SUMMARY OF EXISTING MONITORING PROGRAMS IN THE SAN GABRIEL RIVER WATERSHED

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Introduction

As part of the effort to develop an integrated, watershed-wide monitoring program for the San Gabriel River watershed, the existing monitoring efforts being implemented in the watershed have been reviewed and are summarized below. The watershed-wide monitoring program was originally required by the Los Angeles Regional Water Quality Control Board ("Regional Board") in the NPDES permits for the Long Beach, Los Coyotes, and Whittier Narrows Water Reclamation Plants (WRPs) in 2002, and the elements of the program and a preliminary schedule were outlined in the Districts' July 2, 2003 letter to the Regional Board.

The goals of the watershed-wide monitoring program, as outlined in the NPDES permits for the Long Beach, Los Coyotes, and Whittier Narrows WRPs are to:

- Determine compliance with receiving water limits
- Monitor trends in surface water quality
- Ensure protection of beneficial uses
- Provide data for modeling contaminants of concern
- Characterize water quality, including seasonal variation of surface waters within the watershed
- Assess the health of the biological community
- Determine mixing dynamics of effluent and receiving waters in the estuary.

These goals will be addressed through a combination of existing compliance monitoring, new efforts, and the integration of ongoing and planned special studies in the watershed. In addition, regional efforts underway through the Southern California Coastal Water Research Project (SCCWRP) and the Stormwater Monitoring Coalition (SMC) will provide further useful guidance for the development of this program. The Districts have empaneled a technical workgroup that will meet monthly through the remainder of 2004 to develop the specifics of this program.

The summary of existing monitoring presented below is based on information gathered from the AES Alamitos power plant, Los Angeles County Sanitation Districts (LACSD), Los Angeles County Department of Public Works (LACDPW), Los Angeles Department of Water and Power (LADWP), the Orange County Stormwater Program, and the United States Forest Service (USFS). It is intended as a first step in organizing available information, educating the members of the technical workgroup about the full range of monitoring activities, and providing a benchmark against which to assess recommended changes to monitoring designs.

Program-specific details

Based on the review of existing monitoring efforts, there appear to be four basic types of monitoring designs currently utilized by the agencies conducting monitoring in the San Gabriel River watershed, including:

- End of watershed designs that typically measure the cumulative mass emissions from all discharges

- Dispersed watershed designs that assess overall conditions and impacts in freshwater habitats
- Site-specific watershed designs that assess conditions and trends in freshwater or estuarine habitats of particular interest
- Dry-weather reconnaissance designs focused on identifying sources of pollution to the MS4 system.

While all of these approaches can be found in the watershed, not every agency uses all four, as illustrated in Table 1.

Table 1. Generalized distribution of monitoring approaches across the separate monitoring programs in the San Gabriel River watershed.

Program	End of watershed	Dispersed watershed	Site-specific watershed	Recon-naissance
AES (power plant)			X	
LACSD	X		X	
LACDPW	X	X		
LA Dept. Water and Power			X	
Orange County Stormwater				X
US Forest Service			X	

In addition, the relative attention given to each type of monitoring varies across programs. This primarily reflects differences in regulatory emphasis and program purpose. For example, the two storm water programs (LACDPW and Orange County Stormwater) are concerned about the cumulative mass emissions of pollutants, while monitoring conducted by the AES plant and the LADWP appear to assess specific potential impacts downstream of their power plant discharges.

The following tables summarize the existing efforts in each of the programs. Figures 1 and 2 show the locations of monitoring stations on a map of the watershed. Information was collected from the most recent set of program documents available, as well as recently conducted interviews with representatives of each program.

Table 2 shows the current end of watershed monitoring efforts for active programs. The two stormwater programs implemented by LACDPW and Orange County conduct this category of monitoring, focusing primarily on estimating mass loads from larger watersheds. In addition, LACSD maintains stations in the San Gabriel River estuary, in part to assess cumulative downstream effects at the end of the watershed. The lack of such stations from the other programs may reflect the fact that their regulatory and management focus is on other issues.

Table 2. End of watershed monitoring efforts in each monitoring program.

Program	No. Sites	No. Events/Yr	Indicators	Notes
AES (power plant)	-			
LACSD	6	Weekly – semi-annually	Water quality, toxicity	Estuary stations
	1	Annually	Bioassessment	Stn. R-5
LACDPW	1	2 storms 2 dry in storm season	Water quality, toxicity	

LA Dept. Water and Power	-			
Orange County Stormwater	3	3 storm 3 dry in dry season	Water quality, toxicity	Adaptive toxicity, TIE, Source ID
US Forest Service	-			

Both the LACDPW and Orange County stormwater programs conduct typical mass emissions monitoring, using composite samples combined with flow measurements to estimate loads. Both agencies sample a subset of storms during any one season. In general, both programs conduct mass emissions monitoring of storms with greater than 0.25 inches of rainfall forecast, beginning with the first such storm of the season. While ideally they would target sampling of runoff from a storm yielding at least 0.25 inch of rainfall with no antecedent moisture for 72 hours, this criterion may be relaxed if the end of the rainy season is approaching and the requisite number of storms has not yet been sampled. Toxicity is an integral part of both stormwater programs, and Orange County's program also includes an adaptive provision for conducting Toxicity Identification Evaluations (TIEs) and upstream source identification efforts, as required. Parameters sampled include a broad range of water quality indicators (see Appendix 1 for more detail). Both stormwater programs conduct dry weather sampling at the beginning, middle , and end of the dry season (April to October).

LACSD's end of watershed monitoring effort is not focused on estimating mass loads. The estuary stations monitor a range of water quality parameters at the sampling frequencies detailed in Appendix 1, and bioassessment is conducted annually at one station at the bottom of the watershed, just upstream of the estuary.

Table 3 shows the distribution of dispersed watershed monitoring efforts across the monitoring programs in the region. Dispersed watershed monitoring efforts are typically used to assess the representative extent and magnitude of impact on watersheds and their beneficial uses. The LACDPW's stormwater program explicitly includes such sites, as part of the bioassessment component of its monitoring program. The four sites are spread throughout the watershed, as detailed in Appendix 2, and are sampled in early fall, before winter storms impact instream communities. Two of these bioassessment monitoring locations overlap with bioassessment sites monitored by LACSD. Sampling of these two sites is coordinated between the two agencies. The Orange County Stormwater program also includes dispersed bioassessment sites, but none of these are located in the San Gabriel River watershed. The LACSD bioassessment monitoring has been included under site-specific watershed monitoring because it occurs at NPDES stations upstream and downstream of individual WRPs. However, taken as a group, the bioassessment sites also provide information from throughout the watershed. In that sense, they fit partially into both categories of monitoring design.

The inclusion of bioassessment in stormwater and NPDES monitoring programs may reflect a growing awareness that chemical measurements alone, or even chemical measurements combined with toxicity testing, may not necessarily capture all impacts (i.e., physical habitat limitations) to aquatic habitats. The inclusion of bioassessment monitoring is thus an effort to directly measure habitat quality. However, the other monitoring programs in the watershed are focused on potential impacts in specific locations and/or from specific activities.

Table 3. Dispersed watershed monitoring efforts in each monitoring program.

Program	No. Sites	No. Events/Yr	Indicators	Notes
AES (power plant)	-			
LACSD	-			
LACDPW	4	1 in October	Bioassessment	2 overlap w/LACSD
LA Dept. Water and Power	-			
Orange County Stormwater	-			
US Forest Service	-			

Table 4 shows the distribution of site-specific watershed monitoring across the region. These efforts are targeted at locations to assess impact of point discharges to the receiving water or areas that may be considered of interest because of their high ecological and societal value and/or because of the potential for specific impacts of concern. The bulk of existing monitoring in the watershed falls into this category. For example, LACSD typically monitors upstream and immediately downstream of the discharges from several water reclamation plants, although the actual distribution of stations differs among WRPs. Both AES and the LADWP monitor around the discharges from their respective power plants. See Appendix 3 for additional details, including the list of parameters monitored in each program, along with their respective frequencies of measurement.

Table 4. Site-specific watershed monitoring efforts in each monitoring program. RPA refers to Reasonable Potential Analysis monitoring required for a limited period of time prior to permit renewal applications.

Program	No. Sites	No. Events/Yr	Indicators	Notes
AES (power plant)	(NA) NPDES	Daily – annually	Water quality, toxicity, trawl, benthos	Intake, discharges, receiving water
	(NA) RPA	Quarterly	Water quality	Intakes, discharges, downstream
LACSD	25 NPDES	Weekly – annually Monthly – annually 1 in fall	Water quality Toxicity Bioassessment	At, and up / downstream of treatment plants
LACDPW	-			
LA Dept. Water and Power	21 NPDES *	Daily – annually	Water quality, toxicity, trawl, benthos	Intake plant, discharges, receiving water
	8 RPA	Quarterly	Water quality	Intakes, discharges, upstream
Orange County Stormwater	-			
US Forest Service	Randomly along 4-mile stretch	Summer monthly Winter bi-monthly	Trash	Focus on litter on East Fork

NA: Not available at this time.

* AES and LADWP share 12 NPDES receiving water stations in the river and estuary at which water quality, trawls, and benthos are sampled.

Table 5 shows the distribution of dry-weather reconnaissance monitoring efforts in the watershed. While the LACDPW conducts field screening of the MS4 system for illegal connections, only the Orange County Stormwater Program carries out a reconnaissance water quality monitoring program focused on discharges to open channels. The goal of this monitoring is to help identify illicit connections and illegal discharges (IC/ID). The Orange County dry weather program samples high-priority inland stormdrain discharges to open channels. Levels of a broad range of constituents are then compared to background levels established at a randomly selected subset of sites throughout the region.

Table 5. Dry-weather storm drain reconnaissance monitoring efforts in each program.

Program	No. Sites	No. Events/Yr	Indicators	Notes
AES (power plant)	-			
LACSD	-			
LACDPW	-			
LA Dept. Water and Power	-			
Orange County Stormwater	7	5 in dry season	Water quality	Part of source ID effort
US Forest Service	-			

Special Studies

In addition to the routine monitoring described above (and in the appendices), there have been a number of significant special studies carried out in the watershed. These include:

- LACSD's Supplemental Environmental Project No. 2, a biological baseline characterization of the San Gabriel River conducted at eight sites, which assessed biological condition and physical habitat characteristics.
- Two synoptic dry-season surveys (September 2002 and 2003) conducted by SCCWRP to identify potential discharges and estimate their relative contribution to overall loads. Sampling included POTW effluent, in-river and tributary sites, and about 100 storm drains and targeted metals, bacteria, and nutrients.
- Time of travel and nitrification/denitrification study conducted by SCCWRP in September 2002 to support EPA model development.
- A cooperative program conducted by USEPA, SCCWRP, and LACSD in summer and fall 2003 for diazinon at both in-river and storm drain locations, along with toxicity tests at 16 in-river locations. The study was intended to follow-up on previous findings (in 1992 and 1993) of toxicity that had been the basis for a 303d listing and a TMDL.

Summary and discussion

The monitoring programs described above were designed and implemented to address issues specific to each location and permittee. Thus, many of the differences between the programs reflect a logical amount of variety, given the different activities and responsibilities of each monitoring agency. In addition, the monitoring programs currently in place in the region have to some extent accreted over time, with new elements being added as permits are renewed. Thus, programs have not all been designed with the goals of balancing efforts throughout the watershed, or of ensuring consistency among programs.

The preceding summary highlights two important features of existing monitoring efforts in the San Gabriel River watershed. First, the bulk of monitoring effort is concentrated around major discharges from water reclamation plants and power generating stations. Second, there are large inconsistencies among programs and program components in terms of the constituent list sampled and the frequency of measurement.

This overview of current monitoring practice provides a concrete starting point for two distinct but complementary considerations. First, the variety across programs provides insight into the breadth and flexibility that should be considered during the development of the watershed-wide monitoring program so that programs throughout the region can be compared. Second, the overview presents information that should be considered when assessing what adjustments could be made to individual programs to bring them more into accord with the needs of an overall watershed perspective, once it is fully developed. It is envisioned that the watershed-wide monitoring program will balance the desire for consistency, standardization, and regional efficiency, with reasonable requirements for program-specific differences in design needed to address site-specific issues.

Figure 1. Location of current monitoring sites in the San Gabriel River watershed.

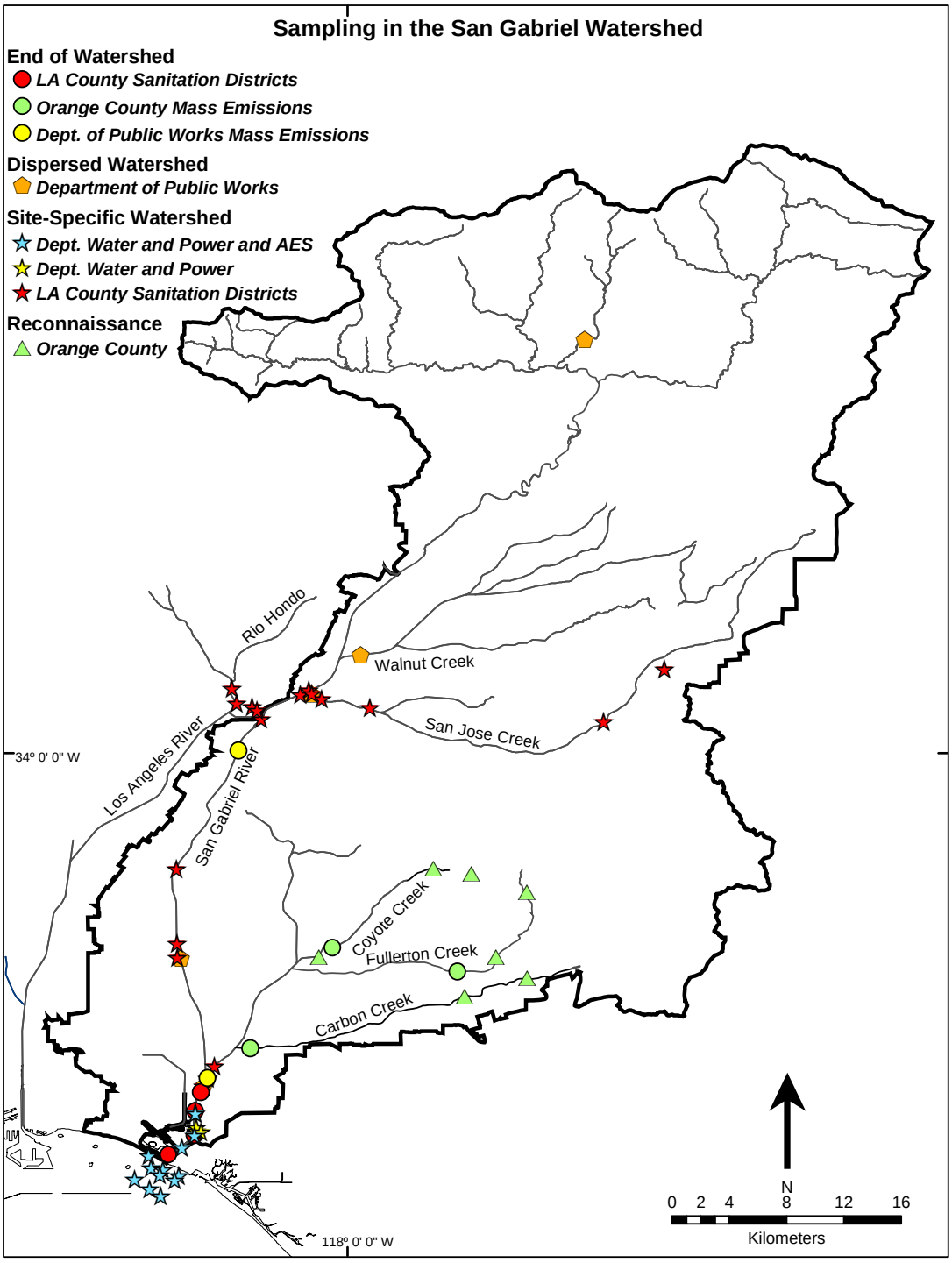
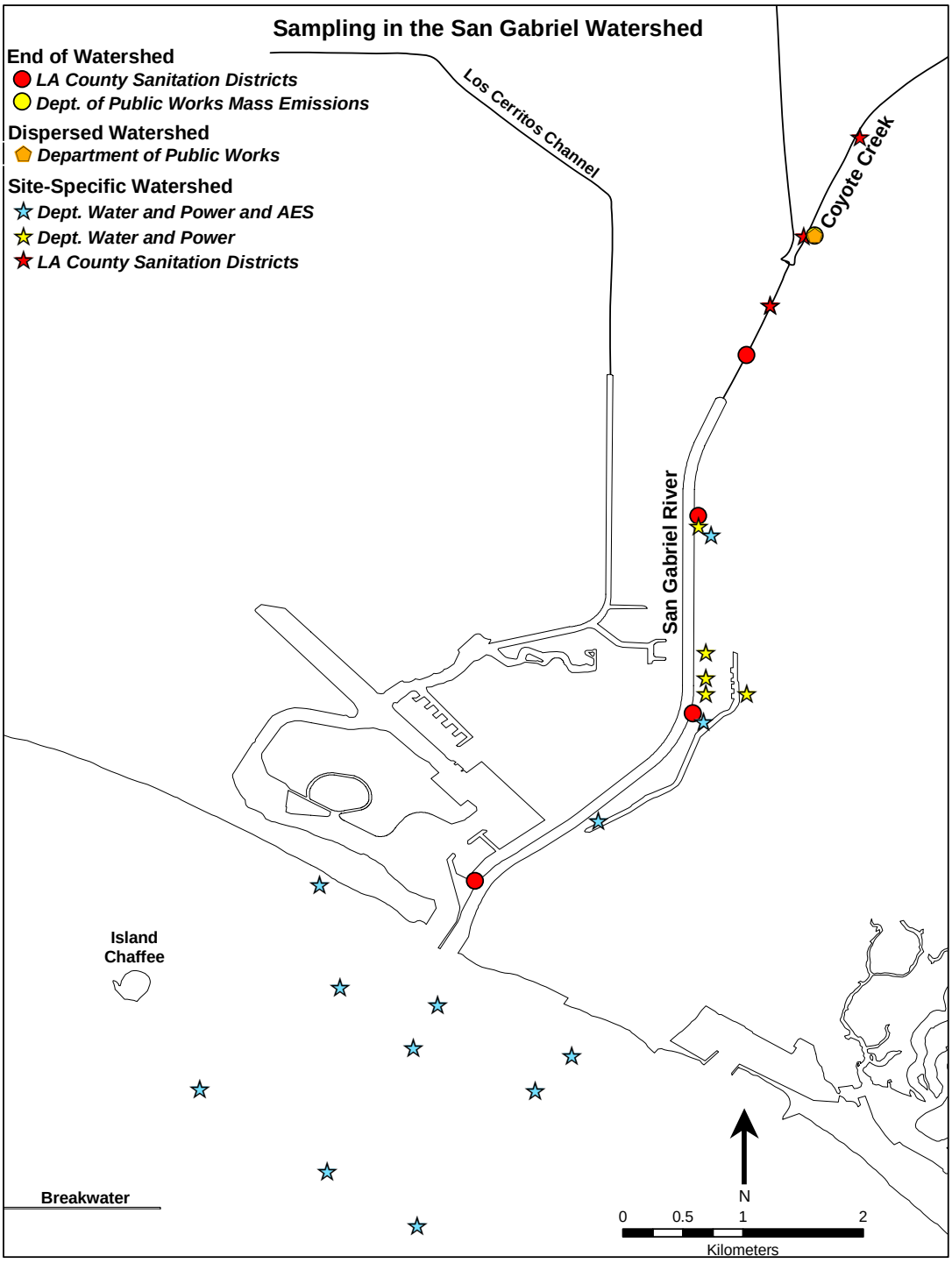


Figure 2. Location of current monitoring sites in the lower portion of the San Gabriel River watershed.



Appendices

The following appendices provide additional detail on individual monitoring programs, focusing particularly on the parameters sampled in each. While an attempt was made to present information in a consistent format, differences among sampling designs and in the level of detail available in program documents necessitates some variation.

Appendix 1. End of watershed (mass emissions) monitoring

The Orange County Stormwater program monitors mass emissions during three storms and at three times during the dry season, as detailed in the following Table A1.

Table A1. Parameters sampled at the Orange County Stormwater mass emissions stations will depend on the season (3 storm events, 3 dry weather samples per year) and on whether the sample is an aqueous (i.e., water) or a sediment sample. Reference to the Toxics TMDL program applies only to the Newport Bay watershed.

Parameter	Wet Season (Stormwater)	Dry Season (Urban Runoff)	Dry Season Sediment
• Nutrients			
o nitrate plus nitrite	X	X	
o total ammonia	X	X	
o total Kjeldahl nitrogen (TKN)	X	X	
o total phosphate	X	X	
o orthophosphate	X	X	
• Dissolved organic carbon (DOC)	X		
• Total organic carbon (TOC)			X
• Total suspended solids (TSS)	X	X	
• Volatile suspended solids	X	X	
• Turbidity	X	X	
• pH	X	X	
• Oil and grease		X	
• Temperature	X	X	
• Dissolved oxygen	X	X	
• Electrical conductivity	X	X	
• Hardness	X	X	
• Particle size			X
• Total and dissolved heavy metals			
o cadmium	X	X	X
o chromium	X	X	X
o copper	X	X	X
o lead	X	X	X
o silver	X	X	X
o mercury[1]	X	X	X
o selenium[1]	X	X	X
o zinc	X	X	X
• Organophosphate pesticides			
o diazinon	X	X	
o chlorpyrifos	X	X	
o malathion	X	X	
o dimethoate	X	X	
• Bacterial indicators			
o total coliform	X	X	

Parameter	Wet Season (Stormwater)	Dry Season (Urban Runoff)	Dry Season Sediment
o fecal coliform	X	X	
o Enterococcus	X	X	
• Toxicity	X[2]	X[3]	
• Herbicides[4] (e.g. Roundup)	X		
• Others[5]			

[1]To be sampled only at the five stations that are also part of the Toxics TMDL program
[2] During two storms per year with Ceriodaphnia dubia, sea urchin fertilization, mysid survival and growth; fathead minnow to be used in addition during the first year at the five stations that are also part of the Toxics TMDL in the Newport Bay watershed
[3] Two times during dry weather with freshwater test organisms; fathead minnow to be used in addition to Ceriodaphnia dubia, Selenastrum capricornutum, and Hyallela azteca during the first year at the five stations that are also part of the Toxics TMDL in the Newport Bay watershed
[4] To be determined
[5] Constituents, determined on a case by case basis, known to have contributed to the impairment of local receiving waters

The LACDPW's stormwater program conducts mass emissions monitoring at two stations during two storms and at two times during the dry season, as detailed in the following Table A2.

Table A2. Parameters sampled at the LACDPW's mass emission stations during two storms per season and two dry weather events per year.

Monitored parameters	
• Conventional o Oil and grease o Total phenols o Cyanide o pH o Dissolved oxygen • Indicator bacteria o Total coliform o Fecal coliform o Fecal streptococcus o Fecal enterococcus • General o Chloride o Fluoride o Nitrate o Sulfate o Alkalinity o Hardness o COD o TPH o Specific conductance o Total dissolved solids o Turbidity o Total suspended solids o Volatile suspended solids o MBAS o Total organic carbon o BOD	• Base/neutral (continued) o 2-Chloronaphthalene o 4-Chlorophenyl phenyl ether o Chrysene o Dibenzo(a,h)anthracene o 1,3-Dichlorobenzene o 1,4-Dichlorobenzene o 1,2-Dichlorobenzene o 3,3-Dichlorobenzene o Diethyl phthalate o Dimethyl phthalate o di-n-Butyl phthalate o 2,4-Dinitrotoluene o 2,6-Dinitrotoluene o 4,6- Dinitro-2-methylphenol o 1,2-Diphenylhydrazine o di-n-Octyl phthalate o Fluoranthene o Fluorene o Hexachlorobenzene o Hexachlorobutadiene o Hexachloro-cyclopentadiene o Hexachloroethane o Indenol(1,2,3-cd)pyrene o Isophorone o Naphthalene o Nitrobenzene o N-Nitroso-dimethyl amine

Monitored parameters	
• Nutrients o Dissolved phosphorus o Total phosphorus o NH3-N o Nitrate-N o Kjeldahl-N • Metals o Aluminum (total, dissolved) o Antimony (total, dissolved) o Arsenic (total, dissolved) o Berylium (total, dissolved) o Cadmium (total, dissolved) o Chromium (total, dissolved) o Chromium +6 (total, dissolved) o Copper (total, dissolved) o Iron (total, dissolved) o Lead (total, dissolved) o Mercury (total, dissolved) o Nickel (total, dissolved) o Selenium (total, dissolved) o Silver (total, dissolved) o Thallium (total, dissolved) o Zinc (total, dissolved) • Semi-volatile organics (EPA 625) o 2-chlorophenol o 2,4-dichlorophenol o 2,4-dimethylphenol o 2,4-dinitrophenol o 2-nitrophenol o 4-chloro 3 methylphenol o Pentachlorophenol o Phenol o 2,4,6-trichlorophenol • Base/neutral o Acenaphthene o Acenaphthylene o Anthracene o Benzidine o 1,2 Benzanthracene o Benzo(a)pyrene o Benzo(k)fluoranthene o Bis(2-Chloroethoxy) methane o Bis(2-Chloroisopropyl) ether o Bis(2-Chloroethyl) ether o Bis(2-Ethylexl) phthalate o 4-Bromophenyl phenyl ether o Butyl benzyl phthalate	o N-Nitroso-diphenyl amine o N-Nitroso-di-n-propyl amine o Phenanthrene o Pyrene o 1,2,4-Trichlorobenzene • Chlorinated pesticides o Aldrin o alpha-BHC o beta-BHC o delta-BHC o gamma-BHC (lindane) o alpha-chlordane o gamma-chlordane o 4,4'-DDD o 4,4'-DDE o 4,4'-DDT o Dieldrin o alpha-Endosulfan o beta-Endosulfan o Endosulfan sulfate o Endrin o Endrin aldehyde o Heptachlor o Heptachlor Epoxide o Toxaphene • Polychlorinated biphenyls o Aroclor-1016 o Aroclor-1221 o Aroclor-1232 o Aroclor-1242 o Aroclor-1248 o Aroclor-1254 o Aroclor-1260 • Organophosphate pesticides o Chlorpyrifos o Diazinon o Prometryn o Atrazine o Simazine o Cyanizine o Malathion • Herbicides o Glyphosate o 2,4-D o 2,4,5-TP-SILVEX

Table A3. LACSD NPDES monitoring in the San Gabriel River estuary.

Receiving water stations	Constituent	Frequency
R9-E, RA-2, R-6, R-7, R-8	Temp/pH/DO	weekly
	Hardness	weekly
	Nutrients/Algal Biomass	weekly
	Coliform/Residual Chlorine	monthly
	Turbidity/BOD/Solids/O&G/EC/TDS/Anions	monthly
	Surfactants	monthly
	Chronic Toxicity	quarterly
	Acute Toxicity	semiannually
	MTBE	semiannually
	Radioactivity	semiannually
	Ba	semiannually
	Priority Pollutants	
	As, Ag	monthly
	Dibenzo(a,h)anthracene	monthly
	Indeno(1,2,3-cd)pyrene	monthly
	Metals	quarterly
	Lindane	quarterly
	Priority Pollutants (Other)	semiannually
R-6	Sediment Chemistry, Grain Size Analysis	quarterly

Appendix 2. Dispersed watershed monitoring

The LACDPW, as part of its stormwater monitoring program, maintains four primary and two alternate bioassessment sites in the San Gabriel River watershed, as described in the following Table A4. Two of these sites overlap with the LACSD bioassessment sites, which also serve the purpose of monitoring potential impacts from specific treatment plant discharges.

Table A4. Names and locations of the LACDPW bioassessment sites routinely monitored in the San Gabriel River watershed.

Name	Location	Comments
Coyote Creek LACSD site RA	Upstream of the confluence with San Gabriel River, downstream of Willow St.	Lined channel bottom Coordinate sampling with LACSD (approx. 100' downstream of their discharge)
San Jose Creek LACSD site C2	Near the 605 Fwy, downstream of Workman Mill Rd.	Unlined channel bottom Coordinate sampling with LACSD
San Gabriel River	Upstream of the San Gabriel Dam	Unlined channel bottom Upstream reference site Main stem of the San Gabriel River - upper watershed
Walnut Channel Unlined bottom	Upstream of the confluence with the San Gabriel River, downstream of N Baldwin Park Blvd.	Tributary to the San Gabriel River - mid watershed Look at impacts of upstream tributary land uses; adjacent to nursery and residential area
Alternates San Gabriel River LACSD sampling sites:		
• R4 (U/S park)	@ El Dorado Park and E. Wardlow Road	Lined channel bottom Main stem of the San Gabriel River - central location Mid watershed in the main river Coordinate sampling with LACSD
•		
•		
• R-5 (D/S)	@ Willow St.	Formerly sampled at R-9W, but site was moved further upstream to avoid any saltwater intrusion

Appendix 3. Site-specific watershed monitoring

Monitoring is carried out by four programs to assess potential impacts at specific receiving water locations in the watershed.

Receiving water monitoring is conducted around the intakes and discharges of the two generating stations in the San Gabriel River estuary. Both agencies (AES and LADWP) conduct routine NPDES permit monitoring, as well as Reasonable Potential Analysis (RPA) (RPA studies are required prior to permit renewal application and scheduled to continue for 12 more quarters). RPA monitoring is conducted at the cooling water intake and at each outfall. In addition, the Department of Water and Power samples an RPA receiving water station upstream of all intake and discharge structures and AES samples a complementary station downstream of all structures. NPDES monitoring focuses on in-plant samples, the discharges of each generating unit, and a number of receiving water stations. The following Table A5 summarizes the stations, parameters, and sampling frequencies for each kind of monitoring.

Table A5. Reasonable Potential Analysis and NPDES monitoring conducted by AES and LADWP in the San Gabriel River estuary. (Numbers in parentheses are the numbers of sampling locations in each category.)

Agency and station type	Location	Parameter	Frequency
AES - RPA	Downstream receiving water (1) Cooling water intakes (NA) Cooling water discharges (NA)	Salinity, hardness, TSS, pH, asbestos, cyanide, metals, pesticides, PCBs, base/neutral extractibles, acid extractibles, volatile organics, dioxins	Quarterly
LA Dept. Water and Power - RPA	Upstream receiving water (1) Cooling water intakes (1) Cooling water discharges (6)	Salinity, hardness, TSS, pH, asbestos, cyanide, metals, pesticides, PCBs, base/neutral extractibles, acid extractibles, volatile organics, dioxins	Quarterly
AES – NPDES	NA	NA	NA
LA Dept. Water and Power - NPDES	In-plant wastestream (3)	pH, suspended solids, oil & grease, settleab le solids, BOD, coliform, copper, iron Priority pollutants of low volume	Monthly Annually
	Cooling water discharges (6)	Temperature Chlorine residual pH Coliform, chronic toxicity Metals Priority pollutants	Continuous Daily Weekly Quarterly Semi-annually Every 5 years
	Receiving water (12) Water column (12)	Temperature profile, pH, dissolved oxygen	Semi-annually

Agency and station type	Location	Parameter	Frequency
	Benthos (12) *	Biomass, diversity, abundance, grain size	Annually
		Copper, chromium, nickel, zinc	Annually (1st year only)
	Trawl (6) *	Identity, size, weight, number of fish and macroinver-tebrates. Rank order abundance, frequency occurrence, diversity. Disease, lesion incidence.	Semi-annually

NA: Not available at this time.
* Benthos and trawl stations are located directly under the water column stations.

The County Sanitation Districts of Los Angeles County (LACSD) also carry out NPDES monitoring around each of the water reclamation plants in the lower San Gabriel River watershed, as detailed in the following Tables A6 – A10. Each treatment plant has a somewhat different monitoring program.

Table A6. LACSD NPDES monitoring at the Long Beach Water Reclamation Plant.

Receiving water stations	Constituent	Frequency
RA-1, RA	Temp/pH/DO/Coliform (T/F)/Residual Chlorine/Flow	weekly
	Hardness	weekly
	Turbidity/BOD/Solids/O&G/EC/TDS/Anions	monthly
	Nutrients/Algal Biomass	weekly
	Surfactants	monthly
	Chronic Toxicity	quarterly
	Acute Toxicity	semiannually
	MTBE	semiannually
	Radioactivity	semiannually
	Ba	semiannually
	Fe	semiannually
	Diazinon	quarterly
	Priority Pollutants	
	As, Cu, Pb, Hg, Ni, Ag, Zn	monthly
	Cyanide	monthly
	Metals	quarterly
	Benzo(a)pyrene	monthly
	Benzo(b)fluoranthene	monthly
	Benzo(k)fluoranthene	monthly
	Dibenzo(a,h)anthracene	monthly
	Indeno(1,2,3-cd)pyrene	monthly
	Lindane	monthly
	Benzene	quarterly
	Bromoform	quarterly
	Dibromochloromethane	quarterly
	Chloroform	quarterly

Receiving water stations	Constituent	Frequency
	Bromodichloromethane	quarterly
	Ethylbenzene	quarterly
	Methylene chloride	quarterly
	Bis(2-ethylhexyl) phthalate	quarterly
	Diethyl phthalate	quarterly
	Dimethyl phthalate	quarterly
	Di-n-butyl phthalate	quarterly
	Chrysene	quarterly
	Priority Pollutants (Other)	semiannually
	Bioassessment	annually (Fall)
Estuary Stations		
(R-9E, RA-2, R-6, R-7, R-8)	Temp/pH/DO/Flow	weekly
	Hardness	weekly
	Nutrients/Algal Biomass	weekly
	Coliform/Residual Chlorine	monthly
	Turbidity/BOD/Solids/O&G/EC/TDS/Salts	monthly
	Surfactants	monthly
	Chronic Toxicity	quarterly
	Acute Toxicity	semiannually
	MTBE	semiannually
	Radioactivity	semiannually
	Ba	semiannually
	Priority Pollutants	
	As, Ag	monthly
	Dibenzo(a,h)anthracene	monthly
	Indeno(1,2,3-cd)pyrene	monthly
	Metals	quarterly
	Lindane	quarterly
	Priority Pollutants (Other)	Semiannually
R-6	Sediment Chemistry	Quarterly
	Total Organic Nitrogen	
	Total Organic Carbon	
	As, Cd, Cu, Pb, Hg, Ni, Zn	
	PCBs, DDT, PAHs, CN	
	Phenols, Dieldrin, Aldrin, Endrin, HCH, Chlordane, Toxaphene	
	Grain Size Analysis	

Table A7. LACSD NPDES monitoring at the Los Coyotes Water Reclamation Plant.

Receiving water stations	Constituent	Frequency
R-3-1, R9W, R-4	Temp/pH/DO/Coliform (T/F)/Residual Chlorine/Flow	weekly
	Nutrients/Algal Biomass	weekly
	Hardness	weekly
	Turbidity/BOD/Solids/COD/O&G/EC/TDS/Salts	monthly
	Surfactants	monthly
	Chronic Toxicity	monthly
	Acute Toxicity	semiannually
	MTBE	semiannually
	diazinon	quarterly
	Priority Pollutants	
	As, Hg, Ni, Ag	monthly
	Lindane	monthly
	Cyanide	monthly
	Metals	quarterly
	Chlorobenzene	quarterly
	Dibromochloromethane	quarterly
	Chloroform	quarterly
	Bromodichloromethane	quarterly
	Toluene	quarterly
	Chrysene	quarterly
	Benzo(a)pyrene	quarterly
	Benzo(b)fluoranthene	quarterly
	Benzo(k)fluoranthene	quarterly
	Dibenzo(a,h)anthracene	quarterly
	Indeno(1,2,3-cd)pyrene	quarterly
	Diethyl phthalate	quarterly
	Be	semiannually
	Th	semiannually
	Priority Pollutants (Other)	semiannually
	Bioassessment	annually (Fall)

Table A8. LACSD NPDES monitoring at the Whittier Narrows Water Reclamation Plant.

Receiving water stations	Constituent	Frequency
R-11, R-C, RD-1, R-A, R-B, R-D	Temp/pH/DO/Coliform (T/F)/Residual Chlorine/Flow	weekly
	Nutrients/Algal Biomass	weekly
	Hardness	weekly
	Turbidity/BOD/Solids/COD/O&G/EC/TDS/Salts	monthly
	Surfactants	monthly
	Chronic Toxicity	quarterly
	Acute Toxicity	semiannually
	MTBE	semiannually
	Diazinon	quarterly
	Priority Pollutants	
	Cu, Pb, Ag, Zn	monthly
	Cyanide	monthly
	Metals	quarterly
	Dioxin	quarterly
	Acrylonitrile	quarterly
	Benzene	quarterly
	Bromoform	quarterly
	Dibromochloromethane	quarterly
	Chloroform	quarterly
	Bromodichloromethane	quarterly
	Methyl chloride	quarterly
	Methylene chloride	quarterly
	Toluene	quarterly
	Chrysene	quarterly
	Benzo(a)pyrene	quarterly
	Benzo(b)fluoranthene	quarterly
	Benzo(k)fluoranthene	quarterly
	Dibenzo(a,h)anthracene	quarterly
	1,4-Dichlorobenzene	quarterly
	Diethyl phthalate	quarterly
	Lindane	quarterly
	Priority Pollutants (Other)	semiannually
	Bioassessment (not req'd at station R-C)	annually (Fall)

Table A9. LACSD NPDES monitoring at the San Jose Creek Water Reclamation Plant.

Receiving water stations	Constituent	Frequency
R-2, R-10, R-11, R-12*,R-13*, C-1, C-2	Residual Chlorine	weekly
	Temp/pH/DO/Coliform/E. coli	monthly
	BOD/Solids/COD/O&G/EC/TDS/Anions	monthly
	Nutrients	monthly
	Surfactants	monthly
	Hardness	monthly
	Chronic toxicity	quarterly
	Acute toxicity	annually
	Perchlorate	semiannually
	1,4-Dioxane	semiannually
	1,2,3-Trichloropropane	semiannually
	MTBE	semiannually
	Priority Pollutants	
	Metals	quarterly
	Cyanide	monthly
	Priority Pollutants (other)	semiannually
	Barium	quarterly
	Pesticides	semiannually
	Diazinon	semiannually
	Bioassessment	annually (Fall)
R-2, R-11, R-12*, R-13*	Ammonia	weekly
	Tetrachloroethylene	quarterly
	Benzo(a)pyrene	quarterly
	Benzo(k)fluoranthene	quarterly
	Dibenzo(a,h)anthracene	quarterly
	Indeno(1,2,3-c,d)pyrene	quarterly
	Cu, Pb, Hg	monthly
	Se	monthly
	N-nitrosodimethylamine	quarterly
	4,4'-DDT	quarterly
	4,4'-DDE	quarterly
C-1	Ammonia	monthly
	Tetrachloroethylene	semiannually
	Benzo(a)pyrene	semiannually
	Benzo(k)fluoranthene	semiannually
	Dibenzo(a,h)anthracene	semiannually
	Indeno(1,2,3-cd)pyrene	semiannually
	Cu, Pb, Hg	quarterly
	Se	monthly
	N-nitrosodimethylamine	semiannually
	4,4'-DDT	semiannually
	4,4'-DDE	semiannually

Receiving water stations	Constituent	Frequency
C-2	Ammonia	monthly
	Tetrachloroethylene	semiannually
	Benzo(a)pyrene	semiannually
	Benzo(k)fluoranthene	semiannually
	Dibenzo(a,h)anthracene	semiannually
	Indeno(1,2,3-cd)pyrene	semiannually
	Cu, Pb, Hg	monthly
	Se	monthly
	N-nitrosodimethylamine	quarterly
	4,4'-DDT	quarterly
	4,4'-DDE	quarterly
R-10	Ammonia	monthly
	Tetrachloroethylene	semiannually
	Benzo(a)pyrene	semiannually
	Benzo(k)fluoranthene	semiannually
	Dibenzo(a,h)anthracene	semiannually
	Indeno(1,2,3-cd)pyrene	semiannually
	Cu, Pb, Hg	quarterly
	Se	quarterly
	N-nitrosodimethylamine	semiannually
	4,4'-DDT	semiannually
	4,4'-DDE	semiannually

*These stations are only required to be monitored when reclaimed water is discharged through Discharge Serial Nos. 001A and/or 001B.

Table A10. LACSD NPDES monitoring at the Pomona Water Reclamation Plant.

Receiving water stations	Constituent	Frequency
R-A, R-C, R-D	Temp/pH/DO/Coliform/E. coli	monthly
	Residual Chlorine	weekly
	Turbidity/BOD/Solids/COD/O&G/EC/TDS/Anions	monthly
	Nutrients/Algal biomass	monthly
	Surfactants	monthly
	Chronic Toxicity	quarterly
	Acute Toxicity	semiannually
	Perchlorate	semiannually
	1,4-Dioxane	semiannually
	1,2,3-Trichloropropane	semiannually
	MTBE	semiannually
	Priority Pollutants	
	Metals	monthly
	Be, Tl	semiannually
	Cyanide	monthly
	Acrylonitrile	monthly
	Bromoform	quarterly
	Carbon tetrachloride	quarterly
	Dibromochloromethane	quarterly
	Chloroform	quarterly
	Bromodichloromethane	quarterly
	1,1-Dichloroethylene	quarterly
	Methylene chloride	quarterly
	Tetrachloroethylene	monthly
	Benzo(a)pyrene	quarterly
	Benzo(b)fluoranthene	quarterly
	Benzo(k)fluoranthene	quarterly
	Bis(2-Ethylhexyl)Phthalate	monthly
	Dibenzo(a,h)anthracene	quarterly
	1,4-Dichlorobenzene	monthly
	N-nitrosodimethylamine	monthly
	Gamma BHC (Lindane)	monthly
	Priority Pollutants (Other)	semiannually
	Barium	monthly
	Methoxychlor	semiannually
	2,4-D	semiannually
	2,4,5-TP (Silvex)	quarterly
	Pesticides	semiannually
	Diazinon	quarterly
	Bioassessment	annually (Fall)

Appendix 4. Reconnaissance monitoring

Reconnaissance monitoring is conducted by the Orange County Stormwater Program.

Monitored parameters will include:

- Ammonia (f)
- Nitrate (f)
- Soluble phosphorus (f)
- Total suspended soids
- PH (f)
- Oil and grease (if sheen is present) or total petroleum hydrocarbons
- Temperature (f)
- Dissolved oxygen (f)
- Electrical conductivity (f)
- Hardness (f)
- Dissolved heavy metals
    - Cadmium
    - Haxavalent chromium
    - Total chromium
    - Copper
    - Lead
    - Nickel
    - Zinc
- Organophosphate pesticides
    - Diazinon
    - Chlorpyrifos
    - Malathion
    - Dimethoate
- Bacterial indicators
    - Total coliform
    - Fecal coliform
    - Enterococcus
- MBAS (f)
- Phenols (f)

“f” refers to constituents analyzed in the field.