	●	●	●	●	●
Operations Data Management and Analytics Support and Roadmap Development	Metropolitan Council Environmental Services, MN	ALL	●	●	●	●	●	●
PLANNING PROJECTS								
Development Demand Tracking Application (Sewer/Water Master Plan)	Elsinore Valley Municipal Water District, CA	MODEL, GIS			●	●	●	●
Water Resource Data Information Management System (DIMS)	County of San Luis Obispo, CA	MODEL, GIS	●	●	●	●	●	●
Digital Master Planning Tools (Sewer Master Plan)			●	●	●	●	●	●
Digital Master Planning Tools (Sewer/Water Master Plan)			●	●	●	●	●	●
Facility Master Plan and Data Management Services (eMaster Plan)			●	●	●	●	●	●
Sewer and Water Demand Tracking Tool			●	●	●	●	●	●
SPATIAL PROJECTS								
Geographical Information Systems and Hydraulic Model Hosting and Maintenance			●	●	●	●	●	●
Oklahoma Comprehensive Water Plan - Data Management and Dashboard Service			●	●	●	●	●	●
Advanced Dashboard and Data Analytics Services			●	●	●	●	●	●
GIS Data Management Services (Program Management Services)			●	●	●	●	●	●
Arsenic Mitigation Study, GIS and Data Management Tools			●	●	●	●	●	●
OPERATION DATA MANAGEMENT PROJECTS								
Digital Water System Development (Phase I, 2 and 3)			●	●	●	●	●	●
Treatment Process Data Management and Analysis (One Water Pilot Study)			●	●	●	●	●	●
Water Meter and Line Replacement Program Management			●	●	●	●	●	●
Electronic Operations and Maintenance Manual			●	●	●	●	●	●
Integrated Electronic Operations and Maintenance Manual			●	●	●	●	●	●
Intelligent Water Planning and Pilot Implementation			●	●	●	●	●	●
Real-time Operations / Info360 Implementation (Phase 2)			●	●	●	●	●	●
Permit Tracking System Implementation Support (Infor IPS)			●	●	●	●	●	●

EXAMPLE OF OUR TEAM'S ASSET AND DATA MANAGEMENT AND GIS EXPERIENCE



What Are Our Utility Clients Asking For?

- **Dashboards** – support operational / planning decisions
- **CIP project management** – tracking, planning, prioritization
- **Asset management** – condition assessment, forecasting, R&R capital costs
- **Field data** collection solutions
- **Digital master plans** – GIS-based apps for tracking developments, supply/demand, and hydraulic model results

BETTER ANALYSIS

BETTER DECISION MAKING

IMPROVED COMMUNICATION

Digital Master Planning Tools



**Demand/
Flow Tracker**



**Hydraulic
Capacity
Tracker**



**Asset
Condition
Tracker**



**CIP
Tracker**



**Project
Overview**

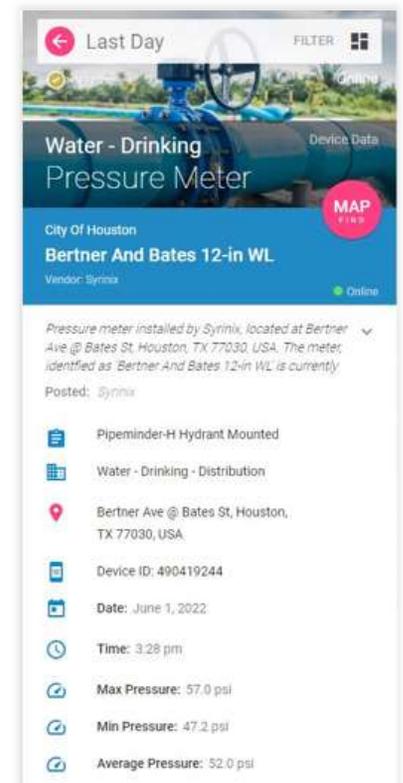
Implementing Digital Tools for Master Planning

Data

- Data and document-centric custom applications
- Microsoft platform – Power BI, Power Platform, SharePoint,
- Custom applications use a low code/no-code approach built around Power Platform

Spatial

- ESRI ArcGIS applications
- Web maps, Story Maps, dashboards, Experience Builder
- Custom centralized portal application built using ArcGIS Online
- Reusable solutions through templates



Digital Master Planning Tools



**Demand/
Flow Tracker**



**Hydraulic
Capacity
Tracker**



**Asset
Condition
Tracker**



**CIP
Tracker**



**Project
Overview**

Demand/Flow Tracker for Planners

Description

- Web-based GIS app to track developments, water, sewer, reclaimed water flows.
- ***Dynamically update*** growth and development for water supply planning and hydraulic models.

Value

- Enable utilities to dynamically update infrastructure plans.

The screenshot displays a mobile application interface for tracking developments. At the top, there is a navigation bar with a back arrow, the text "Existing Calibrated", a "FILTER" button, and a grid icon. Below this is a header section with a "Residential Development" title and a "MAP FIND" button. The main content area shows details for "Horizon Condos TR 36672" by "Lennar Homes of California, Inc.", with an "active" status indicator. A list of metadata includes: "Condos" (dropdown), "Posted: Carollo Engineers" (with a "Contact" link), "Horizon Condos TR 36672", "Engineer: Michael Baker International", "Project Type: Residential", "Status: PC", and "Year: 2022 (February)". Below the metadata are three expandable sections: "Pump Stations" (with a "Find Pumps" link), "Tanks" (with a "Find Tanks" link), and "Lift Stations" (with a "Find Lift Stations" link). At the bottom, there is a "Demands" section with an "EDIT >" link and a bar chart showing a single blue bar representing a demand value of approximately 1,800 on a scale from 1,000 to 2,000.

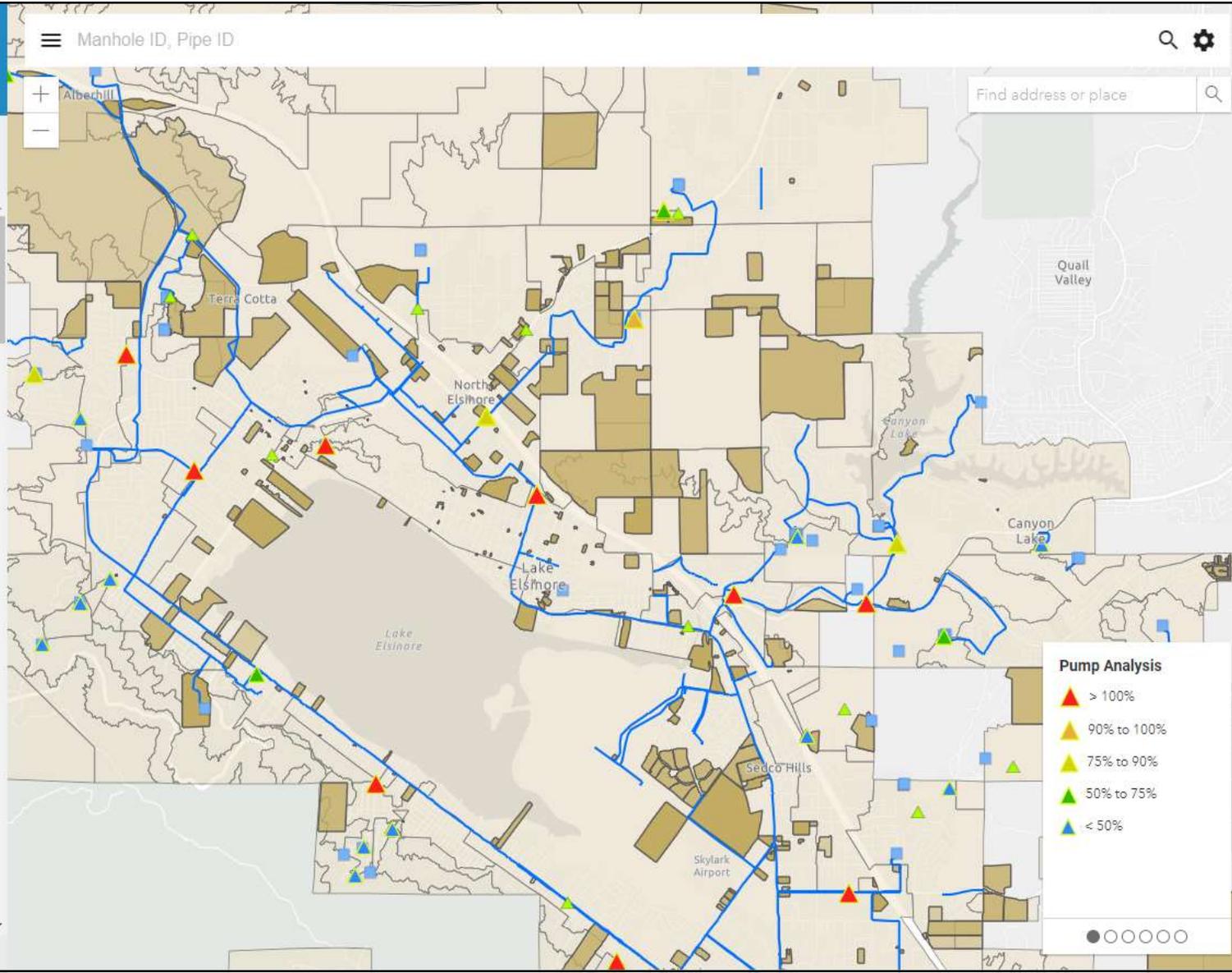
Developments

REVIEW CONSTR OCCUPIED

Status: All FILTER >

All Project Types

-  Lennar Homes of California, Inc. Feb 2022
Horizon Condos TR 36672
Residential | PC >
-  Golden Eagle - Villa Siena LLC/ ... Feb 2022
Villa Siena
Multi-Family | PC >
-  Strata Baxter, LLC Feb 2022
Baxter Village
Commercial | PC >
-  Temescal Valley Land, LLC Feb 2022
Saddleback Estates
Residential | PC >
-  Marks Architects Feb 2022
Jack in the Box El Toro
Commercial | PLAN >
-  Advanced Weldtec Inc Feb 2022
PAR APN 370-080-024 Modular ...
Commercial | PC >
-  RED Corydon, LLC Feb 2022
Corydon Gateway Commercial
Commercial | PC >
-  Huizar & Associates Feb 2022
Lindsay Street
Residential | PLAN >
-  Menh LLC Feb 2022
30433 Chaney Street
Residential | PLAN >



Existing Calibrated

FILTER

OFFICIAL

Residential Development

Active

MAP FIND

Spyglass Ranch (Riverside) ASLIV, LLLP Spyglass Tract 35337

Online

SFD and MFD Tract Development

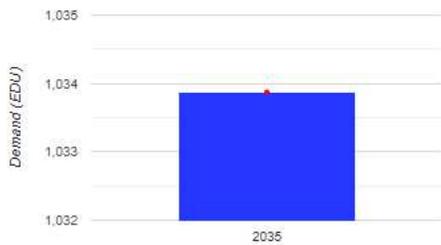
Posted: Carollo Engineers

Contact

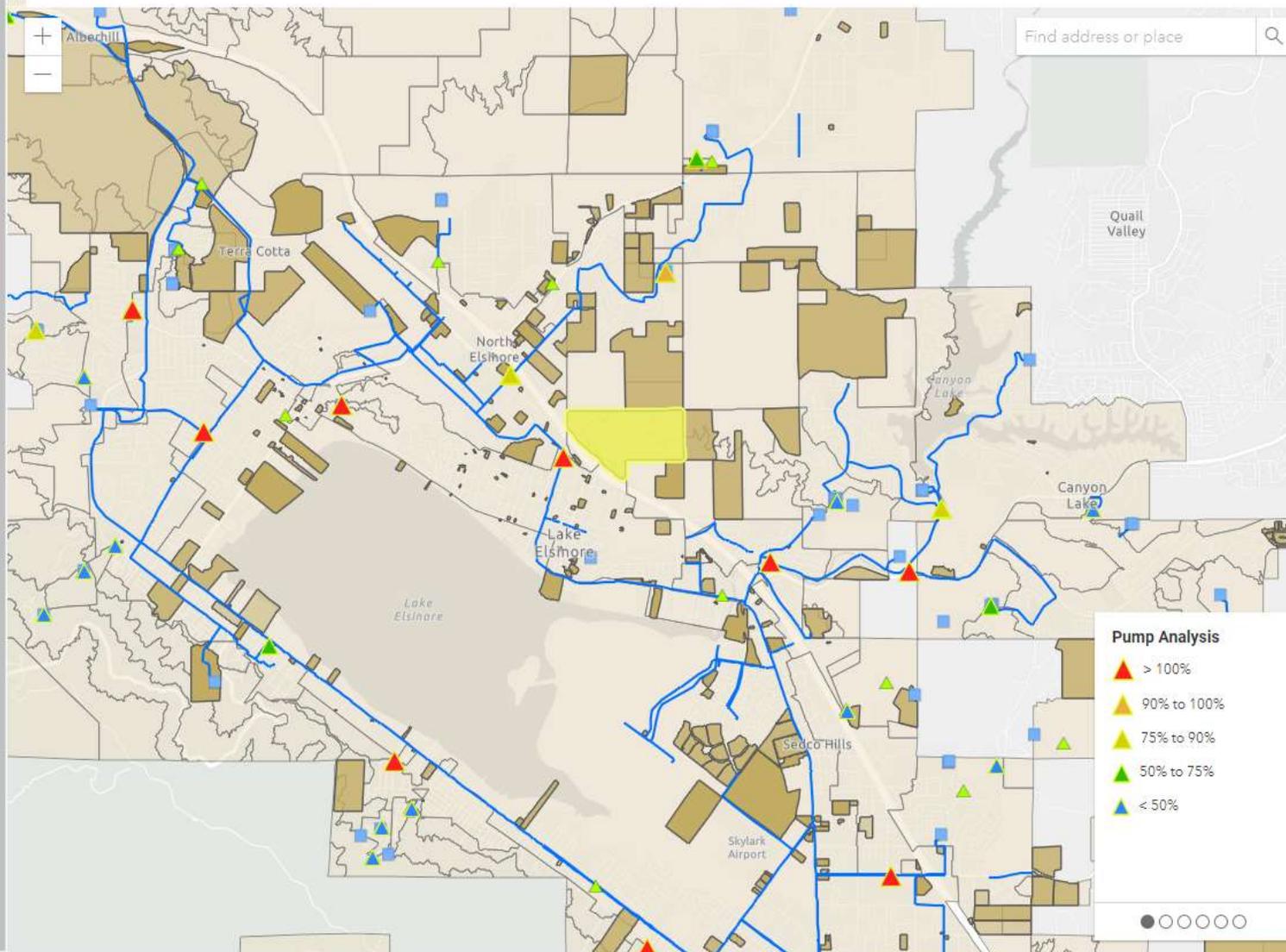
- Spyglass Tract 35337
- Engineer: K&A Engineering
- Project Type: Residential
- Status: PLAN
- Year: 2021 (December)

Demands

EDIT >



Manhole ID, Pipe ID



Pump Analysis

- > 100%
- 90% to 100%
- 75% to 90%
- 50% to 75%
- < 50%



← Edit Demand

DELETE SAVE

Title (Short)

Spyglass Tract 35337

Equivalent Dwelling Units (EDU)

1033.8

Status

Inspection >

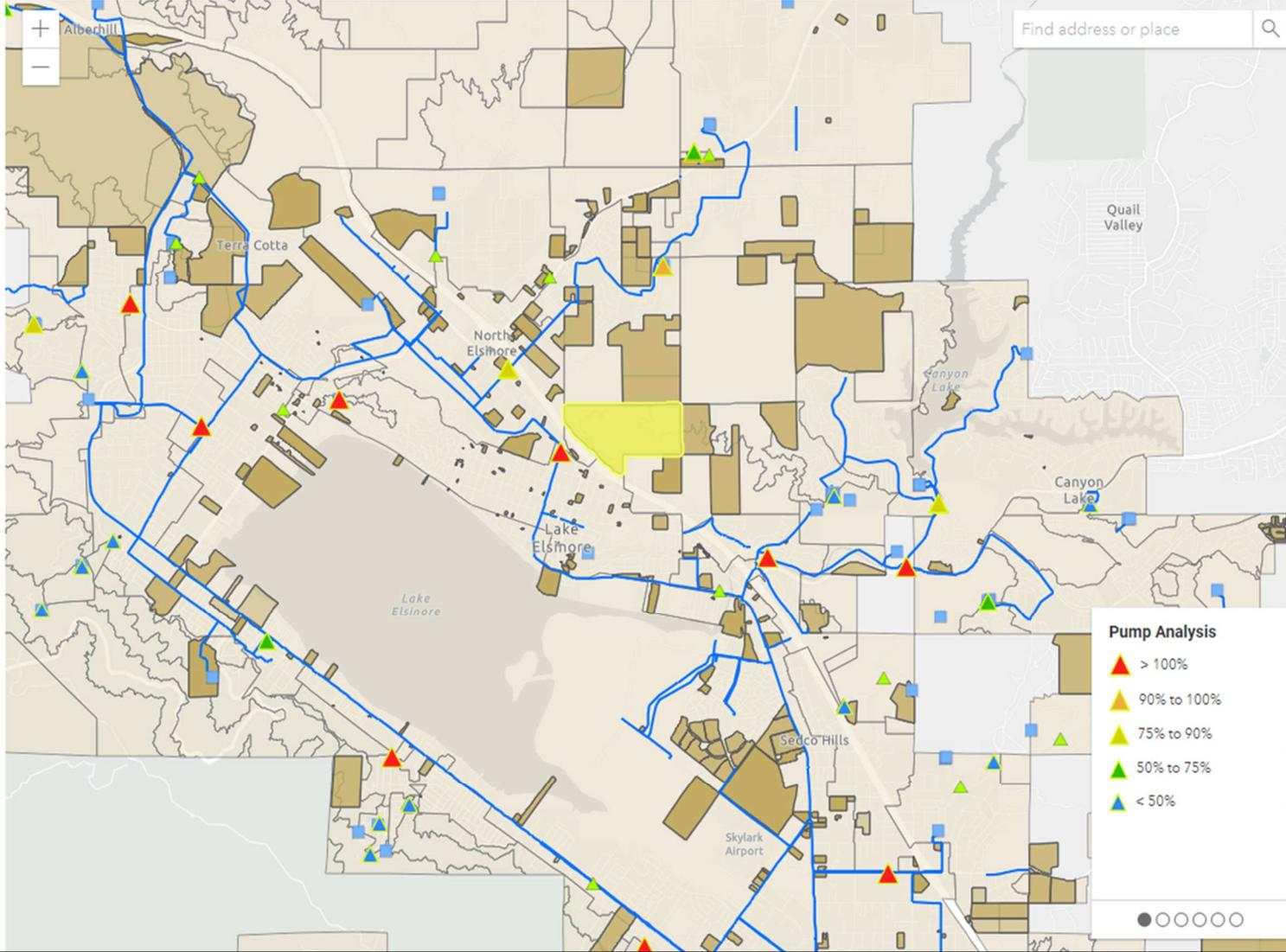
Pressure Zone >

Planning Year

2035

Notes

☰ Manhole ID, Pipe ID





ACT

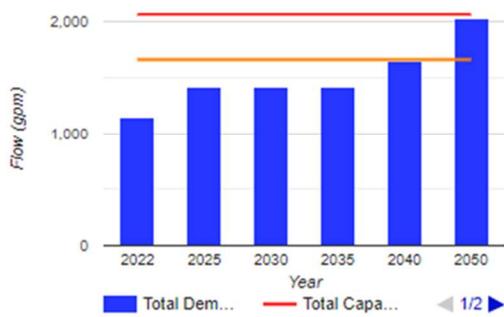
The City Booster pump station located at 521 N Langstaff St, has 3 pumps each with respective capacities of 850/850/850 (gpm). The pump station

Posted: Carollo Engineers

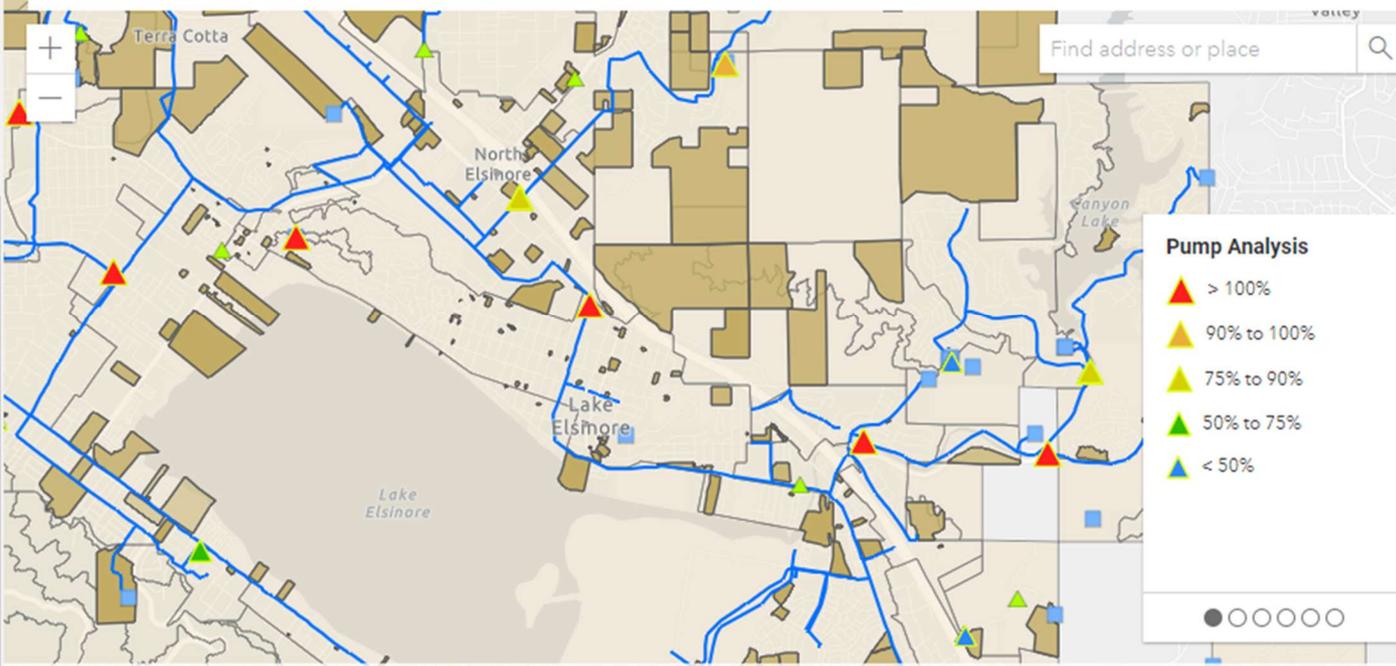
Contact

- City Booster (Model ID: PS-CIB)
- 521 N Langstaff St
- No. of Pumps: 3
- Total Capacity: 2069.3 gpm (Firm)
- Firm Capacity: 1661.0 gpm
- Total Demand: 1144.5 gpm
- Surplus: -37.1 gpm
- Percent Capacity: 103%

Capacity Projections EDU DETAILS >



Manhole ID, Pipe ID



County of Riverside, California State Parks, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EP... Powered by Esri

Capacity Projections

Flow Summary (gpm)	2025	2035	2040	2050
Capacity	2069.3	2069.3	2069.3	2069.3
Firm Capacity	1661.0	1661.0	1661.0	1661.0
Firm Capacity Adjusted	1107.3	1107.3	1107.3	1107.3
Demand: Existing	1279.3	1279.3	1397.4	1589.8
Demand: Will Serve	134.8	134.8	252.9	445.2
Surplus / Deficit	-306.8	-306.8	-543.0	-927.7

Digital Master Planning Tools



**Demand/
Flow Tracker**



**Hydraulic
Capacity
Tracker**



**Asset
Condition
Tracker**



**CIP
Tracker**



**Project
Overview**

Hydraulic Capacity Tracker

Description

- Web-based app for displaying, hydraulic model results.

Value

- Communicates modeling results to a broad audience, enhances understanding.

The screenshot displays the app's interface for a specific sewer main. At the top, it shows a back arrow, the text '2020 Existing', and a 'FILTER' button. Below this is an 'OFFICIAL' status indicator and a background image of a pipe. The main title is 'Wastewater - Collection Sewer Capacity'. The location is identified as 'Padre Dam Municipal Water District' and 'JCT-68 - JCT-70', with a 'Model: Force Main' and an 'Online' status. A descriptive paragraph states: 'The 20-inch gravity sewer main located between Manhole JCT-68 and Manhole JCT-70 has a full-pipe capacity of 11.06-mgd. The following summarizes the'. Below this, it says 'Posted: Carollo Engineers' with a 'Contact' link. A list of key metrics follows, each with an icon and a copy icon:

- Model Type: Force Main
- Wastewater - Collection - Pipe
- JCT-68 - JCT-70
- Size: 20 inch
- Capacity: 11.06 mgd
- Peak Dry Flow: 2.022 mgd
- Peak Wet Flow: 2.025 mgd
- Peak Wet d/D: 27.7
- Peak Wet Surchage: 44.50 feet (above crown)
- Average Dry Flow: 2.303 mgd

Wastewater - Collection Sewer Capacity

Sanitary



Cape Fear Public Utility Authority
117614 - 117615

Model: Sewer

Online

The 24-inch gravity sewer main located between Manhole 117614 and Manhole 117615 has a full-pipe capacity of 3.69-mgd. The following summarizes the

Posted: Carollo Engineers

Contact

Model Type: Sewer

Wastewater - Collection - Pipe

117614 - 117615

Size: 24 inch

Capacity: 3.69 mgd

Peak Dry Flow: 2.666 mgd

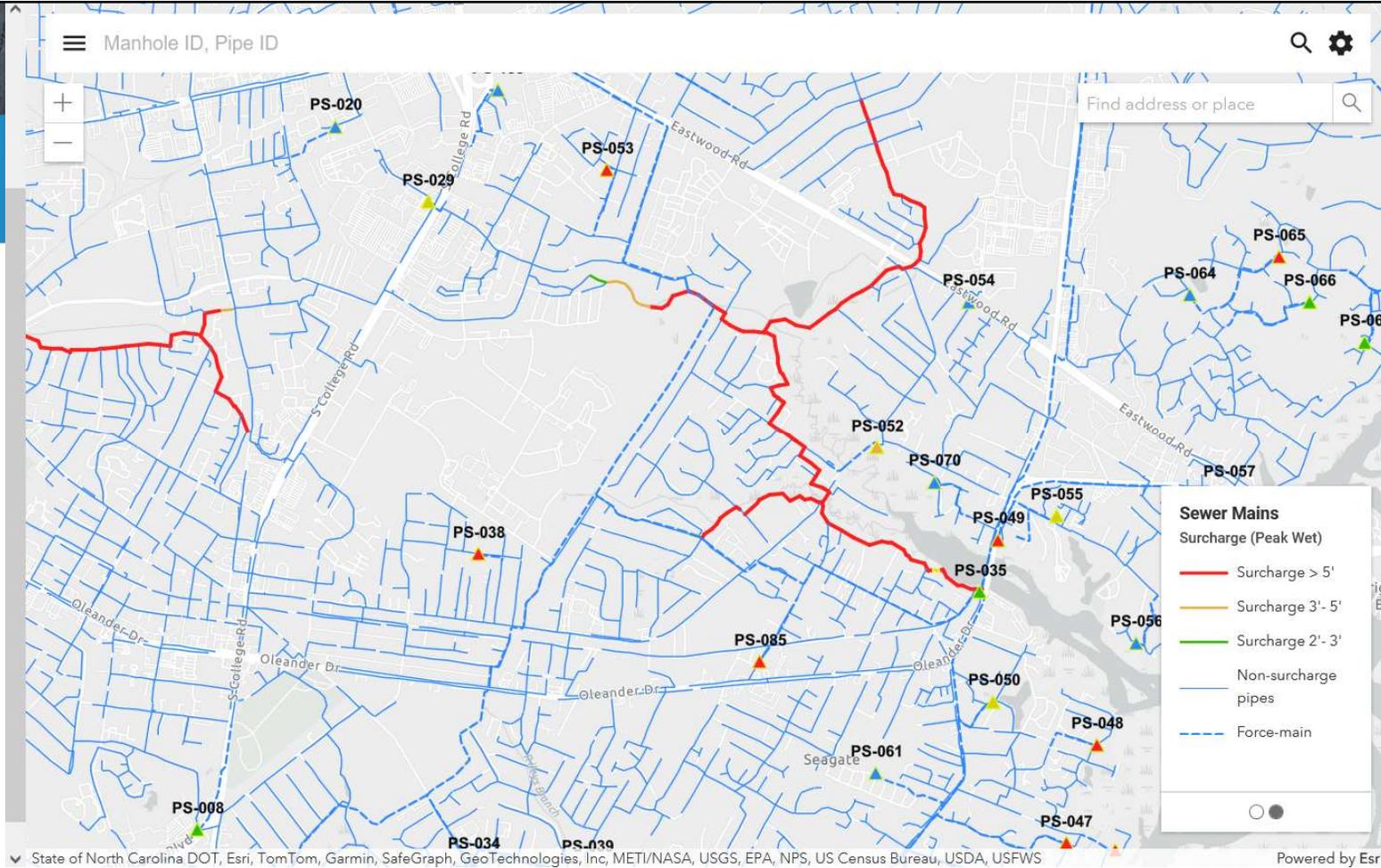
Peak Wet Flow: 2.170 mgd

Peak Wet d/D: 6.6

Peak Wet Surcharge: 11.38 feet (above crown)

Average Dry Flow: 1.948 mgd

Peak Freeboard: 7.073 ft



Digital Master Planning Tools



**Demand/
Flow Tracker**



**Hydraulic
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Tracker**



**Project
Overview**

Condition Tracker for Planners

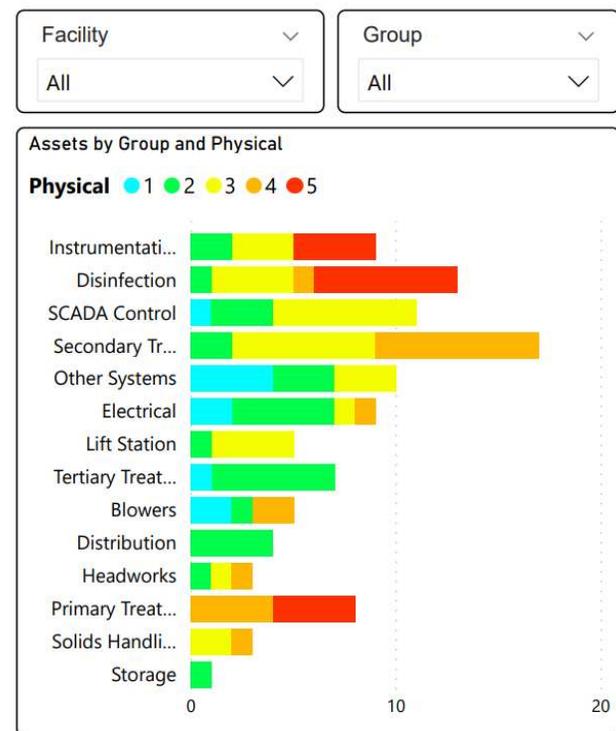
Description

- Web-based app for tracking infrastructure condition.
- Links GIS with condition for viewing systemwide and asset level results.

Value

- Access to condition assessment and risk model results.

Sugar Land Wastewater Treatment Plants



Condition Assessment Field Data Collection

Asset Table

Filter for an Asset

1. Filter Assets by Hierarchy 2. Search for Asset by Header 3. Filter Assets by Discipline/Class 4. Filter Assets by Status

LOCATION	SYSTEM	POSITION	SUB-POSITION	ASSET NAME
GENERIC LS				
LIFT STATION COLLECTION SYSTEM				
	AUTOMATION			WIMAX TRANSMITTER
	DRY PIT AREA	LIFT PUMP 01		LIFT PUMP 01
	DRY PIT AREA	LIFT PUMP 01		LIFT PUMP 01 MOTOR
	DRY PIT AREA	LIFT PUMP 01		LIFT PUMP 01 SUCTION ISOLATION VALVE
	DRY PIT AREA	LIFT PUMP 01		LIFT PUMP 01 DISCHARGE ISOLATION VALVE
	DRY PIT AREA	LIFT PUMP 01		LIFT PUMP 01 CHECK VALVE
	DRY PIT AREA	LIFT PUMP 02		LIFT PUMP 02
	DRY PIT AREA	LIFT PUMP 02		LIFT PUMP 02 MOTOR
	DRY PIT AREA	LIFT PUMP 02		LIFT PUMP 02 SUCTION ISOLATION VALVE
	DRY PIT AREA	LIFT PUMP 02		LIFT PUMP 02 DISCHARGE ISOLATION VALVE
	DRY PIT AREA	LIFT PUMP 02		LIFT PUMP 02 CHECK VALVE
	DRY PIT AREA	LIFT PUMP 03		LIFT PUMP 03
	DRY PIT AREA	LIFT PUMP 03		LIFT PUMP 03 MOTOR
	DRY PIT AREA	LIFT PUMP 03		LIFT PUMP 03 SUCTION ISOLATION VALVE

City of Houston ASSET MANAGEMENT HOME

Edit Asset Details

1. Asset Assessment

Assessed By: Phil Bullock Assessment Date: 11/14/2019

Operator Present: Yes

Asset Stage: 3 - COMPLETE Questions Remaining: 0 of 44

2. Asset Header

Asset Name: LIFT PUMP 01 Asset ID: 45K07RFL

Status: 1 - INSTALLED Install Date: 11/09/2019

3. Asset Details

3.1 Asset Hierarchy

Location	GENERIC LS	Location ID	0001
System	LIFT STATION COLLECTION SYSTEM	System ID	000114
Position	DRY PIT AREA	Position ID	000114DRP1A
Sub-Position	LIFT PUMP 01	Sub-Position ID	000114LTP01D1

3.2 Asset Type

Discipline	MECHANICAL	Class	PUMP
------------	------------	-------	------

4. Asset Attributes

Question	Attribute	Answer
Question 1	COH Eff	TEST
Question 2	Serial #	TEST
Question 3	Manufacturer	TEST
Question 4	Model	TEST
Question 5	Material Type	TEST
Question 6	Size (HP)	TEST
Question 7	Service Application	TEST
Question 8	Capacity Rating (Gallons/Minute)	TEST
Question 9	Horsepower Rating	TEST
Question 10	RPM Rating	TEST

5. Asset Likelihood of Failure (LOF)

5.1 Condition Data

Activities Report

Activity Report

Activity Details

Work Area: Administration and Maintenance Facility Number: 060.2 Administration and Maintenance Building 2

Discipline: Other

Work Summary: Installation of masonry walls continues at Maintenance Building. No other work was observed. No major issues/concerns observed.

Other Observations: HVT AMB QC Inspector is up-to-date on Daily Inspector Reports. Available via Procore.

Photos

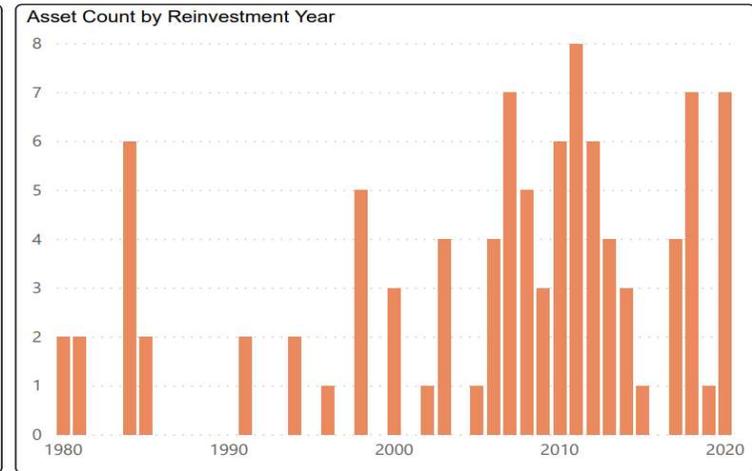
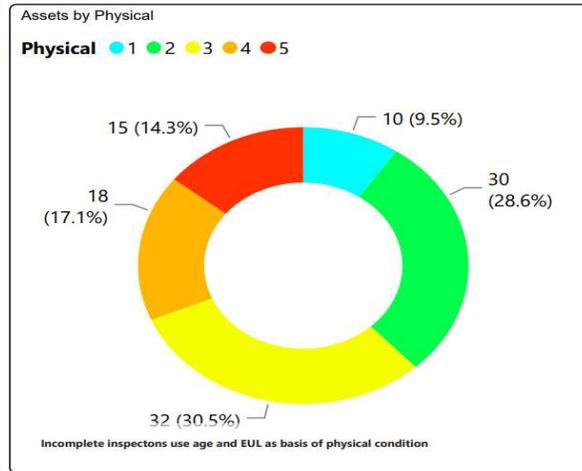
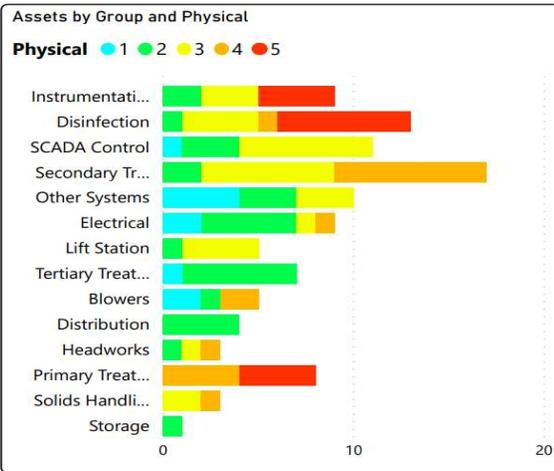
Photo 1: 

Photo 2: 

Condition and Risk Assessment Dashboard Tool

Sugar Land Wastewater Treatment Plants

Facility: |
 Group: |
 Asset Type: |
 Assets: **116** |
 Project Cost: **\$52.5M** |
 Avg Physical: **2.90** |
 Avg Reinvest Yr: **2006**



Facility	Group	Sub-Group	Asset ID	Discipline	Asset Type	Asset Sub-Type	Phys	Max Perf Factors	Perf	EUL	RUL	LoF	CoF	Risk Score	R-Factor	Risk Category	Max CoF Fe
North WWTP	Blowers	Blowers	WWTP.BLA0000001	Mechanical	Blower		1	Perf., Reliability, O&M	2	30	23	1	2	2	1	2 - LOW	Cost, O&M
North WWTP	Blowers	Blowers	WWTP.BLA0000002	Mechanical	Blower		1	Perf., Reliability, O&M	2	30	23	1	2	2	1	2 - LOW	Cost, O&M
North WWTP	Blowers	Blowers	WWTP.BLA0000003	Mechanical	Blower		4	ERUL	3	30	10	3	2	6	1	3 - MEDIUM	Cost, O&M
North WWTP	Blowers	Blowers	WWTP.BLA0000003	Mechanical	Blower		4	ERUL	3	30	10	3	2	6	1	3 - MEDIUM	Cost, O&M
North WWTP	Blowers	Blowers	WWTP.BLA0000004	Mechanical	Blower		4	ERUL	3	30	10	3	2	6	1	3 - MEDIUM	Cost, O&M
North WWTP	Blowers	Blowers	WWTP.BLA0000004	Mechanical	Blower		4	ERUL	3	30	10	3	2	6	1	3 - MEDIUM	Cost, O&M
North WWTP	Blowers	Blowers	WWTP.BLA0000005	Mechanical	Blower		2	Perf., Reliability, O&M, ERUL	2	30	19	2	2	2	1	2 - LOW	Cost, O&M
North WWTP	Disinfection	Chlorination	WWTP.DS.A0000001	Structural	Basin	Contact	5	Redundancy	5	50	14	4	3	13	1	3 - MEDIUM	Cost, O&M, Rep.
Total																	

Digital Master Planning Tools



**Demand/
Flow Tracker**



**Hydraulic
Capacity
Tracker**



**Asset
Condition
Tracker**



**CIP
Tracker**



**Project
Overview**

CIP Tracker for Planners

Description

- Web-based app for displaying and tracking CIP projects.
- Links GIS, master plans, CIP.

Value

- Dynamically update CIP projects.
- Dynamically track project status and CIP spending.

Construction

Government
Public Project

Water Recycled

CITY OF SAN LUIS OBISPO
San Luis Obispo Water Resource Reco...
Contractor: PCL Construction (0 Views)

SAVE COMMENTS SHARE BUSINESS

The San Luis Obispo Water Resource Recovery Facility
treats municipal wastewater collected from the city, California Polytechnic State University and the San

Posted: Support Team, Catchknow Services [Contact](#)

- San Luis Obispo Water Resource Recovery Facility
- Water - Recycled - Treatment
- San Luis Obispo, California
- End Date: Feb 2023
- Source: PCL Project Website [Website](#)
- [Edit Project](#) [Clone](#)
- [Add Media](#)

CIP Tracking Tool



CIP Tracking Tool

Program

Program
Program

Program Type
CRD Capital Improvement Progr...

Project ID: 000

MAP
FIND

This program includes water supply capital improvement projects (CIP) including treatment, conveyance and distribution infrastructure projects.

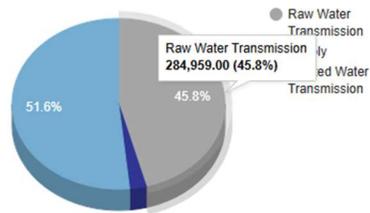
- CRD Capital Improvement Program - Water
- Capital Regional District - Regional Water Supply
- Complete By: Sep 2051
- Phase: PLAN
- [Update Costs, Schedule](#) Update Program

Reports

- Summary
- Schedule
- Budget

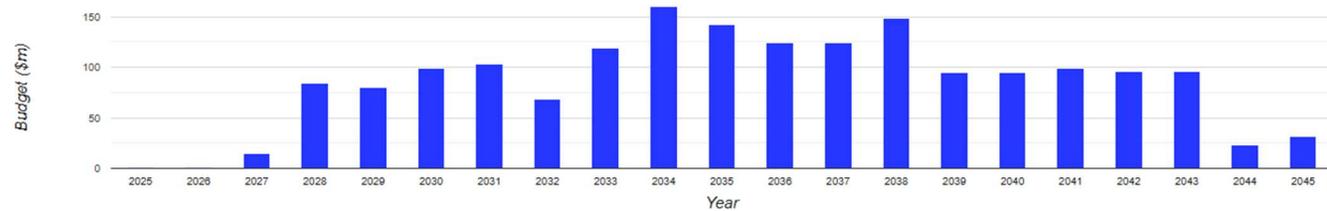
Program Metrics

Budget: \$1803.23M

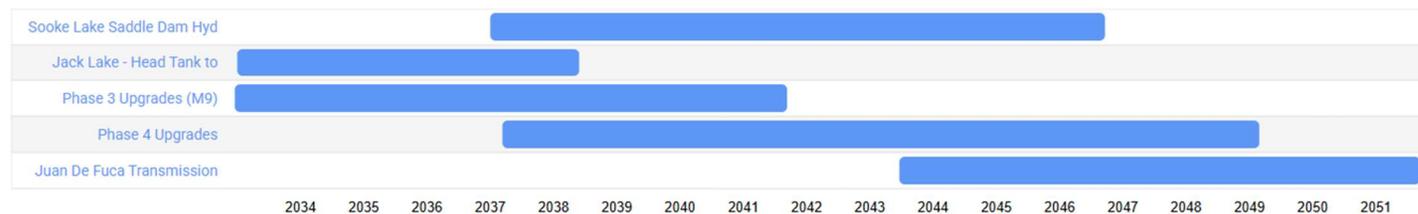


Project ID	Project Name	Phase	Category	Total Budget
012.7500	Juan De Fuca Transmission Main (M...	PLAN	Treated Wate...	\$77.63M
011.7600	Phase 4 Upgrades	PLAN	Treated Wate...	\$165.67M
004.5500	Sooke Lake Saddle Dam Hydraulic Im...	PLAN	Supply	\$15.69M
007.7500	Jack Lake - Head Tank to Japan Gulc...	PLAN	Raw Water Tr...	\$284.95M
010.7500	Phase 3 Upgrades (M9)	PLAN	Treated Wate...	\$77.79M

Budget Projection

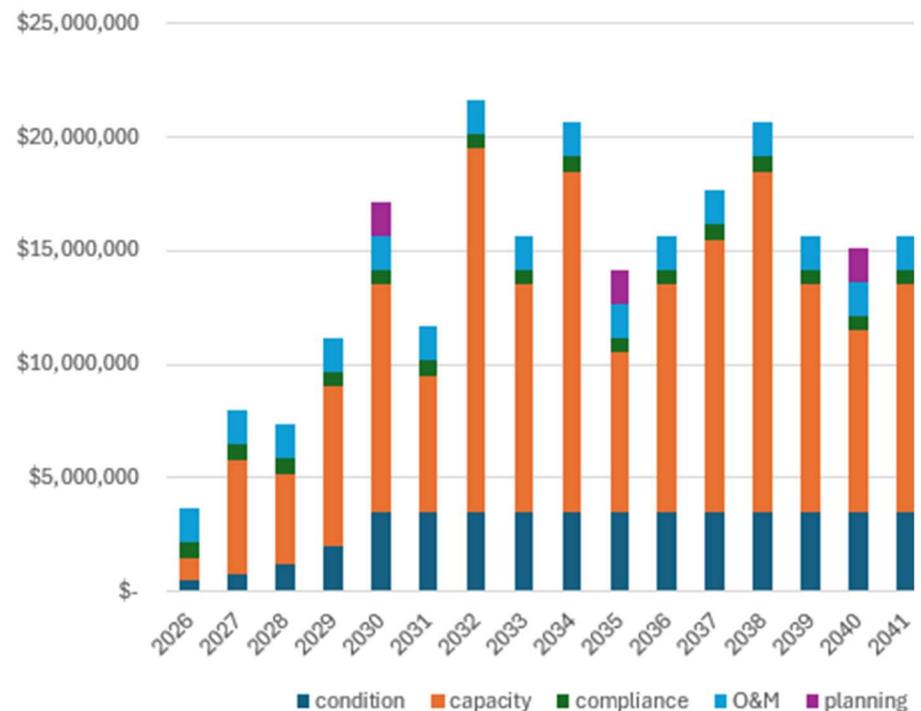


Program Schedule (Top 5 Projects)



Stormwater CIP Tool Benefits

- Looking Ahead to Lifecycle Costs by category:
 - » Condition
 - » Capacity
 - » Compliance
 - » O&M
 - » Future Planning Updates
- Costs Offset by Risk Reduction
- Flag co-located projects



Digital Master Planning Tools



**Demand/
Flow Tracker**



**Hydraulic
Capacity
Tracker**



**Asset
Condition
Tracker**

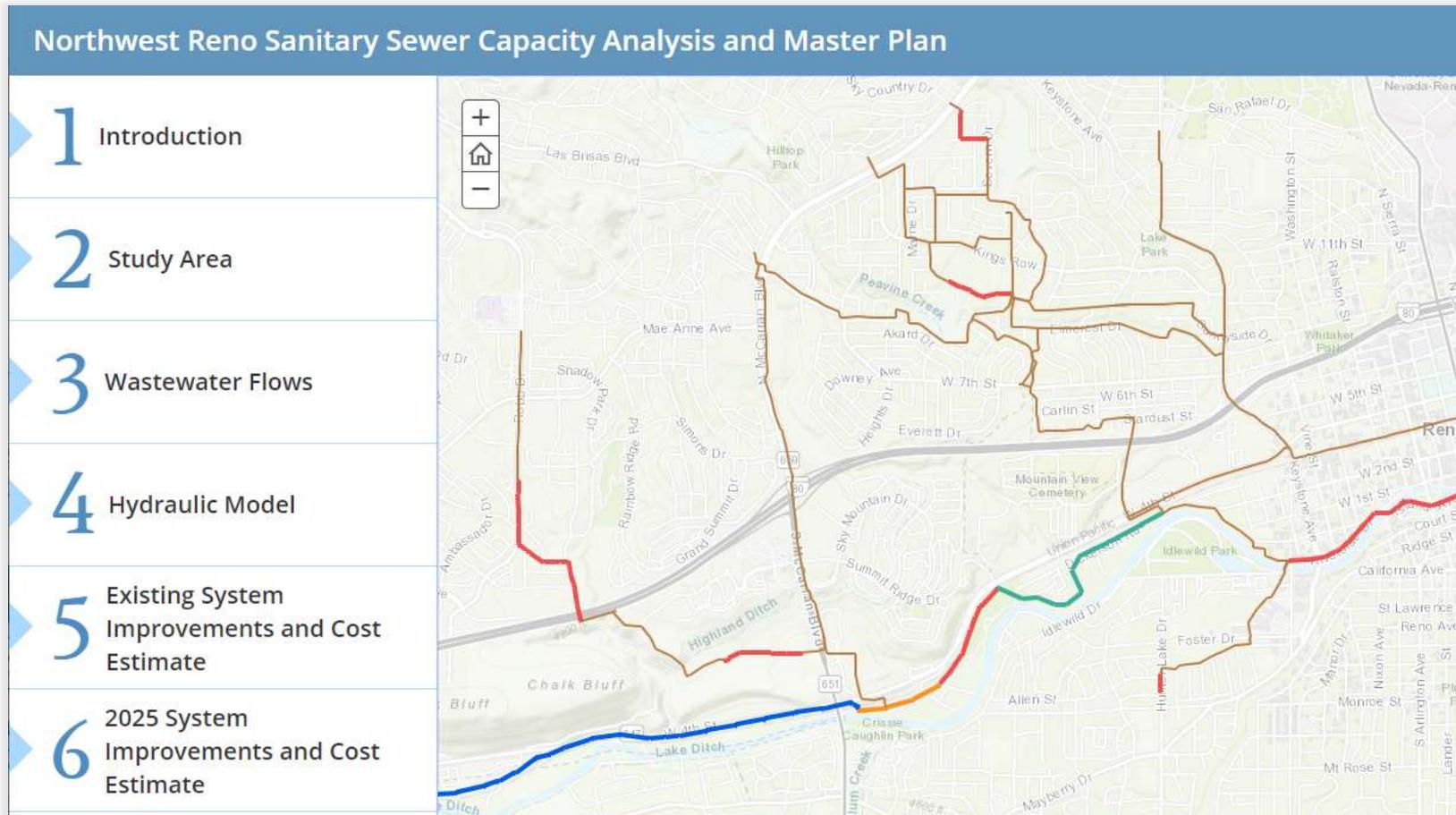


**CIP
Tracker**



**Project
Overview**

Project Overview Tool #1



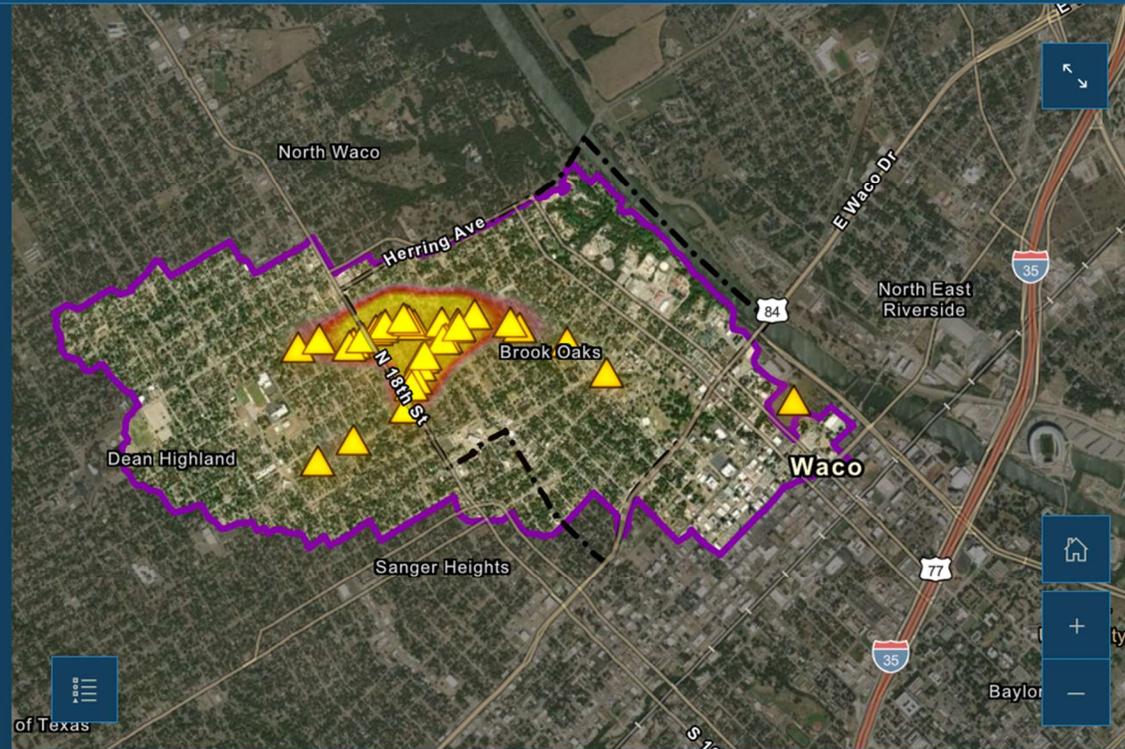
Project Overview Tool #2

Brook Oaks Neighborhood Stormwater Master Plan

Brook Oaks Neighborhood Waco, Texas Project Location The Need Data Collection and Review Model Development Cameron Park 2 →



Barron's Branch between 4th and 5th Street

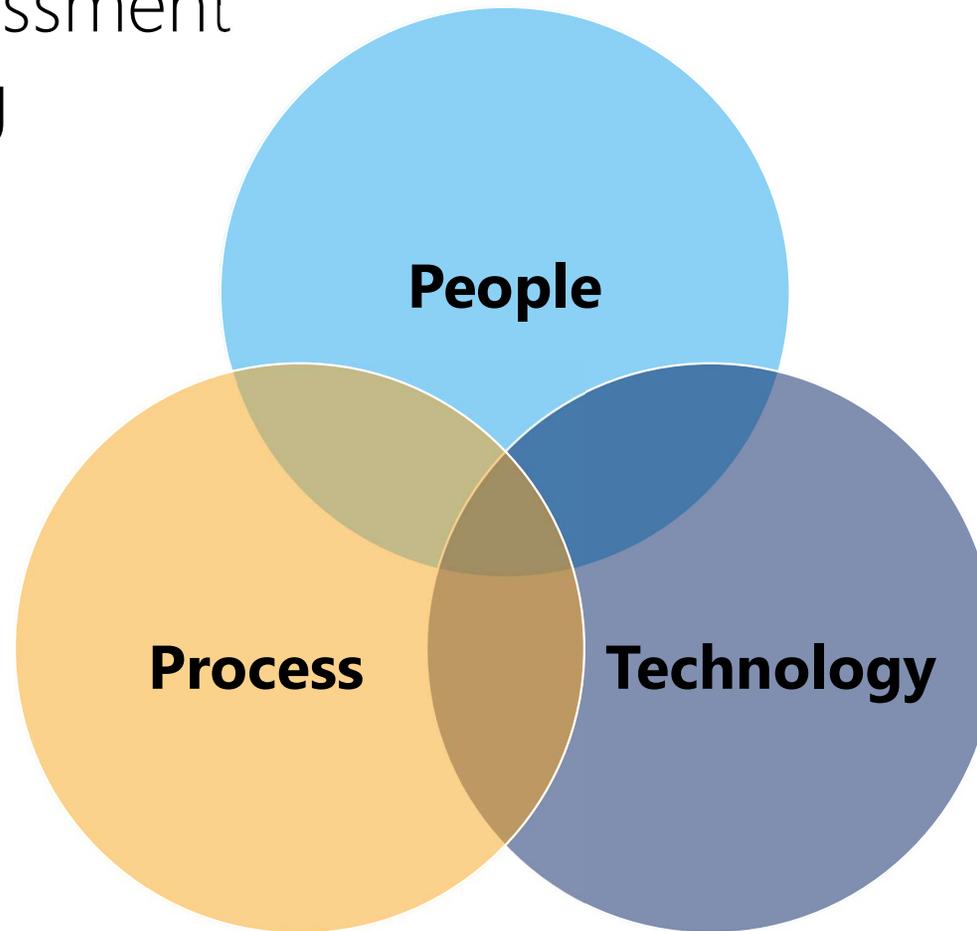


Vantor | Baylor University, Texas Parks & Wildlife, CONANP, Esri, To... 1 km Powered by Esri

04

Foundational Steps

—
Baseline Assessment
and Visioning



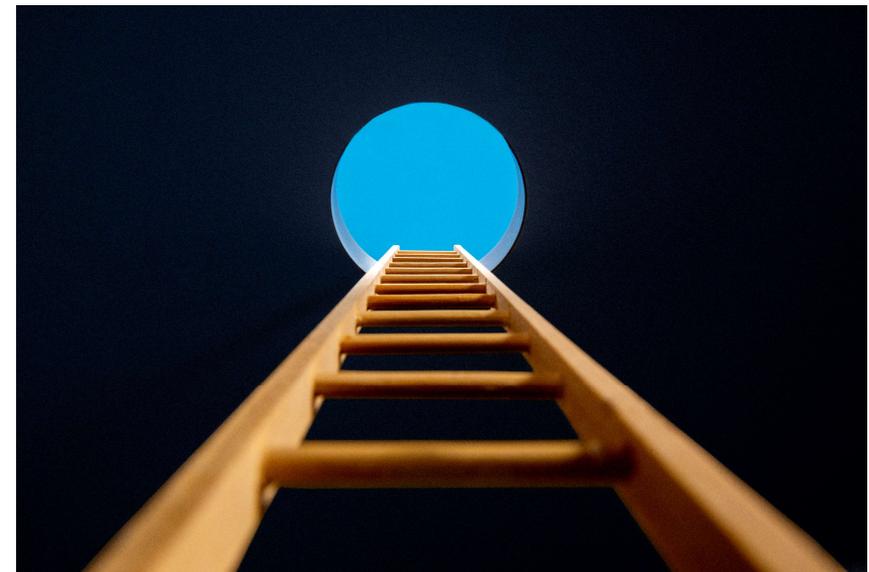
Collaboration



Taking the First Step(s)

» What You Can Do Today

- Take Inventory
 - Identify What Data to Collect
 - Prioritize Based on Need
 - Skills
 - Software/Hardware
- Define Processes
 - How to Create Accurate Asset Inventory
 - How to Transfer from Field/Paper to Databases
- Define Roles
 - Identify Data Stewards
- Buy-In
 - Leadership, Board, Council



Q & A

Shyamala Raveendran
sraveendran@carollo.com
925.977.3097

Julia Schmitt
jschmitt@carollo.com
925.977.3028