Community-Centered Optimization of Nature-Based BMPs Starting with the Gaffey Nature Center Facility

Scientific Studies Program

Fiscal Year 2022-2023

All Watersheds

SEITec

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Study Overview

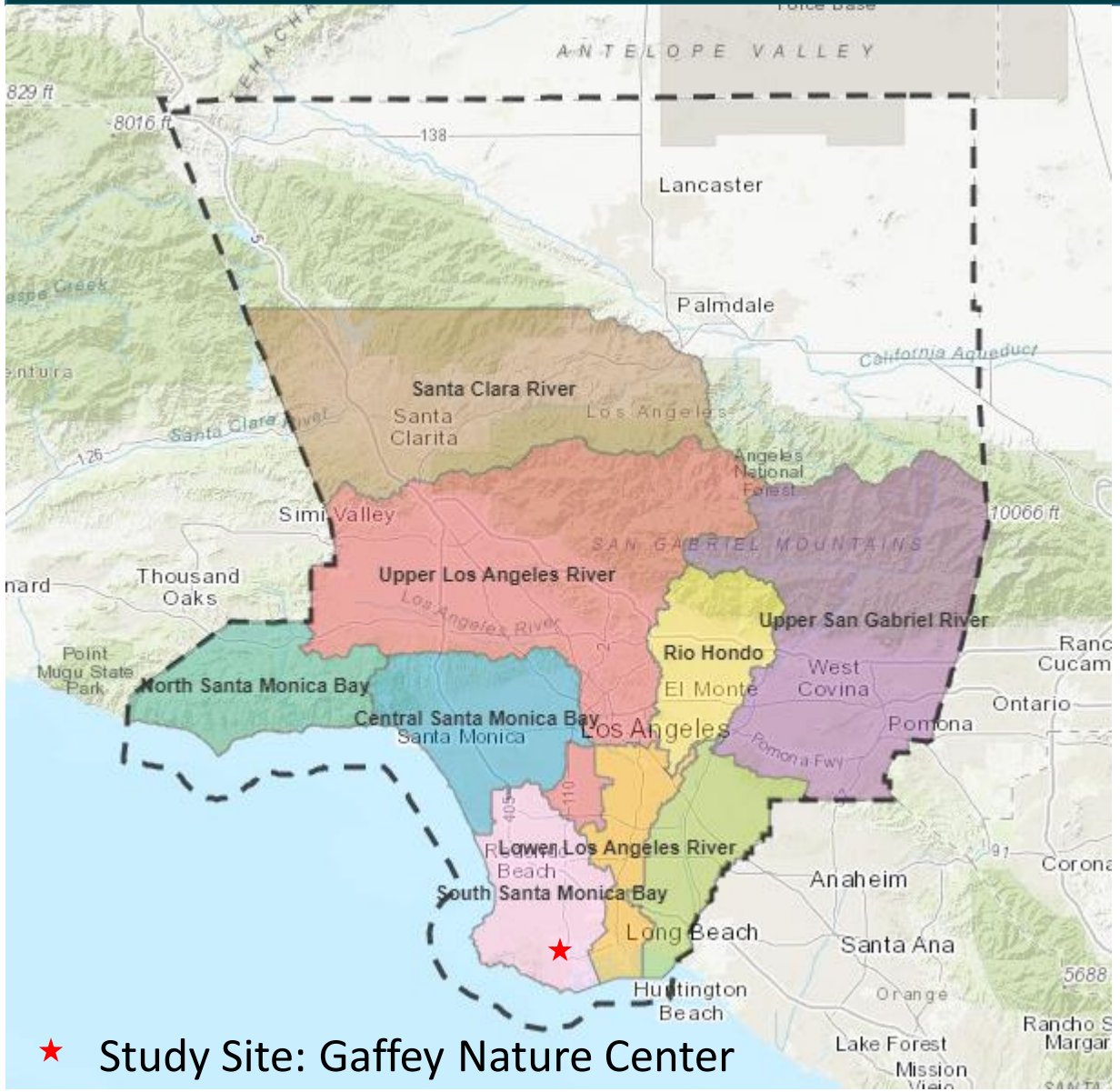
Summary of Study

This study aims to optimize:

1. plant varieties and species, and
2. the design and O&M of

nature-based biofiltration BMPs, with special focus on the community.

Study Location



Study Location: The Gaffey Nature Center in San Pedro, CA, a 3.1-acre research and educational facility purposely built for the study of nature-based stormwater BMPs.

Study Benefits: This study will benefit the implementation of nature-based stormwater BMPs in ALL watersheds.

Study Location – The Gaffey Nature Center

- 3.1-acre site at intersection of N. Gaffey St. and 110-FWY in San Pedro, CA
- Land leased to LA Sanitation and Environment for conversion into a BMP education and research center
- Construction work completed in September 2021

The Gaffey Nature Center

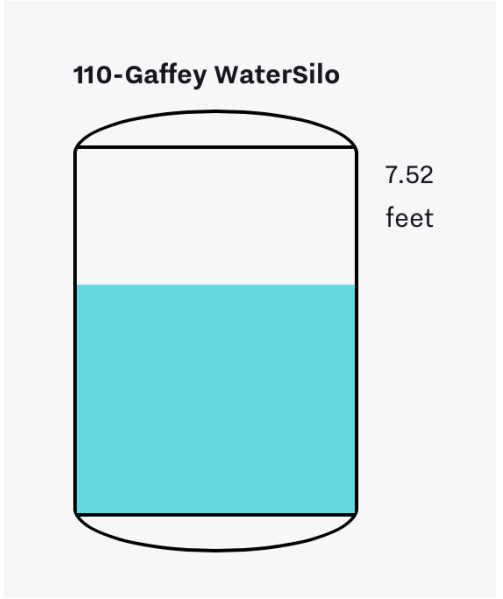
Site incorporates

- City's first vertical cistern, now in several SCW projects
- Central hydroponic bioswale on laser-leveled basins
- Diverse variety of California-native plants for nature-based BMPs

The Gaffey Nature Center

Site incorporates

- Solar powered pumps and recirculation system
- Internet connectivity
- Infrastructure for instrumentation and remote sensing



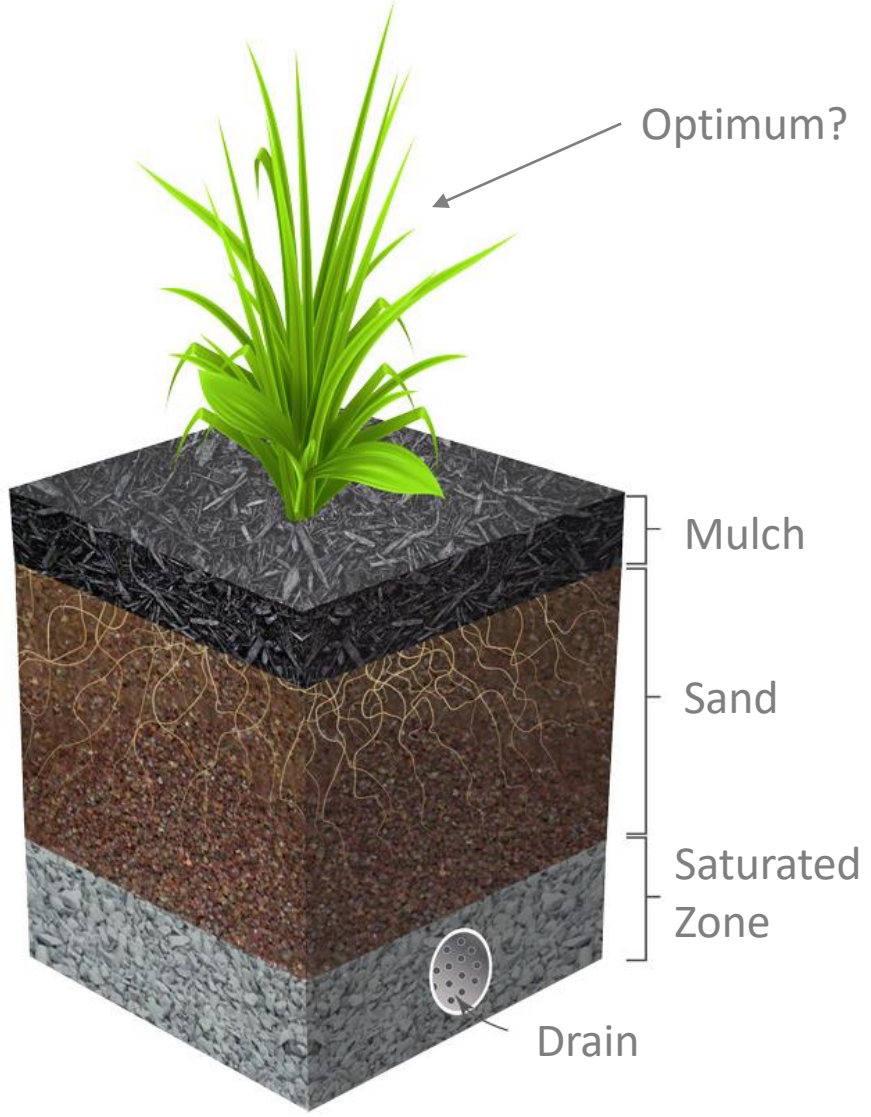
The Gaffey Nature Center

Site incorporates

- Outdoor amphitheater and educational signage
- Experimental plots with CA-native BMP grass varieties
- All basic infrastructure for research and public involvement

Problem Statement

- Biofiltration has been adopted by the City of Los Angeles as nature-based stormwater BMPs. The process relies on bio-diverse native species and beneficial-use varieties.
- Native California species and varieties have enormous potential but there is no research data on their utility for BMPs.
- Credible research is urgently needed to guide the planning, design, operation and maintenance of biofiltration using California native species and varieties.



Problem Statement – Continued

- A key overlooked potential of nature-based BMPs is biomass production, cooling, and air quality improvement.
- Benefits include carbon sequestration, raw materials supply, medicinal use, animal feed, and human consumption.
- Realizing such benefits requires a community-centered approach involving intimate participation and ownership.
- A key requirement is education and training for bioswale development consistent with community interests.

Study Objectives

1. Develop Guidelines and Standard Operating Procedures for the design, optimization, and O&M of nature-based biofiltration BMPs.
2. Incorporate guidelines in a future revision of the City and County ROW and LID manuals.

Summary

LASAN recently completed the “Gaffey Nature Center”, a national bioswale laboratory.

Innovative 3.1-acre site with pilot vertical cistern, hydroponic bioswale, and solar recirculation.

Outdoor living laboratory intended for the proposed scientific study.

Experiment Questions

Q1: What are the optimal plants and planting practices for biofiltration in California?

Q2: What are the BMP optimization variables for maximum efficacy?

Q3: How will community skills, needs, and level of involvement influence optimization?

Study Tasks

Task	Scope
Task 1: Goals & Parameters	• Identify goals and specify the independent variables • Define baseline conditions • Identify performance parameters to measure and monitor
Task 2: Study Setup	• Procure equipment and tools • Construct plots • Plant selected varieties • Install instrumentation and data collection system
Task 3: Perform Study	• Operate and maintain experimentation plots • Collect onsite samples for processing and analysis • Perform field measurements and collect data • Download the data loggers • Perform plot maintenance activities • Send samples to labs and document lab reports • Monitor site surveillance data

Study Tasks – Continued

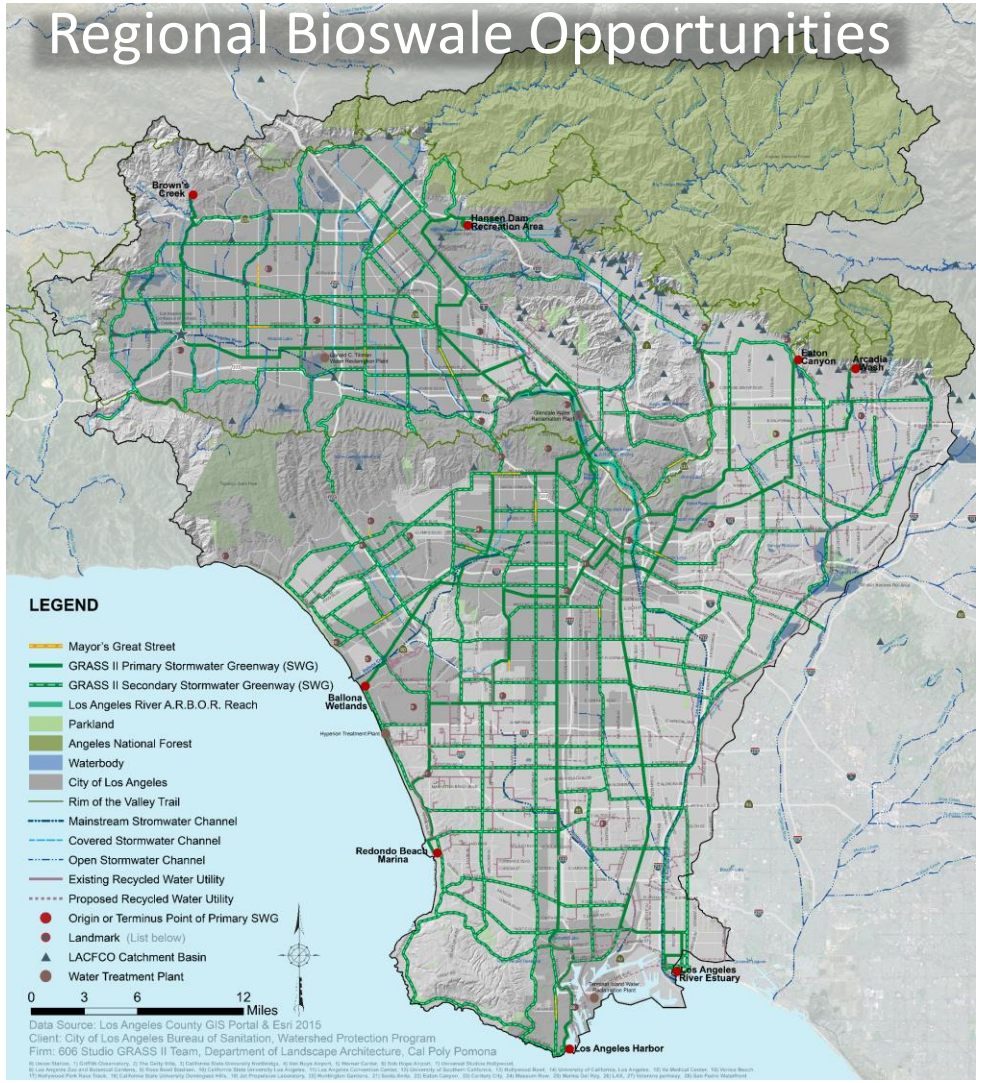
Task	Scope
Task 4: Data Analysis	• Develop and implement data documentation architecture and data processing procedures • Develop and execute calculation procedure for the key performance parameters • Develop and rollout dashboard for collected data and calculated performance parameters
Task 5: Data Evaluation and BMP Optimization	• Examine and evaluate experimentation plots performance • Use result to develop and define optimized designs
Task 6: Study Deliverables	1. **Study Report** – Concise account of the study objectives, data, analysis, results, conclusions, and recommendations. 2. **Design Manual** – Practical guide to designing biofiltration nature-based BMPs 3. **Standard Plans** – Series of plans and details as standard practice for biofiltration BMPs

Study Details – Regional collaboration

Study will closely collaborate with regional Green Streets projects, including:

- Watts Community
- MacArthur Park Lake Project
- Broadway-Manchester Green Streets Project
- Measure W Green Street Projects
- Prop O Green Street Projects

This study will work with ongoing regional projects to construct biofiltration systems at five locations



Cost & Schedule

Task	Description	Cost	Completion Date
Begin Study	Execute funding agreement	N/A	Sep. 2022
Task 1: Goals & Parameters	Identify goals, baseline conditions and performance parameters	$206,000	Nov. 2022
Task 2: Study Setup	Procure equipment, construct plots, procure and plant varieties, install instrumentation, setup communication system	$304,000	Mar. 2023
Task 3: Perform Study	Operate and maintain plots, collect samples and data, download data loggers, maintain plots, document lab reports, monitor site	$1,675,000	Mar. 2027
Task 4: Data Analysis	Develop and implement study architecture, perform calculations and modeling, develop and rollout dashboard	$927,000	Sep. 2023
Task 5: Data Evaluation and BMP Optimization	Examine plot performances, develop and define optimized designs, implement optimized designs in experiment plots	$324,000	Mar. 2027
Task 6: Study Deliverables	1. Study Report 2. Design Manual 3. Standard Plans	$360,000	Sep. 2027
Total		**$3,800,000**	**Sep. 2027**

Funding Request

WASC	Year 1	Year 2	Year 3	Year 4	Year5	Total
CSMB	$175,400	$135,200	$153,200	$151,800	$144,400	$760,000
LLAR	$175,400	$135,200	$153,200	$151,800	$144,400	$760,000
LSGR	$175,400	$135,200	$153,200	$151,800	$144,400	$760,000
NSMB	$175,400	$135,200	$153,200	$151,800	$144,400	$760,000
ULAR	$175,400	$135,200	$153,200	$151,800	$144,400	$760,000
TOTAL	**$877,000**	**$676,000**	**$766,000**	**$759,000**	**$722,000**	**$3,800,000***

* Labor – 67%, Materials 37%

Summary of Benefits

This Study will deliver standard procedures and guidelines for:

a) The scientific design, operation, and maintenance of biofiltration systems

b) Cost-efficient construction of biofiltration BMPs

c) Enhanced beneficial uses of vegetative green infrastructure for communities

d) Sustainable water sourcing solutions for consumptive use supply during dry periods

e) Renewable energy solutions for biofiltration operation and maintenance

Summary of Benefits – Continued

In addition, this Study will:

1. Identify essential plant species for enhanced plant growth, efficient biofiltration, safe consumption, and for combating climate change.
2. Increase efficiency and benefits of bio-filtration for stormwater BMPs and community greening.
3. Inspire community involvement in operation and maintenance of nature-based BMPs.
4. Increase educational benefits of nature-based BMPs for communities.

Questions?

Gateway Area Pathfinding (GAP) Analysis – Phase 2

Scientific Studies Program

Fiscal Year 2022-2023

Watershed Areas: Lower LA River & Lower SGR

Project Lead: Gateway Water Management Authority

Presenter: Brad Wardynski, Craftwater Engineering

Study Overview

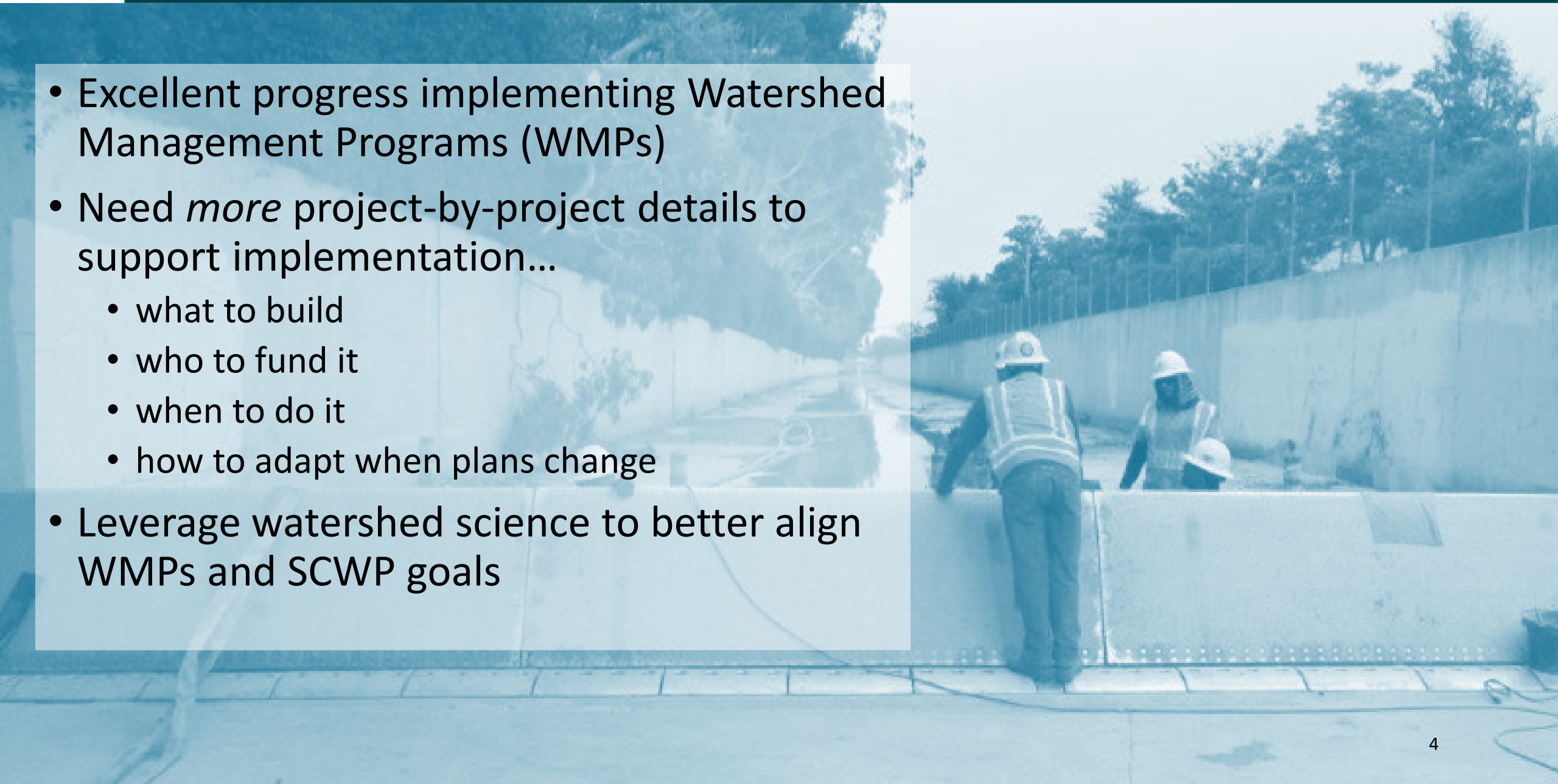
Phase 2 will scale-up the methods tested in Phase 1 to find and analyze projects in a watershed context to recommend a longer-term, project-by-project pathway to safe, clean water

- Nexus: Applies new watershed science to enhance project understanding and synchronize Watershed Management Programs with Safe, Clean Water Program

Study Location

LLAR LSGR

Study Details – Problem Statement



- Excellent progress implementing Watershed Management Programs (WMPs)
- Need *more* project-by-project details to support implementation…
  - what to build
  - who to fund it
  - when to do it
  - how to adapt when plans change
- Leverage watershed science to better align WMPs and SCWP goals

Study Details – Objectives & Outcomes

Identify new, high-impact, multi-benefit projects

Verify with site visits to explore engineering feasibility

Explore how projects interact as a system at the watershed scale

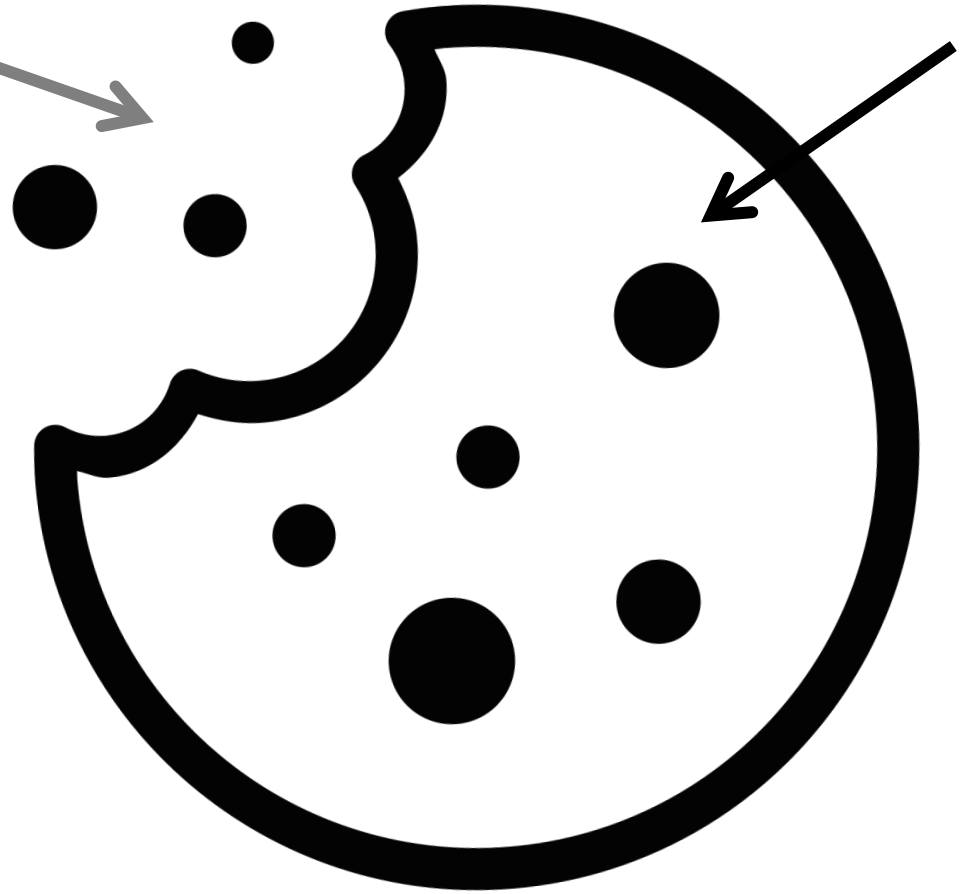
Articulate project-specific roadmap to stormwater quality compliance

Translate findings into Stormwater Investment Plan recommendations

Study Details - Methodology

PHASE I (FUNDED)

- TEST METHODS IN PILOT AREA
- CONDUCT DESKTOP ANALYSIS
- GENERATE NEAR-TERM PROJECT CLARITY



PHASE 2 (PROPOSED)

- SCALE-UP METHODS TO BROADER AREA
- CONDUCT ENGINEER SITE VISITS
- GENERATE LONGER-TERM PROJECT CLARITY
- SYNTHESIZE ADAPTATION & PLAN RECOMMENDATIONS

Study Details – Similar Studies & Regional Collaboration

RIO HONDO/SAN GABRIEL RIVER REVISED WMP

1st watershed plan to articulate a project-by-project pathway to clean water

UPPER LA RIVER PRESIP STUDY

73% potential boost in efficiency, freeing up funding for other watershed and community investments

BUILDING CONSENSUS FOR BALANCED WATERSHED PROJECTS

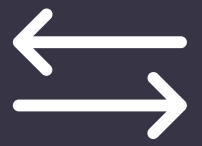
$350k matching funds to analyze cost-effective pathways to achieve multiple SCW goals

LLAR & LSGR WATERSHED COORDINATORS

met to inform about study objectives and brainstorm ways to coordinate and leverage technical outcomes, outreach, and engagement

SCWP METRICS & MONITORING STUDY

coordinating to ensure consistency with SCWP adaptations, and to inform District-led study with enhanced, local data and project-specificity

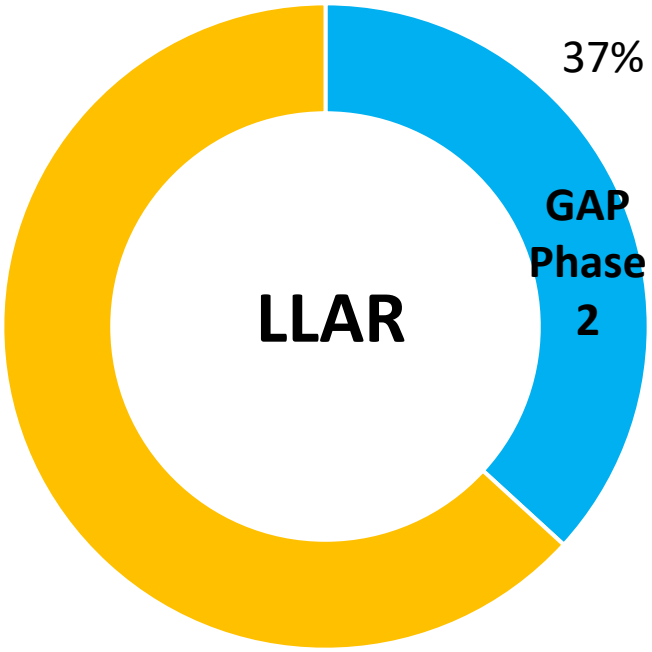


Cost & Schedule

Phase	Description	Cost	Completion Date
1	Identify and Reconcile Watershed-Wide Opportunities	$207k	Funding Transfer + 6 months (February 2023)
2	Model Watershed-Scale Project Interactions and SCWP Scoring	$161k	Funding Transfer + 8 months (May 2023)
3	Cross-Reference Projects with Recipes for Compliance and Plot Path to Clean Water	$55k	Funding Transfer + 10 months (July 2023)
4	Stormwater Investment Plan Recommendations	$37k	Funding Transfer + 12 months (September 2023)
TOTAL		**$460k**	

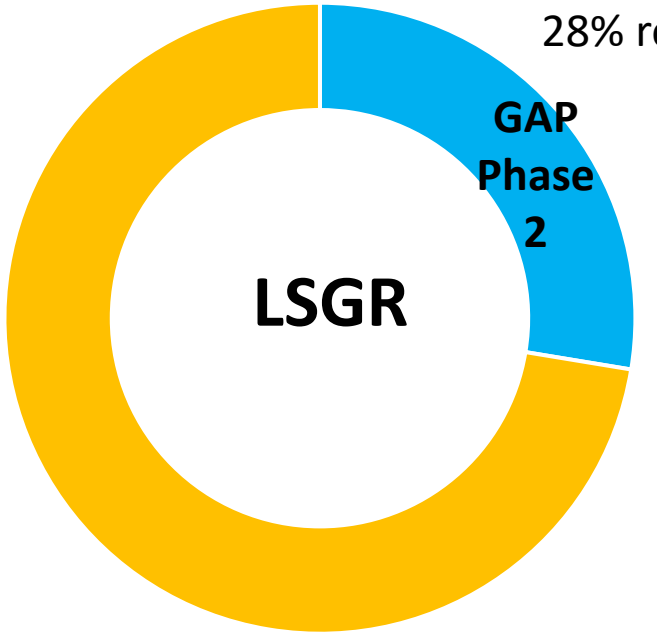
Funding Request

WASC	Phase 1	Phase 2	Year 3	Year 4	Year 4
LLAR	$75k	$230k	FUTURE YEARS TBD		
LSGR	$75k	$230k			
TOTAL	$150k	$460k			



37% requested

Requested Funding Compared to Available Annual Scientific Study Funding (5% of Regional Program)



28% requested

Summary of Benefits

- Supports data-driven stormwater investment planning
- Bolsters certainty of advancing WMP and Safe, Clean Water goals

effectively supports the SCWP's goals

enormous potential to provide long-term value

a clearer hierarchy for retrofitting

unequivocal praise

useful data

produce value for taxpayers

by far the most thoughtful proposal

potential to serve as a model regionwide

minimize conflicts with other projects

technical approach is excellent

a bargain given the proposed budget

-- Consensus on Phase 1 GAP Analysis by Independent Academic Expert Review Panel


Questions?