An aerial photograph of a coastal city, likely Los Angeles, showing a dense urban grid and a large body of water. The left side of the image is overlaid with a solid blue color, which serves as a background for the text.

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

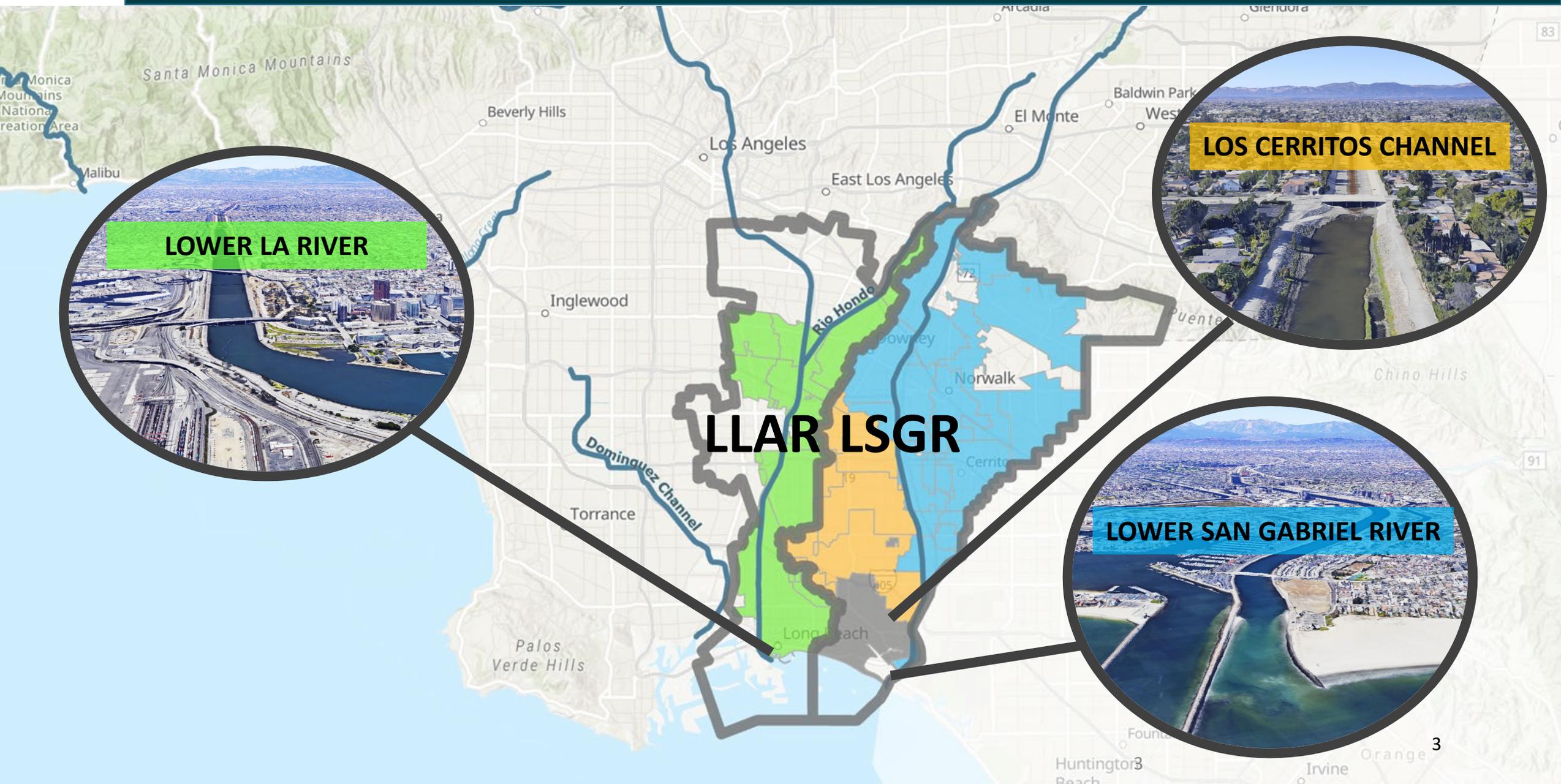
Phase 2 will scale-up the methods tested in Phase 1 to find and analyze projects in a watershed context to recommend a longer-term, project-by-project pathway to safe, clean water

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





Study Location



LOWER LA RIVER

LOS CERRITOS CHANNEL

LOWER SAN GABRIEL RIVER

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

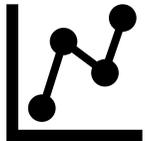




Identify new, high-impact, multi-benefit projects



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



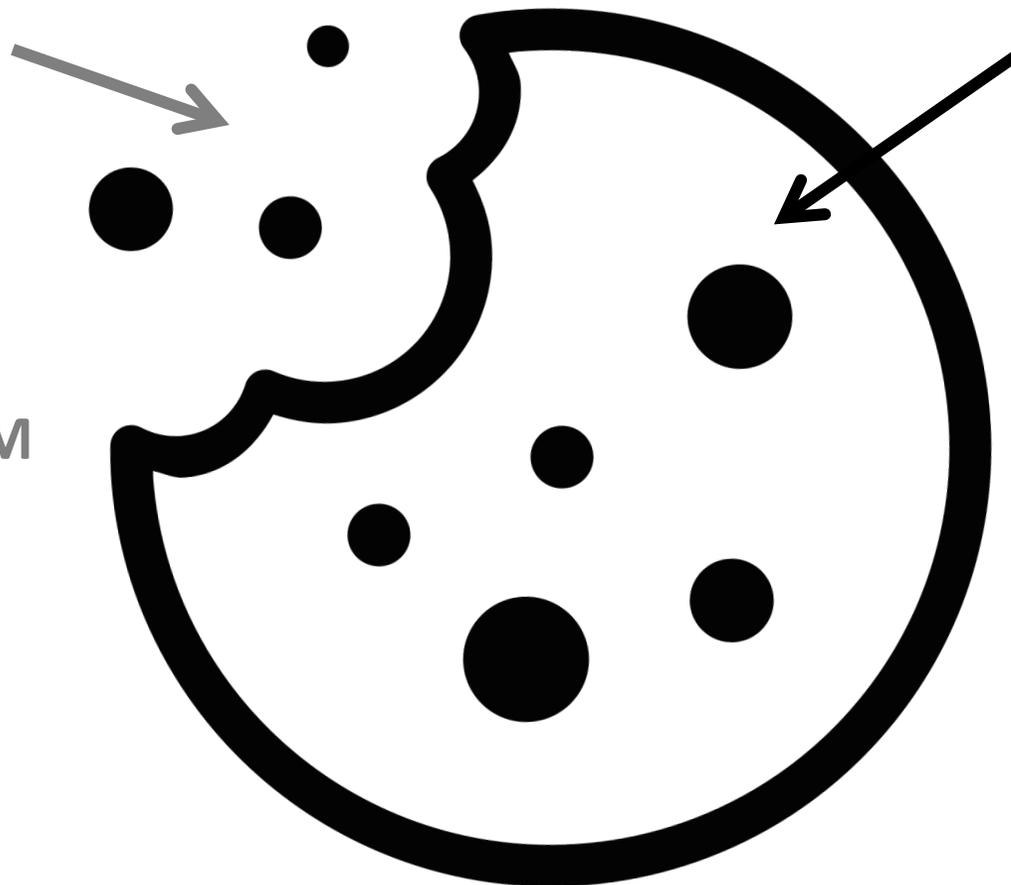
Translate findings into Stormwater Investment Plan recommendations



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





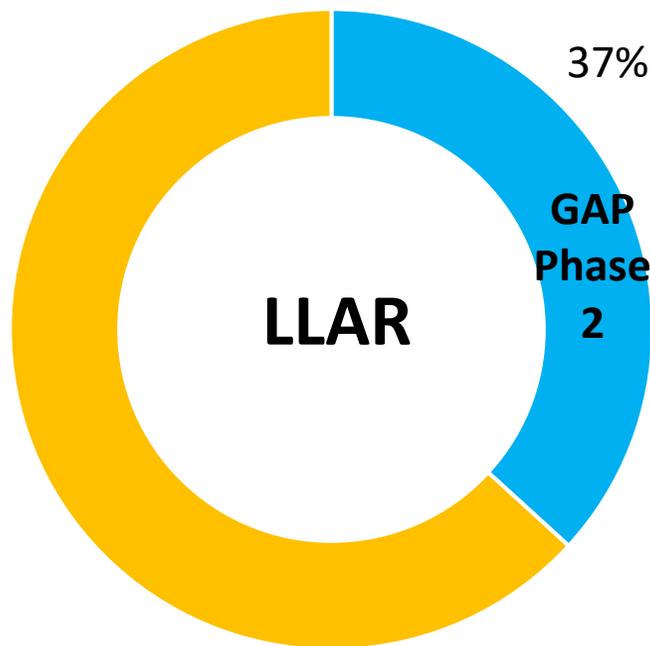
Cost & Schedule

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	

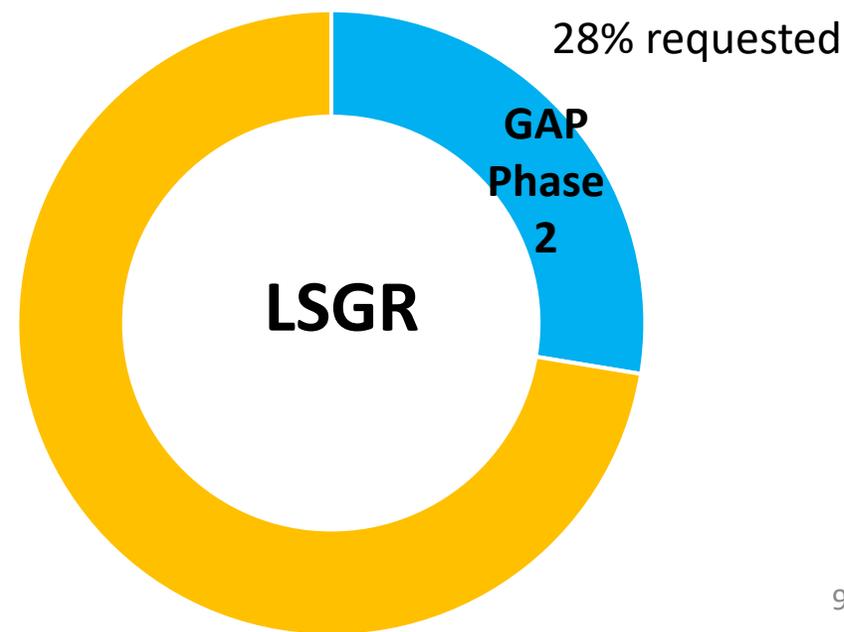


Funding Request

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



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





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?



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

Scientific Studies Program

Fiscal Year 2022-2023

All Watersheds

SEITec

Shahriar Eftekharzadeh, PhD, PE



Study Overview

Summary of Study

This study aims to optimize:

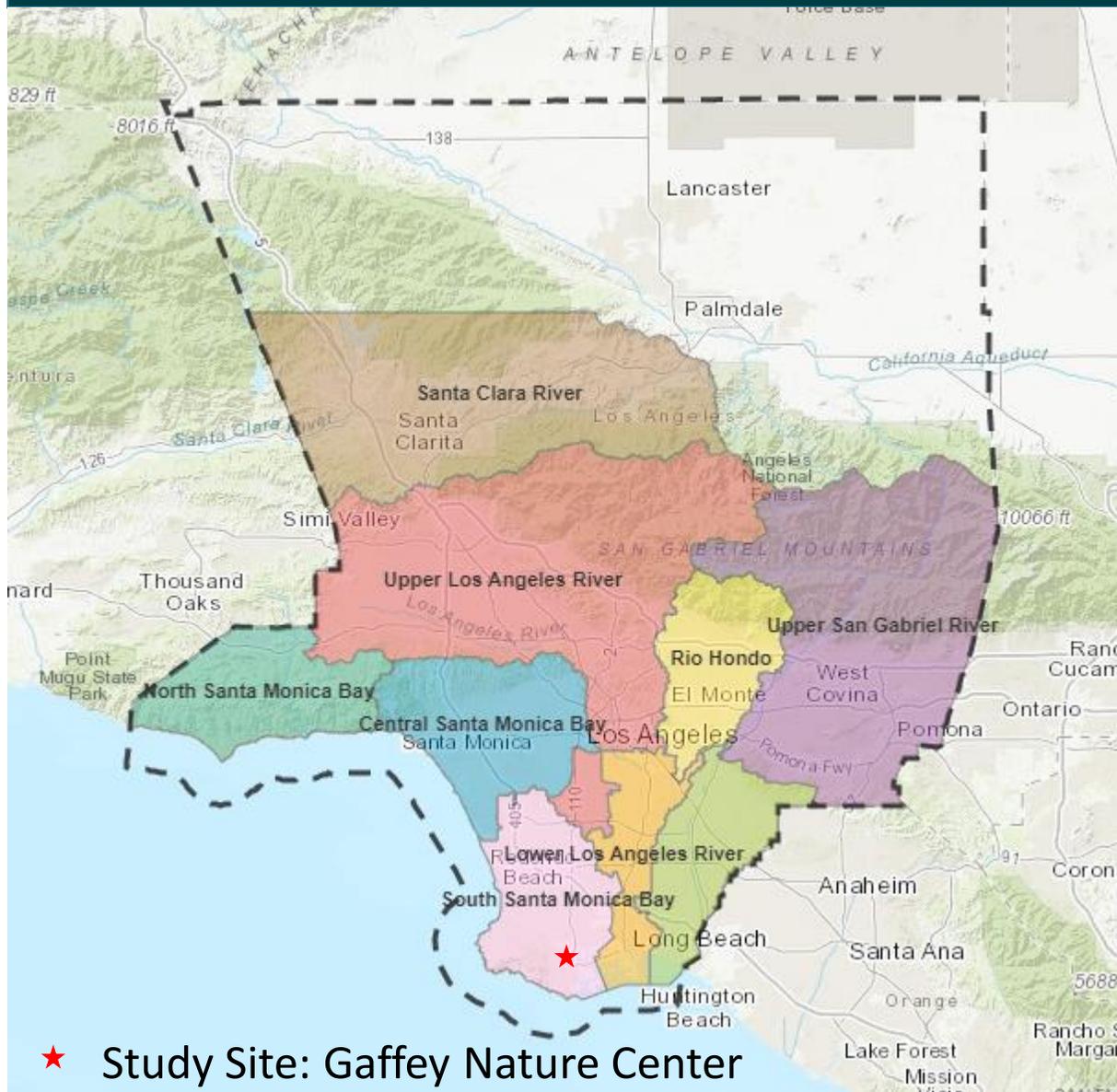
1. plant varieties and species, and
2. the design and O&M of

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



110-Gaffey WaterSilo



7.52
feet



The Gaffey Nature Center

Site incorporates

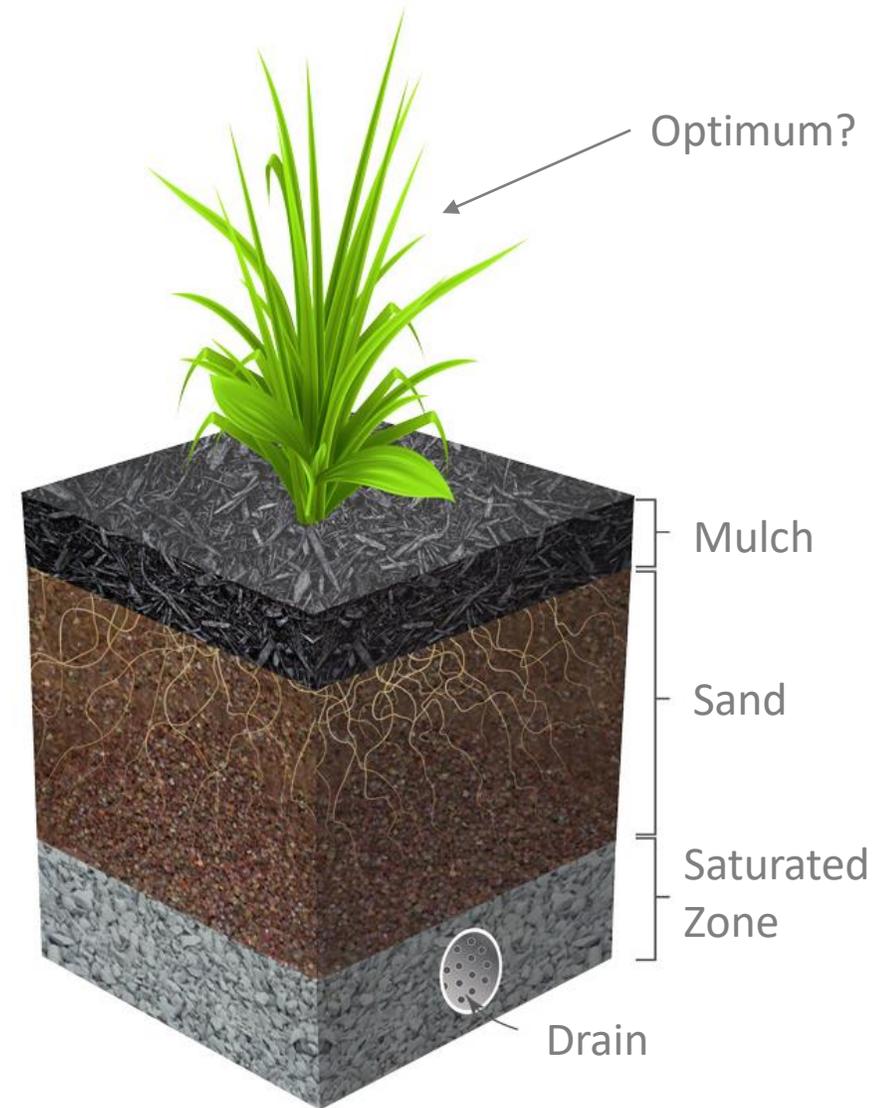
- Outdoor amphitheater and educational signage
- Experimental plots with CA-native BMP grass varieties
- All basic infrastructure for research and public involvement





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	<ul style="list-style-type: none">• Identify goals and specify the independent variables• Define baseline conditions• Identify performance parameters to measure and monitor
Task 2: Study Setup	<ul style="list-style-type: none">• Procure equipment and tools• Construct plots• Plant selected varieties• Install instrumentation and data collection system
Task 3: Perform Study	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Examine and evaluate experimentation plots performance• Use result to develop and define optimized designs
Task 6: Study Deliverables	<ol style="list-style-type: none">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 BMPs3. Standard Plans – Series of plans and details as standard practice for biofiltration BMPs



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	<ol style="list-style-type: none">1. Study Report2. Design Manual3. 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?



Stormwater Treatment and Reuse System (STAR System) Hacienda Park

Funding Program (Infrastructure Program/Technical Resources Program)

Fiscal Year 2022-2023

Watershed Area: Lower San Gabriel River

Project Lead: City of La Habra Heights

Presenters: Christopher Rochfort (STAR Water USA LLC)



Project Overview

The project aims to capture, infiltrate or treat and store stormwater runoff from Hacienda Park and nearby catchment for beneficial reuse.

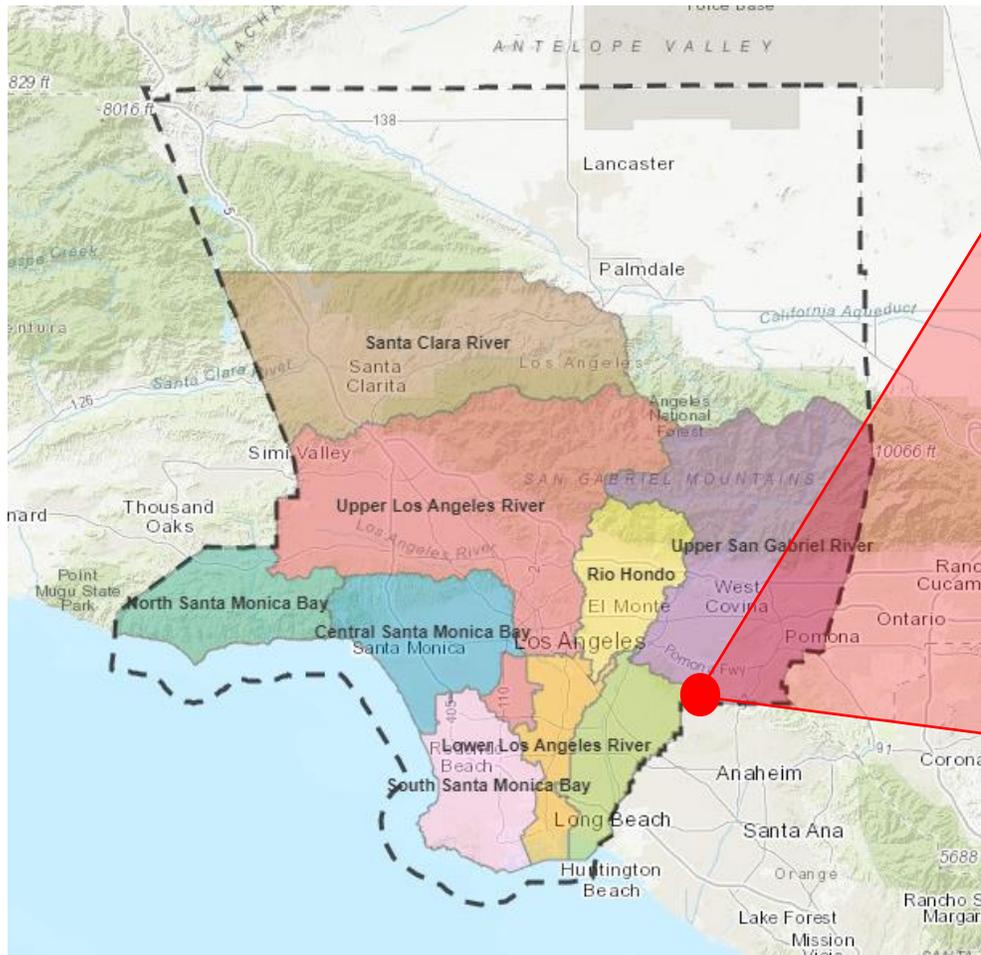
Primary Objective	Secondary Objectives
1. Protect waterways & habitats from contaminated run-off	1. Reduce impervious surface ratio in The Park
2. Capture, infiltrate, collect to reuse treated stormwater	2. Reduce heat island effect in the parking lots
3. Use Nature-Based systems and technologies as BMP	3. Enhance the natural amenity in The Park

Total SCW Funding Requested		\$644,000	
√ Planning	√ Design	√ Construction	√ O & M





Project Location



Watershed Area: Lower San Gabriel River
Disadvantaged Communities (DAC): N/A



The Park (Hecienda Park)
1885 Hacienda Rd, La Habra Heights

Capture Area: Hacienda Rd, Encanada Dr, Parking lots, Roofs, Horse track



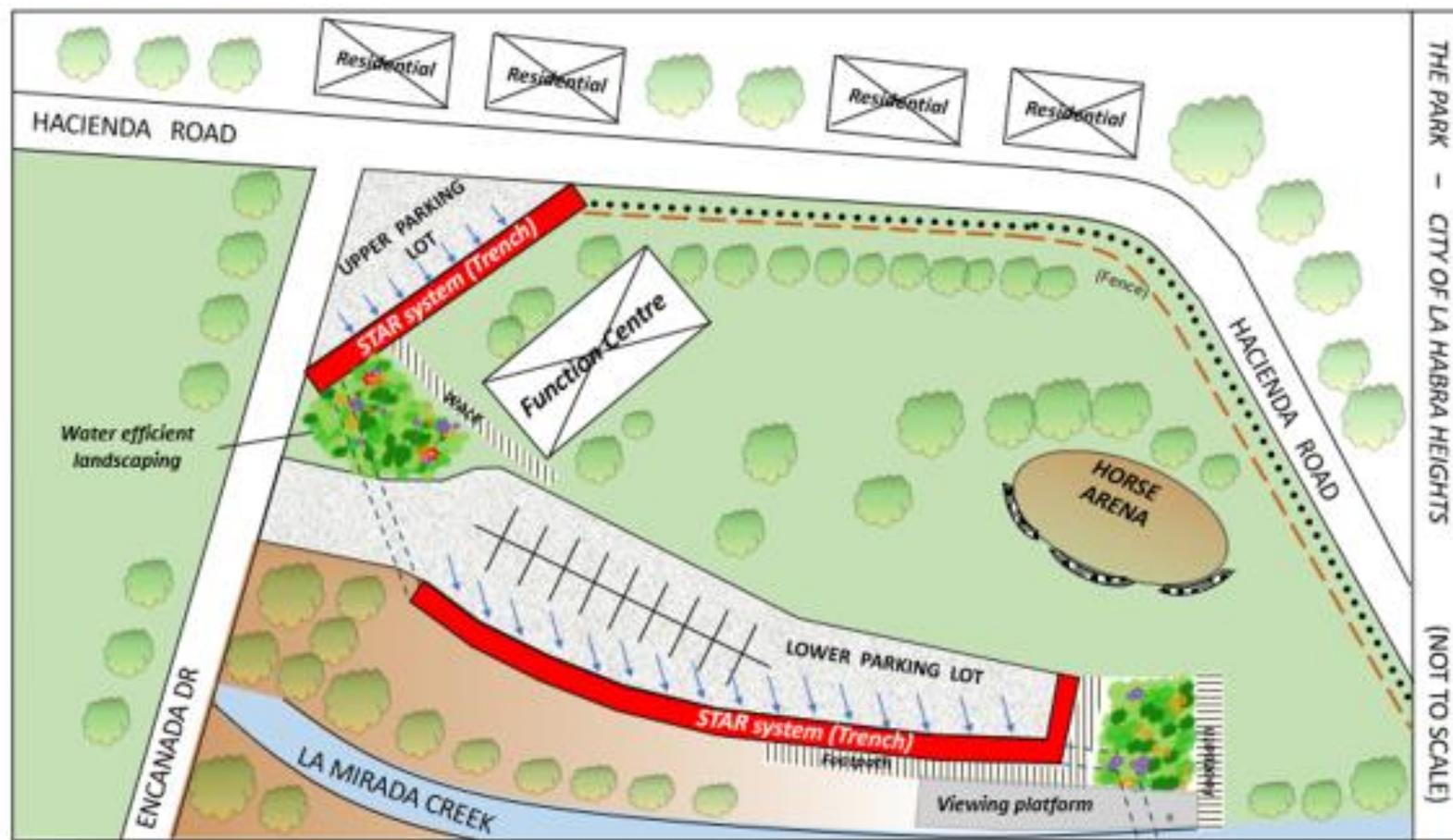
Project Background

WHY	HOW
The City of La Habra Heights assesses its water quality and quantity needs and measures to protect water sensitive areas.	STAR System replaces existing dish drain, which captures, treats, conveys and stores stormwater for reuse.
The Park is one of the City's key community assets, identified as priority area for stormwater treatment and reuse systems.	Water-efficient landscaping (gardens) grows trees and drought-enduring plants, provide tree shading and reduce the heat island effect.
Impermeable surface of Parking lots and nearby roads discharges contaminated runoff to the La Mirada Creek.	Reactive Filter Amendment on the grass area increases the infiltration rate and water holding capacity.
	ABF cartridges around the horse riding track removes bacteria and nutrients.

- Implement low cost high performance stormwater BMP for the community
- Effectively treat contaminated runoff from the site and protects nearby creek
- Provide reusable water for onsite irrigation of the Park
- Encourage the use of recycled products in stormwater management
- Increase green land area and reduce heat island effect from the site
- Improve permeability/infiltration rate/water retention of the Park



Project Details



- Grassy Area
- Horse arena
- Parking Lot
- Viewing Platform
- Water Efficient Landscaping
- STAR Trench System
- Roof Surface
- Footpath
- Fence
- Underground Pipe (overflow discharge)
- Cartridge system (runoff treatment for horse track)
- Reactive Filter Amendment for grassy land

Catchment Area	Road (Hacienda Rd & Encanada Dr)	Roof (Function Center & Residential)	Parking Lot	Grassy Area of The Park	Total
Impermeable	2.061 ac (8,340m ²)	0.760 ac (3,076m ²)	1.384 ac (5,600m ²)	-	4.205 ac (17,016m ²)
Permeable	-	-	-	2.471ac (10,000m ²)	2.471ac (10,000m ²)



Project Details



Hacienda Rd

Encanada Dr

E Rd

Hacienda Park

Hollow Tine Coring for Reactive amendment

STAR System (Trench)

Nutrient and pathogen treatment filters

Water efficient landscaping

Water efficient landscaping & Viewing platform



Cost & Schedule

Phase	Description	Cost	Completion Date
Design	Project engineering design	\$ 90,000.00	07/2022
Planning	Detailed Project planning	\$ 35,000.00	09/2022
Construction	Project Construction stage	\$ 708,000.00	04/2023
Construction	Initial assessment of system performance	\$ 16,500.00	09/2023
O&M	Annual monitoring for 5 years	\$7,500.00	09/2028
TOTAL cost of the project		\$ 857,000.00	
SCW Funding Requested		\$644,000.00	
Co-contribution		\$213,000.00 (approx. 33% of SCW funding)	

Project Life Span: up to 60 years

Module-generated Life-Cycle Cost (5 yrs)* \$ 856,296.62



Funding Request

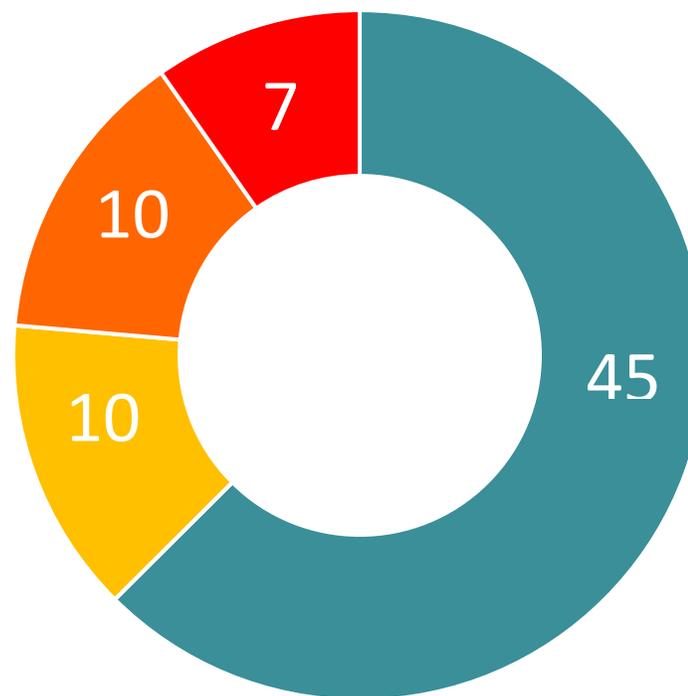
Year	SCW Funding Requested	Phase	Efforts during Phase and Year
1	\$ 93,125.00	Planning	Prepare concept designs Prepare Project Plan Supply chain initiation Reporting
2	\$ 543,375.00	Construction	Complete Designs and City sign off Complete construction phase Initial assessment of system performance Reporting
3	\$ 7,500.00	Monitoring	Monitor system once yearly for five years at an analysis cost of \$1500 per year
TOTAL	\$ 644,000.00		

- Future potential SCW funding requested for continuing monitoring, cartridges and media replacement for every 10 – 15 years.



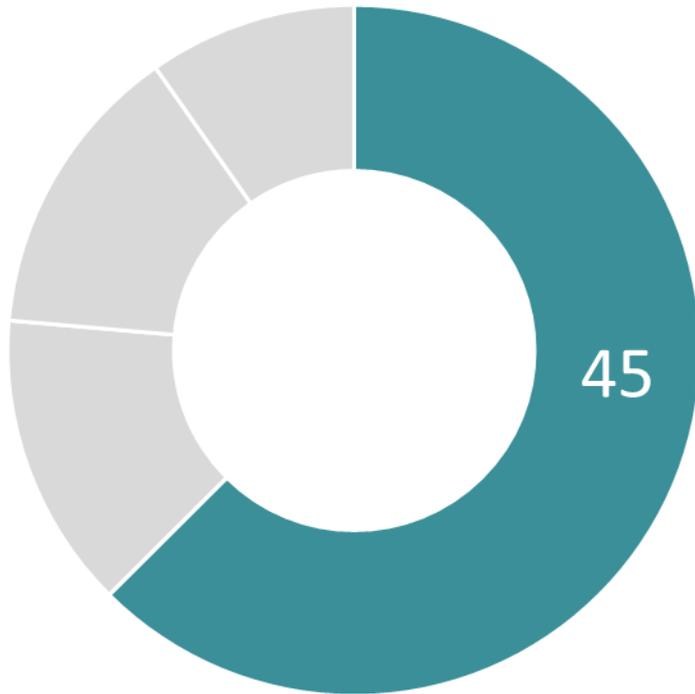
Preliminary Score

- Water quality
- Water supply
- Community Investment Benefits
- Nature Based Solutions
- Leveraged Funds and Community Support





Water Quality & Water Supply Benefits



■ Water quality

Primary mechanisms (Wet Condition)

- Storm Treatment and Reuse (STAR) system captures polluted runoff and treated by the Advanced Biofiltration Filter cartridges placed beneath the trench grates.
- The Advanced Biofiltration Filter Cartridges, contains Reactive Filter Media, can remove multi contaminants from the runoff by the natural treatment processes (physical, chemical & biological).
- The treated runoff can be either stored in the modular channel underdrain installed under the cartridges or safe discharge to nearby La Mirada Creek.
- Coring with Reactive Filter Amendment to the grass area increases the infiltration rate.
- Water efficient landscaping (gardens) provides more tree shades and reduces heat island effect from the parking lot



Water Quality & Water Supply Benefits

Catchment Features

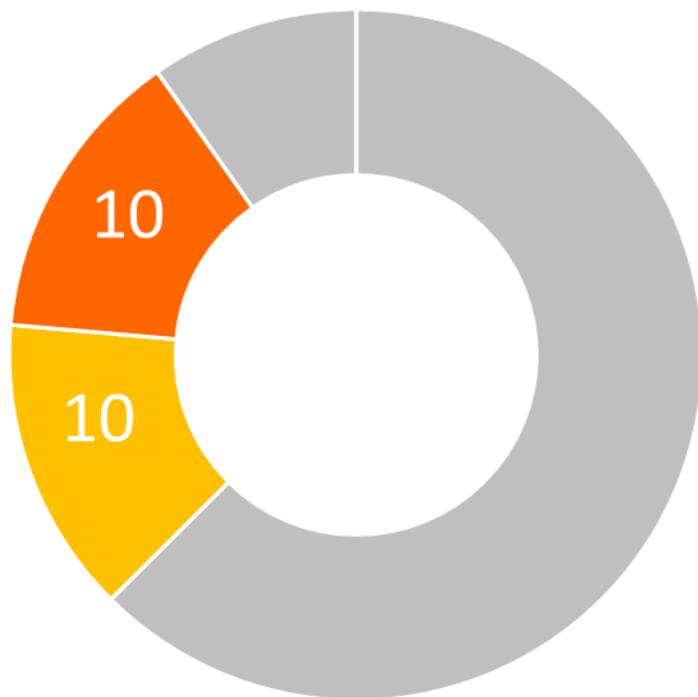
Total catchment area	24-hr Capacity:	Annual Treated runoff		Water Quality Cost Effectiveness:
3.85 acre	1.3157 ac-ft	1.61 ac-ft		>1 (24-hour BMP Capacity) / (Construction Cost in \$Millions) = 1.5)
		reused for irrigation	Safe discharge to La Miranda Creek	
		0.84 ac-ft,	0.77 ac-ft	

Pollutants removal

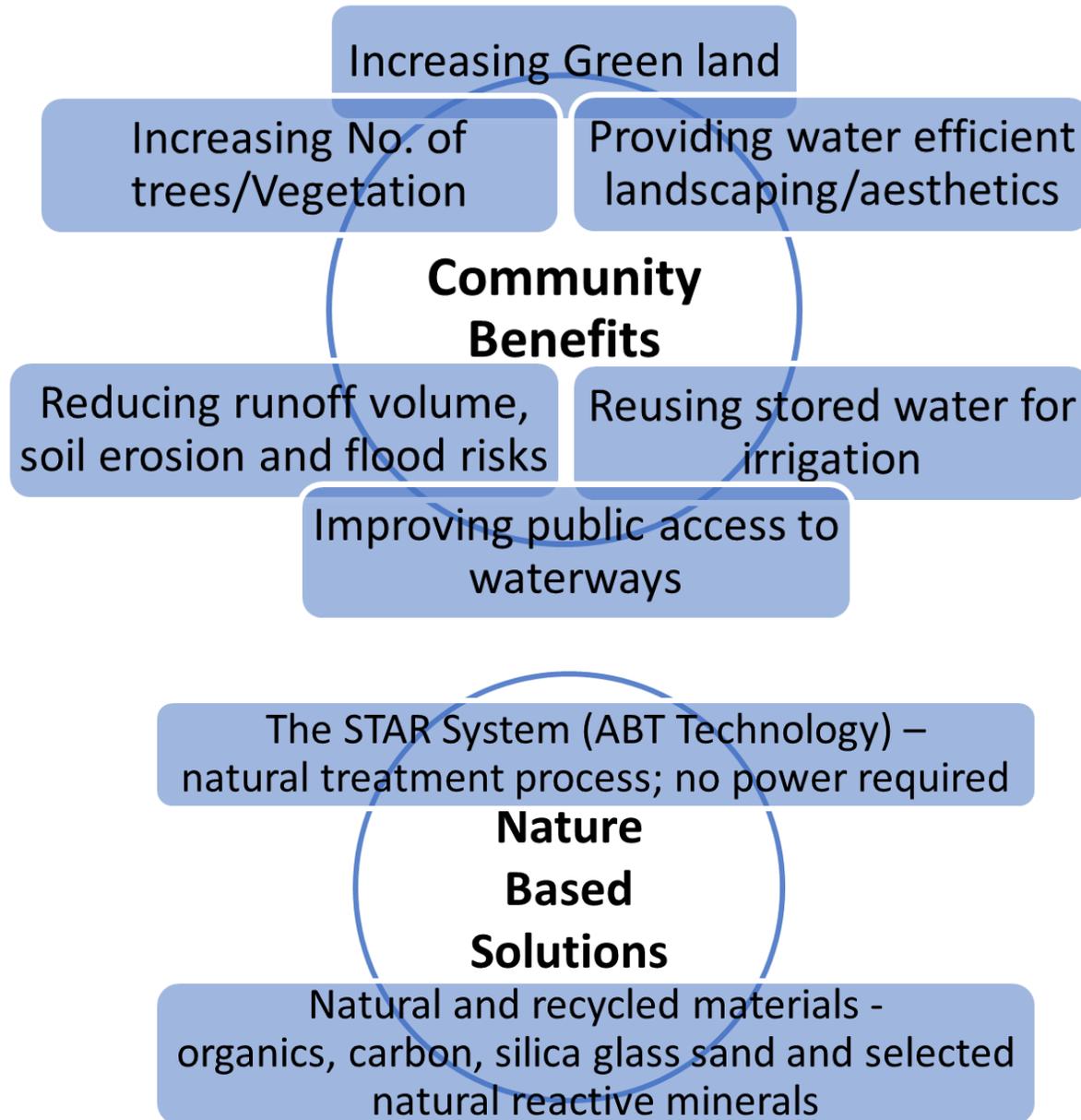
Group	Pollutant	Removal (own value)	Removal (Module generated)
Primary Pollutants	Hydrocarbons, Cu, Pb, Zn, Fe, Al, TSS	90%	100%
Secondary Pollutants	TN	63.5%	100%



Community Investment Benefits and Nature Based Solutions

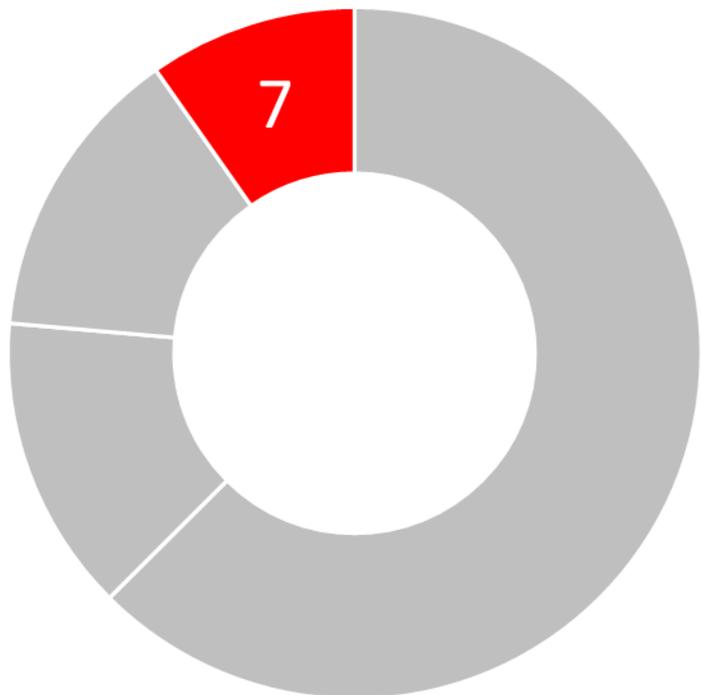


- Community Investment Benefits
- Nature Based Solutions





Leveraging Funds and Community Support



■ Leveraged Funds and
Community Support

- Leveraging Funds: \$213,000 from CORE (Local circular economy industry).
- Community Support
 - Local community representative expresses strong support for the alternative water supply and protection of the waterways by using innovative solutions in the area of climate uncertainty.
- Community outreach and engagement
 - Meetings with community representatives
 - Develop a Community and Stakeholder Engagement Strategy, identify key opportunities for engagement, potential risks and mitigation strategies
 - Drive awareness of the project's benefits and provide updates via regular communications
 - Act as the liaison between community members and the project team, responding to any issues or concerns in a timely and effective manner



Questions?