

March 5, 2025

Consulting
Engineers and
Scientists

Rick Whetsel, Senior Watershed Manager
Santa Ana Watershed Project Authority
11615 Sterling Avenue
Riverside, CA 92503

**Re: Middle Santa Ana River (MSAR) Bacteria TMDL 2025 Synoptic Study and
2026 Triennial TMDL Report Cost Proposal**

Dear Mr. Whetsel,

The purpose of this letter is to present GEI Consultant's (GEI) proposal to develop and implement the MSAR Bacteria TMDL Synoptic Study on behalf of the Santa Ana Watershed Project Authority (SAWPA) and the MSAR Bacteria TMDL Task Force ("Task Force"). This proposal was developed to continue implementation of the CBRP by conducting an updated source analysis and prioritization of subwatersheds, building upon methods and findings from past iterations in 2007, 2012, and 2019. Sampling is proposed to begin in the dry season of 2025. The purpose of the of the Synoptic Study is to evaluate the effectiveness of the Comprehensive Bacteria Reduction Plans (CBRPs) implemented by MS4 programs and to improve those programs where necessary. The new data set would augment the historical record and will be reflected upon in the next Triennial Review Report, which is due by February 15, 2026.

If approved by the Task Force, the 2025 study will 1) collect data for multiple pathogens to support exploratory analysis of potential quantitative microbial risk assessment (QMRA) for development of site-specific criteria for the MSAR TMDL waters, and 2) interpret water quality data and other implementation activities over the 2023-2025 period for development of a 2026 Triennial TMDL Report. A detailed study plan for the 2025 dry season Synoptic Survey will be developed with input from experts in microbial source tracking (MST), Regional Board staff, and the MSAR TMDL Task Force. A list of key study objectives is provided below:

- Characterize the flows and concentrations of *E. coli* and microbial source tracking (MST) markers for controllable sources (human and dog) being discharged into the waterbodies named in the TMDL from all Tier 1 MS4 outfalls. Update the CBRP implementation prioritization score for all sites with hydrologically connected discharge during dry weather and summarize how these scores have changed since the previous ranking was prepared based on data collected in the 2019 Synoptic Survey (SAWPA 2020).

- Previous studies suggest that MSAR TMDL waters are strong candidates for alternative water quality criteria (AWQC) because human sources fall below the 30 percent threshold for human contribution for applicability to implement EPA’s 2024 *Technical Support Materials: Developing Alternative Recreational Criteria for Waters Contaminated by Predominantly Non-Human Fecal Sources*, (EPA 822-R24-003). The 2019 Synoptic Study involved analysis of the HF183 Bacteroides marker at MS4 outfalls and within the MSAR TMDL waters: at five sites within Reach 3 of the Santa Ana River (SAR), one site in Mill-Cucamonga Creek, and one site in Chino Creek. Of the 42 samples collected over the six weekly dry weather sampling events, only 1 resulted in HF183 above the detection limit (100 gene copies per 200mL at WW-MISSION on August 14, 2019). Amplification of the marker below detection limits (<10 gc/200mL) was observed in 22 of the 42 samples; however no statistical difference was observed when comparing *E. coli* from samples with and without amplified/detected HF183 (see Table 3-14 of the 2020 TMDL Triennial Report). Based on these results, it is likely that human contributions to the MSAR TMDL waters in the 2019 dry season were less than 30 percent, and therefore ‘predominantly non-human’ according to EPA 2024 guidance. The 2025 Synoptic Study will collect additional data to validate these findings to support a conclusion that the MSAR TMDL waters continue to be contaminated by predominantly non-human fecal sources.
- Update estimates of existing *E. coli* load and propose reduction targets for updated dry and new wet weather CBRPs to focus on controllable sources from within MS4 drainage areas.
- Develop a 2026 Triennial TMDL Report with detailed interpretation of data collected in 2023-2025.

Findings from the Synoptic Study and other data collected in 2023-2025 are intended to guide resource allocation for future bacterial mitigation projects, determine if human pathogens are present in the watershed, and identify sources of bacterial indicators in the MSAR watershed under dry and wet weather conditions. The Synoptic Study includes five tasks, summarized as follows:

- Task 1: Prepare a Study Plan with sample locations, water quality parameters to be analyzed, a sampling schedule and an estimate of the cost to implement Task 3 (sample collection).
- Task 2: Update MST and source analysis sections of the approved Monitoring Plan (MP) and Quality Assurance Project Plan (QAPP) for the ongoing Regional Bacteria Monitoring Program (RBMP) based on proposed methods in the 2025 Synoptic Study.
- Task 3: Collect samples to perform the analyses described in the Study Plan.

- Task 4: Prepare a 2026 Triennial TMDL Report, that summarizes current compliance with the TMDL, presents interpretative findings from the 2025 Synoptic Study, and provides recommendations to the TMDL Task Force for the upcoming three years for CBRP implementation and updates (2026-2029). This report will include all laboratory reports and the related water quality database to SAWPA, and upload qualified data to CEDEN, as directed.
- Task 5: Attend up to eight Task Force meetings to provide progress reports, accept comments on various draft work products and receive project direction.

Following is a description of key personnel for this project, our cost proposal to complete the above tasks and the proposed project schedule.

Project Team

GEI will work collaboratively with Dr. Menu Leddy of Essential Environmental Engineering Systems (EEES) to execute this project. Roles of key staff are described below:

- Steve Wolosoff will serve as the Project Manager. He has worked on the MSAR Bacteria TMDL since its 2007 effective date, either working directly with the Task Force or with the Riverside and San Bernardino County MS4 Programs through the development and implementation of the CBRPs. Mr. Wolosoff will work closely with the project team to complete the tasks on schedule within the approved budget.
- Menu Leddy (EEES) brings her substantial expertise in the use of microbial source tracking methods and interpretation of microbial data to this project. Previously with Orange County Water District, Menu Leddy has supported Task Force and MS4 Program efforts to collect, analyze and evaluate microbial source data in the MSAR watershed since the original synoptic study was conducted in 2007-2008.
- Kelcey Chung will serve as a task leader for creation of SAP/QAPP updates and oversee the implementation of the field crews and laboratories. Kelcey will also support Steve and Menu in data analysis and preparation of the 2026 Triennial TMDL Report. Kelcey has extensive experience with implementation of surface water monitoring programs and coordination of multi-discipline expert teams.

Cost Proposal

The estimated cost to complete the five tasks summarized above is \$228,117 (Attachment A). This estimate assumes that field staff employed by stakeholders implement field effort to collect water samples, e.g., Riverside and San Bernardino County MS4 Program staff. The following sections provide a summary regarding the basis for the costs estimated for each task. Attachment B provides a detailed summary of estimated laboratory costs.

Task 1: Prepare Study Plan

The project team will prepare a Study Plan that (a) identifies sample locations; (b) water quality samples to be collected; (c) field and laboratory parameters to be analyzed; (d) sample collection frequency; and (e) sample collection schedule. This task includes staff time to visit potential sample locations to verify, where needed, our team’s understanding of the current hydrologic connectivity between proposed sample locations and downstream impaired waters. A Draft Study Plan will be submitted to the Task Force for review and comment. The Draft Study Plan will include updates to the cost estimates provided in this cost proposal for laboratory analysis. A Final Study Plan, based on comments received on the draft, will be submitted to the Task Force.

Task 2: Update Existing MP and QAPP

The project team will prepare an update to the existing RBMP MP and QAPP to support the 2025 Synoptic Study. Modifications to the RBMP MP and QAPP will be made only where necessary, e.g., elements related to project description and sampling design. Some sections will require substantial changes to reflect the purposes of this study, other sections may require only minor or no changes, e.g., sampling methods, sample handling/custody, analytical methods and quality control. A Draft QAPP will be submitted to the Task Force for review and comment. A Final QAPP, based on comments received on the draft, will be submitted to the Task Force and Santa Ana Water Board for approval.

Task 3: Sample Collection/Laboratory Analysis

This task focuses on the implementation of the approved Study Plan. To prepare this cost proposal, we assume all field sampling labor will be implemented by Riverside and San Bernardino County MS4 Program staff for samples from Tier 1 and Tier 2 sites. CWE, the current subcontractor to GEI for the RBMP, will collect additional samples for MST markers from watershed-wide TMDL compliance and mainstem sites during routine sampling. A complete summary of the proposed sampling is provided in Attachment B.

Following is description of the basis for this cost proposal:

- Water Quality Constituents: Routine water quality field measurements (e.g., dissolved oxygen, conductivity, pH, temperature and turbidity) will be collected at each sample location during each sample event. Water samples will be collected for laboratory analysis of the fecal indicator bacteria *Escherichia coli* (*E. coli*) and digital droplet PCR (ddPCR) for the HF183 Bacteroides marker and Crassphage genetic marker for human bacteriophage, the DogBac genetic marker for Bacteroides from dogs. Additional filters from mainstem and watershed-wide Compliance sites will be frozen for later laboratory analysis of pathogen analysis with ddPCR. Determination of pathogen markers for analysis will be dependent on results from the human specific bacteriophage analysis. If human bacteriophage is detected, the pathogen analyzed will

be norovirus. If human specific bacteriophage is not detected, the laboratory analysis will be for salmonella.

- Sample Locations – Collection of water quality and flow data is proposed at the following types of sites to obtain the data necessary to update previous source contribution analyses for both *E. coli* and the human genetic marker HF183. Sampling will occur at all sites for 5 dry weather events :
 - Tier 1 and Tier 2 - To be successful, the synoptic survey must collect samples at all MS4 outfalls to waters listed as impaired; however, many do not contribute dry weather flow and have been previously identified as hydrologically disconnected. Based on the results of previous studies (e.g., Tier 1 source evaluations in 2007, 2012, 2019, and recent follow-up surveys). This cost proposal is based on the collection of *E. coli* and Bacteroides samples from 18 Tier 1 or Tier 2 sites during each of the 5 dry weather sample events. **Table 1** provides a preliminary list of 18 sample locations assumed at this time to have measurable dry weather flow for sample collection (Note: This is for preliminary planning purposes; these assumptions will be field verified during preparation of the Study Plan).
 - Watershed Compliance and Other Mainstem Sites - To the maximum extent possible, sampling for *E. coli* will occur concurrently with Tier 1 and 2 sampling at downstream sites watershed-wide TMDL compliance monitoring sites (WW-S1, WW-S4, WW-M6, and WW-C7) or other mainstem sites (MISSION, P3-SBC1) through the RBMP. In addition to *E.coli*, RBMP field crews will collect samples for analysis of Bacteroides markers (HF183, DogBac), a human specific bacteriophage (Crassphage), and pathogens (assume 3 assays per sample for budgeting purposes). Pathogen selected for analysis in each watershed-wide compliance or other mainstem site will be determined after review of the results for Bacteroides markers and human specific bacteriophage, based on procedures defined in the study plan. While the water quality and *E. coli* samples will be collected at these sites as part of the RBMP, the additional laboratory cost for HF183, DogBac, Crassphage, and subsequent pathogen analysis are included in this proposal.
 - Wastewater Effluent Discharge Sites – This proposal includes costs for the collection of water quality data and Bacteroides marker samples at or near the point of discharge of effluent from the CCWRP, Rialto, RIX, RP1, and Riverside WQCP during dry weather events.
- Sample Frequency - Findings from the synoptic survey are most scientifically defensible if they are repeated in multiple events. Given the temporal variability in dry weather flows and associated bacteria loads from MS4s, multiple sample events are recommended to characterize bacteria and dry weather flow. For this cost proposal, it is assumed that up to 5 weekly sample events will be conducted at each of the sample

locations over 5 consecutive weeks during the 2025 dry weather (August/September) time period.

Table 1. Preliminary List of Sample Locations

Site Type	Site Name	Site Description
Mainstem	MISSION	SAR at Mission Blvd
	P3-SBC1	SAR Reach 4 above S. Riverside Ave Bridge
POTW Treated Effluent	CCWRP	Carbon Canyon Water Recycling Plant effluent
	Rialto WWTP	Rialto Wastewater Treatment Plant effluent
	Riverside WQCP	Riverside Water Quality Control Plant effluent
	RIX	Rapid Infiltration and Extraction Facility effluent
	RP1	IEUA Regional Water Recycling Plant No. 1 effluent (at Chino Ave)
Tier 1	T1-ANZA	Anza Drain
	T1-BRSC	Boys Republic South Channel
	T1-BXSP	Box Springs Channel
	T1-CCCH	Carbon Canyon Creek Channel
	T1-CHINOCRK	Chino Creek upstream of San Antonio Channel
	T1-CUCAMONGA	Cucamonga Creek at Hellman
	T1-DAY	Day Creek
	T1-LLSC	Lake Los Serranos Channel
	T1-MCSD	Magnolia Center Storm Drain
	T1-SACH	San Antonio Channel
	T1-SNCH	Sunnyslope Channel
	T1-SSCH	San Sevaine Channel
Tier 2	T2-HWY60	Cucamonga Creek at Hwy 60
	T2-CHRIS	Chris Basin outflow to Cucamonga Creek
	T2-DEER	Deer Creek inflow to Chris Basin
	T2-CLCH	County Line Channel
	T2-EVLA	Eastvale Line A
	T2-EVLB	Eastvale Line B
Watershed Compliance Site	WW-C7	Chino Creek at Central Ave
	WW-M6	Mill-Cucamonga Creek
	WW-S1	SAR at Pedley Avenue
	WW-S4	SAR at MWD Crossing

- Flow Measurements - Because MS4 flow contributions to downstream impaired waters can have low flow rates but high concentrations relative to the receiving waters, the rate of flow used in the planned mass balance analysis can be a highly sensitive parameter. Flow measurement at each site will involve volumetric methods or use of a Marsh-McBirney velocity meter. Other flow measurement alternatives that rely on flow sensor equipment will be explored during Study Plan development, but costs for any potential alternatives have not been included in this proposal.
- Estimated laboratory costs to analyze water samples for *Escherichia coli* (*E. coli*), the PCR human Bacteroides markers HF183, dog Bacteroides marker DogBac, human specific bacteriophage Crassphage, and subsequent pathogen markers. These cost estimates are based on preliminary quotes provided by Babcock Laboratories, Inc. (*E. coli*), Orange County Public Health Laboratory (HF183, Crassphage, DogBac), and AP Genomics. Project team costs are included for management of the field teams and laboratories, data QA/QC, and data compilation.

Task 4 – 2026 Triennial Report

The project team will prepare a Study Report that (a) updates understanding of dry weather flows and hydrologic connectivity throughout the watershed; (b) identify and compile data being collected by other agencies or organizations (including POTW inspection programs for sanitary sewer collection systems) working in the watershed; and (c) updates source contribution analyses previously completed to support TMDL implementation in the watershed, and d) considers illness risk based on additional analytes proposed in the 2025 Synoptic Study. The study results will be included in the 2026 Triennial Report for the ongoing TMDL implementation program and provide data to support future revision of the TMDL and anticipated updates to existing TMDL implementation plans in the watershed. Other information involving TMDL implementation and long-term compliance monitoring will also be included in the 2026 Triennial Report. A Draft 2026 Triennial Report will be submitted to the Task Force for review and comment. A Final 2026 Triennial Report, based on comments received on the draft, will be submitted to the Task Force. The final submittal will include electronic copies of field data sheets, laboratory reports and the project water quality database. As directed by the Task Force, we will upload qualified data to the California Environmental Data Exchange Network (CEDEN).

Task 5 – Task Force Meetings

GEI's project manager will attend all Task Force meetings during implementation of the Synoptic Study to provide progress updates in slideshow format, accept comments on work products or receive further Task Force direction. EEES will attend where appropriate to discuss microbial source tracking related findings. Preparation and participation in up to eight meetings (labor and expenses) are included in the budget.

Project Schedule

The project team is committed to meeting the project schedule in Table 2 based on a Notice to Proceed by March 10, 2025.

Table 2. Proposed Project Schedule

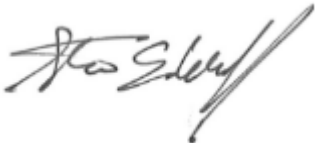
Task	Complete By
Draft Study Plan, MP/QAPP Update	June 1, 2025
Final Study Plan, MP/QAPP Update	July 15, 2025
Data Collection	August 4 - September 5 2025
Progress Report with Presentation to Task Force	October 15, 2026
Draft 2026 TMDL Triennial Report	December 15, 2026
Submit Final 2026 TMDL Triennial Report to Santa Ana Water Board	February 15, 2026
Participate in Task Force meetings	As scheduled

Closing

We appreciate having the opportunity to work with SAWPA and the Task Force on this critical project. Should you have any questions or need further information regarding this proposal, please contact Steve Wolosoff at 781-430-9150 (cell).

Sincerely,

GEI CONSULTANTS, INC.



Steve Wolosoff, BCES, PMP
Senior Project Manager



Iqbal Ahmed, Ph.D, P.E.
Principal in Charge

Attachment A

Task	Labor			Equipment Rental & Supplies ¹	Courier Estimate	Laboratory Estimate	Total Cost Estimate
	Hours	Fee	Expenses				
Task 1 - Study Plan	132	\$ 27,590	\$ 1,750		\$ -	\$ -	\$ 29,340
Field Assessment	32	\$ 6,220	\$ 250		\$ -	\$ -	\$ 6,470
Draft Study Plan	48	\$ 10,490	\$ -		\$ -	\$ -	\$ 10,490
Reconnaissance & Training	20	\$ 3,640	\$ 1,500		\$ -	\$ -	\$ 5,140
Final Study Plan	32	\$ 7,240	\$ -		\$ -	\$ -	\$ 7,240
Task 2 - QAPP	54	\$ 11,895	\$ -		\$ -	\$ -	\$ 11,895
Update Existing QAPP	18	\$ 4,275	\$ -		\$ -	\$ -	\$ 4,275
Update Existing Monitoring Plan Section 6	36	\$ 7,620	\$ -		\$ -	\$ -	\$ 7,620
Task 3 - Data Collection	76	\$ 14,180	\$ -	\$ 4,750	\$ 8,100	\$ 45,757	\$ 72,787
Field Team/Laboratory Management	22	\$ 4,400	\$ -		\$ -	\$ -	\$ 4,400
Data Collection Activities	0	\$ -	\$ -	\$ 4,750	\$ 8,100	\$ 45,757	\$ 58,607
Data QA/QC	22	\$ 3,940	\$ -		\$ -	\$ -	\$ 3,940
Data Compilation	32	\$ 5,840	\$ -		\$ -	\$ -	\$ 5,840
Task 4 - 2026 Triennial TMDL Report	384	\$ 90,925	\$ -		\$ -	\$ -	\$ 90,925
Draft 2026 Triennial TMDL Report	290	\$ 68,895	\$ -		\$ -	\$ -	\$ 68,895
Final 2026 Triennial TMDL Report	79	\$ 19,780	\$ -		\$ -	\$ -	\$ 19,780
CEDEN Upload	15	\$ 2,250	\$ -		\$ -	\$ -	\$ 2,250
Task 5 - Task Force Meetings	76	\$ 16,170	\$ 7,000		\$ -	\$ -	\$ 23,170
Meeting Prep/Participation	76	\$ 16,170	\$ 7,000		\$ -	\$ -	\$ 23,170
Totals	722	\$ 160,760	\$ 8,750	\$ 4,750	\$ 8,100	\$ 45,757	\$ 228,117

Attachment B

Site Type	Site Name	Site Description	No. E. coli	No. MST Analyses	E. coli	HF183	DogBac	Bacteriophage	Pathogens - Assume 3 Assays	Total
					\$50	\$89	\$41	\$41	\$389	
POTW Treated Effluent	CCWRP	Carbon Canyon Water Recycling Plant effluent	0	5	\$0	\$446	\$205			\$651
	Rialto WWTP	Rialto Wastewater Treatment Plant effluent	0	5	\$0	\$446	\$205			\$651
	Riverside WQCP	Riverside Water Quality Control Plant effluent	0	5	\$0	\$446	\$205			\$651
	RIX	Rapid Infiltration and Extraction Facility effluent	0	5	\$0	\$446	\$205			\$651
	RP1	IEUA Regional Water Recycling Plant No. 1 effluent	0	5	\$0	\$446	\$205			\$651
Tier 1	T1-ANZA	Anza Drain	5	5	\$252	\$446	\$205			\$903
	T1-BRSC	Boys Republic South Channel	5	5	\$252	\$446	\$205			\$903
	T1-BXSP	Box Springs Channel	5	5	\$252	\$446	\$205			\$903
	T1-CCCH	Carbon Canyon Creek Channel	5	5	\$252	\$446	\$205			\$903
	T1-CHINOCRK	Chino Creek upstream of San Antonio Channel	5	5	\$252	\$446	\$205			\$903
	T1-CUCAMONGA	Cucamonga Creek at Hellman	5	5	\$252	\$446	\$205			\$903
	T1-DAY	Day Creek	5	5	\$252	\$446	\$205			\$903
	T1-LLSC	Lake Los Serranos Channel	5	5	\$252	\$446	\$205			\$903
	T1-MCSD	Magnolia Center Storm Drain	5	5	\$252	\$446	\$205			\$903
	T1-SACH	San Antonio Channel	5	5	\$252	\$446	\$205			\$903
	T1-SNCH	Sunnyslope Channel	5	5	\$252	\$446	\$205			\$903
	T1-SSCH	San Sevaine Channel	5	5	\$252	\$446	\$205			\$903
	Tier 2	T2-HWY60	Cucamonga Creek at Hwy 60	5	5	\$252	\$446	\$205		
T2-CHRIS		Chris Basin outflow to Cucamonga Creek	5	5	\$252	\$446	\$205			\$903
T2-DEER		Deer Creek inflow to Chris Basin	5	5	\$252	\$446	\$205			\$903
T2-CLCH		County Line Channel	5	5	\$252	\$446	\$205			\$903
T2-EVLA		Eastvale Line A	5	5	\$252	\$446	\$205			\$903
T2-EVLB	Eastvale Line B	5	5	\$252	\$446	\$205			\$903	
Mainstem	MISSION	SAR at Mission Blvd	0	5	\$0	\$446	\$205	\$205	\$1,943	\$2,798
	P3-SBC1	SAR Reach 4 above S. Riverside Ave Bridge	0	5	\$0	\$446	\$205	\$205	\$1,943	\$2,798
Watershed-wide Compliance Site	WW-C7	Chino Creek at Central Ave	0	5	\$0	\$446	\$205	\$205	\$1,943	\$2,798
	WW-M6	Mill-Cucamonga Creek	0	5	\$0	\$446	\$205	\$205	\$1,943	\$2,798
	WW-S1	SAR at Pedley Avenue	0	5	\$0	\$446	\$205	\$205	\$1,943	\$2,798
	WW-S4	SAR at MWD Crossing	0	5	\$0	\$446	\$205	\$205	\$1,943	\$2,798
QA/QC Samples	Equipment Blanks	1/sample day or 2 each week over 6-week period	5	8	\$252	\$714	\$328	\$328	\$3,108	\$4,729
	Field Replicates	1/sample day or 2 each week over 6-week period	5	8	\$252	\$714	\$328	\$328	\$3,108	\$4,729
Totals			100	161	\$5,040	\$14,369	\$6,593	\$1,884	\$17,871	\$45,757