

**SOUTH ORANGE COUNTY
WATER QUALITY IMPROVEMENT PLAN**



1 HIGH PRIORITY WATER QUALITY CONDITION MONITORING PROGRAMS

1.1 Pathogen Health Risk

1.1.1 Overview

<u>Objectives</u>	Verify the effectiveness of dry and wet weather human waste abatement activities. Evaluate the effectiveness of structural best management practice (BMP) strategies.
<u>Sampling Locations</u>	To be determined pursuant to preparation of a <i>Human Waste Investigation and Abatement Work Plan</i> or installation of select structural BMP strategies
<u>Frequency of Events</u>	To be determined pursuant to preparation of a <i>Human Waste Investigation and Abatement Work Plan</i> or installation of select structural BMP strategies
<u>Monitoring Methods</u>	California Microbial Source Identification Manual, as deemed appropriate. (www.waterboards.ca.gov/water_issues/programs/beaches/cbi_projects/docs/sipp_manual.pdf)
<u>Reference</u>	Standardized EPA methods for human fecal pollution characterization (in development), as deemed appropriate. Urban Stormwater BMP Performance Monitoring Manual (www.bmpdatabase.org/monitoring-guidance.html)

1.1.2 Sample Collection

- Water Grab Samples

1.1.3 Sample analysis

<u>Water Grab</u>	To be determined pursuant to preparation of a <i>Human Waste Investigation and Abatement Work Plan</i> or installation of
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Samples select structural BMP strategies

1.2 Channel Erosion and Associated Geomorphic Impacts

1.2.1 Overview

Objectives Evaluate the stability of restored stream reaches over time.
Determine whether the biological integrity of downstream reaches improves over time.

<u>Sampling Locations</u>	<u>Station ID</u>	<u>Description</u>
	Geomorphic Assessment	To be determined upon stream restoration site selection
	High-resolution LiDAR analysis	South Orange County Watershed Management Area
	Downstream Targeted Bioassessment and CRAM	To be determined upon stream restoration site selection

<u>Frequency of Events</u>		
	Geomorphic characterization	Annually, <i>post-restoration</i>
	High-resolution LiDAR analysis	Every 5-years
	Targeted Bioassessment and CRAM	<i>Pre-restoration</i> , once annually in the late spring after the rainy season for a period of three years. <i>Post-restoration</i> , once annually in the late spring after the rainy season for a period of five years.

<u>Monitoring Methods Reference</u>		
	High-resolution LiDAR analysis	2016 Orange County Scope of Work for High Density Stream Corridor LiDAR-Orange County, California
	Targeted Bioassessment and CRAM	Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Standard Operating Procedures (SOP), and amendments SWAMP Stream Habitat Characterization Form – Full Version SWAMP Standard Operating Procedures for Collecting Algae Samples CRAM User’s Manual and Field Books

1.2.2 Sample Collection

- Geomorphic characterization;
- Targeted bioassessment and CRAM

1.2.3 Sample Analysis

<u><i>Geomorphic Characterization</i></u>	Field Measurements	Longitudinal profile
		Channel cross-section
		Bed material particle size distribution
		Size and extent of channel features (pools, riffles, and runs)
		Photographs
<u><i>Targeted Bioassessment and CRAM</i></u>	SWAMP Bioassessment Parameters	BMI Collection
		Multi-habitat Periphyton Collection
		Physical Habitat Assessment
		CRAM Attributes
	CRAM Attributes	Buffer and landscape context
		Hydrology
		Physical structure
		Biotic Structure

1.3 Unnatural Water Balance and Flow Regime

1.3.1 Overview

<u>Objectives</u>	Collect data intended to fill data gaps, support prioritization of strategies, and support adaptive management. Verify effectiveness of programmatic and structural dry weather discharge control strategies.	
<u>Sampling Locations</u>	Expanded Outfall Observations	All major (≥ 36 inches in diameter) with persistent flow. Minor outfalls (≤ 36 inches in diameter) deemed a priority pursuant to the findings of other monitoring programs and through implementation of individual JRMPs.
	Flow Monitoring at Priority Outfalls	All “priority” outfalls. Priority outfalls are those Major and Minor outfalls where <i>expanded outfall observations</i> identified consistent flow with connectivity to the receiving water, and average flow rates are estimated to be greater than approximately 0.02 cfs or 10 gpm.
	High-resolution Multispectral Aerial Imagery	South Orange County Watershed Management Area
<u>Frequency of Events</u>	Expanded Outfall Observations	As needed to perform observations at applicable Major (≥ 36 inches in diameter) and Minor outfalls (≤ 36 inches in diameter) by 2021.
	Flow Monitoring at Priority Outfalls	As needed to perform monitoring at all <i>priority</i> Major and Minor outfalls by 2021.
	High-resolution Multispectral Aerial Imagery	Every 5-years
<u>Monitoring Methods Reference</u>	South Orange County Monitoring and Assessment Program Quality Assurance Program Plan (In progress) 2016 Orange County Scope of Work for High Density Stream Corridor LiDAR- Orange County, California	

1.3.2 Sample Collection

- Expanded Outfall Observations
- Flow Monitoring at Priority Outfalls

1.3.3 Sample Analysis

<u>Expanded Outfall Observations</u>	<ol style="list-style-type: none">1) Station identification and location2) Presence of flow, or pooled or ponded water3) If flow is present:<ul style="list-style-type: none">- Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate)- Flow characteristics (i.e. presence of floatables, surface scum, sheens, odor, color)- Flow source(s) suspected or identified from non-storm water source investigation- Flow source(s) eliminated during non-storm water source identification4) If pooled or ponded water is present:<ul style="list-style-type: none">- Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, sheens, odor, color)- Known or suspected source(s) of pooled or ponded water5) Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology)6) Presence and assessment of trash in and around station7) Evidence or signs of illicit connections or illegal dumping8) Flow connectivity to receiving waters:<ul style="list-style-type: none">- not connected- partially connected- completely connected9) If there is flow connectivity to receiving waters:<ul style="list-style-type: none">- Upstream receiving water condition: dry, ponded, flowing- Downstream receiving water condition: dry, ponded, flowing10) Contribution to receiving water flow<ul style="list-style-type: none">- Small (<10%)- Minor (10% to 50%)- Major (>50%)
<u>Flow Monitoring at Priority Outfalls</u>	Flow is to be recorded at 5-minute intervals for a 2 week period

2 RECEIVING WATER MONITORING (PERMIT PROVISION D.1)

2.1 Dry Weather Receiving Water Monitoring (Permit Prov. D.1.c)

2.1.1 Overview

<u>Objectives</u>	Determine whether the conditions in the receiving water during dry weather are protective or likely protective of beneficial uses.
	Determine the extent and magnitude of the current or potential dry weather receiving water problems.
	Evaluate whether conditions in the receiving water during dry weather are improving or declining.
	Assess the effectiveness of the South Orange County Hydromodification Management Plan (HMP) with controlling Priority Development Project runoff volume and duration, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive forces.
	Assess on an annual basis the Rancho Mission Viejo stream and habitat monitoring data and annually assess whether an update to the Technical Guidance Document is required based on the findings of recommendations of RMV monitoring data collected and submitted per EIR 589 Mitigation Measure 4.5-8. The intended objective is also to provide annual reporting associated with Provision B.3.c.

<u>Sampling Locations</u>	Type	Station ID	Watershed	Description	Latitude	Longitude
Long-term Mass Emission Stations (LTME)		ACJ01	Aliso Creek	Aliso Creek in Aliso/Wood Canyon Park	33.54348	-117.73243
		LCWI02	Laguna Coastal Streams	Laguna Canyon Channel at Woodland	33.5523	-117.77685
		PDCM01	San Clemente Coastal Streams	Prima Deshecha at Calle Grande Vista	33.4453	-117.64434
		SDCM02	San Clemente Coastal Streams	Segunda Deshecha at El Camino Real	33.43338	-117.63155
		SJNL01	San Juan Creek	San Juan Creek at La Novia	33.50209	-117.64819
		TCOL02	San Juan Creek	Trabuco Creek at Del Obispo	33.49749	-117.66568
		TBD	Dana Point Coastal Streams	Salt Creek at TBD	TBD	TBD
Proposed Temporary		TBD	Aliso Creek	English Canyon	TBD	TBD
		TBD	Laguna Coastal	Moro Canyon	TBD	TBD

Watershed Assessment Stations (TWAS) ²	TBD	Streams San Juan Creek	Oso Creek (at Mission Viejo Golf Course)	TBD	TBD
	TBD	San Juan Creek	Oso Creek (lower)	TBD	TBD
HMP Effectiveness ¹	TBD	San Juan Creek Tributaries	Three stations will be established in Chiquita Canyon downstream of land development constructed with hydromodification flow control facilities.	TBD	TBD
Ranch Mission Viejo Stream Monitoring Program and Habitat Conservation Plan Monitoring Program³					

- Notes: 1 Three stations will be established and monitored for a period of 3 years beginning in 2019 (geoform assessment, cross section survey, and CRAM in conjunction with bioassessment) for the purpose of assessing the effectiveness of the South Orange County Hydromodification Management Plan. This monitoring element will be incorporated into the South Orange County Monitoring and Assessment Program Quality Assurance Program Plan within 60 days of Plan acceptance.
- 2 Temporary Watershed Assessment Stations will be adjusted as necessary according to regular assessment of data.
- 3 The Copermittees will assess on an annual basis the Rancho Mission Viejo stream and habitat monitoring data submitted to the County under EIR 589 Mitigation Measure 4.5-8 and annually assess whether an update to the Technical Guidance Document is required based on the findings of recommendations of RMV monitoring data. Additional assessment and reporting details are provided in Section 4 of the WQIP and Section 2.1.3 of this appendix (Sample Analysis).

<i>Frequency of Events</i>	Event Type	Frequency	Timing
	LTME Field Observations, Measurements, and Sampling	Three During Permit Term	Event 1-During dry Season (May 1-Sep. 30) Event 2-During wet season (Oct. 1-Apr. 30) Event 3-At-large dry weather event
	TWAS Field Observations, Measurements, and Sampling	Three During Permit Term	Event 1-During dry Season (May 1-Sep. 30) Event 2-During wet season (Oct. 1-Apr. 30) Event 3-At-large dry weather event
	LTME Bioassessment	Once During Permit Term	Spring
	LTME Hydromodification	Once During Permit Term	Dry season
	HMP Effectiveness (geoform assessment, cross	Annually for three years. Monitoring in 2019, 2020,	Monitoring in Spring to Summer; data and findings submitted with next WQIP

	section surveys, CRAM and Bioassessment)	and 2021 with annual submittals in January 2020, 2021, and 2022.	Annual Report.
	RMV Stream and Habitat Monitoring	Per EIR 589 Mitigation Measure 4.5-8	Spring

Monitoring Methods Reference

South Orange County Monitoring and Assessment Program Quality Assurance Program Plan (In progress)

Surface Water Ambient Monitoring Program (SWAMP) Bioassessment Standard Operating Procedures (SOP), and amendments

SWAMP Stream Habitat Characterization Form – Full Version

SWAMP Standard Operating Procedures for Collecting Algae Samples

Southern Subregion Habitat Conservation Plan

Rancho Mission Viejo Ranch Development Plan, San Juan Creek Watershed Stream Monitoring Program

Rancho Mission Viejo Engineering Investigation Study, San Juan Creek Watershed Stream Monitoring, Additional Stream Monitoring Cross Section Locations & Engineering Assessment

CRAM User’s Manual and Field Books

2.1.2 Sample Collection

- LTME & TWAS Field Observations
- LTME & TWAS Time/Flow-Weighted Composites
- LTME & TWAS Grab Samples
- LTME Bioassessment Monitoring
- Hydromodification Monitoring
 - South Orange County HMP Effectiveness Monitoring
 - Rancho Mission Viejo Stream Mentoring Program and Habitat Conservation Plan (Data assessed and reported by the Permittees)
 - Hydromodification Monitoring at LTME Stations

2.1.3 Sample Analysis

<u>LTME & TWAS Dry</u>	1) Station identification and location
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<u>Weather Receiving Water Monitoring - Field Observations</u>	2) Presence of flow, or pooled or ponded water
	3) If flow is present: - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate) - Flow characteristics (i.e. presence of floatables, surface scum, sheens, odor, color)
	4) If pooled or ponded water is present: - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, sheens, odor, color)
	5) Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology)
	6) Presence and assessment of trash in and around station

<u>LTME & TWAS Dry Weather Receiving Water Monitoring - Grab and Composite Sampling*</u>	Sample Type	Parameter Group	Parameter
	Grab Samples	Field Measurements	pH ^{1,2}
			Temperature ²
			Specific Conductivity ²
			Dissolved Oxygen ^{1,2}
			Turbidity ^{1,2,3}
			Indicator Bacteria ^{1,2,3}
	Time-weighted Composites	Conventional	Total Coliform
			Enterococcus
			Fecal Coliform
			Chloride ³
			Total Dissolved Solids ^{2,3}
			Total Suspended Solids ²
			Total Hardness ²
			Total Organic Carbon ²
			Dissolved Organic Carbon ²
			Sulfate ^{2,3}
			MBAS ^{1,2}
Metals (Total and Dissolved ⁷)	Arsenic ²		
	Cadmium ^{1,2,3}		
	Chromium ²		

	Chromium III ¹
	Chromium VI ¹
	Copper ^{1,2,3}
	Iron ^{1,2}
	Lead ^{1,2}
	Mercury ²
	Manganese ¹
	Nickel ^{1,2,3}
	Selenium ^{2,3}
	Silver ¹
	Thallium ²
	Zinc ^{1,2,3}
Nutrients	Total Phosphorus ^{1,2,3}
	Orthophosphate ²
	Nitrate ²
	Nitrite ²
	Total Nitrogen as N ^{1,3}
	Total Kjeldahl Nitrogen ²
	Ammonia ²
Chronic Toxicity ^{2,3,4}	<i>Pimephales promelas</i> (Fathead Minnow) – Larval Survival, Growth
	<i>Ceriodaphnia dubia</i> ⁸ (Daphnid) – Survival, Reproduction
	<i>Selenastrum capricornutum</i> (Green Algae) - Growth
Pesticides	Organophosphates ^{2,3,5}
	Pyrethroids ^{2,5}
	Organochlorines ^{3,6}

- Notes: * Time/flow-weighted composite samples will be collected and analyzed for all parameters except for *field measurements* and *indicator bacteria*.
- 1 Permit Provision C.1 parameter
- 2 Permit Provision D.1.c parameter.
- 3 303(d) Listed constituent.
- 4 Aliquots are salinity-adjusted by the laboratory to the proper range for the respective testing organism. Copermittees will use *Strongylocentrotus purpuratus* (Purple Sea Urchin) if salinity of the receiving water exceeds 1 part per thousand. Alternatively, the Copermittees will use a separate species upon approval by the SDRWQCB Executive Officer.

- 5 All organophosphate (including Diazinon) and pyrethroid pesticides should be analyzed.
- 6 Dieldrin and DDE are the only organochlorine pesticides required.
- 7 An aliquot of each sample collected for total recoverable metals analyses are filtered with a 0.45 micron groundwater filter. The filtered and the unfiltered fractions are then preserved with ultra-pure grade nitric acid prior to submittal for analysis.
- 8 Copermitees will coordinate with the San Diego Water Board regarding substitution of *Ceriodaphnia dubia* for *Hyallela azteca* in receiving waters where historical total dissolved solids concentrations were high. *Ceriodaphnia dubia* tests aren't as reproducible as proved by a SCCWRP interlaboratory calibration study, and *Hyallela azteca* is less sensitive to TDS.

<u>Dry Weather Receiving Water Monitoring - Bioassessment Monitoring at LTME Stations</u>	SWAMP Parameters	BMI Collection Multi-habitat Periphyton Collection Physical Habitat Assessment
<u>Dry Weather Receiving Water Monitoring - Hydromodification Monitoring at LTME Stations</u>	<ol style="list-style-type: none"> 1) Channel conditions, including: <ul style="list-style-type: none"> - Channel dimensions, - Hydrologic and geomorphic conditions, and - Presence and condition of vegetation and habitat 2) Location of discharge points 3) Habitat integrity 4) Photo documentation of existing erosion and habitat impacts, with location (i.e. latitude and longitude coordinates) where photos were taken 5) Measurement or estimate of dimensions of any existing channel bed or bank eroded areas, including length, width, and depth of any incisions 6) Known or suspected cause(s) of existing downstream erosion or habitat impact, including flow, soil, slope, and vegetation conditions, as well as upstream land uses and contributing new and existing development 	
<u>Dry Weather Receiving Water Monitoring - SOC HMP Effectiveness Monitoring</u>	<ol style="list-style-type: none"> 1) HMP effectiveness monitoring at three stations within Chiquita Canyon downstream of areas developed with flow duration control facilities. Monitoring will include geoform assessment, cross sectional survey, and CRAM in conjunction with bioassessment. Stations and methods will be defined as part of an HMP-Specific Quality Assurance Program Plan within 60 days of Plan acceptance. 2) Stream and Habitat Monitoring conducted by Rancho Mission Viejo. The Copermitees will annually submit with the January 31 Annual Plan Report the RMV project monitoring data and 	

reports required by the mitigation and monitoring program (EIR 589 Mitigation Measure 4.5-8) for creek systems and tributaries impacted by the RMV project for Phases 2 through 5. The data shall be submitted with a technical summary prepared by the Copermittees that includes a map of Phases 2 through 5. At the time of the January 31 Annual Plan Report, the map shall identify the outfall locations, percent impervious area draining to the outfalls. The annual technical summary shall include any creek restoration recommendations due to hydromodification impacts from development. Based on the hydromodification monitoring data and recommendations submitted by the RMV project to mitigate hydromodification impacts to stream systems, the Copermittees will (1) Submit annually a summary report describing any updates to the low flow design criteria as part of the January 31 Annual Plan Report; and (2) Update the Technical Guidance Document (TGD) with revised low flow design criteria, if applicable.

2.2 Wet Weather Receiving Water Monitoring (Permit Prov. D.1.d)

2.2.1 Overview

<u>Objectives</u>	Determine whether the conditions in the receiving water during wet weather are protective or likely protective of beneficial uses.
	Determine the extent and magnitude of the current or potential wet weather receiving water problems.
	Evaluate whether conditions in the receiving water during wet weather are improving or declining.

<u>Sampling Locations</u>	Type	Station ID	Watershed	Description	Latitude	Longitude
	Long-term Mass Emission Stations (LTME)	ACJ01	Aliso Creek	Aliso Creek in Aliso/Wood Canyon Park	33.54348	-117.73243
		LCWI02	Laguna Coastal Streams	Laguna Canyon Channel at Woodland	33.5523	-117.77685
		PDCM01	San Clemente Coastal Streams	Prima Deshecha at Calle Grande Vista	33.4453	-117.64434
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		SJNL01	San Juan Creek	San Juan Creek at La Novia	33.50209	-117.64819
		TCOL02	San Juan Creek	Trabuco Creek at Del Obispo	33.49749	-117.66568
		TBD	Dana Point Coastal Streams	Salt Creek at TBD	TBD	TBD
	Proposed TWAS ¹	TBD	Aliso Creek	English Canyon	TBD	TBD
		TBD	Laguna Coastal Streams	Moro Canyon	TBD	TBD
		TBD	San Juan Creek	Oso Creek (at Mission Viejo Golf Course)	TBD	TBD
		TBD	San Juan Creek	Oso Creek (lower)	TBD	TBD

Notes: 1 Temporary Watershed Assessment Stations will be adjusted as necessary according to regular assessment of data.

<u>Frequency of Events</u>	<u>Event Type</u>	<u>Frequency</u>	<u>Timing</u>
	LTME Field Observations, Measurements, and Sampling	Three During Permit Term	Event 1-First wet weather event of the season (Oct. 1-Apr. 30)
			Event 2- Event occurring after Feb. 1
			Event 3- At-large wet weather event
	TWAS Field Observations, Measurements, and Sampling	Three During Permit Term	Event 1-First wet weather event of the season (Oct. 1-Apr. 30)
			Event 2- Event occurring after Feb. 1
			Event 3- At-large wet weather event

Monitoring Methods Reference South Orange County Monitoring and Assessment Program Quality Assurance Program Plan (In progress)

2.2.2 Sample Collection

- LTME & TWAS Field Observations
- LTME & TWAS Time-/Flow-Weighted Composites
- LTME & TWAS Grab Samples

2.2.3 Sample Analysis

<u>LTME & TWAS Wet Weather Receiving Water Monitoring - Field Observations</u>	1) Station identification and location: - Location; - Date of storm event; - Duration of storm event; - Rainfall estimate, and - Antecedent dry period.
	2) Flow Rate and Volume (measured or estimated)
	3) Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology)
	4) Presence and assessment of trash

<i>LTME & TWAS Wet Weather Receiving Water Monitoring - Parameters*</i>	Sample Type	Parameter Group	Parameter	
	Grab Sample	Field Measurements	pH ²	
			Temperature ²	
			Specific Conductivity ²	
			Dissolved Oxygen ^{1,2}	
			Turbidity ^{1,2}	
		Indicator Bacteria ^{2,3}	Total Coliform	
			Enterococcus	
			Fecal Coliform	
		Time-/Flow-Weighted Composite	Conventional	Chloride ³
				Total Dissolved Solids ^{2,3}
	Total Suspended Solids ²			
	Total Hardness ²			
	Total Organic Carbon ²			
	Metals (Total and Dissolved ⁷)		Dissolved Organic Carbon ²	
			Sulfate ^{2,3}	
			MBAS ²	
			Arsenic ²	
			Cadmium ^{1,2,3}	
			Chromium ²	
			Copper ^{1,2,3}	
			Iron ²	
			Lead ^{1,2}	
			Mercury ²	
	Nutrients	Nickel ^{1,2,3}		
		Selenium ^{2,3}		
		Thallium ²		
		Zinc ^{1,2,3}		
		Total Phosphorus ^{1,2,3}		
		Orthophosphate ²		
		Nitrate ²		
		Nitrite ²		
		Total Nitrogen as N ^{1,3}		

	Total Kjeldahl Nitrogen ²
	Ammonia ²
Pesticides	Organophosphates ^{2,3,5}
	Pyrethroids ^{2,5}
	Organochlorines ^{3,6}
Chronic Toxicity ^{2,3,4}	<i>Pimephales promelas</i> (Fathead Minnow) - Larval Survival, Growth
	<i>Ceriodaphnia dubia</i> (Daphnid) - Survival, Reproduction
	<i>Selenastrum capricornutum</i> (Green Algae) - Growth

- Notes: *
- 1 Time-/flow-weighted composite samples will be collected and analyzed for all parameters except for *field measurements* and *indicator bacteria*.
 - 2 Permit Provision C.1 parameter
 - 3 Permit Provision D.1.b parameter.
 - 4 303(d) Listed constituent.
 - 5 Aliquots are salinity-adjusted by the laboratory to the proper range for the respective testing organism. Copermittees will use *Strongylocentrotus purpuratus* (Purple Sea Urchin) if salinity of the receiving water exceeds 1 part per thousand. Alternatively, the Copermittees will use a separate species upon approval by the SDRWQCB Executive Officer.
 - 6 All organophosphate (including Diazinon) and pyrethroid pesticides should be analyzed.
 - 7 Dieldrin and DDE are the only organochlorine pesticides required.
 - 8 An aliquot of each sample collected for total recoverable metals analyses are filtered with a 0.45 micron groundwater filter. The filtered and the unfiltered fractions are then preserved with ultra-pure grade nitric acid prior to submittal for analysis.

2.3 Sediment Quality Monitoring (Permit Prov. D.1.e.(2))

2.3.1 Overview

<u>Objectives</u>	Evaluate the condition of sediments in enclosed bays or estuaries with respect to the statewide sediment quality objectives.															
<u>Sampling Stations*</u>	<table border="1"> <thead> <tr> <th>Station ID</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>B18-10214/RHMP_SD-0001</td> <td>33.45744334</td> <td>-117.691249</td> </tr> <tr> <td>B18-10215/RHMP_SD-1595</td> <td>33.45946684</td> <td>-117.699421</td> </tr> <tr> <td>B18-10216/RHMP_SD-2184</td> <td>33.46044769</td> <td>-117.694613</td> </tr> <tr> <td>B18-10217/RHMP_SD-0786</td> <td>33.46069968</td> <td>-117.700811</td> </tr> </tbody> </table>	Station ID	Latitude	Longitude	B18-10214/RHMP_SD-0001	33.45744334	-117.691249	B18-10215/RHMP_SD-1595	33.45946684	-117.699421	B18-10216/RHMP_SD-2184	33.46044769	-117.694613	B18-10217/RHMP_SD-0786	33.46069968	-117.700811
Station ID	Latitude	Longitude														
B18-10214/RHMP_SD-0001	33.45744334	-117.691249														
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B18-10216/RHMP_SD-2184	33.46044769	-117.694613														
B18-10217/RHMP_SD-0786	33.46069968	-117.700811														
<u>Frequency of Events</u>	Two events during the Permit term between June and September. One event will be accomplished via the Regional Harbor Monitoring Program. A second event will be accomplished by the Copermittees according to the work plan and quality assurance program plan developed by the RHMP (i.e., stations, parameters, measurement quality objectives, etc).															
<u>Monitoring Methods Reference (Regional Harbor Monitoring Program)</u>	State Water Resources Control Board Water Quality Control Plan for Enclosed Bays and Estuaries - Part 1 Sediment Quality Regional Harbor Monitoring Program (RHMP) Final Work Plan Regional Harbor Monitoring Program (RHMP) Quality Assurance Program Plan															

2.3.2 Sample Collection (Sediment Quality Objectives Multiple Lines of Evidence Approach)

- Sediment and Water Chemistry
- Toxicity
- Benthic Community Condition

2.3.3 Sample Analysis

<u>Sediment Quality Objectives Multiple Lines of Evidence</u>	Sediment Chemistry	Conventional Parameters	TOC
			Sediment Grain Size
		Metals	Percent Solids
			Cadmium
			Copper

<u>Approach</u>		Lead
		Mercury
		Zinc
	Organics	Organochlorine Pesticides
		PCB Congeners
		PAHs
Toxicity	Short-Term Survival	Minimum one of the following: E. estuarius, L. plumulosus, R. abronius
	Sublethal Survival	48-hour M. galloprovincialis development or 28 day N. areaceodontata survival and growth
Benthic Infauna	Organism Identification and Enumeration	Annelids and annelid fragments
		Arthropods
		Echinoderms (non-ophiuroid)
		Ophiuroids and ophiuroid arms
		Mollusks
		Miscellaneous phyla (e.g., Cnidarians, Nemertean)
		Debris and plastics

Notes: * - Sampling stations consistent with Bight '18/RHMP '18 and may vary in accordance with future cycles of Bight/RHMP.

2.4 Area of Special Biological Significance (ASBS) Monitoring (Permit Prov. D.1.a)

2.4.1 Overview

<u>Objectives</u>	Assess maintenance and protection of natural water quality conditions within the Heisler Park ASBS.				
<u>Sampling Locations</u>	Site ID	Description	Parameters	Latitude	Longitude
	HSL013_SD	Core Discharge	Storm Drain	33.54305	-117.78965
	HSL013_RW	Receiving Water	Ocean	33.542912	-117.788788
<u>Frequency of Events</u>	Outfall and marine receiving water: three times annually during qualifying storm events				
	Bioaccumulation: one time every 5 years				
	Survey of marine benthic invertebrates: one time every 5 years				
<u>Monitoring Methods Reference</u>	The City of Laguna Beach Monitoring Plan for the Heisler Park ASBS Protection and Preservation Project				

2.4.2 Sample Collection

- Receiving Water
 - Grab samples collected pre- and post/during storm
- Outfall Monitoring
 - Flow-weighted composite
 - Grab samples by protocol

2.4.3 Sample Analysis

<u>ASBS Grab Samples for Receiving Water Monitoring Locations</u>	Conventional Parameters	TSS
		Oil and Grease
	Nutrients	Ammonia
		Nitrate-N
		Total Ortho-P
	Metals (Total)	Arsenic
		Cadmium

		Chromium
		Copper
		Lead ^{1,2}
		Mercury ²
		Nickel ^{1,2,3}
		Selenium ^{2,3}
		Silver ¹
		Zinc ^{1,2,3}
	Organics	Organophosphate Pesticides
		PAHs
		Synthetic Pyrethroids
	Toxicity Testing	<i>Strongylocentrotus purpuratus</i> (Sea Urchin), Fertilization
		<i>Mytilus spp.</i> (Mussel), Embryo Development
		<i>Macrocystis pyrifera</i> (Giant Kelp), Germination and Growth
<u>ASBS Composite Samples for Outfall Monitoring Locations</u>	Conventional Parameters	TSS
	Nutrients	Ammonia
		Nitrate-N
		Total Ortho-P
	Metals (Total)	Arsenic
		Cadmium
		Chromium
		Copper
		Lead ^{1,2}
		Mercury ²
		Nickel ^{1,2,3}
		Selenium ^{2,3}
		Silver ¹
		Zinc ^{1,2,3}
	Organics	Organophosphate Pesticides
		PAHs
		Synthetic Pyrethroids

	Toxicity Testing	<i>Strongylocentrotus purpuratus</i> (Sea Urchin), Fertilization
<u>ASBS Grab Samples for Outfall Monitoring Locations</u>	Field Parameters	Temperature
		Conductivity
		Salinity
	Conventional Parameters	Oil and Grease

3 MS4 OUTFALL DISCHARGE MONITORING

3.1 Dry Weather MS4 Outfall Discharge Monitoring (Permit Prov. D.2.b.(1))

3.1.1 Overview

<u>Objectives</u>	Field Screening	Identify non-storm water and illicit discharges within jurisdiction per Provision E.2.c. Determine which discharges are transient vs. persistent flows.
		Prioritize persistent dry weather MS4 discharges to investigate/eliminate per Provision E.2.d.
	Non-storm Water	Determine which persistent non-storm water discharges contain concentrations of
	Persistent Flow	pollutants above non-storm water action levels (NALs) (Permit Prov. C.1)
	MS4 Outfall	Determine the relative contribution of MS4 outfalls to priority water quality
	Discharge	conditions during dry weather
	Sampling	Investigate the sources of persistent non-storm water flows

<u>Sampling Locations</u>	<u>Sampling Type</u>	<u>Station ID</u>	<u>Jurisdiction</u>	<u>Watershed</u>	<u>Latitude</u>	<u>Longitude</u>
	Field Screening	All	222 "Major" outfalls (i.e., 80% of 278 "Major" outfalls in the WMA)			
	Non-storm Water	J01-9007-1	Aliso Viejo	Aliso Creek	33.558645	-117.737827
	Persistent Flow	J01-9992-1	Aliso Viejo	Aliso Creek	33.573256	-117.716612
	MS4 Outfall	J01-9131-1	Aliso Viejo	Aliso Creek	33.574713	-117.715865
	Discharge	J06-9079-1	Aliso Viejo	Aliso Creek	33.592263	-117.715642
	Sampling	J06-10011-1	Aliso Viejo	Aliso Creek	33.595041	-117.715762
		J01-9082-2	Aliso Viejo	Aliso Creek	33.581589	-117.745760
		J06-9362-1	Aliso Viejo	Aliso Creek	33.591100	-117.714334
		L01-727-1	Dana Point	San Juan Creek	33.471155	-117.681012
		L01-728-5	Dana Point	San Juan Creek	33.468224	-117.682223
		I00-11468-1	Laguna Beach	Laguna Coastal Streams	33.535658	-117.769013
		I01-11010-1	Laguna Beach	Laguna Coastal Streams	33.544343	-117.783317
		J03-9221-1	Laguna Niguel	Aliso Creek	33.549947	-117.717171
		J01-9224-2	Laguna Niguel	Aliso Creek	33.557616	-117.717680
		J01-9224-1	Laguna Niguel	Aliso Creek	33.556482	-117.717798
		K01-12156-4	Laguna Niguel	Dana Point Coastal Streams	33.505611	-117.708565
		K01-12177-1	Laguna Niguel	Dana Point Coastal Streams	33.508601	-117.707381

L03-418-8	Laguna Niguel	San Juan Creek	33.557570	-117.676309
J01-9273-1	Laguna Woods	Aliso Creek	33.599892	-117.707365
J01-9349-1	Lake Forest	Aliso Creek	33.644123	-117.665816
J01-9046-2	Lake Forest	Aliso Creek	33.654461	-117.659687
J01-9046-1	Lake Forest	Aliso Creek	33.654533	-117.659798
J01-9785-1	Lake Forest	Aliso Creek	33.617162	-117.693665
J01-10004-1	Lake Forest	Aliso Creek	33.633411	-117.676900
L04-136-1	Mission Viejo	San Juan Creek	33.606868	-117.677865
L04-266-5	Mission Viejo	San Juan Creek	33.607317	-117.668880
L03-316-3	Mission Viejo	San Juan Creek	33.596022	-117.655902
L03-662-3	Mission Viejo	San Juan Creek	33.624723	-117.648244
L03-214-2	Mission Viejo	San Juan Creek	33.623725	-117.642315
L03-073-3	Mission Viejo	San Juan Creek	33.644244	-117.639317
L02-374-1	Orange County/ Flood Control	San Juan Creek	33.569855	-117.646012
L05-049-1	Orange County/ Flood Control	San Juan Creek	33.534750	-117.646189
L01-404-1	Orange County/ Flood Control	San Juan Creek	33.564522	-117.585847
L01-340-1	Orange County/ Flood Control	San Juan Creek	33.586962	-117.595440
L05-489-3	Orange County/ Flood Control	San Juan Creek	33.529802	-117.646538
L02-246-1	Rancho Santa Margarita	San Juan Creek	33.610465	-117.616600
L01-731-1	Rancho Santa Margarita	San Juan Creek	33.625156	-117.566008
L02-641-1	Rancho Santa Margarita	San Juan Creek	33.631117	-117.594886
L02-166-3	Rancho Santa Margarita	San Juan Creek	33.644613	-117.613795
L02-641-2	Rancho Santa Margarita	San Juan Creek	33.631115	-117.594853
M02-032-1	San Clemente	San Clemente Coastal Streams	33.457547	-117.600832
M01-042-1	San Clemente	San Clemente Coastal Streams	33.454447	-117.623444
M02-015-1	San Clemente	San Clemente Coastal Streams	33.478157	-117.583246
M02-062-2	San Clemente	San Clemente Coastal Streams	33.451206	-117.609882
M02-085-1	San Clemente	San Clemente Coastal Streams	33.458346	-117.594583

M02-085-2	San Clemente	San Clemente Coastal Streams	33.458044	-117.594250
L01-749-2	San Juan Capistrano	San Juan Creek	33.508305	-117.640179
L01-766-7	San Juan Capistrano	San Juan Creek	33.492296	-117.663183
L02-541-9	San Juan Capistrano	San Juan Creek	33.503991	-117.667517
L01-766-4	San Juan Capistrano	San Juan Creek	33.487744	-117.667590
L01-766-2	San Juan Capistrano	San Juan Creek	33.485916	-117.672152

<u>Frequency of Events</u>	Field Screening <i>and</i> Non-storm Water Persistent Flow MS4 Outfall Discharge Sampling will be performed twice annually, during dry conditions with an antecedent dry period of at least 72 hours with less than 0.1 inch of rainfall.
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<u>Monitoring Methods Reference</u>	South Orange County Monitoring and Assessment Program Quality Assurance Program Plan (In progress)
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3.1.2 Sample Analysis

- Field Screening Observations
- Grab samples (Non-storm Water Persistent Flow MS4 Outfall Discharge Sampling)

<u>Dry Weather MS4 Outfall Discharge Monitoring - Field Screening Observations</u>	<ol style="list-style-type: none"> 1) Station identification and location 2) Presence of flow, or pooled or ponded water 3) If flow is present: <ul style="list-style-type: none"> - Flow estimation (i.e. width of water surface, approximate depth of water, approximate flow velocity, flow rate) - Flow characteristics (i.e. presence of floatables, surface scum, sheens, odor, color) - Flow sources (suspected or identified) - Flow sources eliminated 4) If pooled or ponded water is present: <ul style="list-style-type: none"> - Characteristics of pooled or ponded water (i.e. presence of floatables, surface scum, sheens, odor, color) 5) Station description (i.e. deposits or stains, vegetation condition, structural condition, observable biology) 6) Presence and assessment of trash in and around station
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<u>Dry Weather MS4 Outfall Discharge Monitoring - Grab Samples*</u>	Parameter Type	Parameter Group	Parameter
	Field Measurements		pH ¹
			Temperature ²
			Specific Conductivity ²
			Dissolved Oxygen ¹
			Turbidity ^{1,3}
	Laboratory Analytes	Conventional	Chloride ³
			Total Dissolved Solids ^{2,3}
			Total Suspended Solids ²
			Total Hardness ²
			Total Organic Carbon
		Dissolved Organic Carbon	
		Sulfate ³	
		MBAS ¹	
		Metals (Total and Dissolved)	Arsenic
			Cadmium ^{1,2,3}
			Chromium
			Chromium III ¹
			Chromium VI ¹
	Copper ^{1,2,3}		
	Iron ¹		
	Lead ^{1,2}		
	Manganese ¹		
	Nickel ^{1,3}		
	Selenium ³		
	Silver ¹		
	Thallium		
	Zinc ^{1,2,3}		
	Nutrients	Total Phosphorus ^{1,2,3}	
		Orthophosphate ²	
		Nitrate ²	
		Nitrite ²	

	Total Nitrogen as N ^{1,3}
	Total Kjeldahl Nitrogen ²
	Ammonia ²
Indicator Bacteria ^{1,2,3}	Total Coliform
	Enterococcus
	Fecal Coliform
Polycyclic Aromatic Hydrocarbons ³	Benzo[b]fluoranthene
Organophosphate Pesticides ³	Diazinon
Organochlorine Pesticides ³	Dieldrin
	DDE

Notes: * - Applicable when measurable flow is present; grab or composite samples will be collected.

1 - Permit Provision C.1 parameter

2 - Permit Provision D.2.b parameter.

3 - 303(d) Listed constituent.

3.2 Wet Weather MS4 Outfall Discharge Monitoring (Permit Prov. D.2.c)

3.2.1 Overview

<u>Objectives</u>	Determine which persistent non-storm water discharges contain concentrations of pollutants below storm water action levels (SALs) (Permit Prov. C.2)				
	Determine the relative contribution of MS4 outfalls to priority water quality conditions during wet weather				
	Investigate how discharge concentrations, loads, and flows change over time at representative MS4 outfalls				
<u>Sampling Locations</u>	Station_ID	Jurisdiction	Watershed	Latitude	Longitude
	J01P27	Aliso Viejo	Aliso Creek	33.57324	-117.71661
	L01-DP	Dana Point	San Juan Creek	33.46822	-117.68222
	VICTRA u/s P	Laguna Beach	Laguna Coastal Streams	33.54098	-117.78353
	J03P01in	Laguna Niguel	Aliso Creek	33.52829	-117.70968
	L03P05	Laguna Niguel	San Juan Creek	33.56270	-117.67590
	SCNK01	Laguna Niguel	Dana Point Coastal Streams	33.50596	-117.70744
	J01ASVM	Laguna Woods	Aliso Creek	33.59990	-117.70734
	J01-Norm	Lake Forest	Aliso Creek	33.65440	-117.65960
	J07P02	Mission Viejo	Aliso Creek	33.64645	-117.65580
	Horno/u	Orange County	San Juan Creek	33.53475	-117.64617
	Horno_OUT	Orange County	San Juan Creek	33.52979	-117.64653
	L02P25	Rancho Santa Margarita	San Juan Creek	33.63762	-117.61790
	M00P02	San Clemente	San Clemente Coastal Streams	33.41778	-117.61793
	L01P03	San Juan Capistrano	San Juan Creek	33.48468	-117.67537
<u>Frequency of Events</u>	Once annually, during the wet season (October 1 - April 30).				
<u>Monitoring Methods Reference</u>	South Orange County Monitoring and Assessment Program Quality Assurance Program Plan (In progress)				

3.2.2 Sample Collection

- Field Observations

- Time-weighted Composites
- Grab Samples

3.2.3 Sample Analysis

<u>Wet Weather MS4 Outfall Discharge Monitoring - Field Observations</u>	Parameter Group	Parameter
	Station ²	Station location
	Storm Event ²	Storm event date
		Duration of storm event sampled
		Total rainfall for storm event sampled
		Duration of time between storm event sampled and the end of the previous storm event exceeding 0.1 inch of rainfall
	Flow ²	Storm event flow rates
		Storm event volume

<u>Wet Weather MS4 Outfall Discharge Monitoring - Sampling Parameters</u>	Sample Type	Parameter Group	Parameter		
	Grab Samples	Field Measurements	pH ²		
			Temperature ²		
			Specific Conductivity ²		
			Dissolved Oxygen ²		
			Turbidity ^{1,2,3}		
		Indicator Bacteria ^{1,2,3}	Total Coliform		
			Enterococcus		
			Fecal Coliform		
			Time-weighted Composites	Conventional	Chloride ³
					Total Dissolved Solids ^{2,3}
	Total Suspended Solids ²				
	Total Hardness ²				
	Total Organic Carbon ²				
			Dissolved Organic Carbon ²		
			Sulfate ^{2,3}		
			MBAS ²		
			Metals (Total and	Arsenic ²	

Dissolved)	Cadmium ^{1,2,3}
	Chromium ²
	Copper ^{1,2,3}
	Iron ²
	Lead ^{1,2}
	Nickel ^{2,3}
	Selenium ^{2,3}
	Thallium ²
	Zinc ^{1,2,3}
	Nutrients
Orthophosphate ²	
Nitrate + Nitrite ^{1,2}	
Total Nitrogen as N ³	
Total Kjeldahl Nitrogen ²	
Ammonia ²	
Polycyclic Aromatic Hydrocarbons ³	Benzo[b]fluoranthene
Organophosphate Pesticides ³	Diazinon
Organochlorine Pesticides ³	Dieldrin
	DDE

Notes: 1 - Permit Provision C.2 parameter.
2 - Permit Provision D.2.c parameter.
3 - 303(d) Listed constituent.

4 BACTERIA TMDL MONITORING (PERMIT ATTACHMENT E)

4.1.1 Overview

<u>Objectives</u>	Determine whether the TMDL numeric targets for bacteria indicators are being met at the compliance monitoring locations.
	Evaluate whether bacteria levels are improving at the compliance monitoring locations.

<u>Twenty Beaches and Creeks Sampling Locations*</u>	<u>TMDL Watershed</u>	<u>TMDL Waterbody</u>	<u>Segment or Area</u>	<u>Monitoring Stations</u>
	San Joaquin Hills HSA and Laguna Beach HSA	Pacific Ocean Shoreline	Cameo Cove at Irvine Cove Drive – Riviera Way ¹	TBD
			at Heisler Park - North ¹	HEISLR u/d/z
			at Main Laguna Beach ¹	MAINBC u/d/z
			Laguna Beach at Ocean Avenue ¹	VICTRA u/d/z
			Laguna Beach at Cleo Street ¹	CLEO u/d/z
	Aliso HSA	Pacific Ocean Shoreline	Arch Cove at Bluebird Canyon Road ¹	BLUBRD u/d/z
			Laguna Beach at Dumond Drive ¹	DUMOND u/d/z
			Laguna Beach at Lagunita Place / Blue Lagoon Place at Aliso Beach ¹	BLULGN u/d/z
			Aliso Creek	ACJ01
			Entire reach (7.2 miles) and associated tributaries: - Aliso Hills Channel - English Canyon Creek - Dairy Fork Creek - Sulfur Creek - Wood Canyon Creek	CTPJ01
Aliso Creek Mouth	ACM1			
Dana Point HSA	Pacific Ocean Shoreline	Aliso Beach at West Street ¹	WEST u/d/z	
		Aliso Beach at Table Rock Drive ¹	S6	
		100 Steps Beach at Pacific Coast Hwy at hospital	S4	

		(9 th Avenue) ¹	
		at Salt Creek (large outlet) ¹	OSL25 SCM1 d/z
		Salt Creek Beach at Salt Creek service road ¹	S2
		Salt Creek Beach at Strand Road ¹	S1
Lower San Juan HSA	Pacific Ocean Shoreline	at San Juan Creek	S-0
	San Juan Creek	lower 1 mile	SJCL01
	San Juan Creek Mouth	at mouth	SJC1 u/d/z
San Clemente HSA	Pacific Ocean Shoreline	at Poche Beach	S-15 POCHE u/d/z
		Ole Hanson Beach Club Beach at Pico Drain ¹	PICO u/d/z S-17
		San Clemente City Beach at El Portal Street Stairs ¹	ELPORTAL u/d/z
		San Clemente City Beach at Mariposa Street ¹	MARIPO u/d/z
		San Clemente City Beach at Linda Lane ¹	LINDAL u/d/z
		San Clemente City Beach at South Linda Lane ¹	SLINDAL u/d/z
		San Clemente City Beach at Lifeguard Headquarters ¹	S-19
		San Clemente Municipal Pier	PIER u/d/z
		San Clemente City Beach at Trafalgar Canyon (Trafalgar Lane) ¹	TRFCYN u/d/z
		San Clemente State Beach at Riviera Beach ¹	S-21 RIVERA u/d/z
		San Clemente State Beach at Cypress Shores ¹	S-23

- Notes: * SOC WMA Copermittees will identify and incorporate additional MS4 outfall and receiving water monitoring stations and/or adjust monitoring frequencies to identify sources causing exceedances of the receiving water WQBELs.
- 1 Beach segments omitted or delisted from the 2010 Clean Water Act Section 303(d) List of Water Quality Limited Segments for bacteria (REC-1 beneficial use).
- u/d/z Station has three sample locations associated with it: 1) "up-coast," 2) "down-coast," and 3) "zero-point." The "zero-point" is the position along the shoreline where the surface flow enters the ocean. At times when there is no surface flow connection with the ocean, a "virtual zero-point" is sampled, which is the position along the shoreline where it appears that surface flow would enter the ocean if there were a surface flow.

<u>Baby Beach TMDL Sampling Locations*</u>	<u>TMDL Watershed</u>	<u>TMDL Waterbody</u>	<u>Segment or Area</u>	<u>Monitoring Stations</u>
	Dana Point HSA	Dana Point Harbor	Baby Beach	BDP12
				BDP13
				BDP14 ¹
				BDP15

- Notes: * SOC WMA Copermittees will identify and incorporate additional MS4 outfall and receiving water monitoring stations and/or adjust monitoring frequencies to identify sources causing exceedances of the receiving water WQBELs.
- 1 Wet weather monitoring station.

<u>Frequency of Events</u>	<u>Dry weather</u>	<u>Beaches¹</u>	<u>Weekly (via the Unified Beach Monitoring Program)</u>
		<u>Creeks</u>	<u>Monthly</u>
	<u>Wet weather²</u>	<u>Creeks/Beaches³</u>	<u>At least once/year, within the first 24 hours of the end of a storm event; up to 6 storms per year.</u>
		<u>Beaches</u>	<u>At least once/year, within the first 72 hours of the end of a storm event</u>

- Notes: 1 Frequency applies to both active and delisted beach segments.
- 2 Wet weather days are defined as storm events of 0.1 inches or greater and the following 72 hours.

<u>Monitoring Methods</u>	Baby beach annual report
<u>Reference</u>	South Orange County Monitoring and Assessment Program Quality Assurance Program Plan (In progress)

4.1.2 **Sample Collection**

- Field Parameters
- Grab samples

4.1.3 **Sample Analysis**

<u>Bacterial TMDL Monitoring</u>	Field Parameters (Optional During Dry Weather)		Dissolved Oxygen
			pH
			Specific conductivity
			Temperature
			Turbidity
	Compliance Grab Samples	Beaches/ Creek Mouths	<i>Enterococcus</i>
			Fecal coliform
			Total coliform
		Creeks	<i>Enterococcus</i>
			Fecal coliform
			<i>Escherichia coli</i>