FUTURE SUPPLY ACTIONS PROGRAM

WEBINAR SERIES

SMART WATERSHED NETWORK PILOT PROJECT

June 15, 2023

One Water

THE METROPOLITAN WATER DISTRICT *of* SOUTHERN CALIFORNIA

moulton niguel water district

OC Public Works

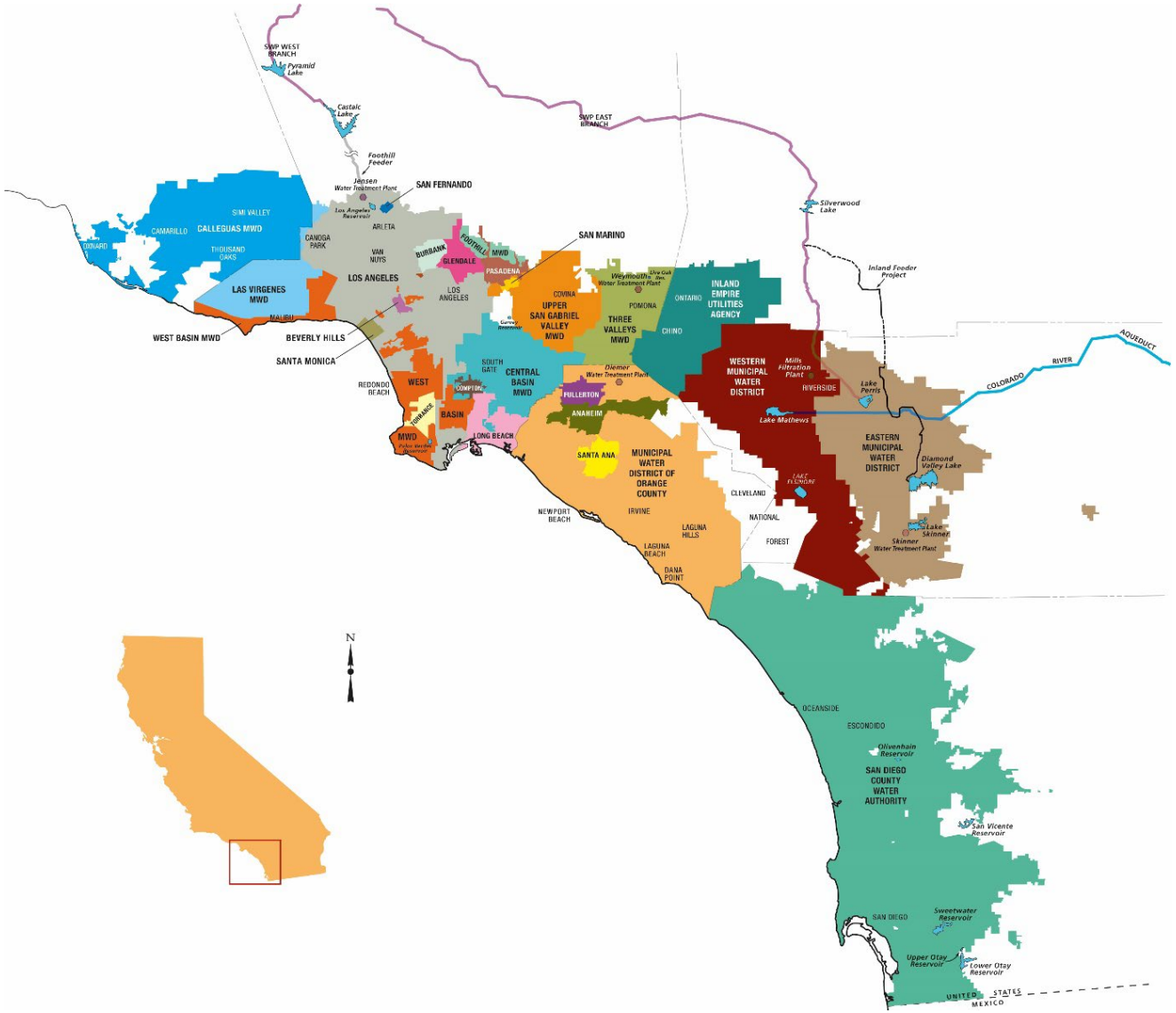
MWDOC

Smart Watershed Network

Agenda

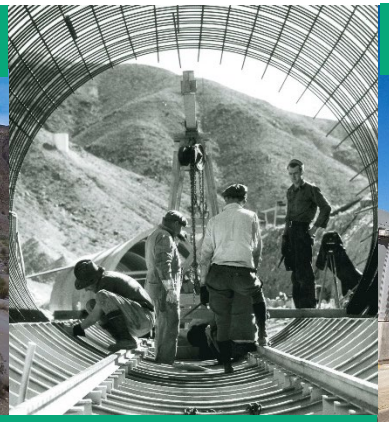
The Metropolitan Water District of Southern California

- Nation's largest wholesale water provider
- Service area: 19 million people/5,200 square miles/parts of six counties
- 26 member agencies
- Supports $1 trillion regional economy
- Imports water from Northern Sierra and the Colorado River, invests in local projects



Metropolitan's Role for Southern CA

REGIONAL PROVIDER

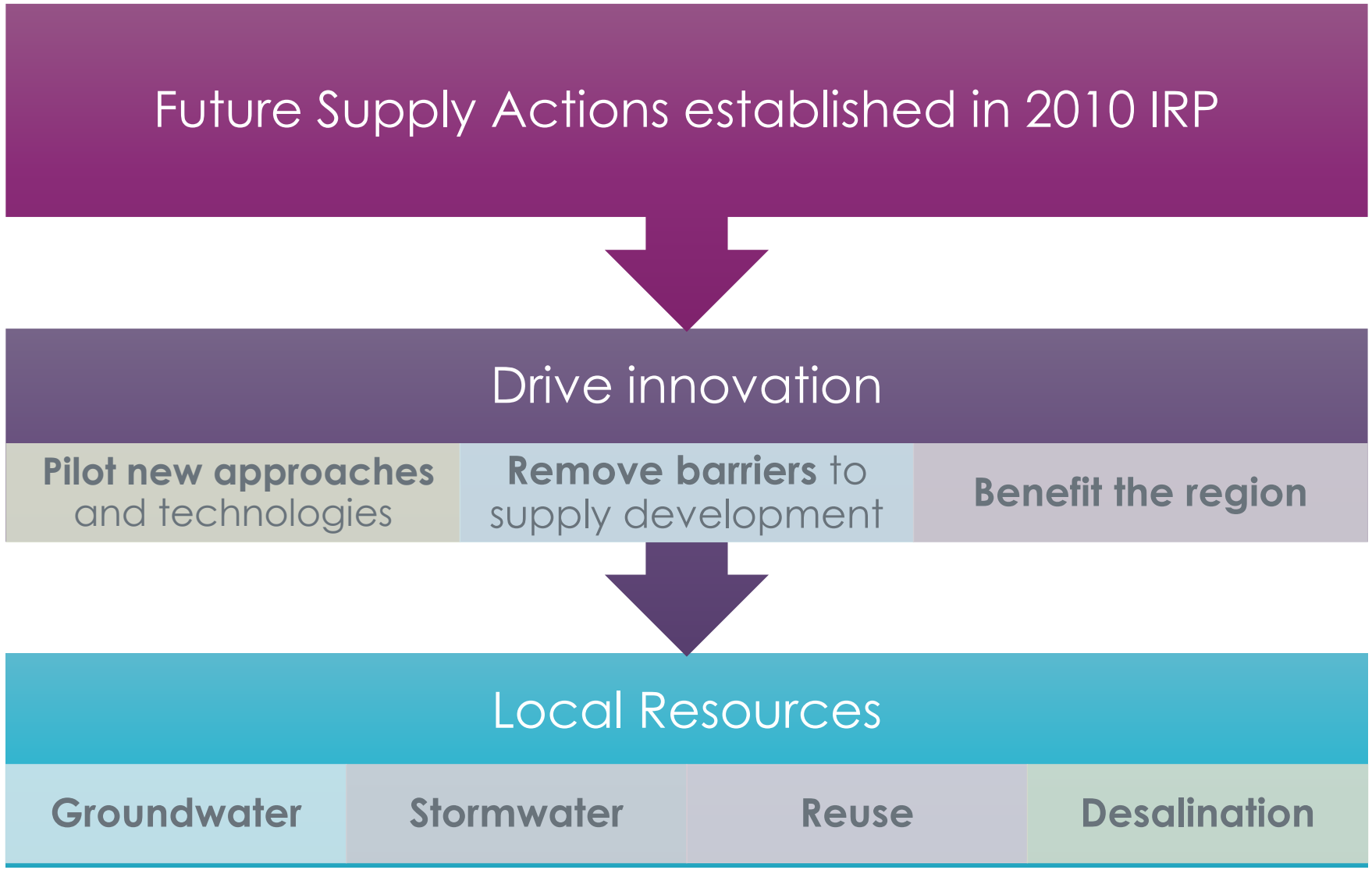


INNOVATION

VISION

SAFE & RELIABLE

Future Supply Actions Funding Program



Current Program

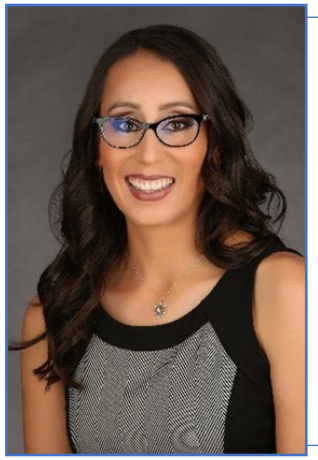
Member Agency

- 14 studies
- $3.1 million

Water Research Foundation

- 6 potable reuse studies
- 1 agricultural reuse study
- $975k

Speaker Spotlight



Laura Rocha - Water Resources Manager at Moulton Niguel Water District, leads MNWD's long-range water resources planning, implementing watershed and water supply projects, policy development, and drought response efforts

Austin Orr, P.E. – Civil Engineer at Geosyntec Consultant's water resources practice, specifically stormwater quantity and quality management. Recently focused on building software tools to help bring monitoring, data analysis, and modeling via the web

Presentation Outline

- Background & Study Design
- Primary Work Products
- Watershed Monitoring System
- Data Management and Analytic Tools
- Case Study
- Project Accomplishments and Broader Applicability

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Moulton Niguel Water District

- Provide water, recycled water, and wastewater services
- Serving Aliso Viejo, Laguna Niguel, Laguna Hills, Mission Viejo, Dana Point, and San Juan Capistrano
- Serving over 170,000 customers
- Urbanized, planned communities
- AMI Program

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Urban Runoff Collaboration

- Partnership with County, Cities, NGOs
- Data Sharing, Program Development, and Community Outreach
- Reduce Runoff and Improve Watershed Health

Aliso Viejo
Live Life Inspired

Dana Point California 1989

City of Laguna Hills 1991

City of Laguna Niguel Sea Country 1989

Mission Viejo California 1988

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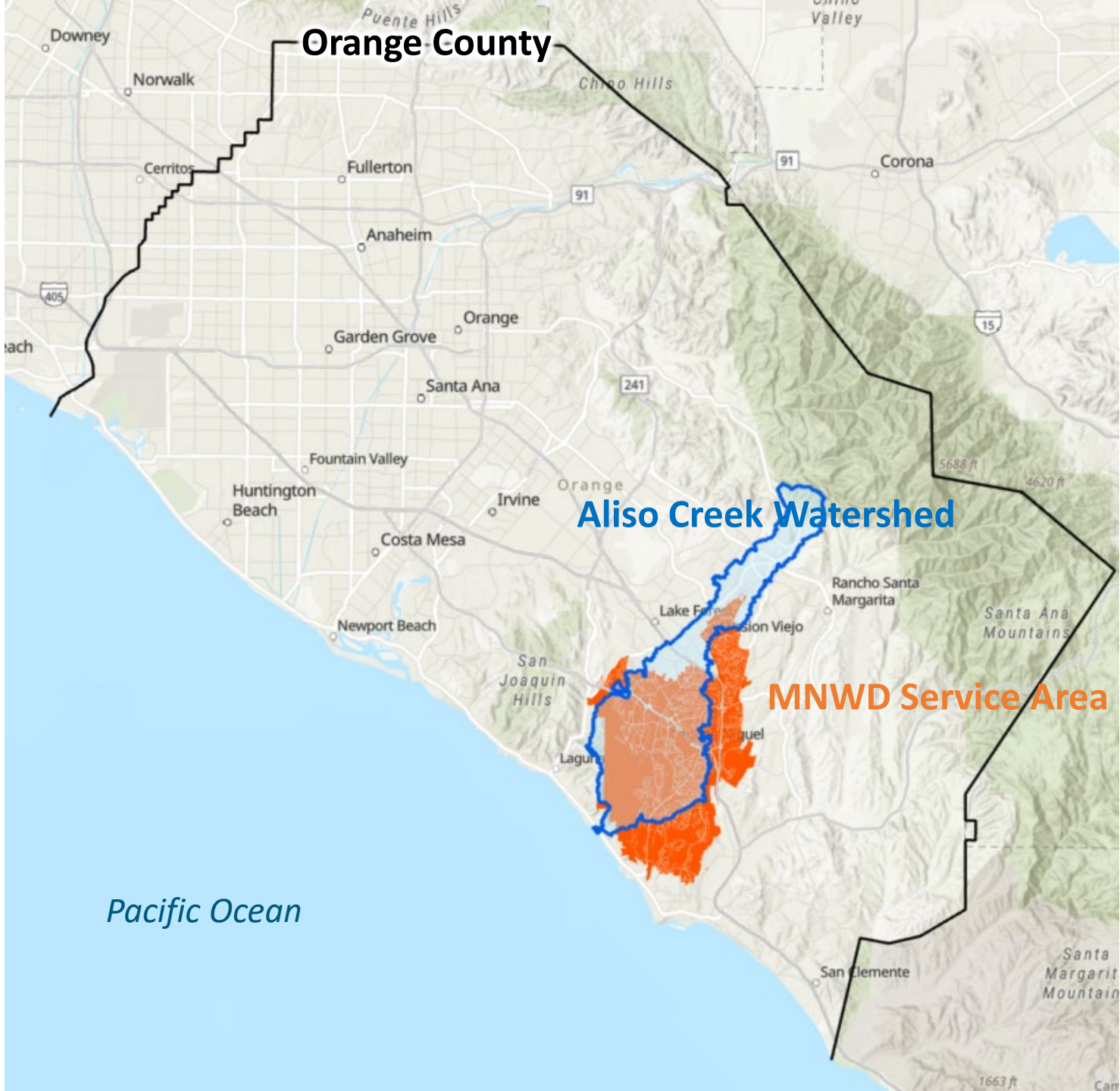
Laguna Bluebelt Coalition

Orange County Coastkeeper

Project Area

- Orange County Public Works
  - OC Stormwater Program
  - H2OC is the "brand"
  - Collaborative effort (all 34 cities)
- Aliso Creek Watershed
  - 35-square miles
  - Over 80 storm drain outfalls
  - 70% developed



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Nuisance Turned Resource

- Dry weather runoff exceeds 1 MG daily in Aliso Creek
- Dry weather discharge changes streamflow and transports pollutants
- Opportunity to augment local supply and increase watershed health

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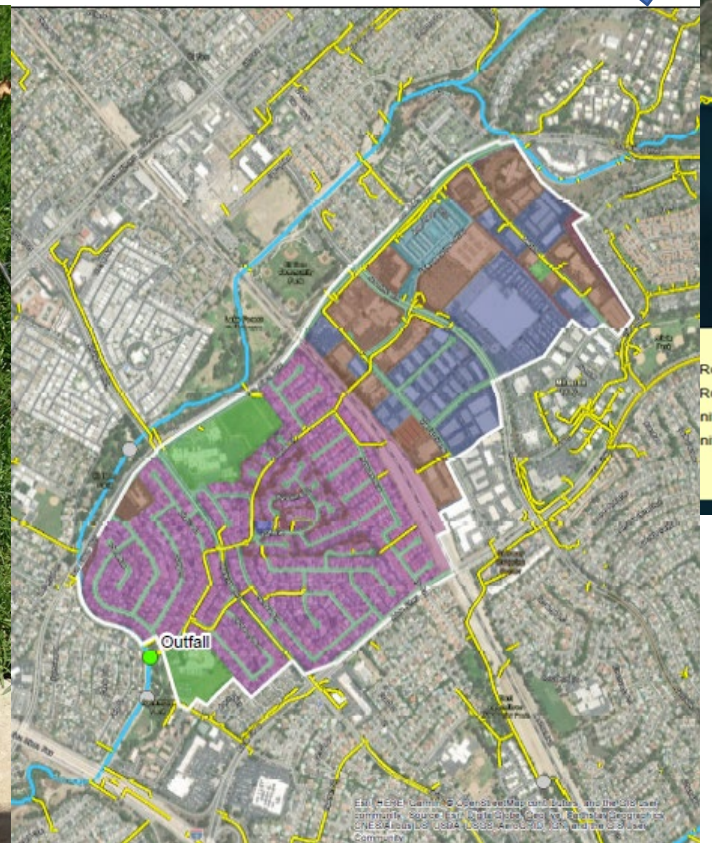
Bridging Infrastructure and Data

Compatible Systems?



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Smart Watershed Network Pilot Project

Primary Objective: Evaluate the sustainable use of urban runoff and stormwater as a potential water supply source

1) Pilot use of AMI Network
2) Build datasets that fill key knowledge gaps
3) Support data analysis, exploration, and management decisions about resource recovery
4) Provide transferable lessons

Primary Work Product: Watershed Monitoring System

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Monitoring Locations

52 New Flow Monitoring Sites

- 39 priority outfalls
- 13 receiving water locations

20 New Conductivity Monitoring Sites

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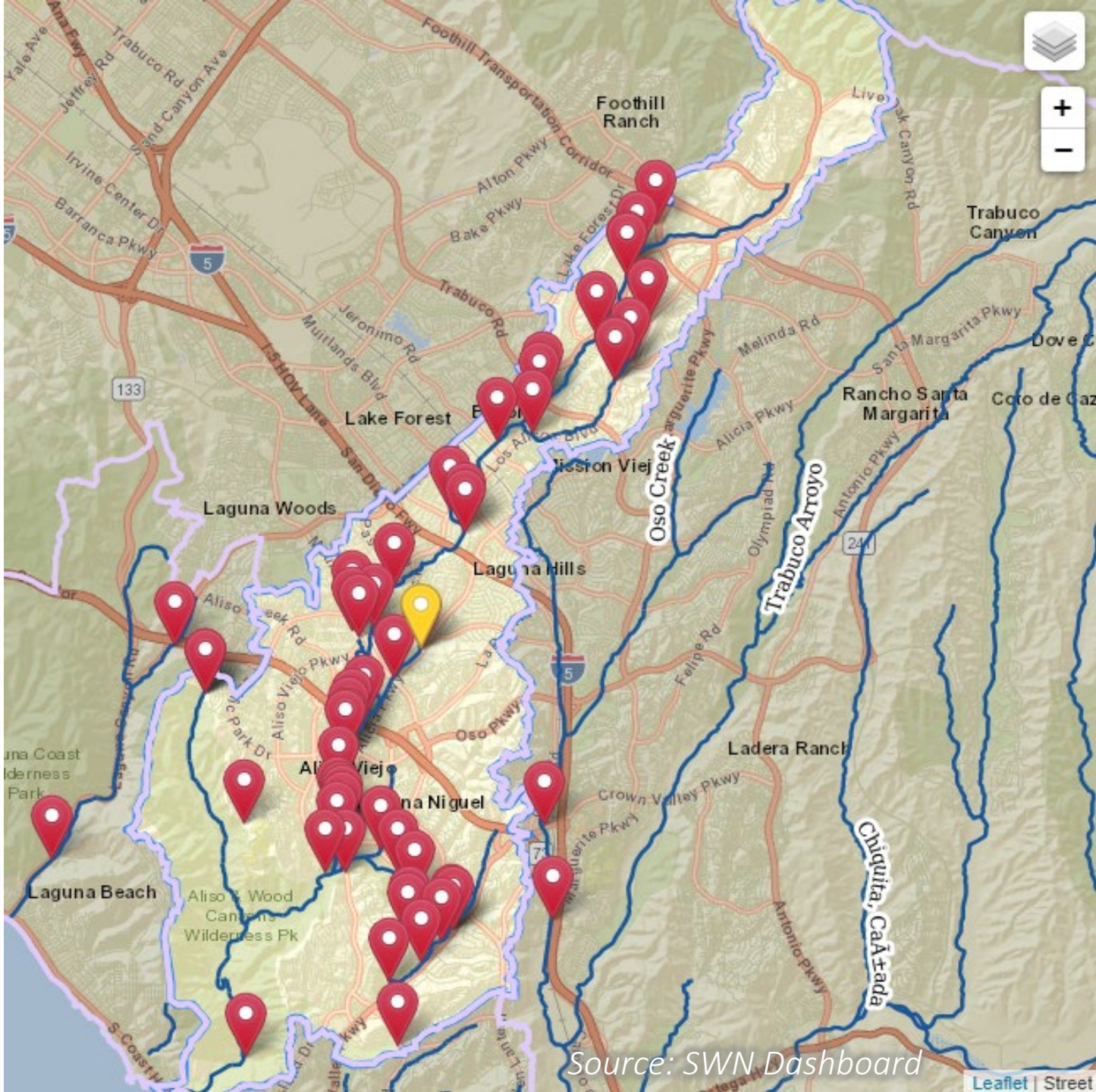


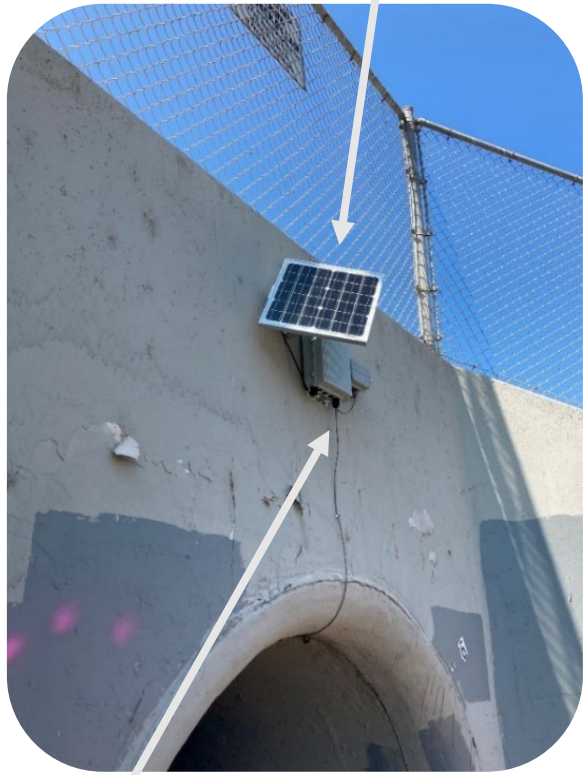
Source: SWN Dashboard

Field Instrumentation

Depth Sensor

Supplemental Solar Power

Ultrasonic Sensor



Sensus AMI Transmitter

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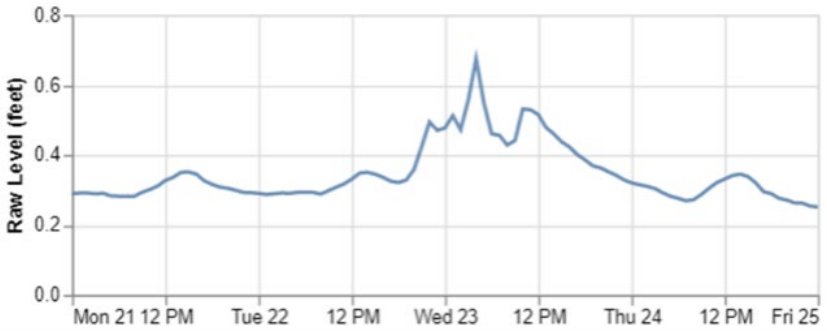
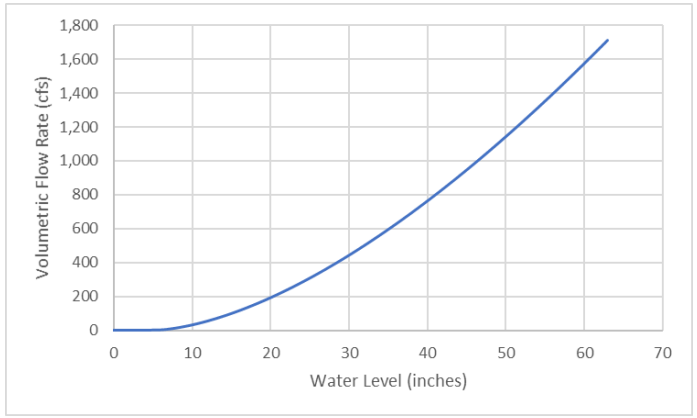
Calibration and Rating Curves

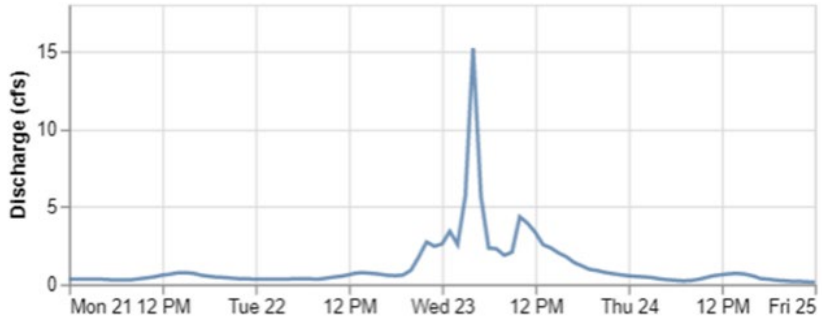
Raw sensor data (depth, feet)

Site specific rating curve

Discharge (flow, cfs)







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Primary Work Product: Data Management and Analytic Tools

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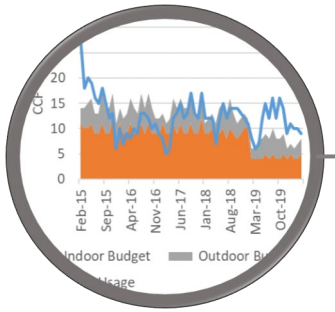
Data Management and Analysis System

OCPW Drainage Network GIS Layers

MNWD Water Usage and Budget Metrics



Scripts to Summarize at Neighborhood Level

OCPW Hydstra DB

SWN Flow and Conductivity Stations

MNWD AMI Pipeline

Existing OCPW Monitoring Stations

Data Store

Data Processing

Web API

Data Integration & Analysis Environment

Map View & Data Downloader

Timeseries Comparisons and Regressions

Diversion Capture/Recovery Scenarios

Web Map & User Interface

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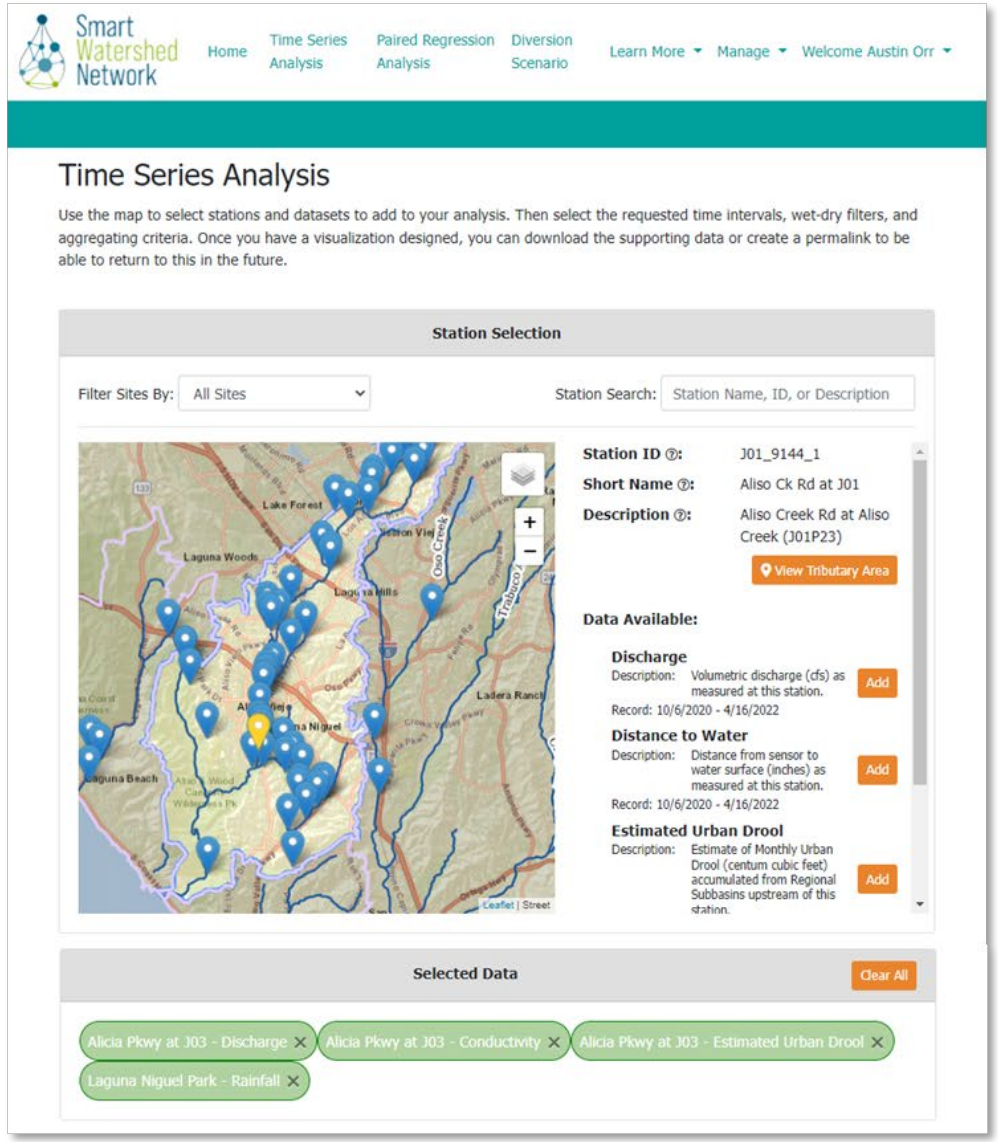
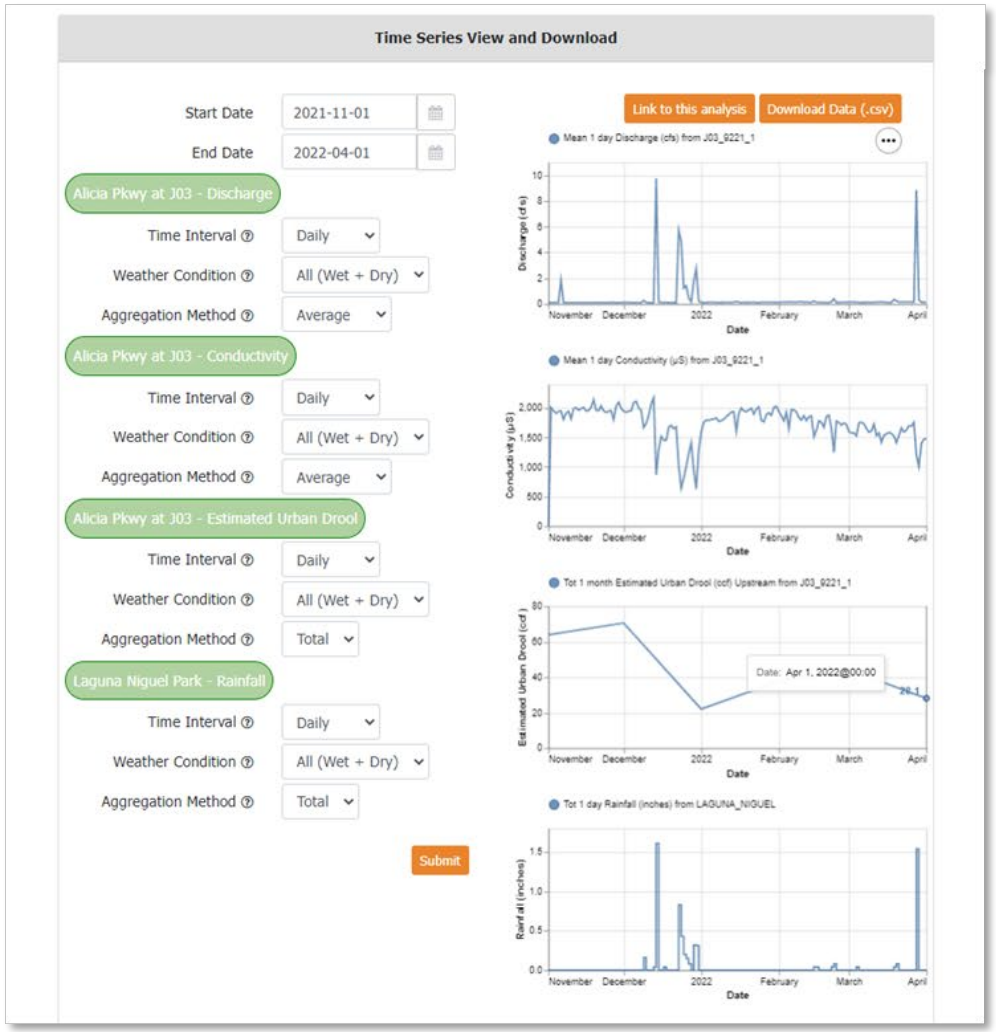
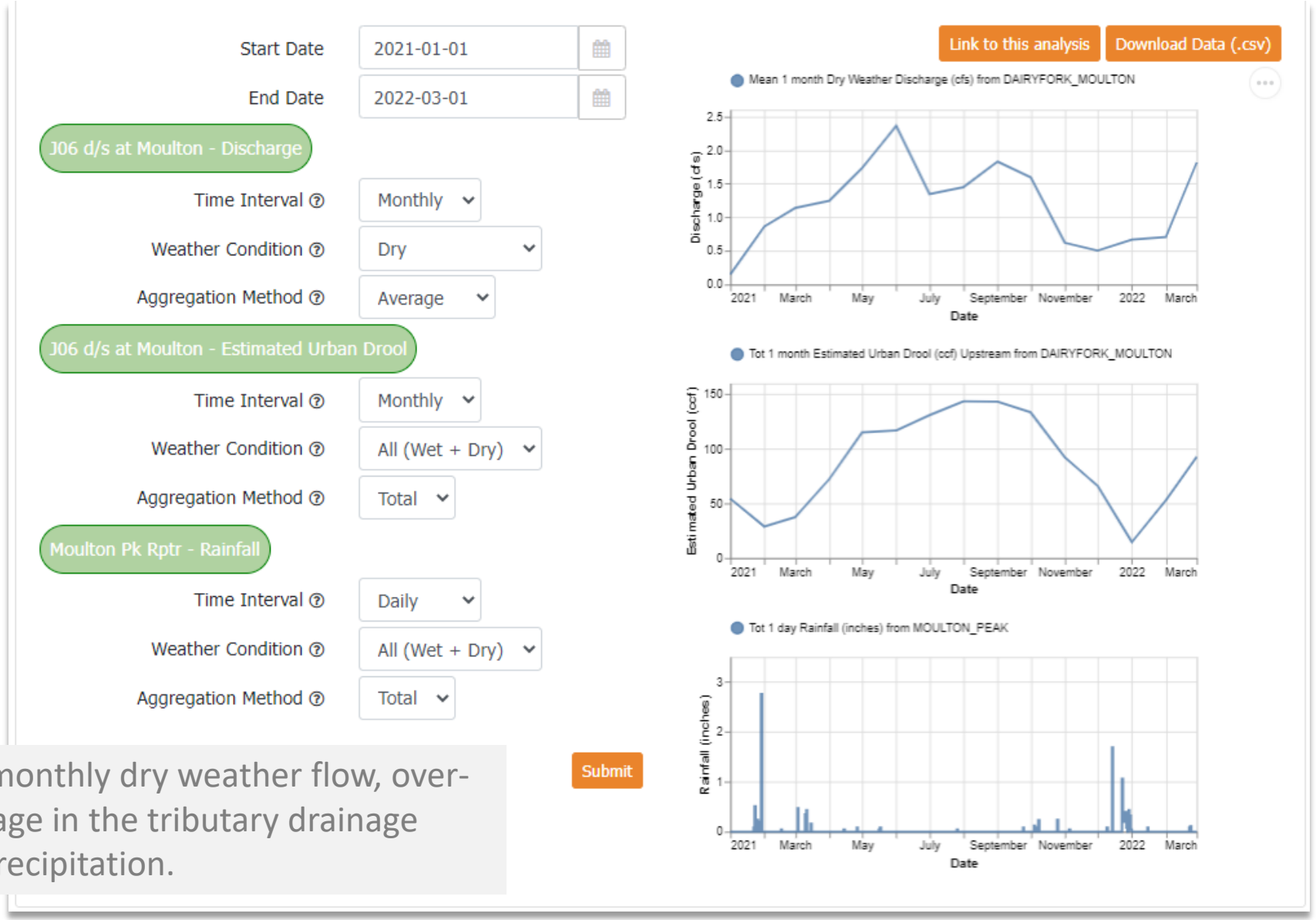
Smart Watershed Network Dashboard





https://swn.yachats.sitkatech.com/

SWN Dashboard – Time Series Analysis Tool



This plot shows monthly dry weather flow, over-budget water usage in the tributary drainage area, and daily precipitation.

SWN Dashboard – Regression Analysis Tool

Start Date: 2021-01-01

End Date: 2022-03-01

Time Interval: Monthly

Weather Condition: Dry

Regression Method: Linear

J06 d/s at Moulton - Estimated Urban Drool

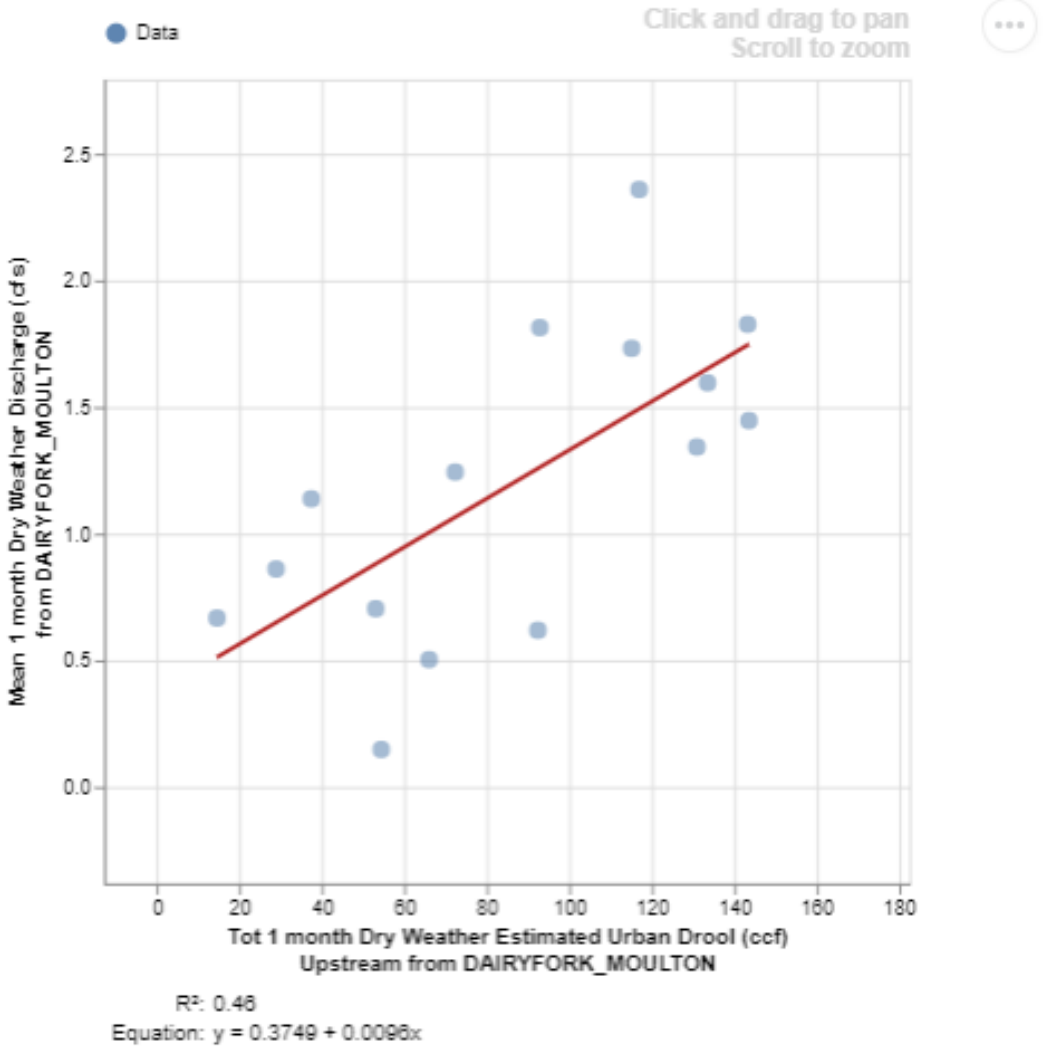
Aggregation Method: Total

J06 d/s at Moulton - Discharge

Aggregation Method: Average

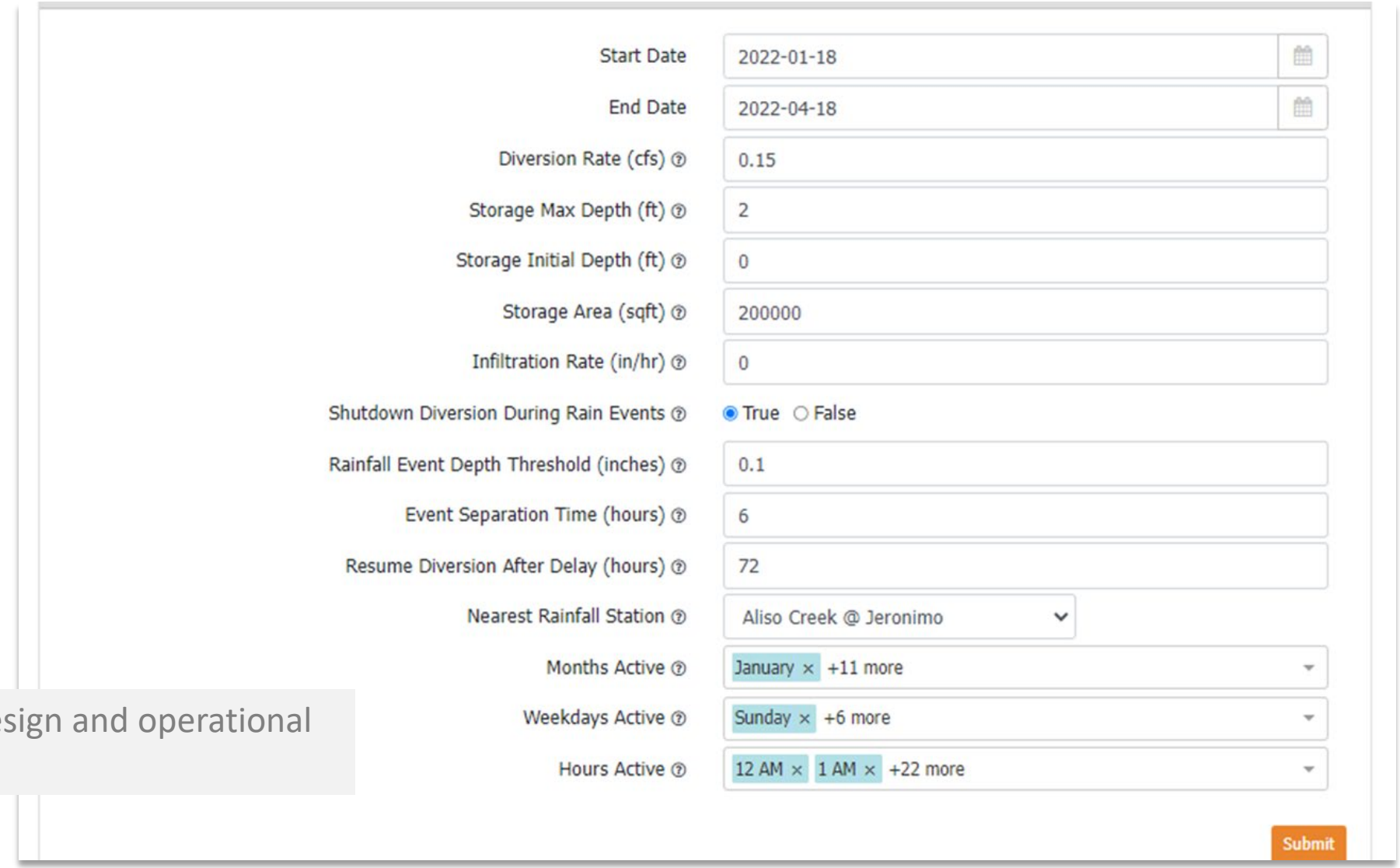
Submit

Link to this analysis | Download Data (.csv)



This regression shows a relationship between monthly dry weather flow and the corresponding over-budget water usage in the tributary drainage area.

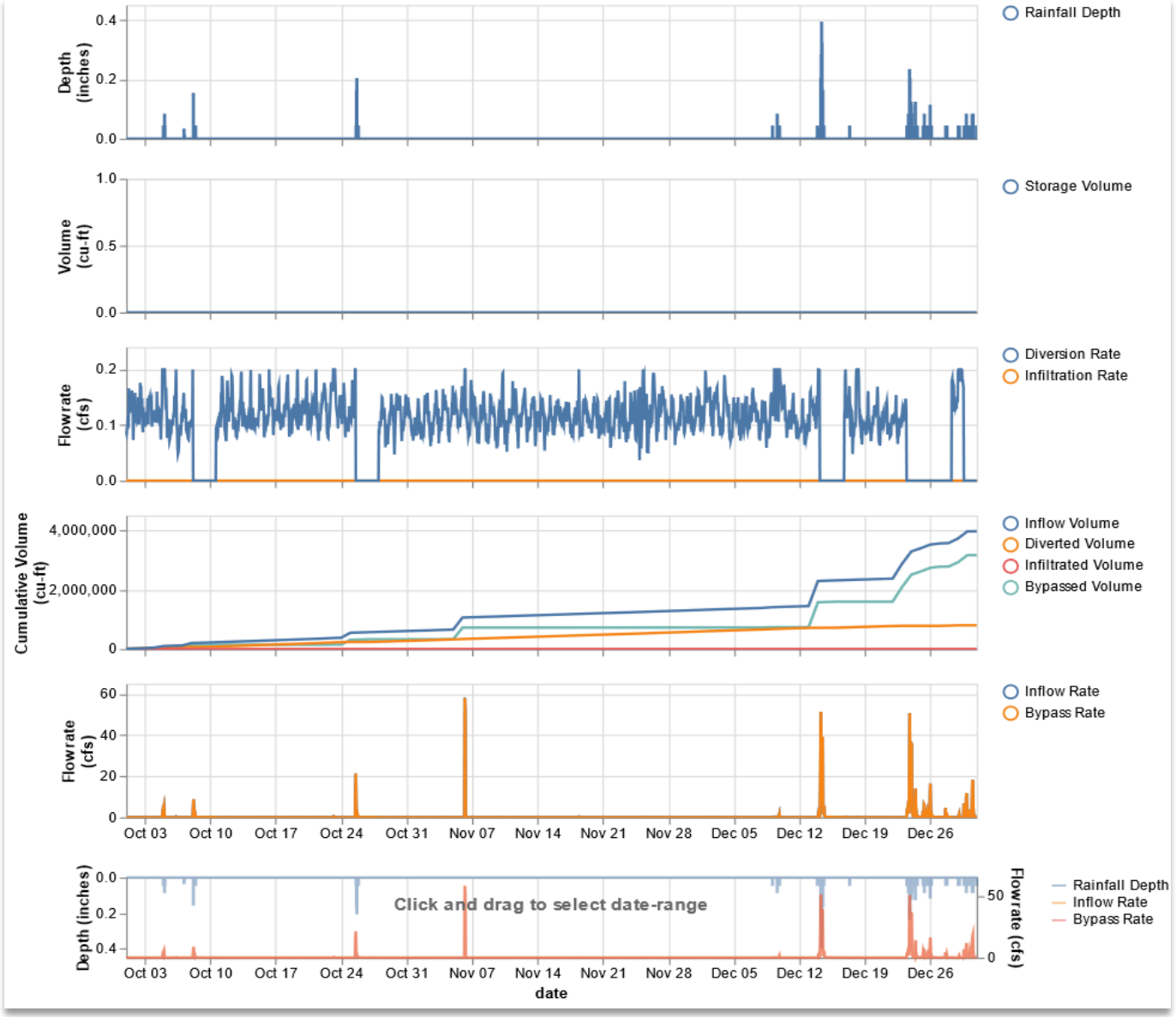
SWN Dashboard – Diversion Scenario Analysis Tool



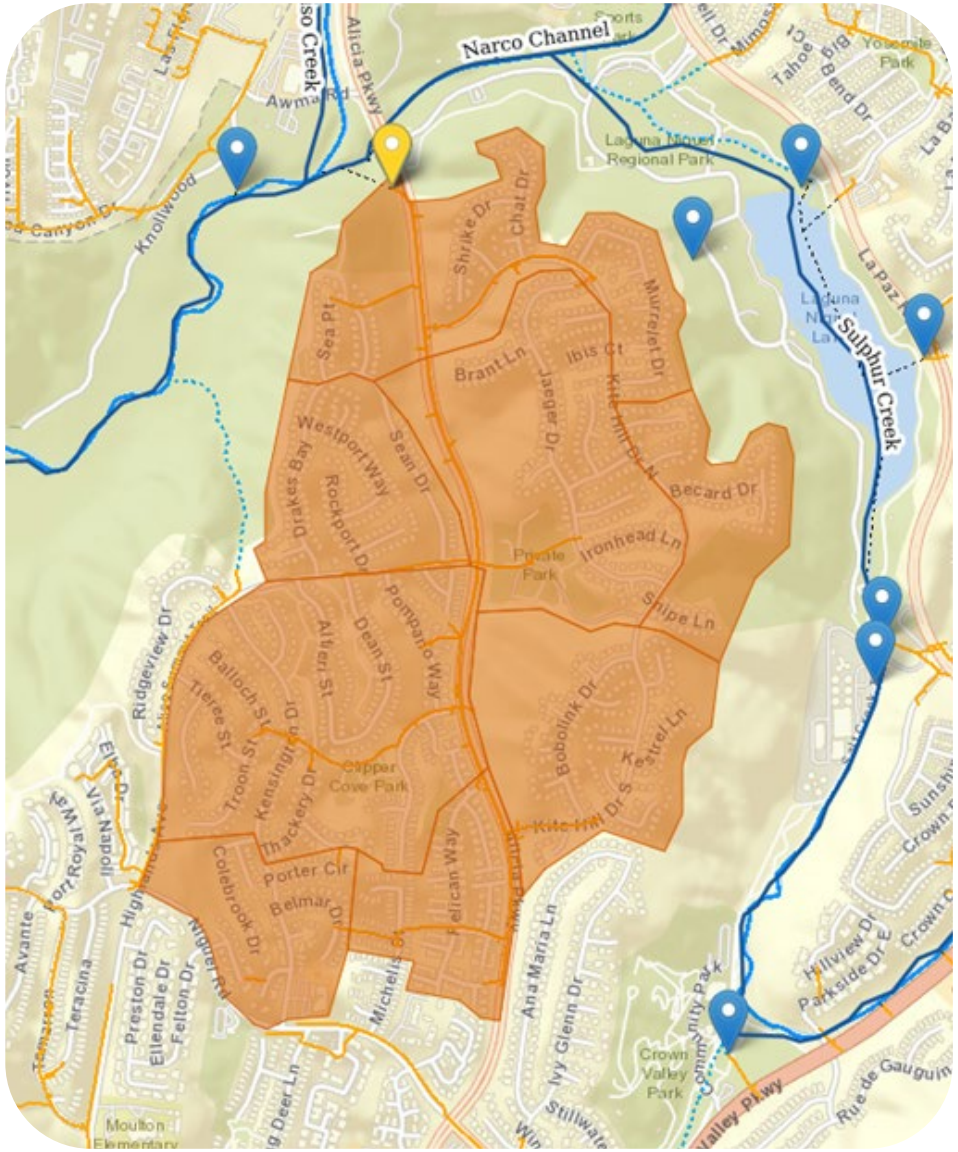
User interface to set design and operational parameters.

SWN Dashboard – Diversion Scenario Analysis Tool

Scenario results are shown as time series and summarized in a table.



Case Study



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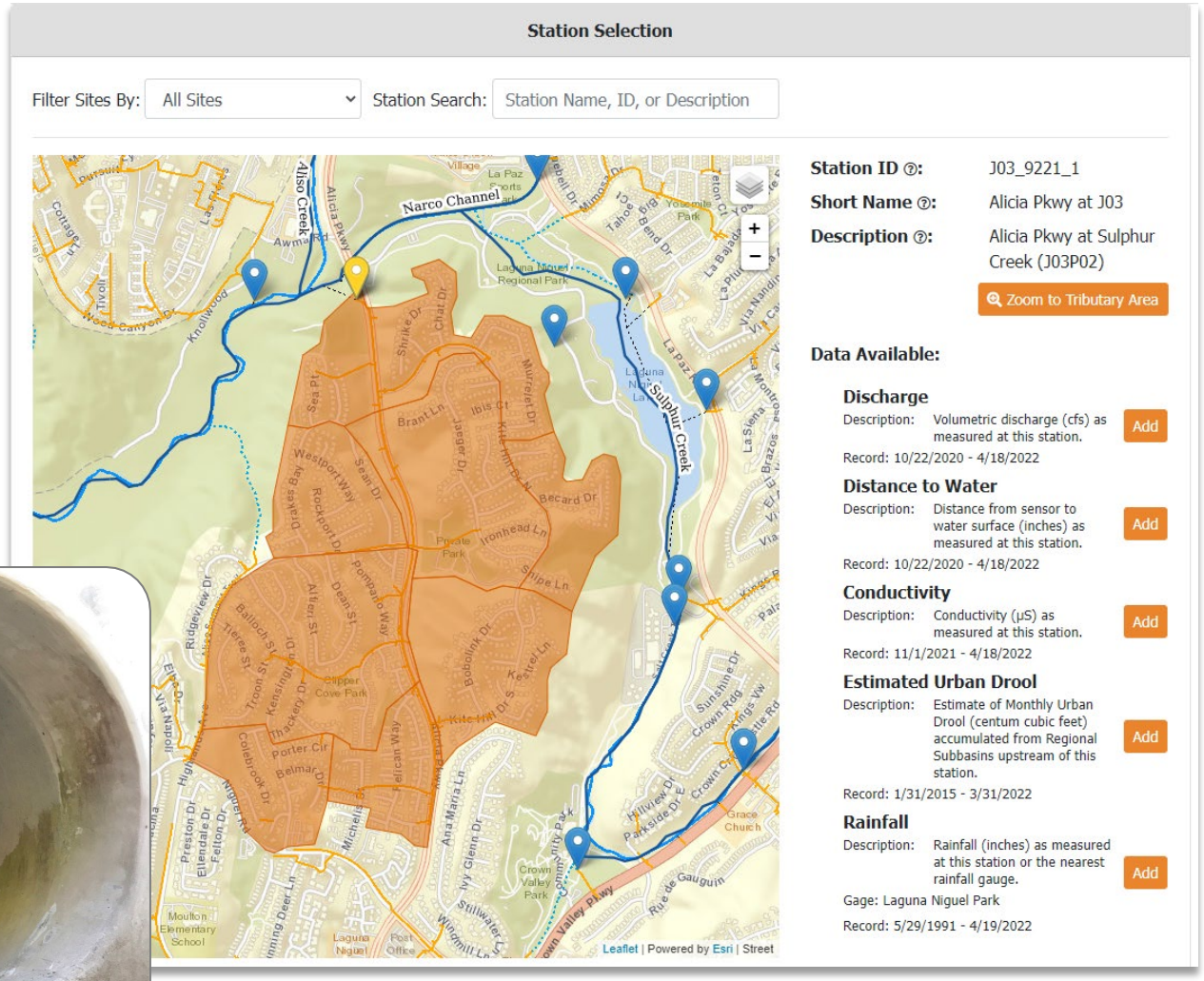
Urban Runoff Capture Analysis @ Alicia Parkway & Sulphur Creek

- Predominantly residential watershed
- Monitoring location has both flow and conductivity data
- Full dataset available for period from November 2021 – March 2022



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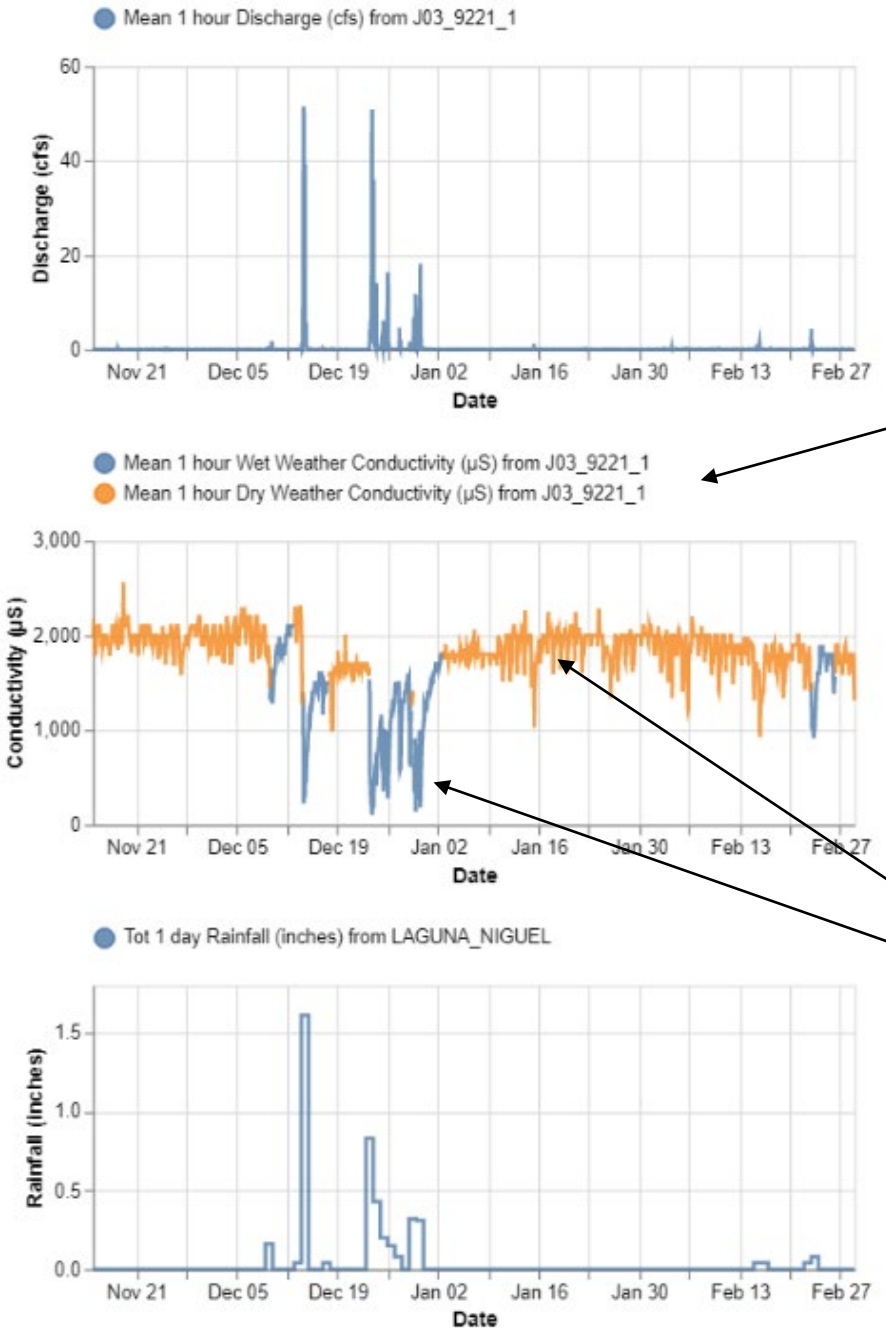
Time Series Analysis @Alicia Parkway & Sulphur Creek

- Review conductivity sensor readings from November 2021 – February 2022
- Identify wet and dry weather conditions
- Note temporal co-occurrence of changing conductivity with other variables



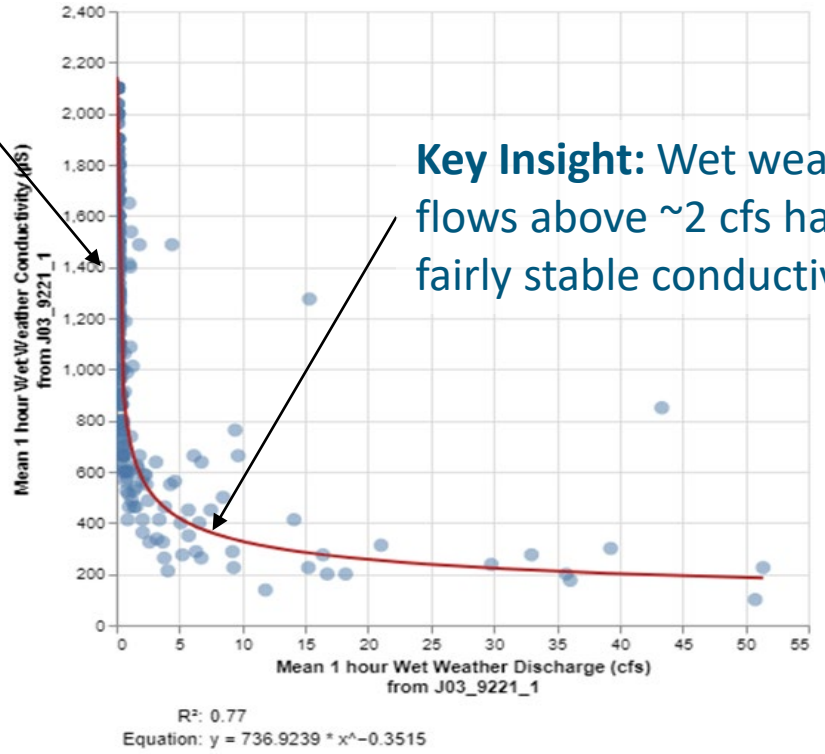
Identify and visually separate wet and dry weather observations

Key Insight: Conductivity appears to drop during periods of increased discharge associated with rainfall events

Regression Analysis – Discharge vs Conductivity
@Alicia Parkway & Sulphur Creek

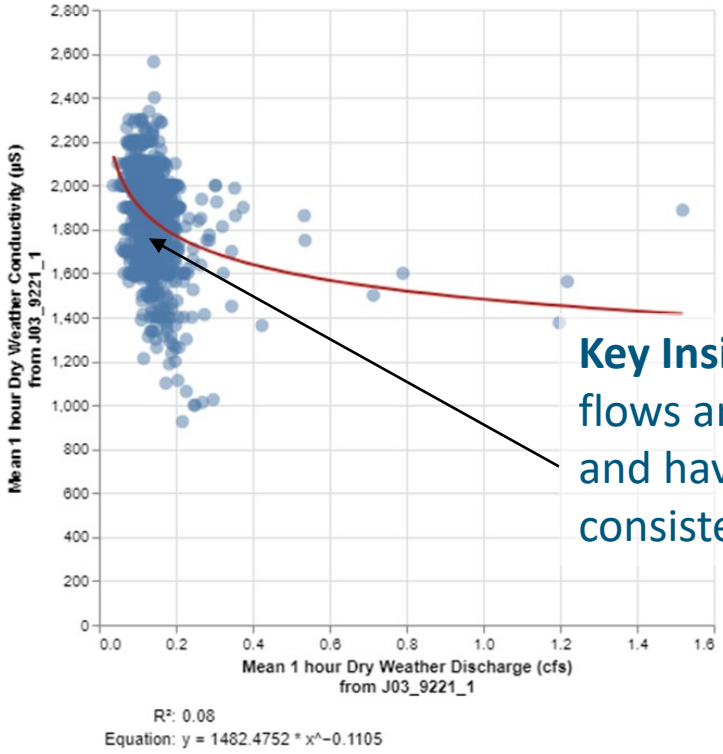
Key Insight: As flow regimes transition from wet to dry weather flow-rates, the conductivity increases

Wet Weather Conditions Only



Key Insight: Wet weather flows above ~2 cfs have fairly stable conductivity

Dry Weather Conditions Only



Key Insight: Dry weather flows are under ~0.2 cfs, and have relatively consistent conductivity

Regressions of Discharge vs Conductivity from November 2021 – February 2022

Diversion Scenario Analysis
@Alicia Parkway & Sulphur Creek

Key Insight: Rapidly assess multiple scenarios to iterate on various system configurations and operational decisions

Key Insight: As system continues to collect data, these diversion scenarios may be easily revisited to assess performance during other flow regimes and weather conditions, e.g., during summer months

Input/Result	Scenario 1	Scenario 2	Scenario 3				
			Base	Base + double diversion rate	Base + double storage volume	Base + double storage, double diversion rate	Base + full time diversion
Operating Rule	Dry only	Full time	Dry only	Dry only	Dry only	Dry only	Full time
Operating delay	48 hrs	NA	48 hrs	48 hrs	48 hrs	48 hrs	NA
Storage Volume	0	0	3.5 ac-ft	3.5 ac-ft	7 ac-ft	7 ac-ft	3.5 ac-ft
Diversion Rate	0.2 cfs	1 cfs	0.5 cfs	1 cfs	0.5 cfs	1 cfs	0.5 cfs
% of Inflow Diverted	23%	36%	43%	44%	52%	56%	52%
Approx. dry weather volume diverted, ac-ft	22	22	22	22	22	22	22
Approx. wet weather volume diverted, ac-ft	0	12	19	20	28	31	28
Approximate conductivity of diverted water, uS/cm	1800	1290	1150	1130	1020	980	1020

Scenarios were evaluated for period from October 1, 2021 – January 15, 2021

Project Accomplishments and Broader Applicability

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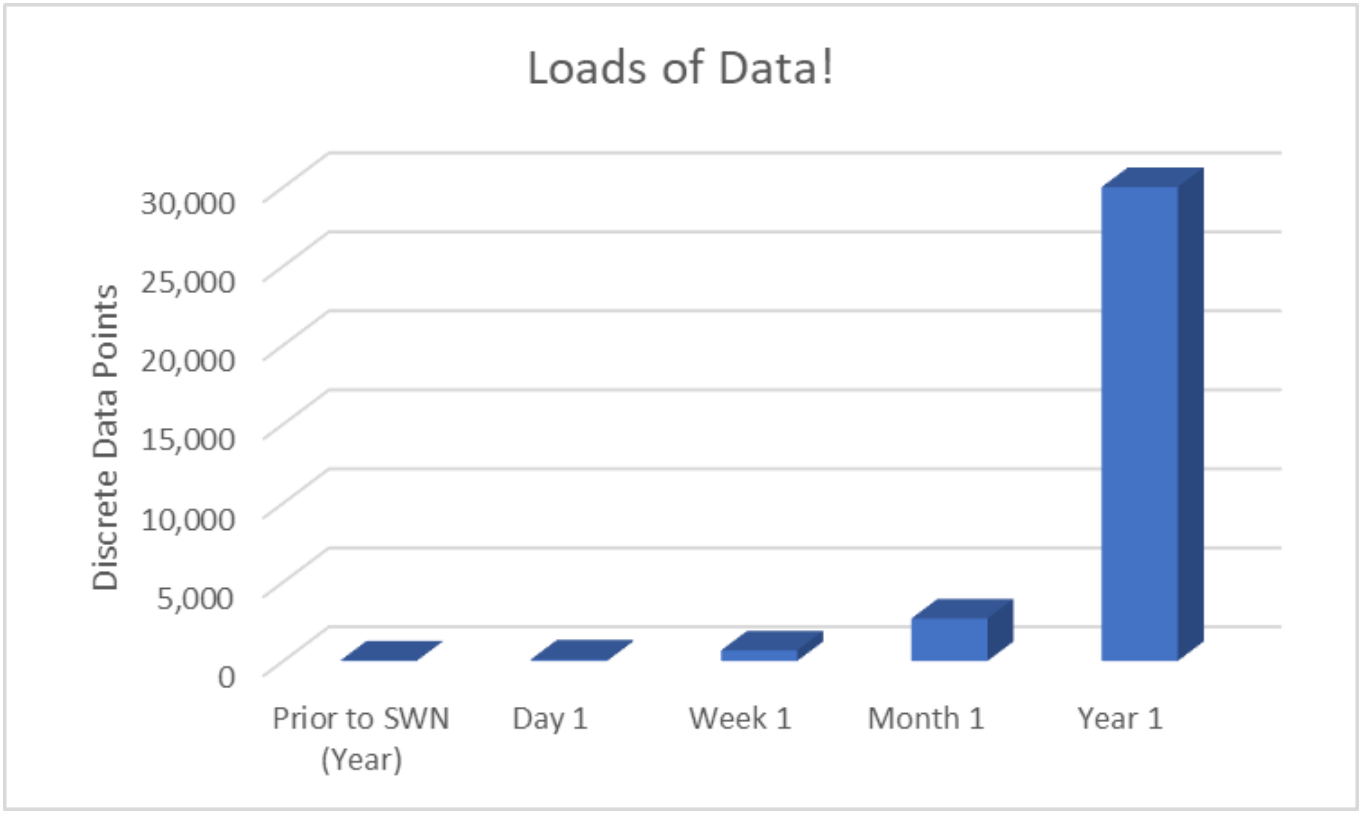
Project Accomplishments

- Piloted AMI for new watershed data use
- Developed Integrated Analysis Dashboard
- >2 Years of Continuous Data
- Grant Funded
- Open-Source Dashboard



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Next Steps

- Drive Project Planning
- Data Use by Several Agencies
- Non-Structural Strategies Evaluation
- Provide Guidance on Target Areas

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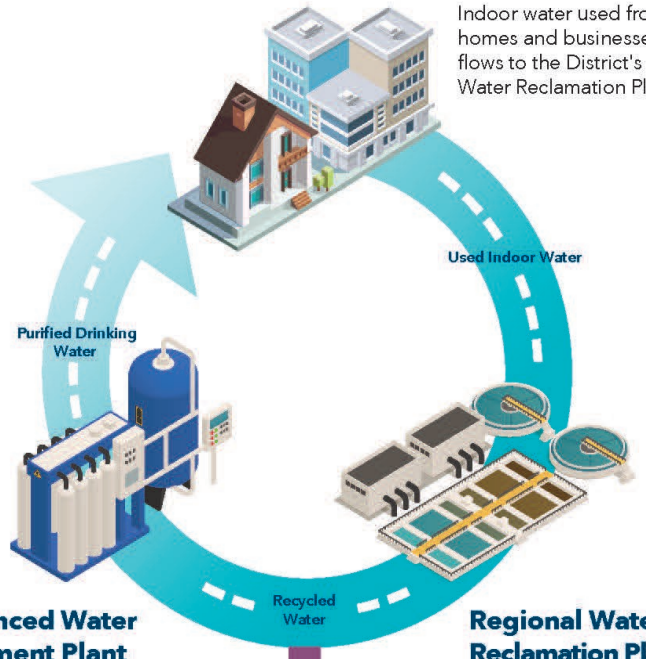
Optimized, Adaptive, Sustainable, and Integrated Supply (OASIS) Treatment Center

DIRECT POTABLE REUSE DRINKING WATER



Homes & Businesses

Indoor water used from homes and businesses flows to the District's Water Reclamation Plant

Advanced Water Treatment Plant

Cleaned water from the Regional Water Reclamation Plant would be further purified to drinking water standards and distributed to homes and businesses

Regional Water Reclamation Plant

Used indoor water is cleaned at the Regional Water Reclamation Plant and can be reused for non-potable uses or treated further for drinking water purposes

Recycled Water

*Potable Water = Drinking Water

RUNOFF DIVERSION RECYCLED WATER

Local Runoff & Stormwater

Urban runoff water and stormwater is collected from storm drains in the watershed to be reused

Lake Reservoir and Natural Treatment Center

Urban runoff and stormwater are temporarily stored in the Laguna Niguel Lake so that the water can be reused when demands are highest

Non-potable Water Use (Irrigation)

Treated water from the Regional Water Reclamation Plant and the Lake Reservoir and Natural Treatment Center is sent to recycled water customers for outdoor irrigation use

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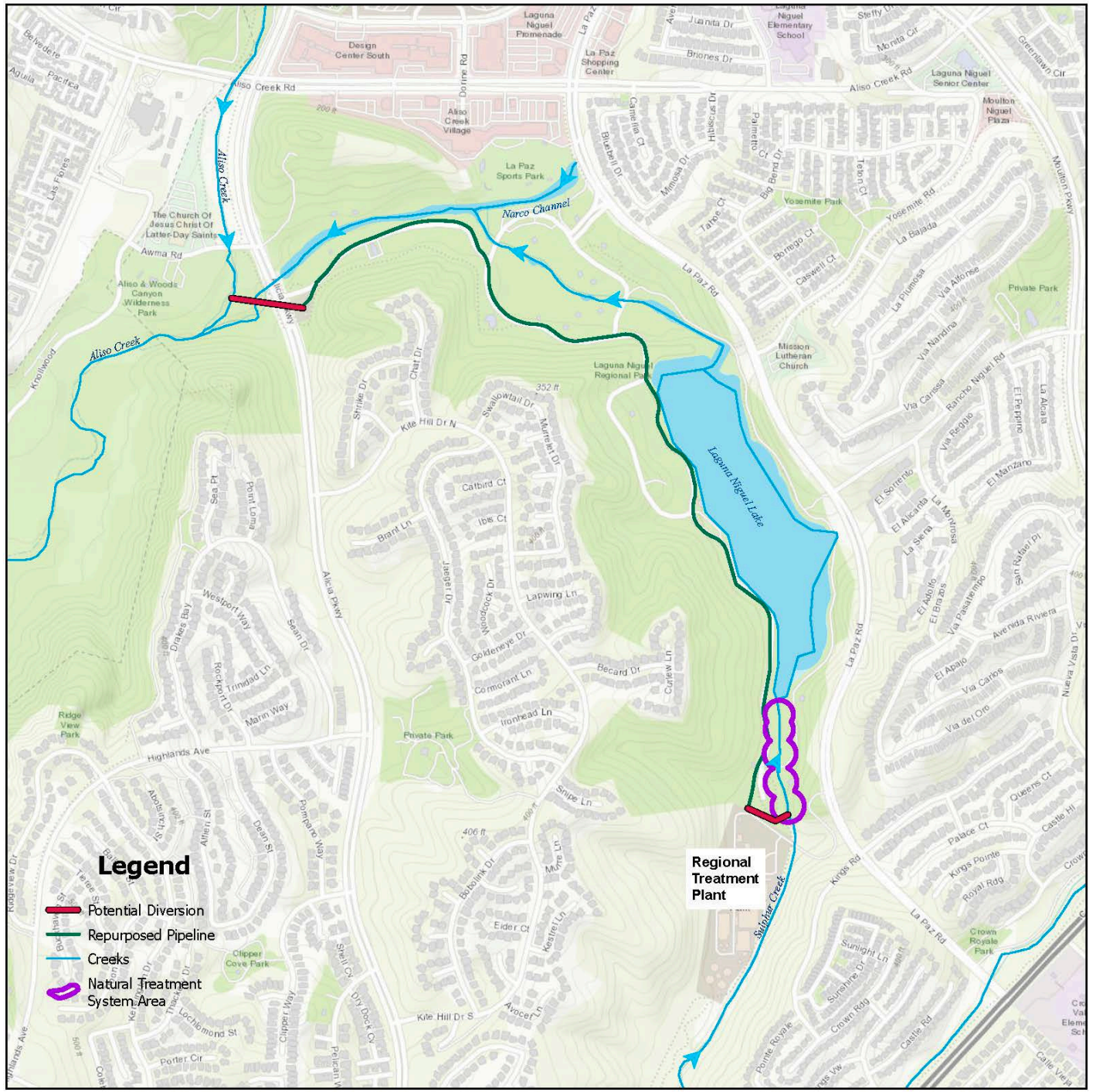
Potential OASIS Facilities

- Runoff Diversion Structure
- Repurposed Pipeline
- Natural Treatment System
- Direct Potable Reuse
- Education Center



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OASIS Planning Activities

- Grant Funding Opportunities
  - $1.5M Building Resilient Infrastructure Communities (FEMA)
- DPR Concept Study
- Demonstration Plant
- Runoff Diversion Study
- Water Quality Monitoring Plan
- Regional Partnerships
- Stakeholder Coordination and Outreach

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Thanks to the Team!

MNWD – Program Manager
Laura Rocha
Drew Atwater
Monobina Mukherjee
Anudeep Vanjavakam
Alex Thomas
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California Data Collaborative
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Sensus (AMI)
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