ATTACHMENT A: Project Modification Request (PMR) Form

The purpose of this PMR form is to initiate the Project modification process and provide the SCWP with information necessary to evaluate the Project modification request.

Regional Program	☑Infrastructure Program Project ☐Scientific Studies Program ☐Technical Resources Program
Project/Study Name	Eaton Wash Stormwater Capture Project / Kinneloa Yard Stormwater Capture Project Preliminary Design and Feasibility Study
Project/Study Lead	City of Pasadena Public Works Department
Watershed Area(s)	Rio Hondo
Current Project Phase	Design
Estimated Completion Date of Funded Activity	12/30/2025
Approved Stormwater Investment Plan Fiscal Year	FY 2023-24
Transfer Agreement ID (e.g., 2020RPULAR52)	2023RPRH01

Has the Transfer Agreement or most recent Addendum been executed (i.e., signed by the project lead and the District)? ☑ Yes ☐ No

What type(s) of modification request?

☐ like-for-like modifications
☑ functionally equivalent BMP modifications
☐ modifications to Project or Study components that were not material to the WASC, ROC, or Board's decision to include the Project or Study in the SIP
☐ reallocation of annual funding projections in the SIP, provided that the total amount of Regional Program funding for the Project or Study remains unchanged
☐ change in primary or secondary objective
☑ change in Project benefits
☑ change in methodology (e.g., infiltration instead of diversion to sanitary sewer)
☐ decrease in BMP capacity
☑ change in Project or Study location
☐ change in capture area where benefits claimed are diminished or where there is a change in the municipalities that are receiving benefits
☐ updated engineering analysis resulting in a reduction of benefits
☐ increase in community support
☐ reduction or withdrawal of community support
☐ change in amount or status of leveraged funding
☐ any modification resulting in an increase of the total amount of Regional Program funding for the Project or Study
☐ any modification resulting in a decrease of the estimated total amount of Regional Program funding for the Project or Study
☐ other, please describe:

Impact on scope or benefits?

☑ Improved
☐ Diminished
☐ Neither
☐ Not Sure

Description of the proposed modification(s), a comparison to the previously approved Project, and the reason(s) why the modification(s) is/are being proposed. Attach additional pages, as needed.

The design of the Eaton Wash Stormwater Capture Project was funded by the Safe, Clean Water Program in Fiscal Year 2023-24. The original project, developed in 2021 by the City of Pasadena, initially proposed a stormwater capture and runoff facility at the City's existing Kinneloa Yard.

The City is also required by the California Air Resources Board to transition to a zero-emissions public bus fleet by 2040. The City developed a Zero Emission Rollout Plan in 2022 and adopted in 2023 that proposes to install the City's Hydrogen Fueling Station at the Kinneloa Yard site by 2027 to meet this regulation and represents a major effort in meeting the City's Climate Action Plan. The Kinneloa Yard site is the only vacant City-owned Property that is also strategically located to serve as its Hydrogen Fueling Station for the entire zero-emission bus fleet.

The City conducted an assessment of alternative sites for the Eaton Wash Stormwater Capture Project to evaluate a location that could provide the same or better project benefits. An alternate site located approximately 1,200 feet downstream of the original site allows for the same project benefits, but also allows flows from a City storm drain to be captured to treat slightly more runoff and pollutants, and the alternate site provides for infiltration which is not feasible at the original site.

The proposed project modifications are summarized and discussed in detail in the enclosed "Attachment B. Project Modification Supplemental Information". Also, provided is "Attachment C. Eaton Wash Stormwater Capture Project BMP Performance Evaluation Memorandum" which details the analysis of these Project Options and a comparison of project benefits.

If applicable, list previously approved funding allocations/disbursements and revised funding request:

Note, if some or all of a previously Funded Activity cannot be completed as a result of the proposed modification, please include a description and indicate the amount of unused funds. Any unused funds should be reallocated and accounted for in your revised funding request. Attach additional pages, as needed.

SIP Fiscal Year	Approved Funding Allocations	Increase/ Decrease Requested	Revised Funding Request	Description/Phase/Status *If applicable, include description of unused funds*
2023-24	$2,292,762		$2,292,762	Design Phase
TOTAL	$2,292,762		$2,292,762	

A: Approved Total Funding Allocations	$2,292,762
B: Revised Estimate of Total Funding from Regional Program	$2,292,762
Regional Program Funds Received to date	$0
Regional Program Expenditures to date	$0
Difference between B and A	$0
Percent change between B and A	0%

Would the additional funding request be the only option that would allow the project to be implemented? Please describe.	☐ YES
No additional funding required.	
Would delaying funding allocations impact the project's ability to be implemented? Please describe.	☐ YES
No funding delay.	
Would funding only a portion of the additional funding request impact the project's ability to be implemented? Please describe.	☐ YES
No partial funding requested	
Has the Recipient considered other funding sources? Please describe. Include type of funding, status, and amount.	☐ YES
No additional funding requested	

If applicable, a description of difference in SCWP Anticipated Total Funding Request. As a reminder, annual funding is at the discretion of the WASC, ROC, and ultimately the Board of Supervisors. Attach additional pages, as needed.

N.A.

Brief description of Supporting Documentation provided. Please include any documentation needed to support benefits claimed by the modified Project or Study and confirm compliance with the Feasibility Study Guidelines.

Attachment B. Project Modification Supplemental Information (details the changes) Attachment C. BMP Performance Evaluation Memorandum Attachment D. Pasadena Zero Emission Roll Out Plan (Reference)

Contact information of persons who should be included in correspondence with the SCWP regarding this Project or Study. Attach additional pages, as needed.

Name	Title	Email Address
Dawn Petschauer	Stormwater Program Mgr	Dpetschauer@cityofpasadena.net
Brent Maue	Acting City Engineer	BMaue@cityofpasadena.net
Oliver Galang	Principal, Craftwater	Oliver.Galang@craftwaterinc.com
Courtney Semlow	Project Manager, Craftwater	Courtney.Semlow@craftwaterinc.com

I certify the information and supporting documentation provided is accurate and true.	☑ YES
I certify the modified Project complies with all requirements described in the Feasibility Study Guidelines.	☑ YES
I understand this is a request and it is under the WASC's discretion to consider requested modifications.	☑ YES

Name Dawn Petschauer Organization City of Pasadena

Signature [signature] Date 10/31/2024

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Proposed Modifications to Projects or Studies:

	Status	Date
Scope/benefits of the modified Project or Study is **consistent** with the Project or Study included in the current fiscal year's SIP and proposed modifications were **approved** by the SCWP.	☐ YES	
Scope/benefits of the modified Project or Study **requires reapproval in the SIP**. **If yes, select all that apply**:	☒ YES	1/17/25
Budget/schedule modifications would impact future SIP funding allocations. **If yes, select all that apply**:	☐ YES	
PMR was received **after** October 31 of a fiscal year and the PMR will be considered for approval during the preparation of **subsequent** SIP for the fiscal year after the next	☐ YES	-
Project or Study **abandoned** the proposed modifications	☐ YES	
Projector or Study was **withdrawn** from consideration by the WASC and shall issue repayment of unspent funds	☐ YES	
Proposed **scope/benefit** modifications were **recommended for approval** in the SIP	☐ YES ☐ NO ☐ N/A	
Modifications to the Project or Study's **funding allocations** were **recommended for approval** as identified in the SIP	☐ YES ☐ PARTIAL ☐ NO	

Proposed Modifications to Project Concepts:

	Status	Date
Proposed modifications were deemed **consistent** with the Project concept that was approved by the WASC, ROC and Board for inclusion in the SIP and can be addressed within the existing budget. SCWP staff will proceed to incorporate the proposed modification into the Feasibility Study immediately.	☐ YES	
Proposed modifications were deemed significant enough to result in a **significantly different** Project concept from the one approved by the WASC, ROC and Board for inclusion in the SIP. **If yes, select one:**	☐ YES	
SCWP staff to **discontinue** work on the Feasibility Study, return unused funds to be programmed in the SIP for the next fiscal year, and advise the proponent to submit the modified Project concept during the Call for Projects for a future fiscal year.	☐ YES	-
SCWP staff to **abandon** the proposed modifications and proceed with the Project concept included in the SIP.	☐ YES	-

Attachment B

EATON WASH STORMWATER CAPTURE PROJECT
Project Modification Supplemental Information

Attachment B
EATON WASH STORMWATER CAPTURE PROJECT
Project Modification Supplemental Information

This document is provided as a supplemental narrative to ***Attachment A: Project Modification Request Form***.

Project Overview

The purpose of this Project Modification Request is to allow the City to locate the stormwater capture project, just downstream along the Eaton Wash Channel, from the City parcel north of Del Mar Blvd (*Kinneloa Site*) to another City Parcel south of Del Mar Blvd (*Del Mar Site*) and adjacent to Eaton Blanche Park.

The development of the **Eaton Wash Stormwater Capture Project** (Project) by the City of Pasadena represents a major opportunity to continue a regional scale process to achieve pollutant load reductions for the Rio Hondo watershed. The original site, the *Kinneloa Site*, is an undeveloped parcel owned by the City of Pasadena and is adjacent to the Eaton Wash Channel and north of Del Mar Blvd. This Project is intended to intercept a sizeable portion of the stormwater flowing from the adjacent Eaton Wash Channel. The project submitted to the Safe Clean Water Program consisted of a pretreatment unit, subsurface storage reservoir, surface treatment basin, and filtration discharge unit to provide water quality and multiple project benefits.

The design of the Eaton Wash Stormwater Capture Project was funded by the Safe Clean Water Program in Fiscal Year 2023-24. The submitted project, developed in 2021 by the City, initially proposed a stormwater capture and runoff facility at the City's *Kinneloa Site*, which is adjacent to the Eaton Wash Channel and north of Del Mar Blvd. This site also consists of contaminated fill material that contained construction debris and scrap metal. Proposed site improvements at this location would require additional soil characterization and clean up to implement this project. Also, the City has a Land Use Covenant on this property for commercial, industrial, or park uses only.

The City is mandated by the California Air Resources Board to transition to a zero-emissions public bus fleet by 2040. The City recently developed a Zero Emission Rollout Plan that was adopted in 2023. The plan requires that the City install a Hydrogen Fueling Station at the Kinneloa Site by 2027 to comply with this regulation, but it also represents a major effort by the City in meeting the City's Climate Action Plan. The Kinneloa Site is the only vacant City-owned property that is accessible for its public bus fleet and strategically located to serve as the only Hydrogen Fueling Station for the City's entire zero-emission bus fleet. Implementing a Hydrogen Fueling Station at this location is consistent with the Land Use Convenant and would require less excavation and removal of soil.

The City conducted an alternative assessment of the Eaton Wash Stormwater Capture Project to evaluate the original project site (*Kinneloa Site*) and a project alternative site (*Del Mar Site*) that will provide the same or better project benefits. It was determined that an equivalent stormwater capture project could be implemented at the Del Mar Site, which is just south of Del Mar Blvd and within the City's property that is also adjacent to the Eaton Wash Channel and Eaton Blanche Park.

Project Modifications Requested

The following describes the **types of modification requests** identified in Attachment A.

1. **Functionally Equivalent BMP modifications**
   - BMP Configuration – **NO CHANGE.** The configuration submitted for the Kinneloa Eaton Wash SW Capture Project is a treat and release facility consisting of a diversion structure, pump station, pretreatment unit, subsurface storage reservoir (6 AF), surface treatment basin (0.33 AF), and a post-treatment filtration unit to discharge treated water back to the channel (5.76 cfs). Since the alternate site is located just downstream, the new configuration would consist of the same components. However, since the new location is south of Del Mar Blvd, this site has the potential to infiltrate treated stormwater, providing water supply benefits for the City.
   - Project Type – **NO CHANGE.** The original project was classified as a **WET Weather** project
   - Drainage Area – **SLIGHT CHANGE**. The proposed location at Eaton Wash, south of Del Mar Blvd, treats the same watershed as the original drainage area for Kinneloa Eaton Wash, north of Del Mar Blvd, but is located just downstream of Del Mar Blvd. **Table 1** below shows the slight increase in drainage area and impervious area for each site location.

Table 1. Site Alternative Drainage Area Comparison

Site Alternative	Drainage Area (ac)	Impervious Area (ac)
Kinneloa Site (north of Del Mar Blvd)	10,254.50	501.50
Del Mar Site (south of Del Mar Blvd)	10,293.80	514.80
% Increase	0.38%	2.65%

   - 85th Percentile Storm Volume – **SLIGHT CHANGE**. Due to slight changes in drainage area, the WMMS 2.0 85th percentile capture volume during the design storm will increase from 30.4 ac-ft to 31.0 ac-ft, representing a 2.0% increase.
     - Kinneloa Site (north of Del Mar Blvd): 30.4 AF
     - Del Mar Site (south of Del Mar Blvd): 31.0 AF (2.0% increase)

2. ***Change in Project Benefits***
   - Water Quality Benefits – **NO CHANGE**. The differences in project site locations and analysis explained above demonstrated that the comparison of Water Quality Benefits between the original location north of Del Mar Blvd and proposed location south of Del Mar are essentially equivalent in drainage area with a slight increase of 0.19%. Also, the original transfer agreement identifies >80% copper (primary pollutant) and >80% zinc (secondary pollutant) removal as a performance target, which will continue to be achieved in the proposed location.
   - Water Supply Benefits – **TO BE DETERMINED.** The proposed project option will evaluate the potential for Water Supply Benefits based on the results of the geotechnical investigation south of Del Mar Blvd. If feasible, potential Water Supply Benefits will be discussed and confirmed also with the Raymond Basin Watermaster.

- Community Investment Benefits – **INCREASE**. The proposed modification significantly improves Community Investment Benefits associated with the project. In comparison to the original concept, the revised concept provides connectivity to the adjacent Eaton Blanche Park while offering the same above-ground improvements that will provide more robust benefits for community members. Some of these features include a pedestrian bridge, new walking paths, seating areas, and passive recreation. This site is also directly adjacent the Boys and Girls Club and Willard Elementary for outdoor uses and potential education opportunities.
- Nature-Based Solutions – **INCREASE.** Since the proposed modification is a larger area, there is more opportunity to include enhanced nature-based solutions including more native vegetation and expanded biotreatment technologies. In addition, the proposed location was also used as a community garden in the past and the community has requested it be restored.
- Leveraging Funds – **NO CHANGE**.
- Community Support – **NO CHANGE**. The project has not had the opportunity to reach the public outreach phase. The City is committed to delivering accurate information to the community with the proposed project location at Eaton Wash south of Del Mar Blvd.

3. ***Change in Methodology***

Change in Methodology – **CHANGED FROM "TREAT AND RELEASE" TO "TREAT, *INFILTRATE*, AND RELEASE"**. The original analysis did not utilize a site-specific infiltration rate, which is critical for the design of infiltration facilities. The proposed alternative will achieve a similar level of pollutant removal of the primary pollutant (Copper) and secondary pollutant (Zinc) load reduction of greater than 80% for each. Since the proposed site at Del Mar is just downstream, and there is no history of contamination at location, the site has the added potential for infiltration. The proposed treatment approach will be accomplished with pretreatment, storage, ***infiltration***, and a manufactured filtration device that will treat captured stormwater and return it to the Eaton Wash Channel. This added benefit could also result in water supply benefits for the City.

4. **Change in Project or Study Location**

Project Location – **LOCATED IN NEARBY PARCEL (ONLY 1,200 FEET DOWNSTREAM) DIVERTING FROM THE SAME DRAINAGE CHANNEL**. In addition to meeting water quality regulations, the City is also mandated by the California Air Resources Board to transition to a zero-emissions public bus fleet by 2040. The City recently developed a Zero Emission Rollout Plan that was adopted in 2023. The plan requires that the City install a Hydrogen Fueling Station at the original site along Kinneloa Ave, north of Del Mar Blvd, by 2027 to comply with this regulation and represents a major effort in meeting the City's Climate Action Plan. The original site along Kinneloa Ave is the only vacant City-owned Property that is directly accessible for its public bus fleet and strategically located to serve as the only Hydrogen Fueling Station for the City's entire zero-emission bus fleet.

The City conducted a comparison for the Eaton Wash Stormwater Capture Project to evaluate the two alternative City-owned project site locations at the Kinneloa Site (Eaton Wash north of Del Mar Blvd) and the Del Mar Site (Eaton Wash south of Del Mar Blvd) based on the potential project benefits for both sites. **Attachment C Eaton Wash Stormwater Capture Project BMP Performance Evaluation and Comparison Memorandum** is provided that details the comparison of the two site locations.

As a result, it was determined that an equivalent stormwater capture project offering enhanced benefits could be implemented at the Del Mar Site, which is just south of Del Mar Blvd and within a City-owned property that is adjacent to the Eaton Wash Channel and Eaton Blanche Park. As a result, the design phase scope of work and budget will not change since just the site location has been moved from the north side of Del Mar Blvd to the south side of Del Mar Blvd.

5. Change in Funded Activity Completion Date

Additional field investigations including survey and geotechnical investigations are needed to be performed as well as updating other studies that had been completed. *If this Project Modification Requests is submitted and approved by the RH WASC,* for inclusion in the Fiscal Year 2025-26 Rio Hondo Stormwater Investment Plan (approx. October 2025), the project completion dates have been modified as follows.

Phase	Activity	Start Date	Finish Date
Design	Professional Design Services (30/60/90/100)	10/16/24	12/29/26
Design	Environmental Planning and Permitting	12/10/25	05/30/26
Design	Community Outreach	10/16/24	07/30/26

Attachment C

EATON WASH STORMWATER CAPTURE PROJECT
BMP Performance Evaluation Memorandum

MEMO

TO: Dawn Petschauer, City of Pasadena

FROM: Craftwater Engineering, Inc.

SUBJECT: Eaton Wash Stormwater Capture Project
BMP Performance Evaluation and Comparison Memorandum

DATE: October 11, 2024

As a member of the Upper Los Angeles River and Rio Hondo watersheds, the City of Pasadena has joined efforts with neighboring municipalities to jointly address requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System, Permit Order No. R4-2021-0105 (MS4 Permit), which was adopted by the Los Angeles Regional Water Quality Control Board (Regional Board). Identification of regional stormwater capture projects served as a principal method to address water quality concerns within the watersheds. The development of the Eaton Wash Stormwater Capture Project (Project) in the City of Pasadena represents another major opportunity to continue regional scale progress to achieve pollutant load reductions for the Rio Hondo Channel watershed.

This Project is intended to intercept a sizeable portion of the stormwater flows from the adjacent Eaton Wash Channel at Del Mar Blvd, managed by the Los Angeles Flood Control District (LACFCD). A treatment basin and a subsurface storage best management practice (BMP) is proposed at the Project site to capture and treat stormwater diverted from the channel.

This memo evaluates the water quality benefits of two project site options, namely the Kinneloa site (Eaton Wash north of Del Mar Blvd) and the Del Mar site (Eaton Wash south of Del Mar Blvd). For each site, the project drainage area was delineated and analyzed to produce hydrographs which were used for BMP performance simulation. The BMP performances at both sites were evaluated and compared using the 85th percentile 24-hour design storm and a 10-year long-term time series. Conceptual plans were developed for both sites.

This memo evaluates the BMP performances of two project site options. Section 1.0 introduces the original concept design and explains the differences between the two sites. Section 2.0 delineates the drainage areas for both sites and analyzes the hydrological and water quality characteristics of those drainage areas. Using the time series developed in Section 2.0, Section 3.0 explains how the BMP model was set up and synthesizes the modeling results. Section 4.0 demonstrates the utility and landscape design concepts of the two sites. Section 5.0 summarizes the BMP performance results and discusses how the Eaton Wash project contributes to Pasadena's compliance goals.

1.0 BACKGROUND

1.1 Original Concept Design

Figure 1-1 is the original concept design of the Kinneloa site approved and funded by the Safe, Clean Water Program in 2022. Stormwater and urban runoff is diverted from the bottom of the Eaton Wash channel and pretreated before entering the wet well. Water is then pumped from the wet well into the sedimentation basin or the 6 ac-ft underground storage. Water pumped to the basin will flow through a naturalized stream and enter the 0.33 ac-ft urban wetland treatment pond. All captured stormwater will pass through a 5.76 cfs filtration unit and discharge back to the Eaton Wash channel. Currently the Kinneloa Site consists of fill contaminated material that contains construction debris and scrap metal. A Land Use Covenant is on this property for commercial, industrial, or park uses.

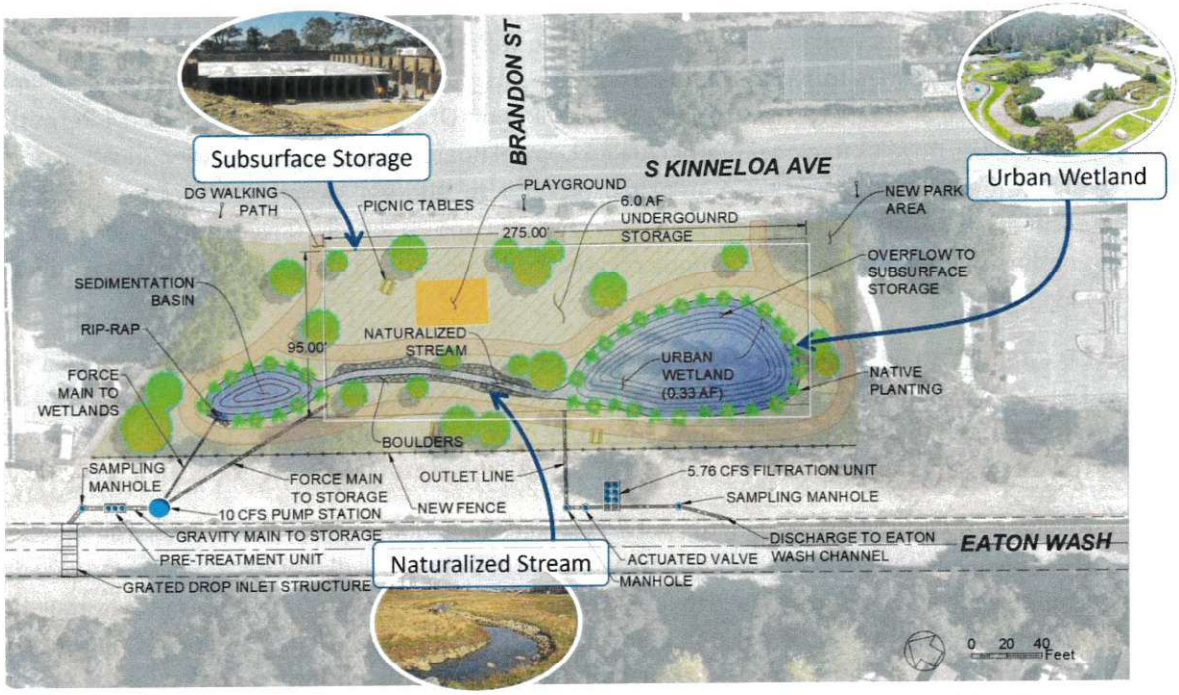

Figure 1-1. Original Eaton Wash Project Concept Design (*Safe, Clean Water Program Feasibility Study, 2022*)

1.2 Project Site Alternative

The two project site location alternatives were evaluated in this memo are described in ***Table 1-1*** and mapped in ***Figure 1-2***.

Table 1-1. Summary of Design Options

Project Site	Diversion Point	BMP Location
Kinneloa Site (Updated Original Concept)	Eaton Wash Channel, approximately 700 ft north of E Del Mar Blvd	City owned parcel (APN 5754-008-906)
Del Mar Site (New Concept)	Eaton Wash Channel, approximately 500 ft south of E Del Mar Blvd	City owned parcel (APN 5754-030-901)

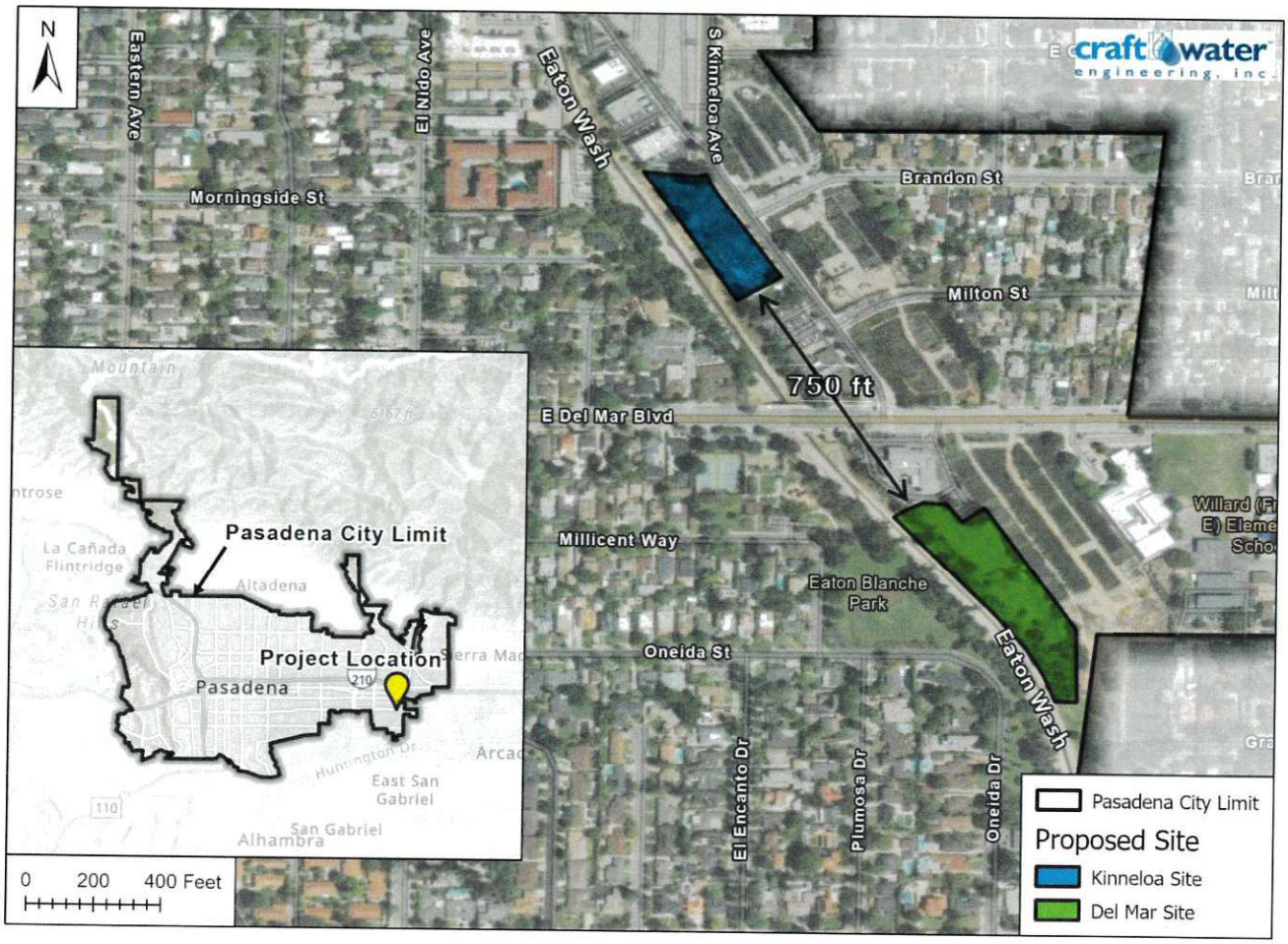

Figure 1-2. Eaton Wash Project Site Location Map

The BMP performances at the two sites are expected to differ due to these two reasons:

- Flows from a City storm drain along E Del Mar Blvd will be captured by the Del Mar site but not the Kinneloa Site. Therefore, the Del Mar BMP has the **potential to treat slightly more runoff and pollutants**.
- Infiltration of captured stormwater is prohibited at the Kinneloa site due to the existing soil contamination. Based on preliminary assessments, infiltration is feasible at the Del Mar site, allowing the Del Mar site BMP to **treat more runoff and pollutants through infiltration**.

These differences will be reflected in the drainage area analysis and BMP modeling described in the following sections.

2.0 EXISTING CONDITIONS

2.1 Drainage Area Characteristics

Drainage area delineations were developed using geospatial data associated with the Loading Simulation Program C++ (LSPC) modeling subwatersheds and verified/corrected slightly using further GIS analysis where full subwatersheds did not coincide with project locations. High-resolution Light Detection and Ranging (LiDAR) elevation data and digital stormwater pipe inventories from the City of Pasadena and Los Angeles County Flood Control District (LACFCD) were used to accomplish subwatershed splitting. Developed drainage areas were used to model runoff and water quality baseline time series. These were then incorporated into BMP models to optimize the BMP decision variables. The Eaton Wash project drainage areas are shown in ***Figure 2-1***. The drainage area land use types are shown in ***Figure 2-2***.

Drainage area land use types categorized by WMMS 2.0 Complete HRUs are summarized in ***Table 2-1***. The northern portion of the drainage areas is mostly vegetation within the unincorporated area. The impervious drainage area is predominantly composed of low-density residential areas.

Table 2-1. Eaton Wash Drainage Area Land Use Summary

Land Use	Kinneloa Site		Del Mar Site	
	Area (ac)	Perc.	Area (ac)	Perc.
High-Density Residential	5.2	0.1%	5.4	0.1%
Low-Density Residential	354.7	3.5%	363.6	3.5%
Industrial	10.8	0.1%	10.8	0.1%
Commercial	30.7	0.3%	30.7	0.3%
Institutional	27.4	0.3%	28.1	0.3%
Irrigated	507.2	4.9%	513.1	5.0%
Pervious	782.4	7.6%	791.9	7.7%
Road-Freeway	7.3	0.1%	7.3	0.1%
Road-Minor	43.0	0.4%	44.7	0.4%
Road-Primary	22.5	0.2%	24.1	0.2%
Vegetation	8463.2	82.5%	8473.9	82.3%
Water	0.2	0.0%	0.2	0.0%
Total Drainage Area	**10254.5**	**100.0%**	**10293.8**	**100.0%**
Impervious Area	**501.5**	**4.9%**	**514.8**	**5.0%**

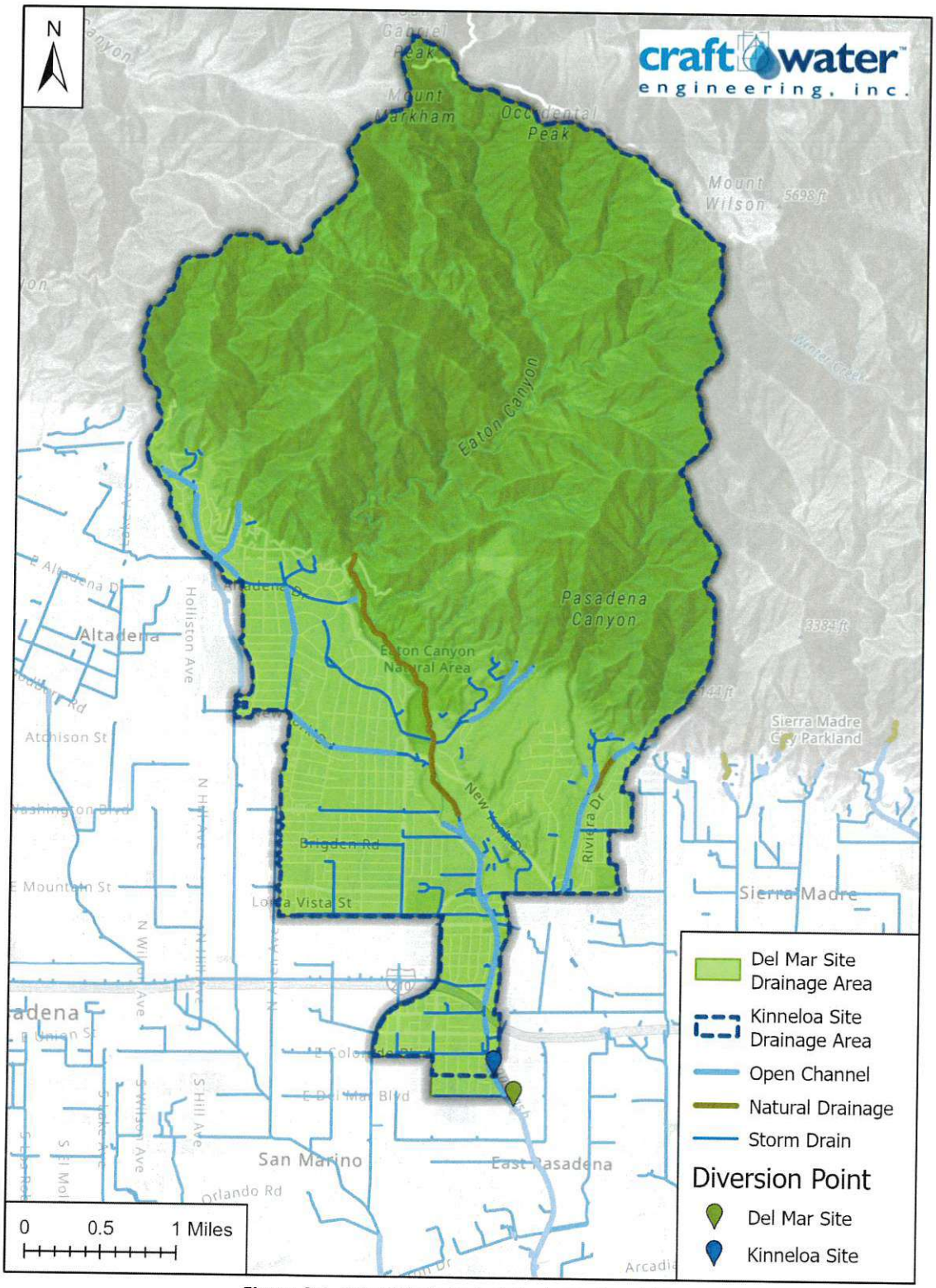

Figure 2-1. Eaton Wash Project Drainage Area Map

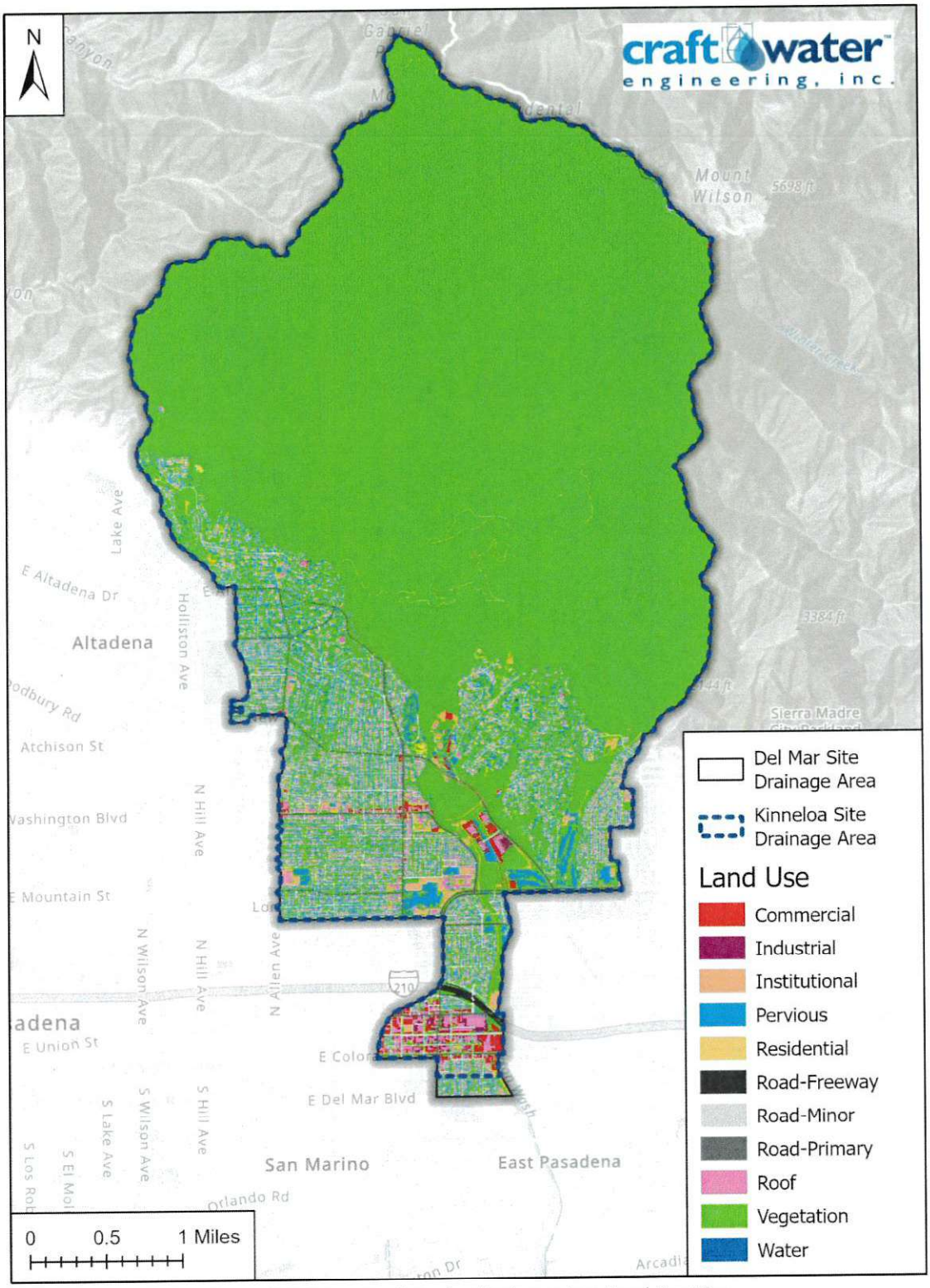

Figure 2-2. Eaton Wash Project Drainage Area Land Use Map

Table 2-2 summarizes the jurisdictional areas within the project drainage areas. The majority of the drainage areas are within the unincorporated LA County.

Table 2-2. Jurisdictional Areas within Eaton Wash Drainage Areas

Jurisdiction	Kinneloa Site		Del Mar Site	
	Area (ac)	Perc.	Area (ac)	Perc.
City of Pasadena	1595.6	15.6%	1634.9	15.9%
Unincorporated LA County	8658.9	84.4%	8658.9	84.1%
Sum	**10254.5**	**100.0%**	**10293.8**	**100.0%**

2.2 Existing Hydrology and Water Quality

The Loading Simulation Program C++ (LSPC) software was used to simulate the contaminant loading, runoff volume, and flow rate associated with a long-term, 10-year continuous time series (Water Year 2009 to Water Year 2018). A regionally calibrated LSPC model was used as this model was used in EWMP/WMP development and is accepted by the Los Angeles Water Quality Control Board for compliance analyses. This LSPC model is a component of the updated Watershed Management Modeling System (WMMS 2.0).

The LSPC model and the WMMS 2.0 Hydrologic Response Units (HRUs) were used to model the 85th percentile 24-hour storm. Both drainage areas are much larger than 40 acres and therefore can't be modeled by rational methods (2006 LACDPW Hydrology Manual). Temporal distribution of the 85th percentile storm depth used the 4-day unit hyetograph per the Hydrology Manual; BMP modeling used the runoff on the 4th day of the 4-day hydrograph.

The hydrologic and water quality characteristics of both project sites are summarized in ***Table 2-3***. The runoff and pollutant time series developed in this section will serve as BMP model inputs in the next section for BMP performance simulation.

Table 2-3. Eaton Wash Drainage Area Hydrologic and Water Quality Characteristics

Storm Type	Drainage Area Characteristics	Kinneloa Site	Del Mar Site
85th Percentile 24-hour Design Storm	85th 24-hr Storm Peak Flow (cfs)	48.7	50.1
	85th 24-hr Storm Volume (ac-ft)	30.4	31.0
Long-Term LSPC Time Series, WY2009-WY2018	Avg Annual Runoff (ac-ft/yr)	943.4	957.48
	Avg Annual TSS (tons/yr)	374.25	377.84
	Avg Annual Total Zinc Load (lb/yr)	326.30	332.22
	Avg Annual Total Copper Load (lb/yr)	53.61	54.85
	Avg Annual Total Lead Load (lb/yr)	20.70	21.82
	Avg Annual Total Cadmium Load (lb/yr)	0.53	0.54
	Avg Annual Total Nitrogen Load (lb/yr)	2743.67	2790.44
	Avg Annual Total Phosphorus Load (lb/yr)	683.90	691.55

3.0 BMP MODELING

3.1 Project Site Comparison Strategy

The primary design goal of the Project is to reduce long-term annual loading of pollutants to the ULAR watershed using zinc as the limiting pollutant of interest in the analysis as established by the EWMP for this watershed group. To ensure that the system is sized to maximize load reductions in a cost-effective manner, optimization modeling was performed and presented in the previous feasibility study for the Kinneloa site (*Safe, Clean Water Program Feasibility Study, 2022*).

The purpose of the optimization modeling was to support BMP design sizing by balancing design components (including BMP volume, BMP storage depth, inflow diversion rates, outflow treatment rates, etc.) such that performance objectives can be met in a cost-effective manner (see ***Figure 3-1*** at right). In this memo, to compare the Kinneloa Site and the Del Mar Site, the site location should be the *only variable*. Therefore, the same BMP design was used for both sites.

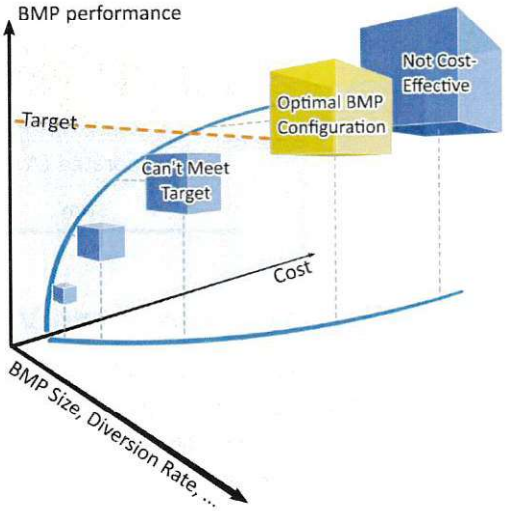

Figure 3-1. Illustration of optimization modeling balancing performance and cost

3.2 BMP Performance Modeling Method

A custom BMP model was used to improve upon certain modeling limitations in EPA's System for Urban Stormwater Treatment and Analysis Integration (SUSTAIN). This custom model is grounded in the physical BMP representations (stage-storage, stage-discharge) used in SUSTAIN, and it provides built-in optimization algorithms to more systematically automate the process of evaluating many different BMP configurations to select an effective solution related to project goals. The model was run using 10 years of runoff and pollutant loading time-series data. For each potential BMP configuration, the hourly inflow, storage, outflow of stormwater, and pollutants were simulated.

The model inputs are summarized in ***Table 3-1***. Because the Kinneloa site contains contaminated soil with a maximum depth of over 20 ft, infiltration discharge could mobilize the contaminant plume and is therefore prohibited. The Del Mar site has Hydrologic Group A soil according to the Soil Survey Geographic Database (SSURGO). A minimum allowable infiltration rate of 0.3 in/hr was assumed in the BMP modeling (see *LADPW Low Impact Development Standards Manual, 2014*). Updated modeling will be performed once site-specific infiltration rates are available.

Table 3-1. Eaton Wash BMP Model Inputs

Input	Kinneloa Site	Del Mar Site
Diversion Rate	10 cfs Pumped	
Discharge-Infiltration	None	Assume 0.3 in/hr
Discharge-Filter	5.76 cfs	
Subsurface Storage Volume	6.0 ac-ft	
Subsurface Storage Footprint	0.6 ac-ft	
Subsurface Storage Depth	10 ft	
Biofiltration Basin Volume*	0.33 ac-ft	
Total BMP Storage Volume	6.0 + 0.33 = 6.33 ac-ft	

* Biofiltration basin only provides storage. Del Mar site infiltration is through the subsurface storage footprint.

The diagram in ***Figure 3-2*** illustrates how BMP components are represented in the BMP model. Other treatment components such as pre-treatment units and settling basins were proposed in the design but not modeled.

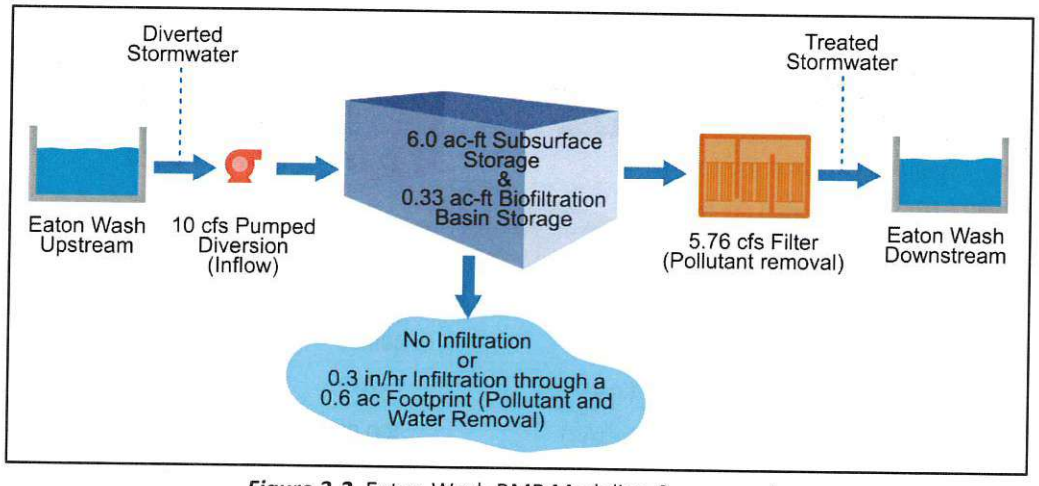

Figure 3-2. Eaton Wash BMP Modeling Components

3.3 BMP Modeling Results

Figure 3-3 illustrates the 85th percentile 24-hour design storm routing for both sites. The project will be able to divert all the flows before runoff in Eaton Wash exceeds 10 cfs. The storage keeps filling until it's full in hour 17-18. The filter works at full capacity starting from the 1st hour until the end of the 24-hour storm. Because the 85th storm peak flow is much higher than the diversion rate, the peak of the storm will not be treated.

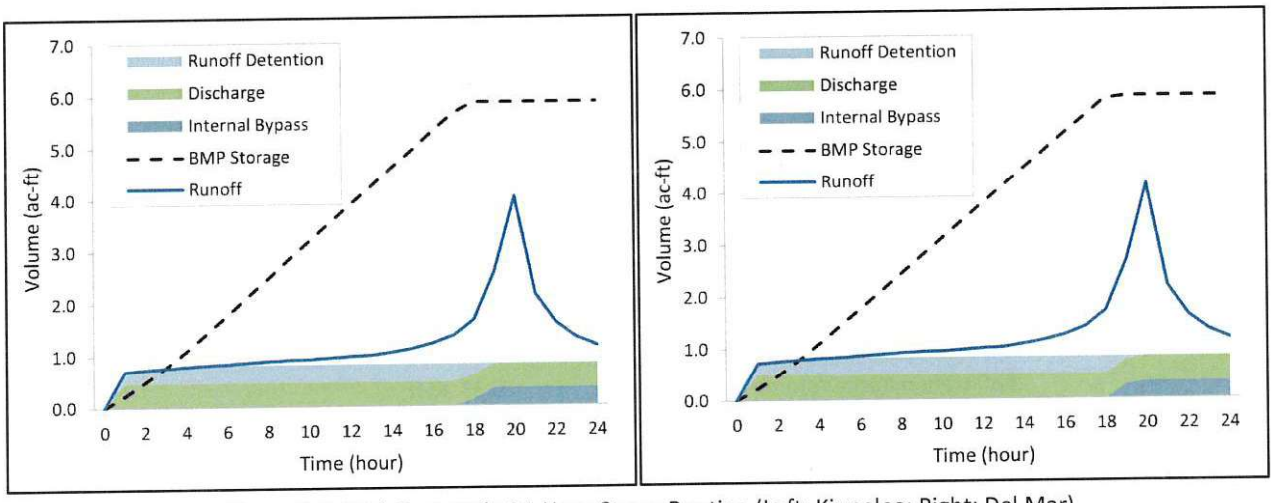

Figure 3-3. 85th Percentile 24-Hour Storm Routing (Left: Kinneloa; Right: Del Mar)

The modeling results of the two sites are compared in ***Table 3-2***.

Table 3-2. Eaton Wash Project Site Modeling Result Comparison

Storm Type	Performance	Kinneloa Site (Original Concept)	Del Mar Site (New Concept)	Difference
85th Percentile 24-hour Design Storm	Volume Captured (ac-ft)	17.28	17.62	**+0.34**
	Volume Infiltrated (ac-ft)	0	0.36	**+0.36**
	Volume Filtered (ac-ft)	11.42	11.42	-
	Percent of 85th Volume Captured	57%	57%	-
Long-Term LSPC Time Series, WY2008-WY2018	Runoff Treated (ac-ft/yr)	300.08	302.67	**+2.59**
	Runoff Treated by Infiltration (ac-ft/yr)	0.0	53.07	**+53.07**
	Runoff Treated by Filtration (ac-ft/yr)	300.08	249.60	**-50.48**
	Total Suspended Solids Reduction (ton/yr)	72.74	74.06	**+1.32**
	Total Nitrogen Reduction (lb/yr)	506.52	589.67	**+83.15**
	Total Phosphorus Reduction (lb/yr)	145.86	158.28	**+12.42**
	Total Cadmium Reduction (lb/yr)	0.09	0.10	**+0.01**
	Total Copper Reduction (lb/yr)	14.24	14.79	**+0.55**
	Total Lead Reduction (lb/yr)	7.10	7.49	**+0.39**
	Total Zinc Reduction (lb/yr)	68.00	74.26	**+6.26**

4.0 CONCEPT PLANS

Concept plans were created for both sites using the same project components. ***Figure 4-1*** and ***Figure 4-2*** are the concept plans for the Kinneloa Site. ***Figure 4-3*** and ***Figure 4-4*** are the concept plans for the Del Mar Site.

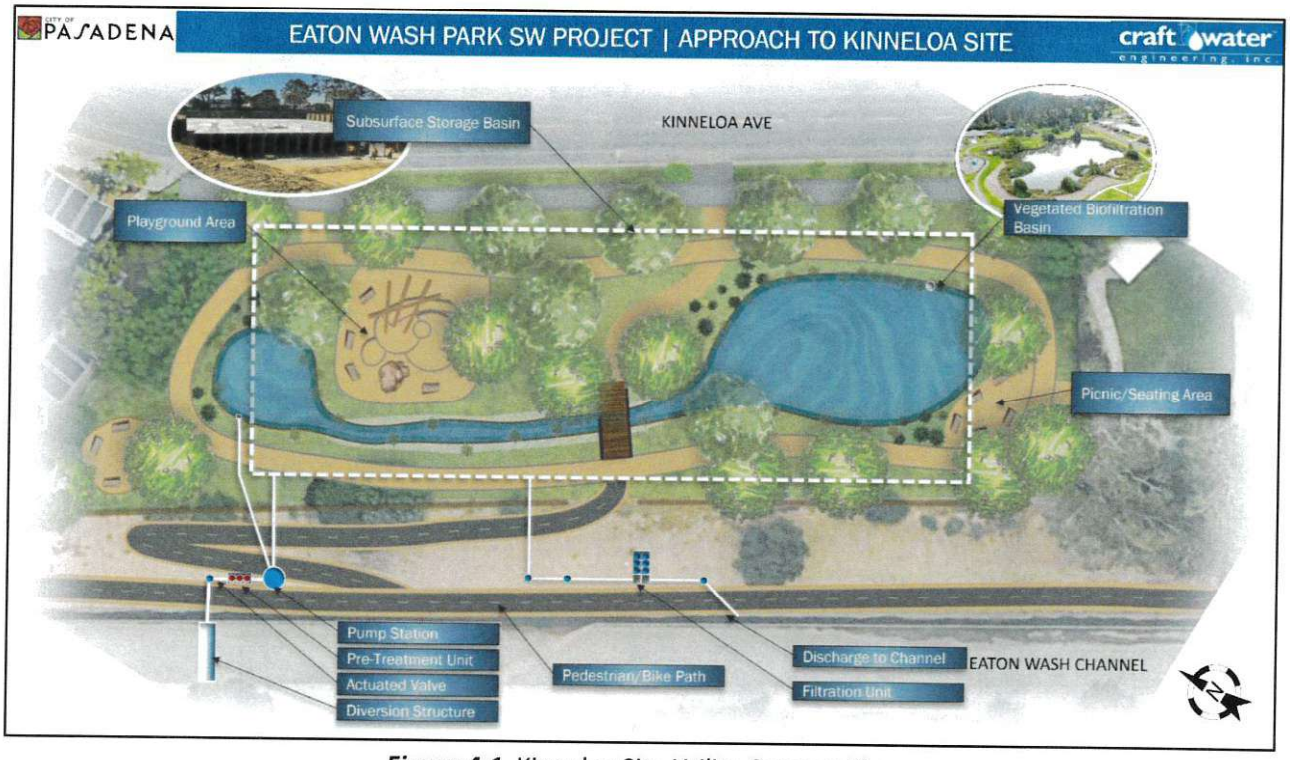

Figure 4-1. Kinneloa Site Utility Concept Plan

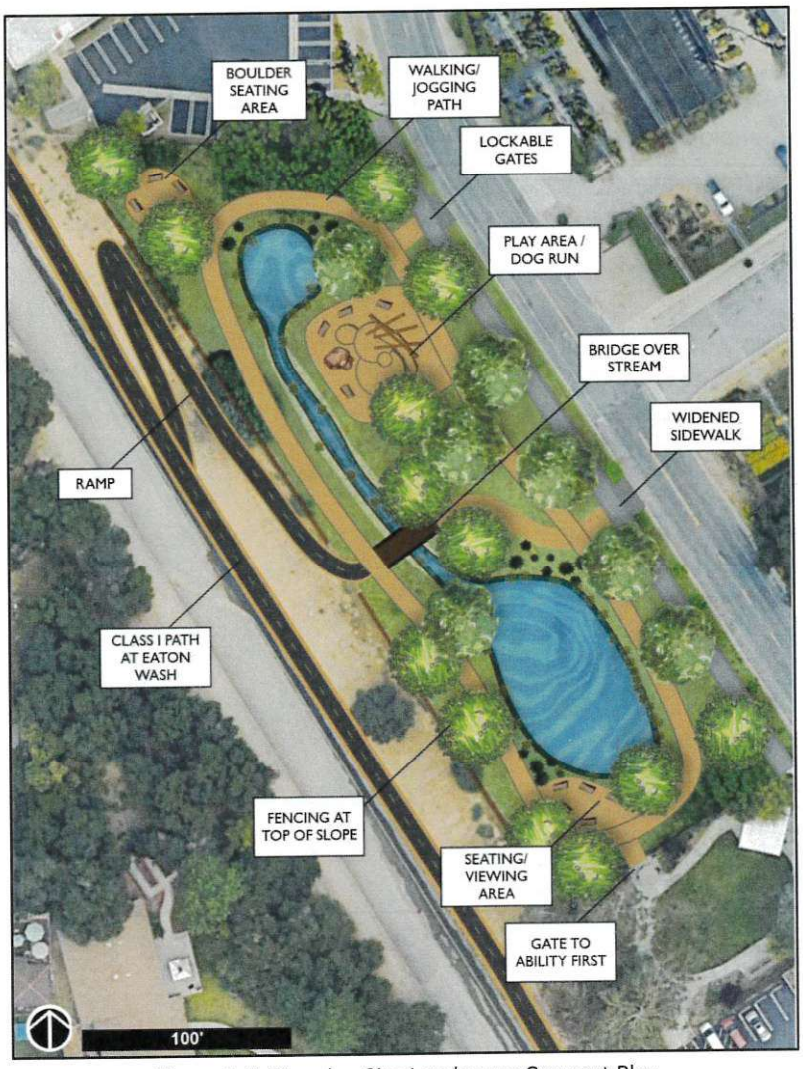

Figure 4-2. Kinneloa Site Landscape Concept Plan

Figure 4-3. Del Mar Site Utility Concept Plan

Figure 4-4. Del Mar Site Landscape Concept Plan

5.0 SUMMARY

5.1 BMP Performance Comparison

The same BMP design is expected to have **equivalent or better performances** at the Del Mar site compared to the original Kinneloa site. The performance improvements can be summarized as follows:

- **Drainage area increase**: the Del Mar site is downstream of the Kinneloa site, allowing the BMP to capture runoff and pollutants from a slightly larger drainage area.
- **Stormwater infiltration increase**: infiltration was not considered at the Kinneloa site due to existing soil contamination. However, the Del Mar site has the potential to infiltrate more than 50 ac-ft/year of captured runoff into the ground to replenish groundwater.
- **Pollutant removal increase**: a larger drainage area generates more pollutants, and the introduction of infiltration enables the same BMP to treat more pollutants.
- Moving the site will also enhance community benefits, including accessibility to youth-based facilities, outdoor educational opportunities, and community garden. Please refer to **Attachment B** for the community benefit comparison.

5.2 Contribution to Compliance

The ULAR EWMP (to which Eaton Wash/Rio Hondo is tributary to) bases their compliance pathway on structural BMP Capacity. While this is implicitly based on pollutant reduction, BMP storage capacity is the regulatory metric that cities are held to. The updated ULAR EWMP Appendix 7F details the required structural BMP capacity for the City of Pasadena within the Rio Hondo watershed to be 161.7 ac-ft, 14.9 ac-ft of which is designated for regional projects on public parcels. See clip from the EWMP below (***Figure 5-1***).

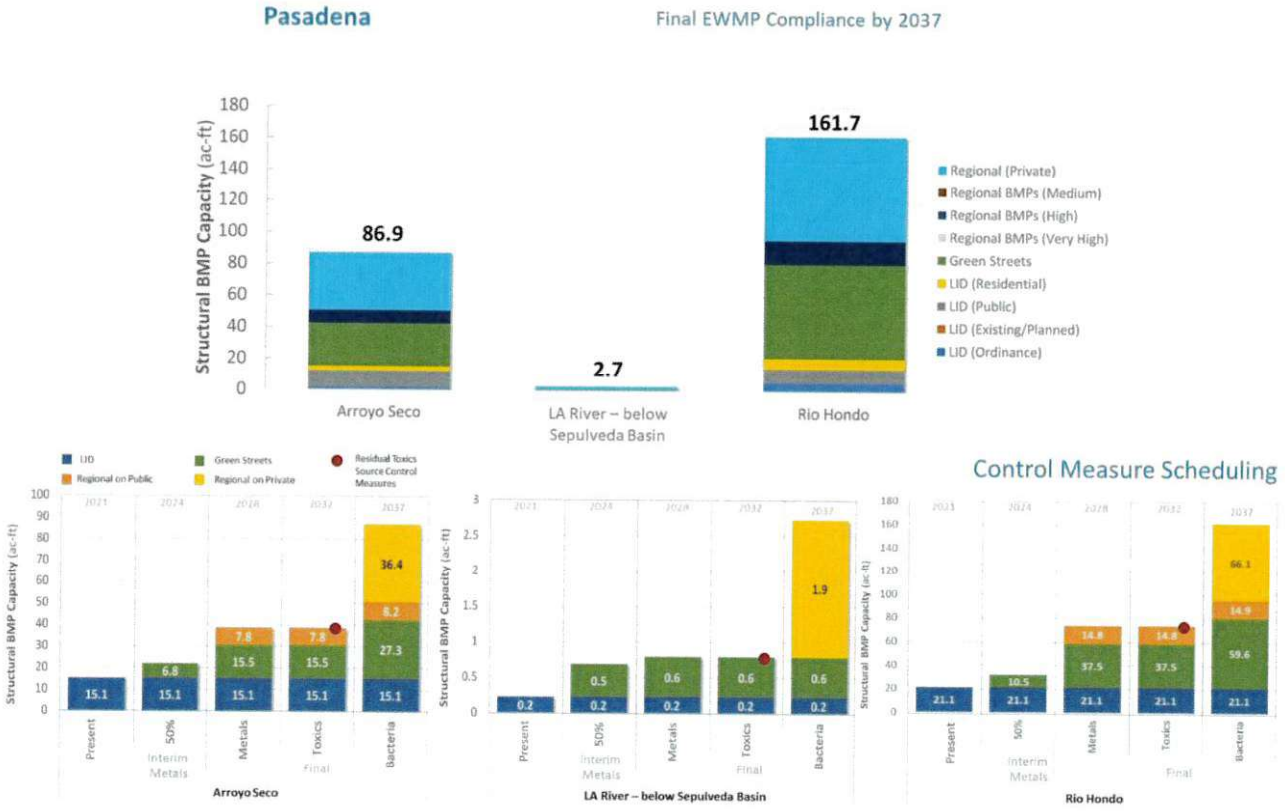

Figure 5-1. City of Pasadena EWMP Compliance Targets

Eaton Wash provides 6.33 ac-ft of storage. Therefore, it fulfills about 42% (6.33/14.9) of this regional on public fraction and approximately 4% (6.33/161.7) of the City of Pasadena's total in the Rio Hondo watershed. However, we consider "treated volume" to be a more appropriate volume metric as the EWMP did not take into consideration infiltration or filtration benefits. During an 85th percentile 24-hour design storm, Eaton Wash treats an additional 0.36 ac-ft of volume due to infiltration and 11.42 ac-ft of volume is treated by the outflow filter. Although BMP storage is currently attached to the MS4 permit, we expect the Regional Board to lean towards pollutant load reduction treatment amount more than BMP storage amounts as a regulatory metric in future WMPs.

ATTACHMENT A: Project Modification Request (PMR) Form

The purpose of this PMR form is to initiate the Project modification process and provide the SCWP with information necessary to evaluate the Project modification request.

Regional Program	☒Infrastructure Program Project ☐Scientific Studies Program ☐Technical Resources Program
Project/Study Name	East Los Angeles College Northeast Drainage Area & City of Monterey Park Biofiltration Project
Project/Study Lead	Los Angeles Community College District
Watershed Area(s)	Rio Hondo Watershed
Current Project Phase	Design
Estimated Completion Date of Funded Activity	12/31/26
Approved Stormwater Investment Plan Fiscal Year	2021-2022
Transfer Agreement ID (e.g., 2020RPULAR52)	2021RPRH01

Has the Transfer Agreement or most recent Addendum been executed (i.e., signed by the project lead and the District)? ☒ Yes ☐ No

What type(s) of modification request?

☐ like-for-like modifications
☐ functionally equivalent BMP modifications
☐ modifications to Project or Study components that were not material to the WASC, ROC, or Board's decision to include the Project or Study in the SIP
☐ reallocation of annual funding projections in the SIP, provided that the total amount of Regional Program funding for the Project or Study remains unchanged
☐ change in primary or secondary objective
☐ change in Project benefits
☐ change in methodology (e.g., infiltration instead of diversion to sanitary sewer)
☐ decrease in BMP capacity
☐ change in Project or Study location
☐ change in capture area where benefits claimed are diminished or where there is a change in the municipalities that are receiving benefits
☐ updated engineering analysis resulting in a reduction of benefits
☐ increase in community support
☐ reduction or withdrawal of community support
☐ change in amount or status of leveraged funding
☒ any modification resulting in an increase of the total amount of Regional Program funding for the Project or Study
☐ any modification resulting in a decrease of the estimated total amount of Regional Program funding for the Project or Study
☐ other, please describe:

Impact on scope or benefits?

☐ Improved
☐ Diminished
☒ Neither
☐ Not Sure

Description of the proposed modification(s), a comparison to the previously approved Project, and the reason(s) why the modification(s) is/are being proposed. Attach additional pages, as needed.

The East Los Angeles College Northeast Drainage Area and City of Monterey Park Biofiltration Project schedule has been affected and there is a cost increase for the project. The project has seen delays based on ongoing coordination with the City of Monterey Park with the use of the City's Transit Center for a portion of the project. The project is moving forward in collaboration with the City of Monterey Park. Additionally the cost of the project has significantly increased. The scope of the project including all of the biofiltration systems has not changed. The costs of most of the materials and labor for the project have increased since the pandemic, when the cost estimate for the project was originally developed and so the cost to complete the project has increased significantly. The original capital (construction) cost for the project was $1,210,495 however the new construction cost estimate is $3,682,308 based on an increase in both materials costs and labor costs.

If applicable, list previously approved funding allocations/disbursements and revised funding request:

Note, if some or all of a previously Funded Activity cannot be completed as a result of the proposed modification, please include a description and indicate the amount of unused funds. Any unused funds should be reallocated and accounted for in your revised funding request. Attach additional pages, as needed.

SIP Fiscal Year	Approved Funding Allocations	Increase/ Decrease Requested	Revised Funding Request	Description/Phase/Status *If applicable, include description of unused funds*
21/22	$60,524			Design
22/23	$472,094			Construction
25/26		+$500,000		Construction
TOTAL	$532,618	$500,000	$1,032,618	

A: Approved Total Funding Allocations	$532,618
B: Revised Estimate of Total Funding from Regional Program	$1,032,618
Regional Program Funds Received to date	$60,524
Regional Program Expenditures to date	
Difference between B and A	$500,000
Percent change between B and A	193%

Would the additional funding request be the only option that would allow the project to be implemented? Please describe.	☒ YES
Due to significant increase of materials for the project, the project will only be able to be implemented if additional funds can be secured from Safe Clean Water. LACCD will be putting in additional funding for the project. The new total capital cost for the project is $3,682,308 which is an additional $2,471,813 of capital cost to complete the project. LACCD is planning to contribute an additional $1,971,813 (80% of the additional cost) and is looking to SCW for additional $500,000 (20% of the additional cost).	
Would delaying funding allocations impact the project's ability to be implemented? Please describe.	☒ YES
A delay of funding allocations will impact the project's ability to be implemented. LACCD is able to contribute an additional $1,971,813 for the project but no other funding is available from LACCD and so any delay in funding allocation for the project will impact the ability of the project to proceed.	
Would funding only a portion of the additional funding request impact the project's ability to be implemented? Please describe.	☒ YES
Unless the full amount of additional funding requested can be secured the project cannot be implemented.	
Has the Recipient considered other funding sources? Please describe. Include type of funding, status, and amount.	☒ YES
The project has investigated other grant funding sources including the Caltrans Cooperative Partnership Program and the California Resources Agency Urban Greening Program. Unfortunately these funding options did not exactly fit the proposed project or the grant funding has already been exhausted.	

If applicable, a description of difference in SCWP Anticipated Total Funding Request. As a reminder, annual funding is at the discretion of the WASC, ROC, and ultimately the Board of Supervisors. Attach additional pages, as needed.

The new total capital cost for the project is $3,682,308 which is an additional $2,471,813 of capital cost to complete the project. This is due to increase in materials costs and labor costs for the project. The original cost estimate for the project was developed in 2020 during the pandemic. Unfortunately all materials costs have increased significantly since 2020 and labor costs have increased as well. LACCD is planning to contribute an additional $1,971,813 (80% of the additional cost) and is looking to SCW for additional $500,000 (20% of the additional cost).

Brief description of Supporting Documentation provided. Please include any documentation needed to support benefits claimed by the modified Project or Study and confirm compliance with the Feasibility Study Guidelines.

No additional benefits are provided for the project but the project is in compliance with the SCW Feasibility Study Guidelines.

Contact information of persons who should be included in correspondence with the SCWP regarding this Project or Study. Attach additional pages, as needed.

Name	Title	Email Address
Don McLarty Planning & Support Services Manager		don.mclarty@build-laccd.org
Mary Ann Breckell	LACCD Special Projects	BreckeMA@email.laccd.edu
Daniel Apt LACCD Stormwater Consultant		dapt@olaunu.com

I certify the information and supporting documentation provided is accurate and true.	☒ YES
I certify the modified Project complies with all requirements described in the Feasibility Study Guidelines.	☒ YES
I understand this is a request and it is under the WASC's discretion to consider requested modifications.	☒ YES

Name Daniel Apt

Organization Olaunu (LACCD Stormwater Consultant)

Signature 

Date 10/31/24

FOR SCWP STAFF USE ONLY

Proposed Modifications to Projects or Studies:

	Status	Date
Scope/benefits of the modified Project or Study is **consistent** with the Project or Study included in the current fiscal year's SIP and proposed modifications were **approved** by the SCWP.	☐ YES	
Scope/benefits of the modified Project or Study **requires reapproval in the SIP**. **If yes, select all that apply**:	☒ YES	1/17/25
Budget/schedule modifications would impact future SIP funding allocations. **If yes, select all that apply**:	☒ YES	1/17/25
PMR was received **after** October 31 of a fiscal year and the PMR will be considered for approval during the preparation of **subsequent** SIP for the fiscal year after the next	☐ YES	-
Project or Study **abandoned** the proposed modifications	☐ YES	
Projector or Study was **withdrawn** from consideration by the WASC and shall issue repayment of unspent funds	☐ YES	
Proposed **scope/benefit** modifications were **recommended for approval** in the SIP	☐ YES ☐ NO ☐ N/A	
Modifications to the Project or Study's **funding allocations** were **recommended for approval** as identified in the SIP	☐ YES ☐ PARTIAL ☐ NO	

Proposed Modifications to Project Concepts:

	Status	Date
Proposed modifications were deemed **consistent** with the Project concept that was approved by the WASC, ROC and Board for inclusion in the SIP and can be addressed within the existing budget. SCWP staff will proceed to incorporate the proposed modification into the Feasibility Study immediately.	☐ YES	
Proposed modifications were deemed significant enough to result in a **significantly different** Project concept from the one approved by the WASC, ROC and Board for inclusion in the SIP. **If yes, select one:**	☐ YES	
SCWP staff to **discontinue** work on the Feasibility Study, return unused funds to be programmed in the SIP for the next fiscal year, and advise the proponent to submit the modified Project concept during the Call for Projects for a future fiscal year.	☐ YES	-
SCWP staff to **abandon** the proposed modifications and proceed with the Project concept included in the SIP.	☐ YES	-

ATTACHMENT A: Project Modification Request (PMR) Form

The purpose of this PMR form is to initiate the Project modification process and provide the SCWP with information necessary to evaluate the Project modification request.

Regional Program	☐Infrastructure Program Project ☑Scientific Studies Program ☐Technical Resources Program
Project/Study Name	Maximizing Impact of Minimum Control Measures
Project/Study Lead	San Gabriel Valley Council of Governments
Watershed Area(s)	Rio Hondo, Upper San Gabriel River
Current Project Phase	Finalizing Modeling Tools and Results
Estimated Completion Date of Funded Activity	6/29/2025
Approved Stormwater Investment Plan Fiscal Year	FY22-23
Transfer Agreement ID (e.g., 2020RPULAR52)	2022RPRH51 and 2022RPUSGR51

Has the Transfer Agreement or most recent Addendum been executed (i.e., signed by the project lead and the District)? ☑ Yes ☐ No

What type(s) of modification request?

☐ like-for-like modifications
☐ functionally equivalent BMP modifications
☐ modifications to Project or Study components that were not material to the WASC, ROC, or Board's decision to include the Project or Study in the SIP
☐ reallocation of annual funding projections in the SIP, provided that the total amount of Regional Program funding for the Project or Study remains unchanged
☐ change in primary or secondary objective
☐ change in Project benefits
☐ change in methodology (e.g., infiltration instead of diversion to sanitary sewer)
☐ decrease in BMP capacity
☐ change in Project or Study location
☐ change in capture area where benefits claimed are diminished or where there is a change in the municipalities that are receiving benefits
☐ updated engineering analysis resulting in a reduction of benefits
☐ increase in community support
☐ reduction or withdrawal of community support
☐ change in amount or status of leveraged funding
☑ any modification resulting in an increase of the total amount of Regional Program funding for the Project or Study
☐ any modification resulting in a decrease of the estimated total amount of Regional Program funding for the Project or Study
☐ other, please describe:

Impact on scope or benefits?

☑ Improved
☐ Diminished
☐ Neither
☐ Not Sure

Description of the proposed modification(s), a comparison to the previously approved Project, and the reason(s) why the modification(s) is/are being proposed. Attach additional pages, as needed.

A study design for measuring the impact of street sweeping on runoff water quality is proposed, where simulated rainfall events are applied over unswept and swept pavements near each other, runoff is collected from each condition, and water quality results for a range of analytical parameters is compared. The results of this analysis will be used to refine the model inputs representing street sweeping efficiencies under the current study tools developed.

The objective of the proposed modification to the current study is to develop field data documenting runoff water quality from unswept and swept street segments. This data will be used to verify and justify model representation of street sweeping activities and associated pollutant reductions achieved.

Refer to the attached scope for additional details.

If applicable, list previously approved funding allocations/disbursements and revised funding request:

Note, if some or all of a previously Funded Activity cannot be completed as a result of the proposed modification, please include a description and indicate the amount of unused funds. Any unused funds should be reallocated and accounted for in your revised funding request. Attach additional pages, as needed.

SIP Fiscal Year	Approved Funding Allocations	Increase/ Decrease Requested	Revised Funding Request	Description/Phase/Status *If applicable, include description of unused funds*
FY22-23	$497,480	$0	$497,480	No change
FY23-24	$939,040	$0	$939,040	No change
FY25-26	$0	$799,115	$799,115	Add empirical measurements of street sweeping
TOTAL	$1,436,520	$799,115	$2,235,635	

A: Approved Total Funding Allocations	$1,436,520
B: Revised Estimate of Total Funding from Regional Program	$2,235,635
Regional Program Funds Received to date	$1,436,520
Regional Program Expenditures to date	$690,182
Difference between B and A	$799,115
Percent change between B and A	156%

Would the additional funding request be the only option that would allow the project to be implemented? Please describe.	☑ YES
The SCWP is the option available to fund the empirical measurements of local street sweeping. The methods were previously developed under the Southern California Stormwater Monitoring Coalition (SMC).	
Would delaying funding allocations impact the project's ability to be implemented? Please describe.	☐ YES
No, the study can proceed as planned; however this additional allocation would provide more robust justification and direct measurements of local street sweeping effectiveness.	
Would funding only a portion of the additional funding request impact the project's ability to be implemented? Please describe.	☑ YES
Funding can be scaled based on the number of test sites, which the current funding request is based on 5 sites. More sites allow for assessment of variable conditions and greater confidence in variability of results.	
Has the Recipient considered other funding sources? Please describe. Include type of funding, status, and amount.	☑ YES
The methods to be utilized under this proposed work were originally funded by the SMC. That funding did not support further implementation of the methods, which is what is being pursued herein.	

If applicable, a description of difference in SCWP Anticipated Total Funding Request. As a reminder, annual funding is at the discretion of the WASC, ROC, and ultimately the Board of Supervisors. Attach additional pages, as needed.

An additional $799,115 is being requested, $479,469 from the USGR WASC and $319,646 from the RH WASC. This is requested for FY25-26 to support the additional of empirical measurements of street sweeping.

Refer to the attached scope for details on the additional funding request cost breakdown.

Brief description of Supporting Documentation provided. Please include any documentation needed to support benefits claimed by the modified Project or Study and confirm compliance with the Feasibility Study Guidelines.

Attached scope includes background, objectives, methods, deliverables, schedule, and budget to be implemented with the additional funding request.

Contact information of persons who should be included in correspondence with the SCWP regarding this Project or Study. Attach additional pages, as needed.

Name	Title	Email Address
Turner Lott	Senior Management Analyst	tlott@sgvcog.org
Brianna Datti	Director of Science & Policy	brianna.datti@craftwater.com

I certify the information and supporting documentation provided is accurate and true.	☑ YES
I certify the modified Project complies with all requirements described in the Feasibility Study Guidelines.	☑ YES
I understand this is a request and it is under the WASC's discretion to consider requested modifications.	☑ YES

Name Marisa Creter Organization SGVCOG

Signature Marisa Creter Date 10/31/24

FOR SCWP STAFF USE ONLY

Proposed Modifications to Projects or Studies:

	Status	Date
Scope/benefits of the modified Project or Study is **consistent** with the Project or Study included in the current fiscal year's SIP and proposed modifications were **approved** by the SCWP.	☐ YES	
Scope/benefits of the modified Project or Study **requires reapproval in the SIP**. **If yes, select all that apply**:	☒ YES	1/17/25
Budget/schedule modifications would impact future SIP funding allocations. **If yes, select all that apply**:	☒ YES	1/17/25
PMR was received **after** October 31 of a fiscal year and the PMR will be considered for approval during the preparation of **subsequent** SIP for the fiscal year after the next	☐ YES	-
Project or Study **abandoned** the proposed modifications	☐ YES	
Projector or Study was **withdrawn** from consideration by the WASC and shall issue repayment of unspent funds	☐ YES	
Proposed **scope/benefit** modifications were **recommended for approval** in the SIP	☐ YES ☐ NO ☐ N/A	
Modifications to the Project or Study's **funding allocations** were **recommended for approval** as identified in the SIP	☐ YES ☐ PARTIAL ☐ NO	

Proposed Modifications to Project Concepts:

	Status	Date
Proposed modifications were deemed **consistent** with the Project concept that was approved by the WASC, ROC and Board for inclusion in the SIP and can be addressed within the existing budget. SCWP staff will proceed to incorporate the proposed modification into the Feasibility Study immediately.	☐ YES	
Proposed modifications were deemed significant enough to result in a **significantly different** Project concept from the one approved by the WASC, ROC and Board for inclusion in the SIP. **If yes, select one:**	☐ YES	
SCWP staff to **discontinue** work on the Feasibility Study, return unused funds to be programmed in the SIP for the next fiscal year, and advise the proponent to submit the modified Project concept during the Call for Projects for a future fiscal year.	☐ YES	-
SCWP staff to **abandon** the proposed modifications and proceed with the Project concept included in the SIP.	☐ YES	-

ATTACHMENT

Empirical Measurement of Street Sweeping Impacts on Runoff Water Quality

Maximizing Impact of Minimum Control Measures Project Modification Request

Background

The Maximizing Impact of Minimum Control Measures scientific study is developing research to quantify the positive impact of "minimum control measures" including street sweeping on pollutant loading and concentrations. Empirical evidence quantifying runoff water quality with and without street sweeping is of interest to support tools being developed by the current study to improve Watershed Management Programs and help achieve water quality objectives.

The body of knowledge in literature concurs that street sweepers remove substantial amounts of debris, and that advanced sweeper technologies (e.g. those that use vacuum, pressure washing, or both) are measurably superior to mechanical broom sweepers. However, there is no generally accepted method to translate loads captured by street sweepers during dry weather into reductions in urban runoff event mean concentrations (EMCs). No study identified to date has shown an effect of street sweeping on downstream water quality, e.g., at outfalls, nor has any study definitively quantified differences in stormwater runoff concentrations between swept and unswept streets (Kang et al. 2009; Kang and Stenstrom 2008; Muhammad et al. 2006; Pearson et al. 2018). High event-to-event variability in pollutant build-up and wash-off has been identified as a challenge in measuring downstream benefits (or lack thereof). Study designs may have also prevented conclusive findings at outfalls, since the roadway is usually only a fraction of the total contributing catchment.

The Southern California Coastal Water Research Project (SCCWRP) has developed a field-testing method that uses a portable rainfall generator (RFG) to create and isolate runoff from street surface segments. Use of simulated storms with the RFG enables generating repeatable experimental conditions in-situ to promote development of a statistically robust dataset. The use of simulated storm events eliminates the environmental variability that confounds interpretation of previous studies found in the literature. Specifically, effects of rainfall intensity, duration, frequency in relation to the occurrence of street sweeping, and interference from runoff from the wider catchment are eliminated by using simulated events.

A study design for measuring the impact of street sweeping on runoff water quality is proposed, where simulated rainfall events are applied over unswept and swept pavements near each other, runoff is collected from each condition, and water quality results for a range of analytical parameters is compared. The results of this analysis will be used to refine the model inputs representing street sweeping efficiencies under the current study tools developed.

Objectives

The objective of the proposed modification to the current study is to develop field data documenting runoff water quality from unswept and swept street segments. This data will be used to verify and justify model representation of street sweeping activities and associated pollutant reductions achieved.

Methods

The overall approach (Figure 1) begins with establishing similar initial pavement conditions by sweeping all pavement segments to be tested according to a set antecedent dry period (ADWP). After the end of the ADWP, simulated rainfall is applied to unswept and swept pavements, and samples are collected. Subsequently, only the designated swept pavement segment is swept again after the next ADWP has elapsed. Rainfall is again applied to both swept and unswept pavements, with sample collection. The cycle is repeated as needed.

Each day of testing will include:

- Traffic control established by the municipal partner
- On-site assembly of the RFG by SCCWRP
- Water delivery provided by the municipal partner, if not available on- or near the tesing site
- Sweeping of the designated side or segment of the street by the municipal partner
- Applying simulated rainfall to unswept and swept pavement segments, and collecting and aliquoting runoff samples by SCCWRP
- Collection of a range of field blanks by SCCWRP
- Disassembly of the RFG by SCCWRP
- Transportation of samples to SCCWRP for subsequent distribution for analytical services on the following day.

The RFG will be applied consecutively over three adjacent pavement segments to create a unique test per pavement condition. Simulated rainfall will be applied for 15-min over each segment. The duration of rainfall has been determined as a balance between providing adequate time for pollutant wash-off, an ability to test multiple segments to constitute a single event for a pavement condition, and testing multiple events in a single day. Runoff will be captured along the gutter using a peristaltic pump, and collected in a clean 200-L polypropylene barrel to create a whole-of-event composite sample per test event per pavement condition. The composite sample will be aliquoted for subsequent laboratory analysis.

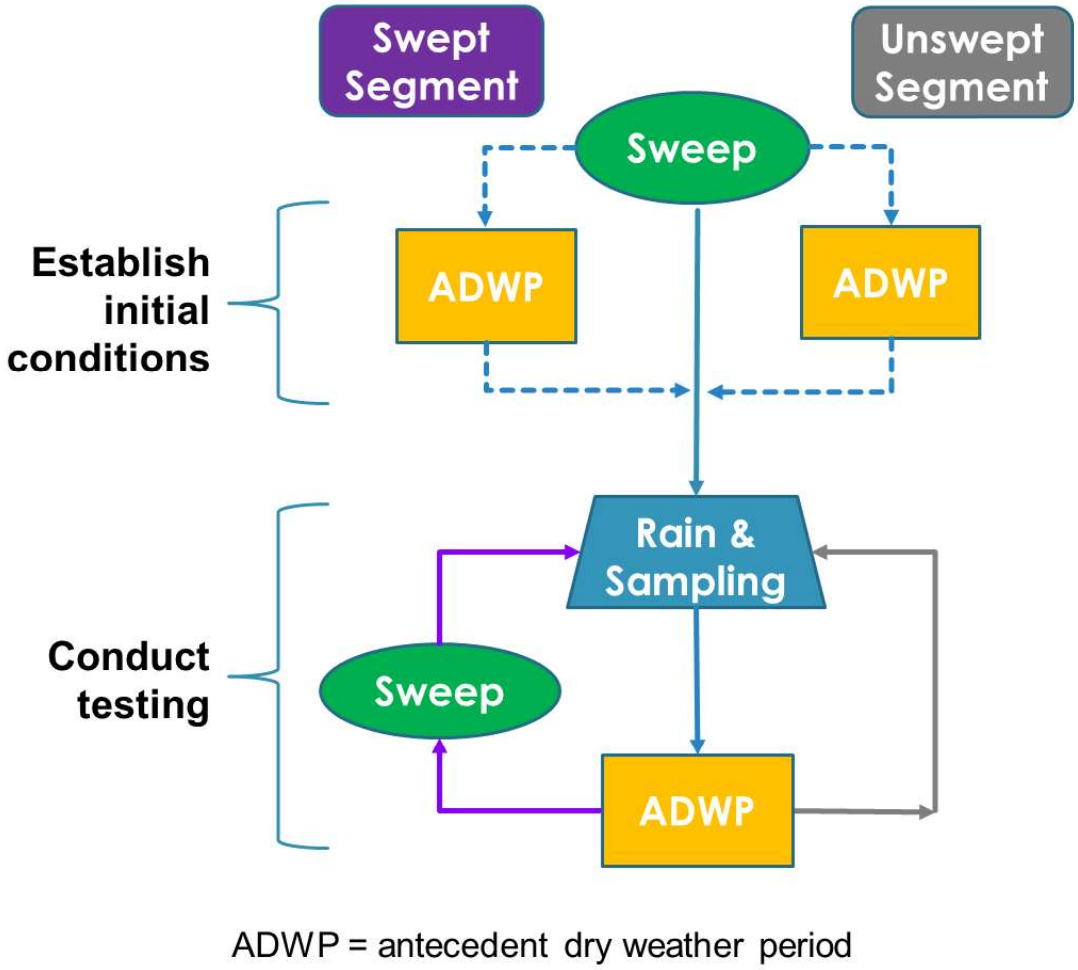

Figure 1. Overall approach to compare runoff water quality from swept and unswept pavements.

Site selection will consider:

- Street segments with a clear slope towards a hard curb (Figure 2).
- At least one driving lane adjacent to the curb.
- Proximity to an accessible water supply is desirable, but not required if the municipal partner is able to provide a water truck or other supply.
- Segments designated as unswept and swept for the purposes of testing must be in close proximity to each other, ideally they are opposite sides of the same street (assuming a center crown), or segments along the same side of the street (Figure 3). This criterion is intended to limit the influence of pavement condition on comparisons between swept and unswept runoff water quality for a given location.
- A candidate list of test locations will be identified in coordination with municipal representatives. SCCWRP will conduct site recon with a municipal representative.

Figure 2. Characteristics of hypothetical test site.

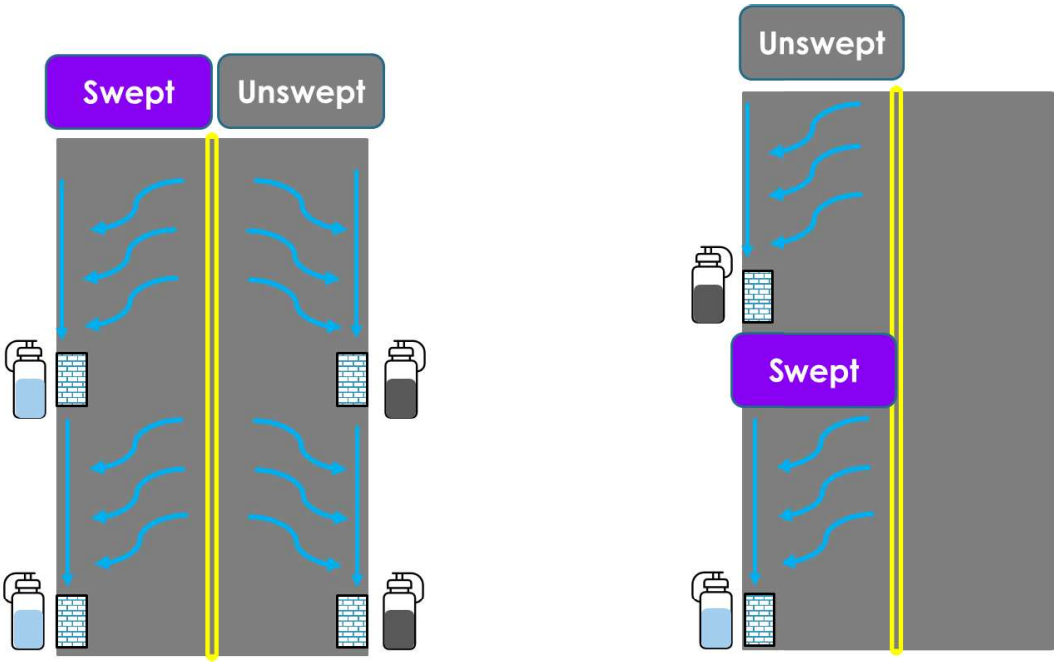

Figure 3. Test location should identify street segments in close proximity to test unswept and swept pavement conditions. Test segments may either be on opposite sides of a street with a center crown (LEFT) or along the same side of a street where a clear designation between unswept and swept areas can be established (RIGHT).

At least four pairs of unswept and swept pavements will be tested at each location. Up to two test pairs (4 individual rainfall events) can be conducted in a single test day if there are multiple segments available for each pavement condition, for the example as depicted in the site configuration on the left of Figure 3. Alternative approaches to testing may be developed to conduct multiple tests in a single day of a single pavement condition at a time (i.e. conduct 4 tests on swept street segments in a single day, and return another day to conduct 4 tests on unswept street segments).

ADWP is hypothesized to influence pollutant accumulation, and thus runoff water quality. At a minimum, testing will be conducted according to the street sweeping frequency currently followed by each municipality, i.e., establish water quality according to current conditions.

Number of Tests

A test pair herein refers to a direct comparison between unswept and swept pavement water quality at a given location. The minimum number of test pairs needed to establish statistically defensible differences in runoff water quality between unswept and swept pavements at a given location is estimated as 4-6 test pairs. This estimate is based on analysis of limited data collected during pilot testing of the method by SCCWRP. Consistently performing locations require fewer samples, whereas sites with significant heterogeneity require more samples for statistical confidence. These conditions cannot be identified in advance. In any/all cases, variability in measured water quality in each location will be quantified.

It is hypothesized that pavement condition/level of service and usage, such as average daily traffic, might influence runoff water quality. The most robust overall data set will be established by locations that all reflect similar pavement conditions. However, this type of criteria may limit feasible sites for testing that support the logistics of the test method, thus limiting pavement condition to a narrow range is not recommended as strict criteria for site selection.

The proposed modification includes testing at up to 5 different site locations.

Analyte List

A range of water quality parameters are proposed for analysis (Table 1), representing conventional contaminants (e.g., sediments and nutrients), typical contaminants of concern from streets (e.g., heavy metals and PAHs), and emerging contaminants of concern (e.g., microplastics).

Table 1. Proposed analyte list

Total suspended solids (TSS)		
Total phosphorus (TP)		
Total nitrogen (TN)		
Total hardness		
Total and dissolved heavy metals	Aluminum (Al) Arsenic (As) Cadmium (Cd) Chromium (Cr) Copper (Cu) Iron (Fe)	Lead (Pb) Mercury (Hg) Nickel (Ni) Selenium (Se) Silver (Ag) Zinc (Zn)
Polycyclic aromatic hydrocarbons (PAHs)	1-Methylnaphthalene 1-Methylphenanthrene 2,3,5-Trimethylnaphthalene 2,6-Dimethylnaphthalene 2-Methylnaphthalene Acenaphthene Acenaphthylene Anthracene Benz[a]anthracene Benzo[a]pyrene Benzo[b]fluoranthene Benzo[e]pyrene	Benzo[g,h,i]perylene Benzo[k]fluoranthene Biphenyl Chrysene Dibenz[a,h]anthracene Dibenzothiophene Fluoranthene Fluorene Indeno[1,2,3-cd]pyrene Naphthalene Perylene Phenanthrene Pyrene
Fecal indicator bacteria (FIB)	*Enterococci* *E. Coli* Total coliforms	
Microplastics		

Deliverables

An Empirical Measurements of Street Sweeping technical memorandum will be prepared documenting test locations, site conditions, and the water quality results. Water quality results for all individual tests will be provided, as well as summary statistics such as mean concentrations from each pavement surface with measures of variability such as confidence intervals on the mean and standard deviations. Likewise, %-differences between unswept and swept pavement runoff concentrations will be determined, with a measure of variability. All laboratory analytical results will be provided.

Results of the empirical measurements will be used to update the models representing long-term impacts of street sweeping. The Program Performance Evaluation memorandum under the current study will be updated with these refined results, along with the Technical Platform displaying model results for street sweeping programs.

Schedule

Task	Task Name	Milestone
	Assumed NTP	10/1/2025
1	Stakeholder Progress Meetings	Ongoing
1	Quarterly Report	11/15/2025
1	Annual Report	12/31/2025
1	Quarterly Report	2/15/2026
1	Quarterly Report	5/15/2026
1	Quarterly Report	8/15/2026
1	Quarterly Report	11/15/2026
1	Annual Report	12/31/2026
2	Field Sampling	7/31/2026
2	Lab Analysis (all conventional pollutants, excluding Microplastics)	8/31/2026
2	Lab Analysis (Microplastics)	11/30/2026
2	Technical Report (all conventional pollutants, excluding Microplastics)	9/30/2026
2	Technical Report (w/ Microplastics)	12/31/2026
3	Updated Program Performance Evaluation Memo	11/30/2026
3	Updated Technical Platform	1/29/2027

Budget

Task	Task Name	Total Budget	USGR WASC Budget	RH WASC Budget
1	**Project Management and Stakeholder Engagement**	**$ 154,047**	**$ 92,428**	**$ 61,619**
2	**Empirical Measurements of Street Sweeping Impacts**	**$ 585,068**	**$ 351,041**	**$ 234,027**
3	**Updated Program Performance Evaluation and Technical Platform**	**$ 60,000**	**$ 36,000**	**$ 24,000**
TOTAL		**$799,115**	**$479,469**	**$319,646**