



SCIENTIFIC STUDY PROGRAM  
FISCAL YEAR 2027-2028

# LCC Treatment BMP Filtration Performance

Lower San Gabriel River

PROJECT LEAD:

Gateway Water Management  
Authority

PRESENTERS:

Rich Watson (LCC WMG Consultant)  
Brianna Datti (Craftwater)  
Dan Angelescu (Fluidion)

PRESENTATION DATE:  
October 13, 2026



# Scientific Study Overview

*Field-validated quantification of bacterial removal mechanisms in stormwater BMPs to improve design, performance, and cost-effectiveness.*

## Nexus

*Connection to Stormwater/Urban Runoff capture or pollution reduction*

- **Quantifying bacterial removal performance in stormwater pre-treatment, filtration, and infiltration BMPs**, focused on particle-associated bacteria that are not adequately characterized by conventional monitoring approaches
- Generating field-based data under real-world conditions to improve understanding of treatment processes and **support refinement of BMP design, performance assumptions, and regional implementation strategies.**

### STUDY LEAD

Gateway Water Management Authority

### WATERSHED AREA(S)

Los Cerritos Channel WMG

### TOTAL FUNDING REQUESTED

\$2,263,000

Funding Phase(s)/FY(s): FY27-28 – FY30-31 (Four Years)

# Scientific Study Overview

*Field-validated quantification of bacterial removal mechanisms in stormwater BMPs to improve design, performance, and cost-effectiveness.*

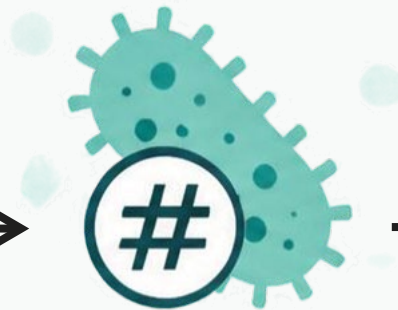
*Analysis of bacterial loads across treatment mechanisms*

Pre-Treatment

Filtration

Infiltration

*Quantified bacterial removal performance*



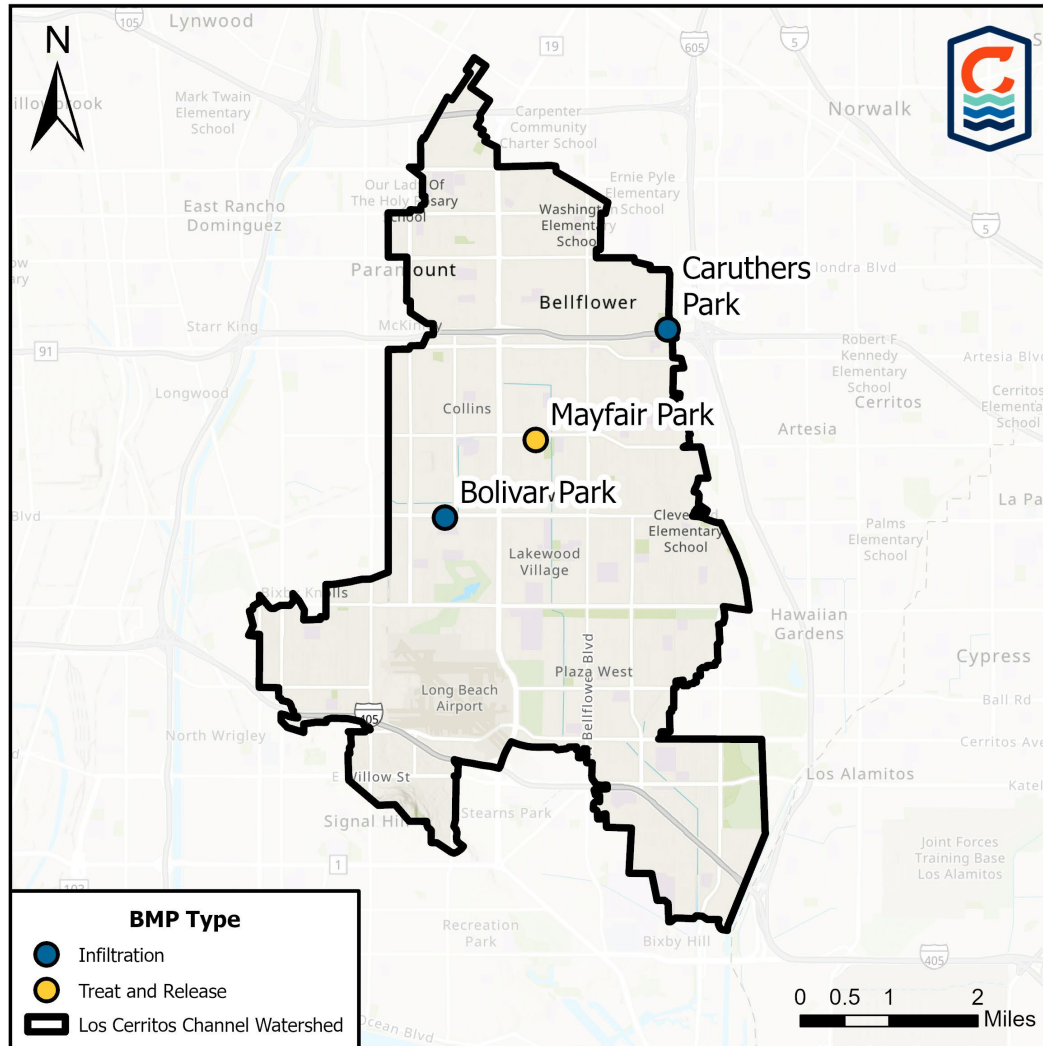
*Emphasis on particle-associated bacteria that are not adequately characterized conventionally*

Improved performance assumptions

Refined BMP designs

Regional implementation strategies

# Study Location



## Bolivar Park



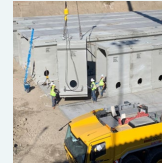
### BMP TYPE

Infiltration  
BMP

### FEATURES

Pretreatment, pump station, infiltration, storage, and discharge pump

## Mayfair Park



### BMP TYPE

Treat and  
Release  
BMP

### FEATURES

Pretreatment, storage, pump, and filtration

## Caruthers Park



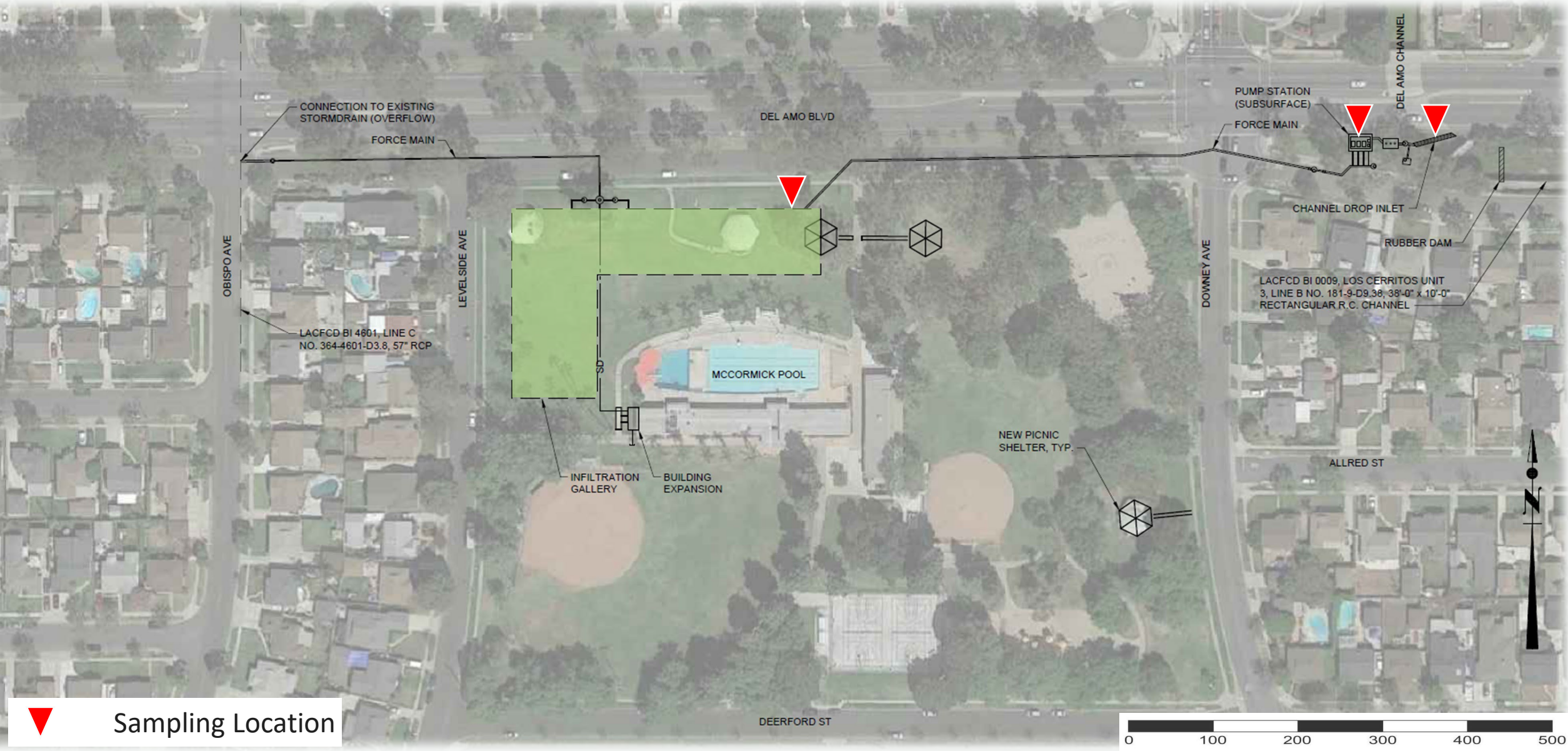
### BMP TYPE

Infiltration  
BMP

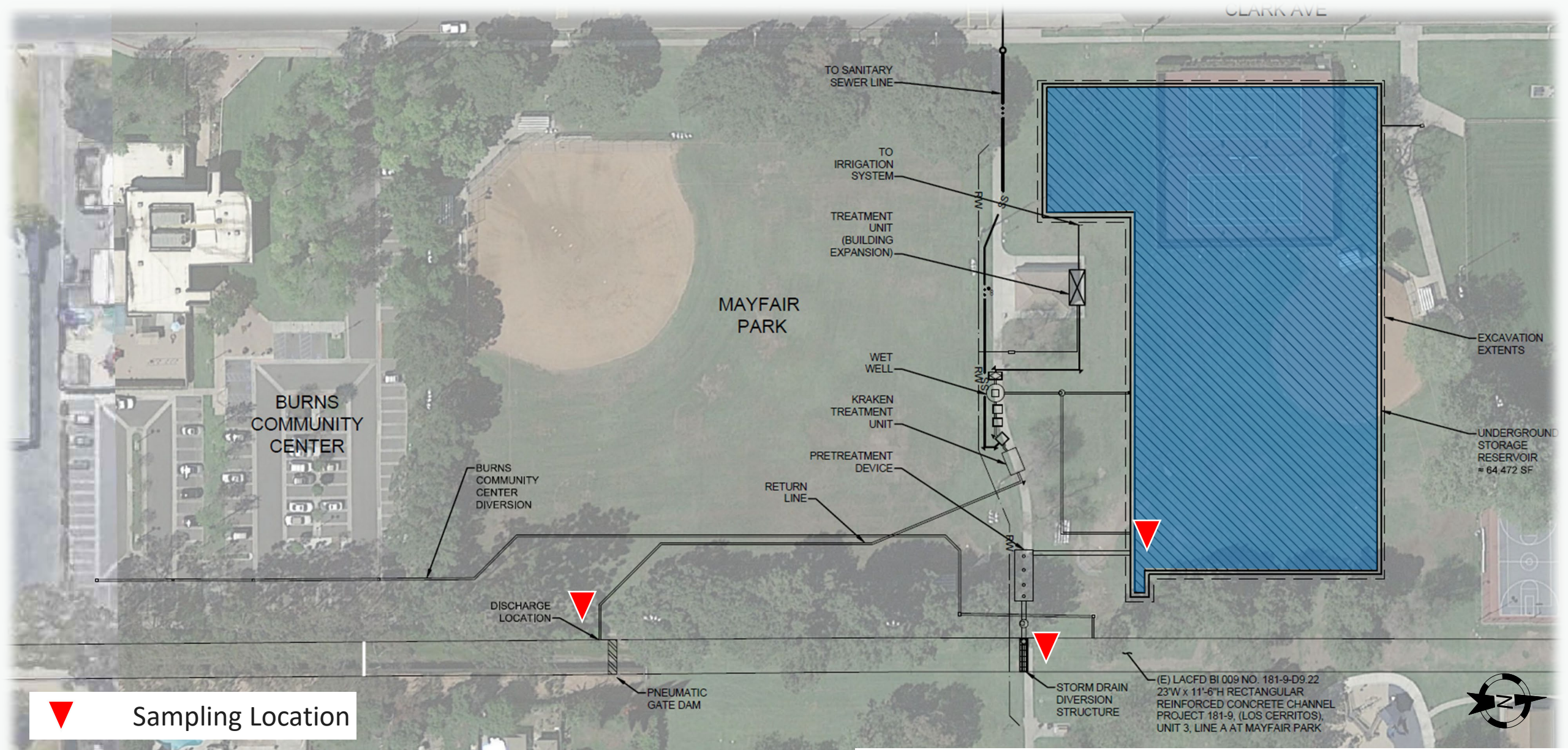
### FEATURES

Pretreatment, infiltration, storage, and discharge pump

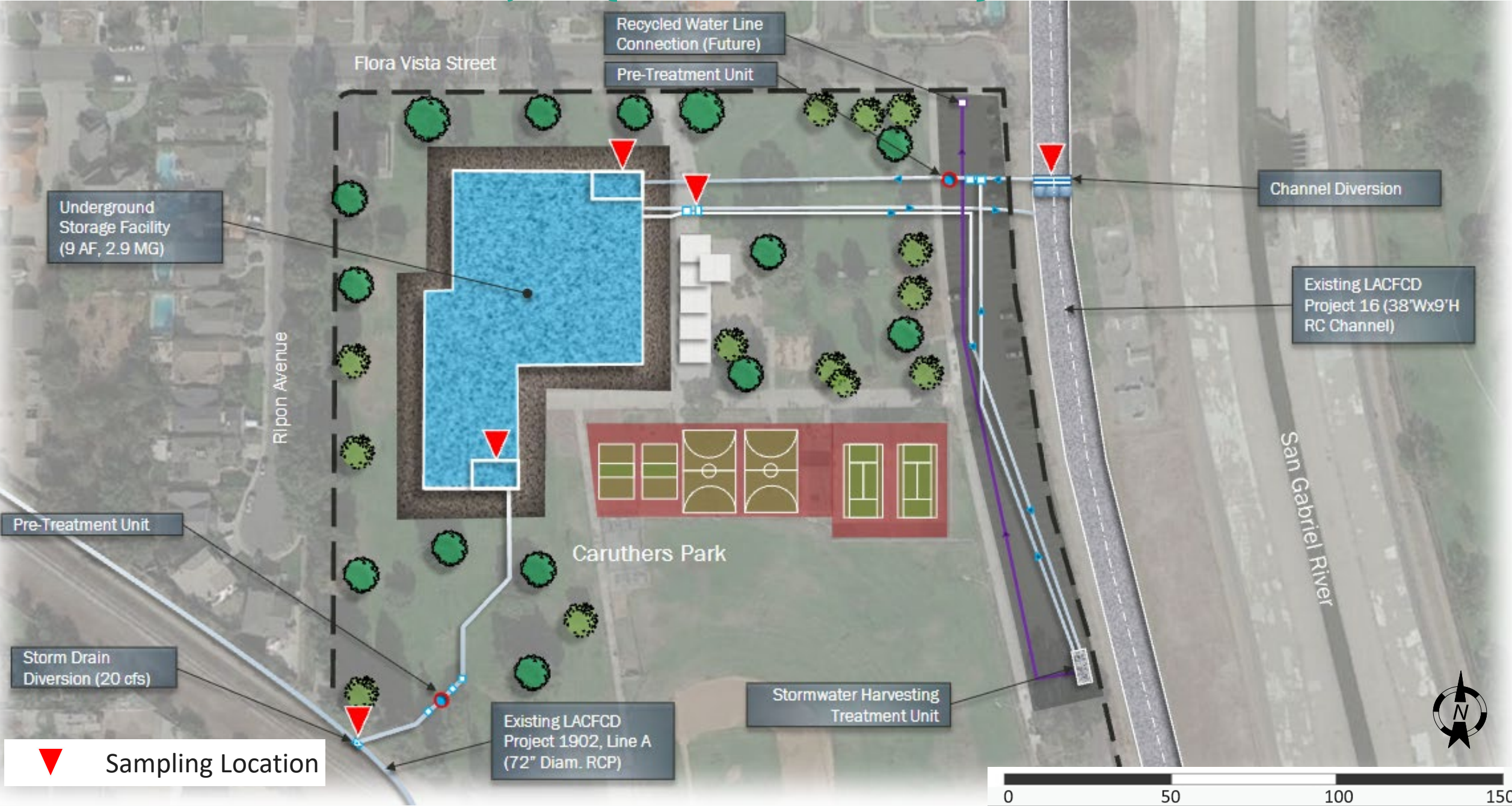
# Bolivar Park SW Project (Infiltration BMP)



# Mayfair Park SW Project (Treat and Release BMP)



# Caruthers Park SW Project (Infiltration BMP)



# Problem Statement, Study Questions & Objectives

## Problem Statement

*The knowledge gap this Study addresses*

Bacterial removal by stormwater BMPs remains **poorly quantified**, particularly for filtration-based and treat-and-release systems, where particle-associated bacteria are often underestimated.

## Study Questions

*What this Study aims to answer*

How effectively do different BMPs **remove free and particle-associated bacteria**?

What **fraction of bacteria is particle-attached** at different stages of storm events, influencing BMP treatment performance in real operating conditions?

Can in-situ monitoring **improve accuracy, representation, and usefulness** of bacteria performance assessment?

Can improved monitoring inform **smaller, more efficient, and more cost-effective designs**?

## Objectives

*How Study Questions investigate the Problem*

Combine **high-frequency in-situ monitoring, laboratory validation, and advanced microscopy** to quantify bacterial removal, calibrate models, and optimize BMP design.

## Prior Similar Studies

*Have any been done before? How this differs?*

- Targeted Human Waste Source Reduction Strategy
- Application of Innovative Technology for Microbiological Testing
- Characterizing and Optimizing the Water Quality Benefits of In-Channel Vegetation
- Regional Pathogen Reduction Study

# Problem Statement, Study Questions & Objectives

## What previous studies address



**Pollution  
Sources**



**Monitoring  
Technologies**



**Vegetation  
Treatment**



**Pathogens**

## What this study adds



**Quantifying bacterial-removal  
mechanisms in constructed BMPs**



**Translate findings into improved  
design and cost-efficiency,  
expanding potential strategies**

# Study Methodology



## Data Collection

*How and under what conditions data is gathered*

Nine monitoring locations across three BMGs, targeting 10 storm events over two wet seasons. Automated monitoring and sampling capture bacterial dynamics and storm conditions.



## Baseline Conditions

*Existing conditions used for comparison*

Upstream bacterial concentrations and hydraulic conditions establish untreated baselines for comparison with downstream measurements at each BMP.



## Data Validation

*QA/QC and comparison to benchmarks*

Established with SAP to include instrument calibration, standardized sampling protocols, and cross-validation of in-situ measurements against laboratory culture methods, qPCR, and microscopy.

| Station ID | Event Date | Water Depth | Water Temp (°C) | Water Temp (°F) | Water Temp (°C) | Water Temp (°F) |
|------------|------------|-------------|-----------------|-----------------|-----------------|-----------------|
| 1001       | 2019-09-09 | 12.0        | 20.0            | 68.0            | 20.0            | 68.0            |
| 1002       | 2019-09-09 | 12.0        | 20.0            | 68.0            | 20.0            | 68.0            |
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| 1100       | 2019-09-09 | 12.0        | 20.0            | 68.0            | 20.0            | 68.0            |

## Documentation

*How records ensure reproducibility*

Standardized field logs, calibration records, sampling documentation, laboratory results, and QA/QC records maintained in a centralized database.

# Study Methodology



# Expected Outcomes

*Anticipated results, use cases, and target audience*



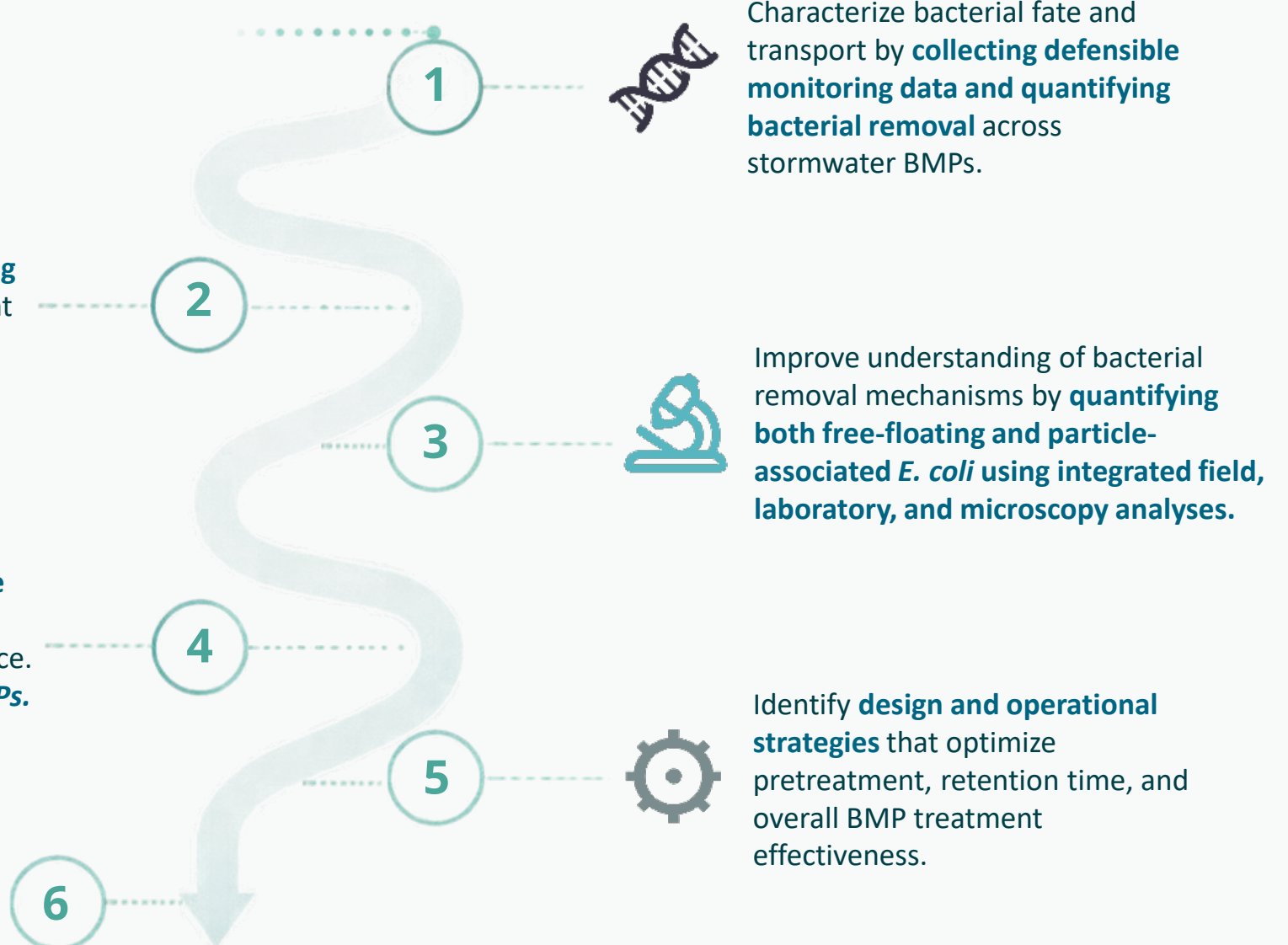
Develop a **high-frequency monitoring framework** that captures storm event pollutographs and **evaluates BMP treatment performance under real-world conditions**.



**Establish defensible BMP performance metrics** to support improved design, performance evaluation, and compliance.  
*Likely smaller, more cost-effective BMPs.*



Develop **scalable regional guidance** to improve future stormwater planning, modeling, BMP design, and regulatory decision-making.



# Alignment

*Fit with Watershed Plans or WASC SIP priorities*



Supports priorities in the **Los Cerritos Channel (LCC) Watershed Management Area** and the **Lower San Gabriel River (LSGR) Initial Watershed Plan (IWP)**.



Connects to **Improving Water Quality (Goal A, Strategy 1.1)** and **Ensuring Ongoing Operations and Maintenance (Goal N, Strategy 8.4)**.



In the IWP, addresses **Actions 1.1.2, 1.1.3, 1.1.7, and 1.1.8** by generating defensible, high-resolution monitoring data to improve understanding of bacterial fate and transport, evaluate BMP treatment performance, refine pollutant reduction estimates and stormwater models, and strengthen regional water quality monitoring.



In the IWP, supports **Action 8.4.1** by producing post-construction performance data that can inform adaptive maintenance, optimize BMP operation, and improve long-term treatment effectiveness.

# Summary of Benefits

This study focuses on **providing water quality benefits** through the research of **bacterial dynamics and treatment performance within select BMP systems**:



**Identify factors driving treatment performance & quantify bacterial-load reductions across BMPs**



**Develop a high-frequency stormwater monitoring framework and bacterial pollutographs**



**Quantify and characterize free-floating and particle-attached *E. coli***



**Establish BMP performance metrics for bacterial removal efficiency**



**Identify optimized design\*, operational, and monitoring strategies**



**Scalable implementation guidance, regional applicability frameworks, and refined performance assumptions**

\*Potential for more bacteria removal achievable through smaller scale BMPs

# Study Team & Dissemination

## Study Team

*Lead entity, partners, relevant expertise*



Global leader in advanced microbiological monitoring, providing autonomous high-frequency sampling.



>35 years implementing complex monitoring programs, automated sampling systems, and BMP performance evaluations throughout California.



Victoria Orphan specializes in advanced imaging of microorganisms in complex environmental samples.



Project leadership across data integration, modeling, and translation of scientific findings into practical BMP design and implementation guidance.

## Regulations

*If applicable — relevant regulatory requirements*

LA Regional MS4 Permit (Order R4-2021-0105) & Los Cerritos Channel and Estuary, Alamitos Bay, and Colorado Lagoon Indicator Bacteria TMDL:  
Supports the assessment of treatment performance against bacteria water quality objectives.

## Engagement & Dissemination

*How results will be shared, incl. SCW Program website*



Coordination with municipalities, watershed stakeholders, and a technical team.



Collaboration with technical experts, lab partners, and research specialists.



Integration of remote monitoring systems and centralized data platforms and dashboards to support transparency, accessibility, and communication.



Communication to SCW Program members, watershed management groups, regulatory agencies, academic partners, and the public through meetings and deliverables.



Publication of scientific articles in peer-reviewed journals and presentations at trade and scientific conferences.

# Cost & Schedule

| TASK                                 | DESCRIPTION                                                                     | COST                  | COMPLETION DATE |
|--------------------------------------|---------------------------------------------------------------------------------|-----------------------|-----------------|
| Task 1 (Pre-Study and Work Planning) | Sampling Analysis Plan, Engineering and Design of Equipment Installation System | \$156,500.00          | 9/30/2028       |
| Task 2 (Study Implementation)        | Stormwater Sampling and Laboratory Analysis                                     | \$1,344,500.00        | 6/30/2030       |
| Task 3 (Study Implementation)        | Ultra High-Resolution Microscopy Confirmation                                   | \$265,500.00          | 11/30/2030      |
| Task 4 (Study Implementation)        | Data Evaluation and Model Calibration                                           | \$272,000.00          | 9/30/2031       |
| Task 5 (Post-Study)                  | Expanding Applicability to Regional BMPs                                        | \$224,500.00          | 3/31/2032       |
| <b>TOTAL COST</b>                    |                                                                                 | <b>\$2,263,000.00</b> |                 |

## Cost Share

**Total Cost Share: \$0    Leveraged Funding %: 0%**

*The Los Cerritos Channel Watershed Management Group has invested in additional bacterial monitoring and microbial source tracking over the past storm seasons. The Group plans to continue similar monitoring across the watershed which will be used in coordination with the BMP performance measurements.*

## Funding Request by Watershed Area

| WASC         | FY 27-28         | FY 28-29         | FY 29-30         | FY 30-31         | TOTAL              |
|--------------|------------------|------------------|------------------|------------------|--------------------|
| LSGR         | \$946,500        | \$438,250        | \$580,750        | \$297,500        | \$2,263,000        |
| <b>TOTAL</b> | <b>\$946,500</b> | <b>\$438,250</b> | <b>\$580,750</b> | <b>\$297,500</b> | <b>\$2,263,000</b> |

# Watershed Planning Alignment

| Watershed Goal                                                        | Strategy                                                                                                            | Actions             | Study Contribution                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Goal A:</b><br>Improve Water Quality                               | <b>Strategy 1.1:</b><br>Prioritize high performance Projects and Programs in areas with the highest pollutant loads | <b>Action 1.1.2</b> | Selection of various BMP configurations to address bacterial treatment performance and improve BMP evaluation of bacterial reductions across the watershed                                                                                                                                 |
|                                                                       |                                                                                                                     | <b>Action 1.1.3</b> | Generate defensible monitoring data on bacteria treatment performance across multiple BMP configurations                                                                                                                                                                                   |
|                                                                       |                                                                                                                     | <b>Action 1.1.7</b> | Publication of scientific articles in peer-reviewed journals and presentations at trade and scientific conferences                                                                                                                                                                         |
|                                                                       |                                                                                                                     | <b>Action 1.1.8</b> | Provide information to incorporate into water quality trend assessments and adaptive watershed management efforts                                                                                                                                                                          |
| <b>Goal N:</b><br>Ensure Ongoing Operations & Management for Projects | <b>Strategy 8.4:</b><br>Integrate post-construction monitoring data into O&M plans                                  | <b>Action 8.4.1</b> | Production of post-construction performance data to evaluate treatment system performance over time, identify operational factors influencing bacteria removal, and provide information that supports adaptive maintenance practices and future O&M planning for regional stormwater BMPs. |

# Thank you

QUESTIONS?

Gateway Water Management Authority

Rich Watson (LCC WMG Lead)

Brianna Datti (Craftwater)

Dan Angelescu (Fluidion)