Contra Costa Clean Water Program

Pollutants of Concern Report: Accomplishments in Water Year 2017 and Allocation of Effort for Water Year 2018

Submitted to the San Francisco Bay Regional Water Quality Control Board

In Compliance with NPDES Permit Provision C.8.h.iv Municipal Regional Stormwater Permit 2.0 (Order R2-2015-0049)

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October 2017

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Prepared for

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- Contra Costa County
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Acronyms and Abbreviations

BASMAA	Bay Area Stormwater Management Agencies Association
Bay	San Francisco Bay
Bay Area	San Francisco Bay Area
BMP	best management practices
CCCWP	Contra Costa Clean Water Program
Delta	Sacramento-San Joaquin River Delta
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
HDS	hydrodynamic separator
IMP	Integrated Management Practice
kg	kilogram
LID	low impact development
MPC	Monitoring and Pollutants of Concern
MRP	municipal regional stormwater permit
MS4	municipal separate storm sewer system
NPDES	National Pollutant Discharge Elimination System
PCBs	polychlorinated biphenyl congeners
POC	pollutants of concern
ppb	parts per billion
PSD	particle size distribution
RAA	reasonable assurance analysis
RMP	regional monitoring program
RWQCB	Regional Water Quality Control Board
SSS	suspended sediment concentration
TMDL	total maximum daily loads
TOC	total organic carbon
WY	water year

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1 BACKGROUND

This report summarizes pollutants of concern (POC) monitoring conducted by Contra Costa Clean Water Program (CCCWP) during water year (WY) 2017 (October 1, 2016 through September 30, 2017), and describes POC monitoring to be completed in the coming water year (October 1, 2017 through September 30, 2018). This report fulfills provision C.8.h.iv of the Municipal Regional Stormwater Permit (MRP) 2.0 (Order R2-2015-0049). The following subsections describe monitoring goals (Section 1.1), CCCWP's dual jurisdiction between the San Francisco Bay and the Central Valley regional water quality control boards (RWQCB) (Section 1.2), and concludes with lessons learned from the past several years of permit implementation (Section 1.3). Section 2.0 describes monitoring completed in water year 2017, and Section 3.0 describes monitoring to be completed in water year 2018. The report concludes with Section 4.0, a summary of monitoring performed by third parties reported elsewhere.

1.1 Monitoring Goals

CCCWP permittees monitor POCs with the goal of identifying reasonable and foreseeable means of achieving load reductions required by total maximum daily loads (TMDLs). TMDLs are watershed plans to attain water quality goals developed and adopted by the San Francisco Bay RWQCB. The two most prominent TMDLs driving stormwater monitoring, source control, and treatment projects are the mercury TMDL and the polychlorinated biphenyl congeners (PCBs) TMDL. In the interest of protecting people and wildlife dependent on San Francisco Bay for food, these regulatory plans are intended to reduce concentrations of mercury and PCBs in fish within the Bay.

Mercury and PCBs tend to bind to sediments. The principal means of transport from watersheds is via sediments washed into the Municipal Separate Storm Sewer System (MS4); therefore, an important focus of POC monitoring is identifying the most significant sources of contaminated sediments to the MS4. An additional focus is quantifying the effectiveness of control measures. The highest POC monitoring priorities for permittees is answering these two basic TMDL implementation questions: where are the most significant POC sources, and what can be done to control them?

The San Francisco Bay RWQCB framed those two priority management information needs, along with three others, in the MRP as follows:

1. ***Source Identification*** — Identify which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff.
2. ***Contributions to Bay Impairment*** — Identify which watershed source areas contribute most to the impairment of San Francisco Bay beneficial uses (due to source intensity and sensitivity of discharge location).

3.	***Management Action Effectiveness***	Provide support for planning future management actions or evaluating the effectiveness or impacts of existing management actions.
4.	***Loads and Status***	Provide information on POC loads, concentrations, and presence in local tributaries or urban stormwater discharges.
5.	***Trends***	Evaluate trends in POC loading to San Francisco Bay and POC concentrations in urban stormwater discharges or local tributaries over time.

Provision C.8.f of the MRP does not specify monitoring details; rather, it requires a total number of samples for different pollutant types to be monitored over the permit term, along with yearly minimum numbers of samples for each POC. The effort is to be applied to the five management information needs listed above.

The MRP requires all stormwater programs to collectively reduce PCBs from stormwater by 3 kilograms (kg) per year. This makes management information needs 1 (sources) and 3 (effectiveness) the highest priorities for permittees to maintain compliance. Part of management information need 2 (watershed areas which contribute most to impairment) is also directly related to achieving load reductions. In order to prioritize management actions, permittees need to know which specific watersheds or sub-catchments are the greatest density of source areas or average sediment pollutant concentrations.

Other aspects of the five management information needs are not as much directly related to complying with the PCB load reduction requirement of 3 kg. Knowing which areas of San Francisco Bay are most sensitive (second part of management information need 2) is interesting from a planning perspective, but nothing in the language of the MRP indicates extra credit would be given for reducing loads to sensitive areas. Likewise, long-term trends of POC concentrations in urban stormwater may be interesting to follow, but short-term actions are a higher priority to comply with the numeric requirements of this permit and make progress toward improving long-term trends. For this reason, the "sensitive areas" aspect of management information need 2 and the trends analysis in management information need 5 is mostly addressed by funding pilot and special studies implemented by the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP).

Thinking more broadly about management questions helps address multiple questions with the same effort. For example, by identifying specific source areas through management information need 1, the concept emerged that old industrial areas contribute relatively greater amounts of PCBs per unit area is information responsive to management information need 2 (areas which contribute the most to impairment). Over time, source area information is aggregated into load estimates, which inform management information need 4 (loads and status). As progress is made on abating source areas and implementing green infrastructure projects, load reduction information is developed responsive to management information need 5 (trends). The loads and status aspect (management information need 4) involves watershed modeling using monitoring data to estimate current loads of POCs and

potential long-term load reductions which may be achieved through source control and stormwater treatment. This addresses long-term planning to understand how implementation of stormwater treatment through green infrastructure[1] leads to attainment of POC load reduction goals. Modeling to forecast attainment of load reduction goals will be performed as part of developing a reasonable assurance analysis in fulfillment of Provisions C.11.d.i and C.12.d.i. A reasonable assurance analysis establishes the relationship between areal extent of green infrastructure implementation and POC reductions; estimates the amount and characteristics of land area to be treated through green infrastructure in future years; and estimates the amount of POC reductions which will result from green infrastructure implementation by specific future years. CCCWP will develop a stormwater resources plan during the next two years, which will include some of the preliminary analysis and reporting required for the reasonable assurance analysis.

In addition to sediment-associated TMDL pollutants, such as mercury and PCBs, provision C.8.f also requires monitoring of copper, nutrients, and emerging contaminants (the alternative flame retardants perfluorooctane sulfonates and perfluoroalkyl sulfonates). Copper and nutrients are directly monitored by CCCWP as described in Sections 2 and 3 below. Emerging contaminants are assessed through a regional collaboration with the Bay Area Stormwater Management Agencies Association (BASMAA) and the RMP and, therefore, are not discussed at length in this report.

To summarize, of the five monitoring goals – source identification, contribution to impairment, effectiveness assessment, loads and status, and trends – the most urgent compliance-driven priorities for CCCWP permittees are source identification and effectiveness assessment for mercury and PCBs. Analysis and modeling to forecast long-term trends will commence within the next two years through development of a stormwater resources plan. Assessments of long-term trends and contribution to impairment are regional projects carried out in collaboration with BASMAA and the RMP.

1.2 Dual Regional Water Quality Control Board Jurisdictions

CCCWP is in a unique position among Bay Area stormwater programs, as the county is split between the jurisdiction of the San Francisco Bay and the Central Valley RWQCBs. In addition to meeting monitoring requirements in the MRP, CCCWP was previously also required to meet monitoring requirements established in the East Contra Costa County NPDES permit (East County Permit). Monitoring responsive to both permits was coordinated successfully in the past to efficiently achieve required goals. Now that the Central Valley Region is moving toward a regional permit for municipal stormwater, CCCWP petitioned the San Francisco Bay and Central Valley RWQCBs to consolidate all areas of the county under the MRP administered by the San Francisco Bay RWQCB. CCCWP will continue to be responsive to monitoring requirements established by TMDLs in the Central Valley Region which affect the East County permittees. At present, the main focus of monitoring in response to Central Valley RWQCB

[1] American Rivers defines “green infrastructure” as approach to water management which protects, restores, or mimics the natural water cycle. Green infrastructure is effective, economical, and enhances community safety and quality of life. It means planting trees and restoring wetlands, rather than building a costly new water treatment plant. Practically, in terms of stormwater management in Contra Costa County, this means requiring all new development and redevelopment projects include stormwater treatment via approved low impact development (LID) designs. These include rain gardens, bioswales, infiltration galleries, etc.

information needs was through compliance with the requirement to implement a methylmercury control study. The summaries of monitoring completed (Section 2) and monitoring to be completed (Section 3) make note, where appropriate, of monitoring information addressing Central Valley TMDL requirements in addition to requirements of the MRP.

1.3 Lessons Learned from MRP 1.0 (Order R2-2009-0074) and Water Years 2016 and 2017

At the advent of MRP 1.0 in 2009, CCCWP and other BASMAA member agencies had some working knowledge of the distribution of PCBs and mercury loads across the urban landscape. Monitoring studies conducted in the 2000-2002 time frame showed concentrations of PCBs are highest in older industrial areas where PCBs were used and released in the past. Mercury is somewhat more evenly distributed across urban land use types, with exceptions where known legacy mining sources (e.g., New Almaden) exist upstream. Still, mercury concentrations also tend to be higher in older industrial urban areas. These early assessments turned up evidence that, in some places, PCBs in sediments collected from catch basins, curbs and gutters may be elevated because of release from nearby contaminated properties. Follow-up assessments solidified the evidence of specific source properties in the City of Richmond (within Contra Costa County). Other programs had similar findings of specific source properties. Along with other information, the early studies performed by CCCWP and other BASMAA member agencies were used to develop the mercury TMDLs and PCBs TMDL for San Francisco Bay.

Source identification work conducted during MRP 1.0 confirmed two private properties in the City of Richmond with consistently high concentrations of PCBs in sediments collected from adjacent curbs, gutters and catch basins. One of the properties is a metal recycler which in the past accepted and recycled used transformers; the other property is a forklift repair shop where hydraulic oil is prevalent[2]. Both properties are referred to the San Francisco RWQCB for remediation and are discussed in the CCCWP fiscal year 2016-2017 annual report.

The metals recycler is an active business. As a result of CCCWP's source property screening process, San Francisco RWQCB in the City of Richmond now regularly inspect the property. The property owner is prohibited from discharging stormwater into the municipal storm sewer system, and is currently designing an on-site stormwater treatment system. Oversight by the City of Richmond compelled the property owner to contain stormwater on-site, and to conduct enhanced street sweeping with vacuum sweepers. By mitigating releases from this property, the "halo effect" of runoff, trackout and windborne dispersion onto surrounding streets is expected to be diminished over time.

During water year 2016, information was developed sufficient to support two new referrals. One is a small property in North Richmond (unincorporated Contra Costa County) tied to a historic remedial action at a transformer recycler. The other is for a site in the City of Pittsburg under remediation prior to redevelopment. Both of these sites were referred to the San Francisco RWQCB for remediation and are reported in the CCCWP fiscal year 2016-2017 annual report.

[2] Transformer oil and hydraulic oil are known historic products containing PCBs.

In addition to the two new sites identified above, the wide-ranging source identification activities described in Section 2 produced two new potential source areas for follow-up investigations in the City of San Pablo, adjacent to a 2015 sampling location containing sediment PCBs levels above 1.0 mg/kg. The recently discovered potential source properties are located across the railroad right-of-way which lies within the City of Richmond jurisdiction and adjacent to the North Richmond community in unincorporated Contra Costa County. The main target property is a dormant remediation site, consisting of a 10-acre parcel between the railroad tracks adjacent to Chesley Avenue, and an empty 0.75-acre parcel across the tracks. With the assistance of the San Francisco RWQCB, if permittees and property owners can implement actions to abate sediment discharge from these parcels to adjacent streets, the MS4, and directly to Wildcat Creek via a bypass drainage, then PCB loads can be further reduced. Mitigating these parcels, in addition to the City of San Pablo's redevelopment/abatement of the 4.45-acre former BNSF railyard site to the north, the "halo effect" of PCB loading in this target source area is expected diminish over time. A data gap remaining in this area is investigating whether the railroad parcels in this area might be contributing to the surrounding loads.

Very few big obvious sites offer "low hanging fruit." Rather, when screening is complete, CCCWP permittees would need to wait for high likelihood parcels to change ownership or offer other opportunity for redevelopment in order to gain modest load reductions. This kind of follow up – to address the gap between cleanup levels directed by DTSC and PCB target levels driven by TMDLs – will be a continuous, adaptive process to gradually "polish the halo" of contaminated sediments around legacy cleanup sites and old industrial areas.

One important lesson learned about monitoring low impact developments (LIDs) is that we need to devote more monitoring effort to quantifying the benefits of complete infiltration. Much of the LID monitoring in MRP 1.0 was focused on effectiveness from the pollutant removal standpoint (i.e., comparison of pollutant concentrations in stormwater flowing into a bioretention cell with concentrations in treated water flowing out of the bioretention underdrain). This inflow-outflow monitoring focus overlooks the benefit of infiltration, which essentially provides 100 percent reduction until infiltration capacity is exceeded. Monitoring during water year 2017 included water level logging using piezometers deployed across a variety of LID designs to provide better countywide information on infiltration rates. This will help improve our ability to model the load reduction benefits of existing and future LIDs, pursuant to management information needs 3 and 5.

CCCWP monitored the Marsh Creek watershed for mercury, with an interest in understanding whether stormwater discharges from the historic Mount Diablo mercury mine in the upper watershed reach the Sacramento-San Joaquin River Delta (Delta) and San Francisco Bay. This activity is responsive to management information needs 1, 2, 4 and 5. A lesson learned during MRP 1.0 was that high frequency monitoring biased results toward smaller storms, when upper watershed flow is trapped behind the Marsh Creek Reservoir. Marsh Creek monitoring was amended to focus on large storms. The first storms in many years large enough to convey upper watershed flow to lower Marsh Creek occurred in water year 2017 and were successfully sampled, as described in Section 2. This monitoring also supports information needed for the methylmercury control study required by the Delta methylmercury TMDL.

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2 MONITORING ACCOMPLISHED IN WATER YEAR 2017

During water year 2017, a variety of monitoring activities were performed with respect to goals established at the conclusion of the previous water year, as outlined in the water year 2016 POCs monitoring report (ADH and AMEC, 2016b). For each activity, the associated management information need is identified from among the following:

1. Source identification
2. Contributions to bay impairment
3. Management action effectiveness
4. Loads and status
5. Trends

Water year 2017 monitoring activities are summarized below and discussed in greater detail in the following subsections:

- Countywide street dirt sampling (Tier 1 approach) in urban landscape targeted for historic industrial land uses and halo extent from known areas of elevated PCB concentrations (management information need 1)
- Stormwater sampling (Tier 3 approach) in the Rumrill Boulevard and Chesley Avenue areas in the cities of Richmond and San Pablo adjacent to suspected source properties for PCBs and mercury to confirm if elevated concentrations are present in runoff (management information needs 1, 2 and 4)
- Copper and nutrients stormwater monitoring in lower Walnut Creek and lower Marsh Creek (management information needs 1, 2, 4 and 5)
- Mercury and methylmercury stormwater monitoring in lower Marsh Creek during upper watershed discharge (management information needs 1, 2, 4 and 5); this monitoring also supports information needed for the methylmercury control study required by the Delta methylmercury TMDL
- Infiltration monitoring to native soil at six BMPs in the City of Pittsburg (management information need 3); this monitoring also supports information needed for the methylmercury control study required by the Delta methylmercury TMDL.

Refer to Figure 1 for the location of each sampling point or monitoring activity.

2.1 Street Dirt Sampling and Analysis (Tier 1 Screening)

In water year 2017, eight street dirt locations throughout the county were sampled and analyzed for PCBs, mercury, total organic carbon (TOC), and particle size distribution (PSD). Street dirt is surface material within the public right-of-way available for stormwater entrainment into the MS4. It is found in street gutters, on sidewalks and driveway aprons, or accumulated near an MS4 entry point (e.g.,

adjacent to a drop inlet grate). Water year 2017 sampling took place at sites known to have or suspected of having elevated levels of PCBs, or were sites requested for survey by CCCWP permittees.

Table 1 provides site IDs, position coordinates, and site descriptions (rationale for selection) for each location. Refer to Table 2 for analytical test methods, reporting limits and holding times. Because street dirt sampling was completed late in the water year, analytical results are not available at the time of this writing.

Table 1. Street Dirt Sampling Locations and Selection Rationale (WY 2017)

Site ID[1]	Latitude (decimal degrees)	Longitude (decimal degrees)	Selection Rationale and General Description
CCC-LBV-100-P1	38.03728	-122.17797	Sample collected near an off-line transformer station
CCC-LBV-101-P1	38.03741	-122.17609	Sample collected below an electrical pole with a transformer on the hillside
CCC-LBV-102-P1	38.03678	-122.17696	Sample collected at a low point in the dry local watercourse downstream of former industrial facility
CCC-PAC-100-P1	37.99732	-122.07687	Sampled trackout from an unpaved access road to several businesses
CCC-PAC-101-P1	38.00598	-122.08932	Sampled along a fence line in right-of-way
CCC-ALT-100-P1	37.99604	-122.34834	Adjacent to PG&E property and recommended for testing by CCCWP; sampled near drop inlet where runoff appears to flow from the substation
CCC-CHR-100-P1	37.95201	-122.36234	Sampled trackout from non-jurisdictional railroad property
CCC-GDN-100-P1	37.96307	-122.37623	Sampled at low point in channel before culvert which runs west to San Francisco Bay; previously identified as a hot spot

1 Site ID Key:

CCC Contra Costa County
LBV Little Bull Valley
P1 Phase 1
PAC Pacheco Blvd
ALT Atlas Rd
CHR Cherry St
GDN Garden Tract Rd

Table 2. Sediment Analytical Tests, Methods, Reporting Limits and Holding Times

Sediment Analytical Test	Method	Reporting Limit	Holding Time
Total PCBs (RMP 40 congeners)[1]	EPA 8082A	0.5 µg/kg	1 year
Total Mercury	EPA 7471B	5 µg/kg	1 year
Total Organic Carbon (TOC)	ASTM D4129-05M	0.05%	28 days
Particle Size Distribution (PSD)[2]	ASTM D422M	0.01%	28 days

1 San Francisco Bay RMP 40 PCB congeners include PCB-8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, and 203.

2 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns

2.2 Stormwater Sampling and Analysis (Tier 3 Screening)

Water year 2017 stormwater samples were collected in the Rumrill Boulevard and Chesley Avenue areas in the cities of Richmond and San Pablo as a follow up to the determination of high PCBs and mercury concentrations found in street dirt samples and drop inlet samples collected in water years 2015 and 2016. Stormwater sampling results correlated with street dirt sampling results and indicated runoff to the MS4 is relatively high in PCBs in the following areas:

- West end of Sutro Avenue
- Kelsey Street, immediately east of railroad tracks
- South of Chesley Avenue, immediately east of railroad tracks

Refer to Table 3 for test methods and reporting limits, and Table 4 for position coordinates of the sampling points and analytical results.

Table 3. Stormwater Analytical Tests, Methods, Reporting Limits, and Holding Times

Sediment Analytical Test	Method	Reporting Limit	Holding Time
Total PCBs (RMP 40 congeners)[1]	EPA 1668C	0.1 µg/kg	1 year
Total Mercury	EPA 1631E	0.5 ng/L	28 days
Total Methylmercury	EPA 1630	0.1 ng/L	28 days
Suspended Sediment Concentration	ASTM D 3977-97	1.5 mg/L	7 days
Total Organic Carbon (TOC)	EPA 9060	0.50 mg/L	28 days

1 San Francisco Bay RMP 40 PCB congeners include PCB-8, 18, 28, 31, 33, 44, 49, 52, 56, 60, 66, 70, 74, 87, 95, 97, 99, 101, 105, 110, 118, 128, 132, 138, 141, 149, 151, 153, 156, 158, 170, 174, 177, 180, 183, 187, 194, 195, 201, and 203.

2 Particle size distribution by the Wentworth scale; percent fines (slit and clay) are less than 62.5 microns.

Street dirt and stormwater sampling data may be compiled and evaluated for PCB congener fingerprints to determine if common source areas can be identified, and to understand the degree of weathering sampled PCBs have undergone. If evaluated, pertinent findings will be reported in the urban creeks monitoring report.

Table 4. Stormwater Sampling Results – Rumrill Boulevard and Chesley Avenue Areas (WY 2017)

Site ID[1]	CCC-MKT-100-SW	CCC-RUM-101-SW	CCC-CHS-102-SW	CCC-CHS-103-SW	CCC-CHS-104-SW	CCC-KEL-105-SW	CCC-CHS-106-SW	CCC-SUT-107-SW	CCC-RUM-108-SW	CCC-RUM-109-SW
Date Sampled	01/08/2017	01/08/2017	01/08/2017	01/08/2017	01/08/2017	01/08/2017	01/08/2017	01/08/2017	01/08/2017	01/08/2017
Latitude	37.95898	37.956605	37.954699	37.954598	37.954212	37.951034	37.954707	37.953363	37.95298	37.954081
Longitude	-122.357749	-122.356936	-122.357417	-122.358093	-122.358118	-122.363521	-122.359882	-122.357754	-122.357131	-122.357083
Total PCBs[2] (ng/L)	5.20	2.58	6.53	4.39	8.37	20.2	5.37	1.98	3.28	30.4
Total Hg (ng/L)	12.1	10.2	5.53	13.8	20.1	21.1	38.6	6.28	2.23	13.5
Total MeHg (ng/L)	0.12	0.38	0.12	0.25	0.58	0.28	0.76	0.08	0.19	0.41
MeHg/Hg Ratio (%)	9.9	37.3	21.7	18.1	28.9	13.3	19.7	12.7	85.2	30.4
SSC (mg/L)	33.2	9.3	14.0	13.7	7.6	15.1	8.3	2.4	43.2	215
TOC (mg/L)	1.7	2.71	1.48	7.6	18.8	5.9	9.9	1.19	2.4	1.9
PCBs/SSC Ratio (ppb)[3]	157	278	466	320	***1101***	***1338***	***647***	***825***	76	141

1 Site ID key: MKT = Market Ave. RUM = Rumrill Blvd. CHS = Chesley Ave. KEL = Kelsey St. SUT = Sutro Ave.

2 PCBs in stormwater matrix analyzed by method EPA 1668

3 Values in bold italics indicate a likely high source area for PCBs

2.3 Copper and Nutrients Monitoring

Copper and nutrients samples were collected during one storm at both Walnut Creek and Marsh Creek. The sampling sites were located in the lower reach of each creek, but upstream of tidal influences, and represent discharge to the Bay/Delta from the two largest watersheds in the county. For Marsh Creek, the site was co-located with the fixed sampling stations for water years 2012-2014, which is immediately upstream of the City of Brentwood's waste water treatment plant discharge. This site was selected because past data for copper and nutrients can be compared to current results to address trends (management information need 5). For Walnut Creek, the site was co-located with an MRP provision C.8.d probabilistic creek status monitoring site which is yet to be sampled; this site was selected because future monitoring efforts under the creek status program may provide an opportunity for trends assessment.

Two sets of grab samples were collected at each creek during the storm of March 24, 2017. At each site, the first set of samples were collected on the rising hydrograph of the storm, and the second set of samples were collected near peak flow. Samples were field filtered within 15 minutes of collection for dissolved copper, ammonia, nitrate, nitrite, and orthophosphate. Refer to Table 5 for test methods and reporting limits, and Table 6 for position coordinates and analytical results.

Table 5. Watershed Characterization Analytical Tests, Methods and Reporting Limits – Copper and Nutrients

Analytical Test	Method	Reporting Limit
Suspended Sediment Concentration (SSC)	ASTM D 3977-97B	3 mg/L
Copper, total recoverable and dissolved	EPA 200.8	0.5 µg/L
Hardness	SM 2340C (titration)	5 mg/L
Ammonium	SM 4500 NH3-C	0.02 mg/L
Nitrate	EPA 300.0	0.05 mg/L
Nitrite	EPA 300.0	0.05 mg/L
Total Kjeldahl Nitrogen	SM 4500 NH3-C	0.1 mg/L
Dissolved Orthophosphate	SM 4500P-E	0.01 mg/L
Total Phosphorus	SM 4500P-E	0.01 mg/L

Table 6. Copper and Nutrients Monitoring Results – Lower Marsh Creek and Lower Walnut Creek (WY 2017)

Site ID [1]	LMC		WAL	
Sample Date	03/24/2017		03/24/2017	
Sample Time	1215 [2]	1330 [3]	1100 [2]	1400 [3]
Latitude	37.96264		37.97271	
Longitude	-121.68794		-122.05305	
Copper, Dissolved (µg/L)	1.4	1.4	1.7	2.2
Copper, Total (µg/L)	2.3	2.3	3.0	4.4
Hardness (mg/L)	340	340	360	340
Ammonium (mg/L)	0.088	0.099	<0.04	<0.066
Nitrate (mg/L)	0.71	0.67	0.69	0.61
Nitrite (mg/L)	0.011	0.01	0.006	0.007
Total Kjeldahl Nitrogen (mg/L)	0.53	0.66	0.48	0.75
Dissolved Orthophosphate (mg/L)	0.007	0.009	0.17	0.17
Phosphorus (mg/L)	0.041	0.039	0.22	0.24

1 Site ID key: LMC = Lower Marsh Creek WAL = Lower Walnut Creek
2 Rising hydrocurve
3 Near peak of hydrocurve

2.4 Mercury and Methylmercury Monitoring in Marsh Creek During Upper Watershed Discharge

To help fill data gaps in the Marsh Creek watershed monitoring effort (performed from water year 2012 through water year 2014), upper watershed discharge samples were collected during one storm in water year 2017. Samples were collected at the site of the former fixed monitoring station on lower Marsh Creek immediately upstream of discharge from the City of Brentwood's waste water treatment plant. Approximately six miles upstream of the sampling point lies the Marsh Creek Reservoir, which captures runoff from the upper watershed, including the former Mount Diablo Mercury Mine. The reservoir discharges through the primary spillway only during periods of extreme runoff; otherwise, the reservoir is successful at impounding water from most rain events.

The storm event of January 8, 2017 produced runoff rates high enough to discharge through the reservoir's primary spillway and conveyed upper watershed runoff through lower Marsh Creek and to the Delta. Four grab samples were collected over a span of eight hours as the initial pulse of reservoir discharge passed through the sampling location. Analytical test methods and reporting limits are presented in Table 3. Analytical results for SSC, mercury, and methylmercury are presented in Table 7.

Table 7. Mercury and Methylmercury Monitoring – Marsh Creek Upper Watershed Discharge (WY 2017)

Site ID [1]	LMC			
Sample Date	01/08/2017			
Sample Time	0920	1220	1445	1745
Latitude	37.96264			
Longitude	-121.68794			
Mercury (µg/L)	0.015	0.023	0.047	0.080
Methylmercury (ng/L)	0.09	0.11	0.23	0.30
SSC (mg/L)	48	57	174	236
MeHg/Hg Ratio (%)	0.6	0.5	0.5	0.4
Hg/SSC Ratio (ppb)	312	404	270	339

LMC Lower Marsh Creek
SSC Suspended sediment concentration
MeHg Methylmercury

2.5 BMP Effectiveness – Infiltration Monitoring

Monitoring was conducted at six bioretention BMPs to help inform management decisions regarding the efficacy of infiltration as a means of reducing or eliminating discharge of pollutants. Three existing BMPs were monitored at the Fire Prevention Bureau in Pittsburg, and three newly constructed BMPs were monitored at a commercial gas station, also in Pittsburg. The typical configuration of a bioretention/ infiltration BMP is depicted in Figure 2.

2.5.1 Fire Prevention Bureau, Pittsburg

During the period of late February to late April 2017, water levels were monitored in subsurface gravel storage layers in three of six bioretention facilities at the Fire Prevention Bureau building and parking lot at 2331 Loveridge Road in Pittsburg, California. These hydromodification BMPs were installed in 2011, as required by MRP 1.0 permit provision C.3.g. They were initially monitored in 2011-2013 for the purposes of model calibration and verification, and to determine their flow-control effectiveness (CCCWP, 2013). The purpose of the most recent monitoring was to determine if stormwater infiltration rates into the surrounding subsurface native soils from the bioretention facilities were the same as reported in 2013.

Each of the three BMPs was constructed in the same general manner: after rilling of the subsurface soil, a layer of gravel and 18 inches of sand/compost mix were placed. The monitoring wells were composed of sections of 3-inch-diameter PVC pipe mounted vertically through the sand/compost and gravel layers with their lowest ends resting at the bottom of the gravel layer. In the 2011-2013 study, the three wells were designated as Integrated Management Practice or IMP 2, IMP 4, and IMP 6. During the recent 2017 study, the wells were designated as Stations A-2, A-4, and A-6, and the water levels were recorded by OnSet® Corporation HOBO® U-220 data loggers.

Over the course of the water year 2017 monitoring period, only Station A-2 had consistently measurable water levels above the bottom of its gravel layer during storms. Station A-4 had little or no measurable

water during the entire sampling period, and Station A-6 had a slight response to the largest storm, which occurred on March 22, 2017. Similar responses were noted and recorded in the 2011-2013 study.

The 2011-2013 study (CCCWP, 2013) reported that, following significant storms, accumulated water receded from the gravel layer at a rate of 0.8 inches per hour at Station A-6, and 0.8 to over 1.0 inches per hour at Station A-2. Figure 3 shows the infiltration rates at Stations A-2 and A-6 during various storms occurring in 2012 and 2017. Note the simple linear recession rates (i.e., the slopes of the fitted lines) at both Stations A-2 and A-6 were much greater in the February to April 2017 monitoring period than those reported from 2011-2013, by as much as a factor of five or six. It is not clear why this difference in recession rates exists. The purpose of this study was only to compare the rates.

2.5.2 Arco Gas Station, Pittsburg

During the period of late February to late April 2017, the water levels were monitored in subsurface storage layer monitoring wells at three BMPs at the Arco Gas Station at 2102 West Leland Road in Pittsburg, California. These hydromodification BMPs were newly implemented in early 2017. The purpose of this monitoring was to determine the rate of stormwater infiltration into the surrounding subsurface native soils.

Each of the three BMPs was constructed in a similar manner: after rilling of the subsurface soil, 12 inches of gravel and then 18 inches of sand/compost mix were placed in layers. The monitoring wells were composed of sections of 8-inch diameter PVC pipe mounted vertically through the sand/compost and gravel layers with their lowest ends resting at the bottom of the gravel layer. The monitoring wells were designated as Arco 1, Arco 2, and Arco 3, with the water levels recorded by OnSet® Corporation HOBO® U-220 data loggers.

The recession rates for two time periods are presented for storms occurring on March 4-5 and March 22, 2017 in Figures 4 and 5. Each station (Arco 1 through Arco 3) accumulated stormwater which percolated down to the gravel layer during storm events. The simple linear approximations of recession rates indicate the following for the stations at this location:

- Arco 1 has very low rates, <0.2 inches per hour
- Arco 2 and Arco 3 have rates varying between 0.5 inches per hour to over 1.5 inches per hour, depending on the rainfall intensity

Table 8 summarizes the infiltration rates for Arco Stations 1 through 3 and for Fire Prevention Bureau Stations A-2 and A-6. Note that the infiltration rates are equivalent to the recession rates multiplied by an estimated porosity factor of 0.4.

Table 8. Summary of Infiltration Rates

BMP Location	Station ID	Date	Infiltration Rate (in/hr) [1]
Fire Prevention Bureau	A-2	03/16/12	0.27
	A-2	03/17/12	0.21
	A-2	11/28/12	0.33
	A-2	11/30/12	0.71
	A-6	11/30/12	0.32
	A-2	03/04/17	1.46
	A-2	03/22/17	1.98
	A-6	03/22/17	2.42
Arco Gas Station	Arco 1	03/04/17	0.05
	Arco 2	03/04/17	0.21
	Arco 3	03/04/17	0.17
	Arco 2	03/05/17	0.56
	Arco 3	03/05/17	0.72
	Arco 1	03/22/17	0.02
	Arco 2	03/22/17	0.26
	Arco 3	03/22/17	0.55
	Arco 2	03/23/17	0.19

1 The porosity of a gravel layer in BMPs like these is generally estimated at 0.4. This factor was applied to the recession rates derived through regression to estimate the rate at which water is infiltrated to the surrounding soils.

2.6 Summary of Monitoring Completed in WY 2017

As a whole, water year 2017 monitoring is summarized in Table 9. The table lists the total number of tests completed for each pollutant class and analyte in water year 2017, the corresponding management information needs addressed, and the target number of tests outlined in the MRP. Table 8 also identifies monitoring completed by third parties which can be used to help CCCWP meet the numeric monitoring targets identified in the MRP.

The number of samples collected and analyzed in water year 2017 met or exceeded the minimum annual requirements of the MRP in all pollutant categories, with the exception of emerging contaminants which will be sampled and analyzed in one special study before the end of the five-year permit term. These results will be reported in the Urban Creeks Monitoring Report due on March 31, 2018, and will help inform water year 2018 sampling efforts.

For a discussion of monitoring completed in water year 2017 by third parties, refer to Section 4.

Table 9. Summary of Monitoring Completed in WY 2017 by Pollutant Class, Analyte, Management Information Need, and MRP Targets

Pollutant Class / Type of Monitoring	Analyte									Management Information Need					Agency or Organization Performing the Monitoring	Number of Samples Collected and Analyzed in WY 2017	Cumulative Number of Samples Collected and Analyzed In WYs 2016 and 2017	Annual Minimum Number of Samples Required by the MRP	Total Number of Samples Required By the MRP Over 5-Year Term
	PCBs	Mercury	Methylmercury	SSC	PSD	TOC	Copper [1]	Hardness	Nutrients [2]	Source ID	Bay Impairment	Management Action	Loads & Status	Trends					
PCBs - water	✓			✓		✓				X	X	X	X	X	CCCWP	10	27	8	80
PCBs - water	✓			✓		✓				X	X	X	X	X	RMP (SFEI)	4			
PCBs - sediment	✓				✓	✓				X	X	X			CCCWP	8	35	8	80
PCBs - sediment	✓				✓	✓				X	X	X			City of San Pablo	5			
Mercury - water		✓	✓	✓		✓				X	X	X	X	X	CCCWP	14	46	8	80
Mercury - water		✓	✓	✓		✓				X	X	X	X	X	RMP (SFEI)	4			
Mercury - sediment		✓			✓	✓				X	X				CCCWP	8	30	8	80
Copper - water							✓	✓		X	X		X	X	CCCWP	4	4	2	20
Nutrients – water									✓	X	X		X	X	CCCWP	4	4	2	20
Emerging Contaminants[3]															-	0	0	3	3
BMP Infiltration												X			CCCWP	6 [a]	6 [a]	0	0

1 Total and dissolved fractions of copper

2 Nutrients include: ammonia, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate and total phosphorus

3 Emerging contaminants (alternative flame retardants) need only be tested during one special study over the 5-year term of the permit

a Infiltration monitoring was performed at 6 bioretention/infiltration BMPs in water year 2017

SSC suspended sediment concentration

PSD particle size distribution

TOC total organic carbon

Figure 1. Location of WY 2017 Sampling Points and Monitoring Activities

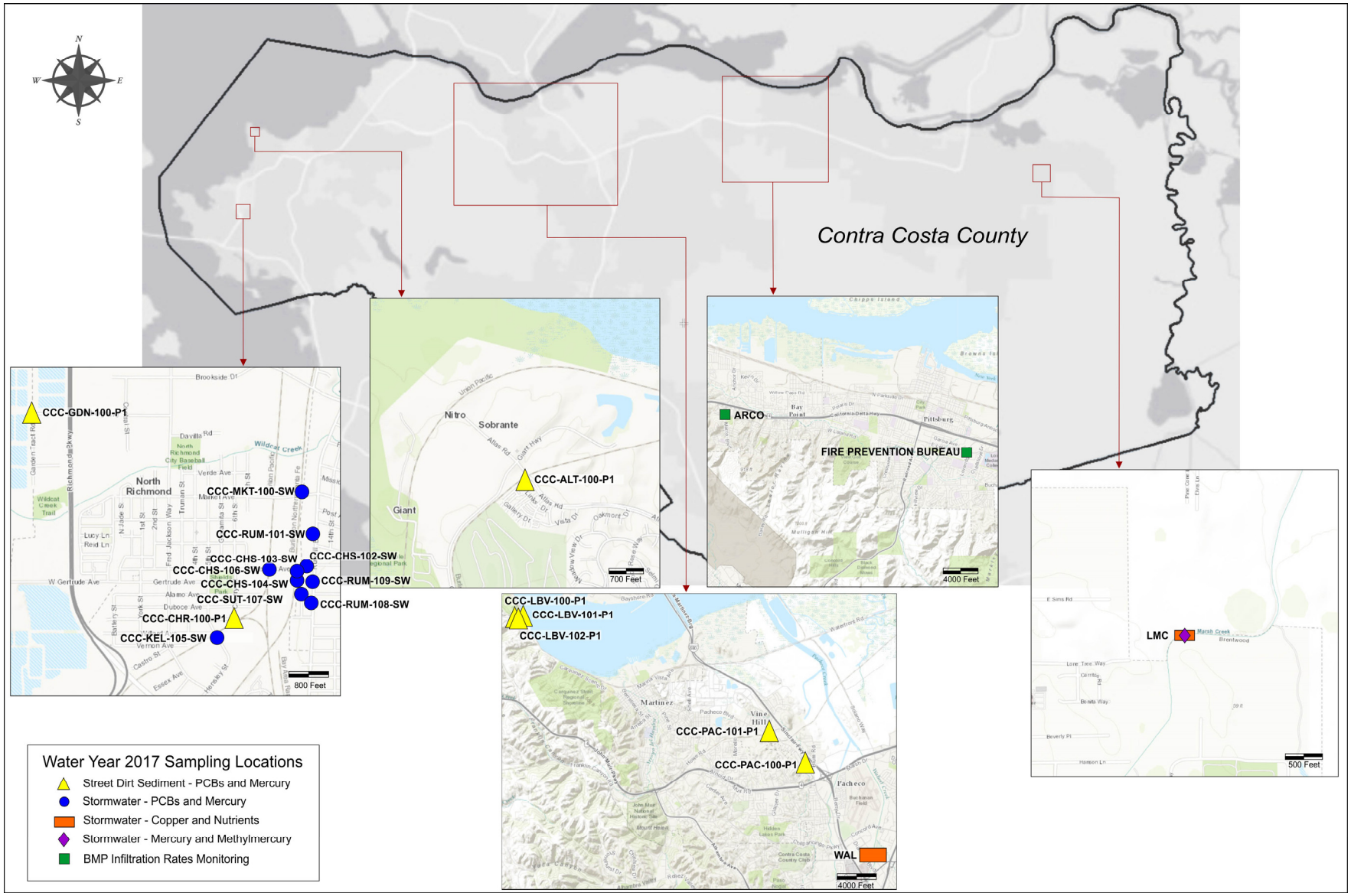


Figure 2. Typical Configuration of Bioretention/Infiltration BMP and Monitoring Well Placement

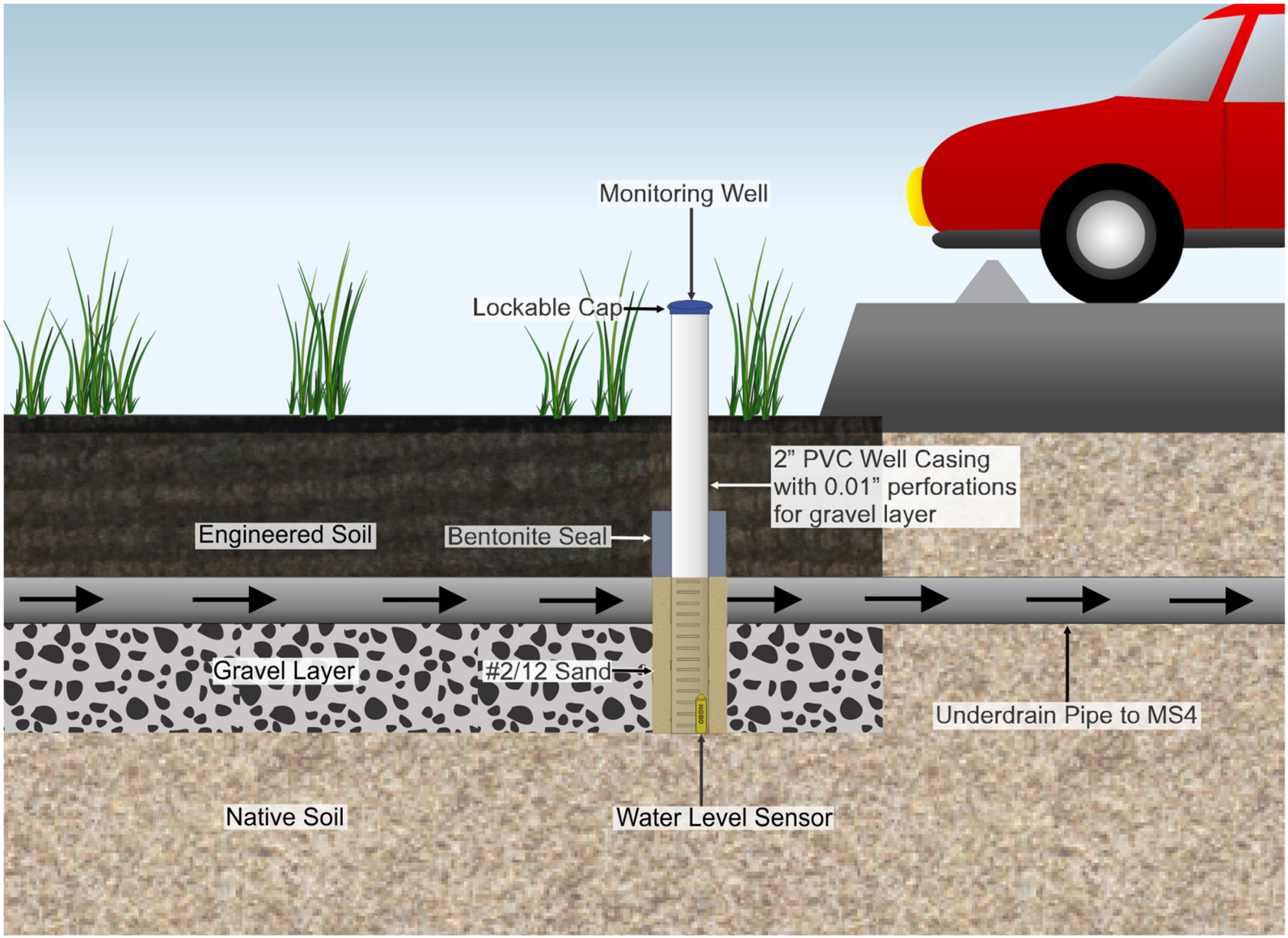


Figure 3. Recession Rates at Fire Prevention Bureau BMPs – Events in 2012 and 2017

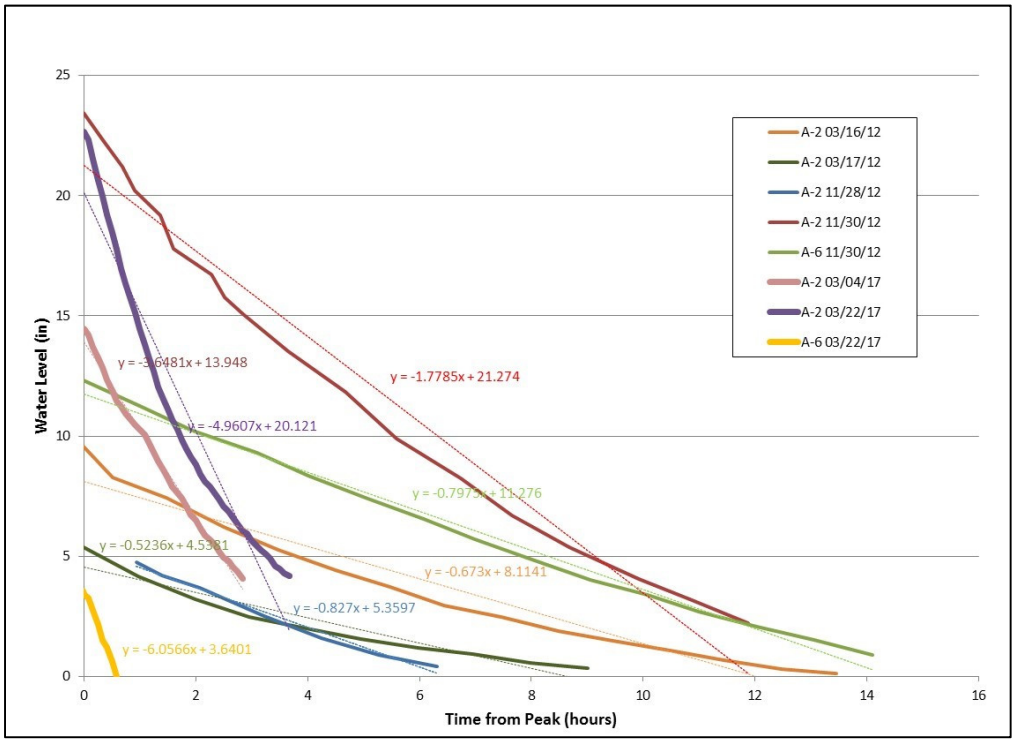


Figure 4. Recession Rates at Arco Gas Station BMPs – March 4-5, 2017

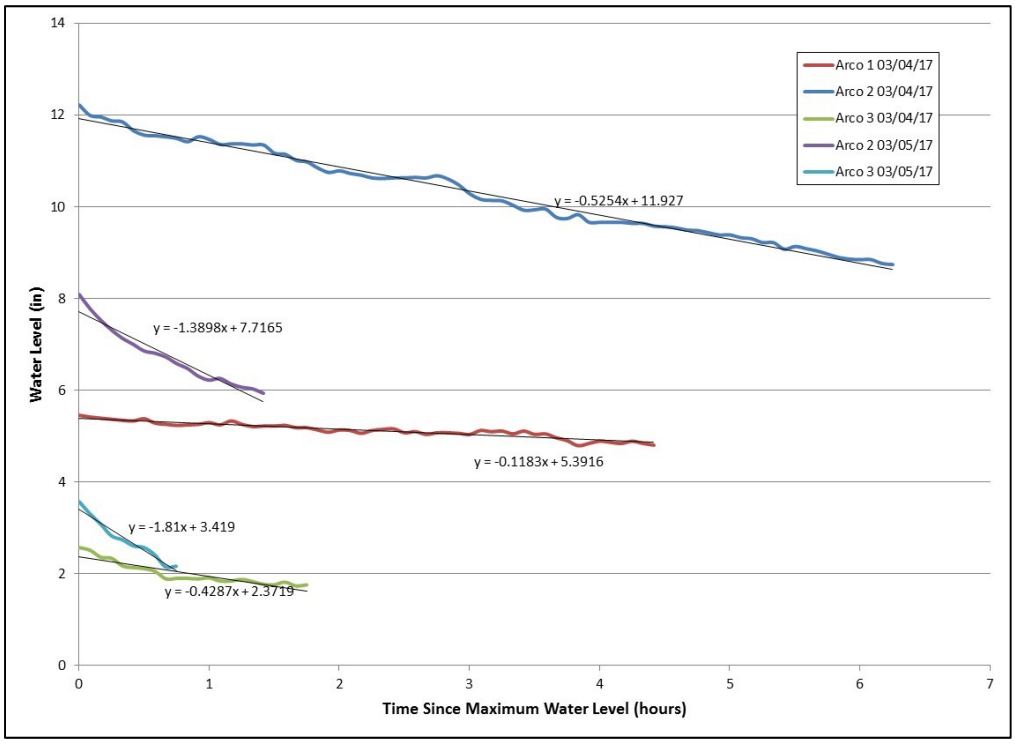
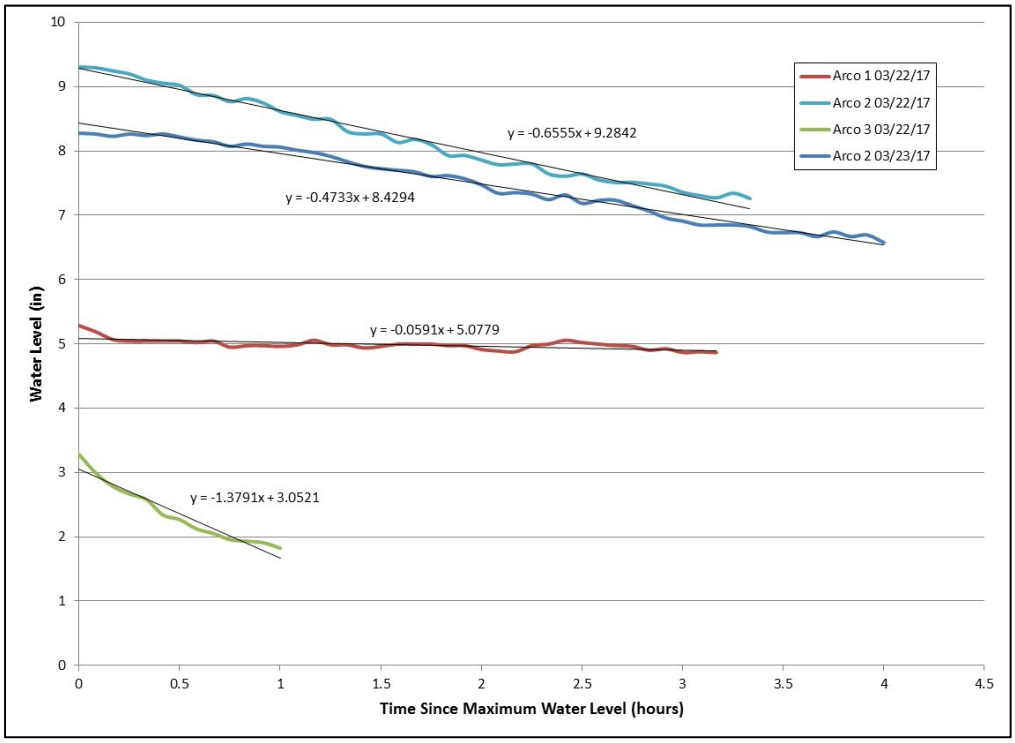


Figure 5. Recession Rates at Arco Gas Station BMPs – March 22, 2017



3 MONITORING PLAN FOR WATER YEAR 2018

Water year 2018 monitoring is expected to include the following activities:

- Sediment screening for PCBs and mercury in streets, drop inlets and public right of ways adjacent to non-jurisdictional lands (e.g., parcels not connected to an MS4 or railroads), and adjacent to current or historical remediation sites
- Stormwater BMP effectiveness monitoring for PCBs and mercury, and PCBs monitoring of caulk/sealants in roadway and storm drain infrastructure (BASMAA regional projects)
- Watershed characterization monitoring for copper and nutrients during wet and dry season (Walnut Creek and Marsh Creek)
- Upper watershed characterization for mercury and methylmercury (Marsh Creek downstream of the reservoir during overflow)
- Stormwater monitoring for PCBs and mercury countywide (CCCWP and BASMAA/RMP)
- BMP effectiveness – infiltration studies (water year 2016 sites and in new locations as newly constructed BMPs become available)

The following subsections provide background information on monitoring goals and descriptions of activities, as well as overall numeric goals (number of samples to be collected) during the water year.

3.1 Sediment Screening

Continuation of street dirt and drop inlet sediment sampling will take place at locations identified through ongoing desktop research, field surveys, and at locations identified by CCCWP permittees. Sites which may be added to the sampling list include locations of interest due to historic or present-day land use, lack of adequate source control by nearby property owners, reoccurring accumulation of sediment, etc. Limited trends monitoring will be conducted at sites in the Richmond Harbor area sampled by others in the past.

Based on lessons learned during water years 2015 through 2017, it is apparent high opportunity areas for PCBs and mercury controls do not always co-locate with known or suspected contaminated source properties. High concentrations of PCBs do not always occur where expected and, in some cases, are found in relatively high concentrations in areas of only moderate interest. For this reason, monitoring efforts were expanded to include halo zones around locations of interest to account for presence of PCBs in areas which might have otherwise been overlooked. Additionally, feedback from the San Francisco Bay RWQCB helped direct efforts toward increased MS4 drop inlet monitoring with the hope of reducing false negatives based on street dirt sampling alone. Similarly, some non-jurisdictional lands will be targeted in the coming water year to conduct due diligence in the search for PCB and mercury sources which may have eluded discovery thus far. CCCWP will also develop a plan to investigate waterfront parcels draining directly to the Bay/Delta without passing through an MS4, and railroads as fulfillment of Provision C.8.e.

Approximately 15 sediment screening samples are targeted for water year 2018.

3.2 Stormwater BMP Effectiveness Monitoring and PCBs in Caulks/Sealants

CCCWP is a contributing participant in a BASMAA regional project to conduct POC monitoring for management action effectiveness. The overall goal of this monitoring project is to evaluate the effectiveness of selected stormwater treatment controls to provide information needed to support reasonable assurance analysis (RAA) development. BASMAA agreed to focus this monitoring effort on two treatment options with the potential to reduce PCB discharges: hydrodynamic separators (HDS units) and enhanced bioretention filters. HDS monitoring will focus on collecting sediment removed from HDS unit sumps during maintenance to evaluate the PCBs and mercury load reduction effectiveness of these units. Enhanced bioretention monitoring will focus on using actual stormwater to conduct bench-scale testing of biochar media amendments to identify those which improve PCB and mercury load removal.

To help fill data gaps in the effectiveness monitoring of stormwater bioretention BMPs on Cutting Boulevard in the City of Richmond, additional monitoring will be performed in water year 2018. These BMPs were first monitored under the Clean Watersheds for a Clean Bay (CW4CB) project immediately after construction was completed. The desired number of samples were not completed during the CW4CB monitoring period (which ended in January 2016). Additionally, the results showed intriguing patterns of enhanced mercury methylation in one of the LID installations which appeared to diminish with the age of the installation. Additional monitoring would help refine our understanding of how newly installed vs. aged bioretention facilities affect mercury methylation, which is useful information to support the goals of the Delta methylmercury TMDL established by the Central Valley RWQCB. This effort would result in approximately 12 stormwater runoff samples for water year 2018.

Additionally, CCCWP is a contributing participant in a BASMAA regional project to collect samples of caulk and other sealants used in storm drain and transportation infrastructure, and to investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of this investigation is on structures installed during this era. At least 20 composite samples of caulk and sealants used in storm drains or roadway infrastructure in public rights-of way throughout the permit area will be collected and analyzed for PCB congeners.

3.3 Watershed Characterization for Copper and Nutrients

Sampling for copper and nutrients is planned for Walnut Creek and Marsh Creek during water year 2017, similar to sampling in water year 2016 except for the addition of one dry weather sampling event at each creek. Sampling during wet weather and dry weather will be performed at the same location in each creek as the water year 2016 sampling. For Marsh Creek, the site will be the same location where water years 2012 through 2014 sampling took place (Lower Marsh Creek in the City of Brentwood). This location is immediately upstream of the City of Brentwood's waste water treatment plant discharge. The

sampling point in Walnut Creek is co-located with an MRP C.8.d probabilistic creek status monitoring site.

Six samples are targeted for water year 2018 – four during wet weather and two during dry weather.

3.4 Marsh Creek Upper Watershed Characterization

To increase the number of sampled storms from the Marsh Creek upper watershed, sampling is targeted once again in water year 2018. The sampling point on Lower Marsh Creek is immediately upstream of discharge from the City of Brentwood's waste water treatment plant. Approximately six miles upstream of the sampling point lies the Marsh Creek Reservoir, which captures runoff from the upper watershed, including the former Mount Diablo Mercury Mine. The reservoir discharges through the primary spillway only during periods of extreme runoff; otherwise, the reservoir is successful at impounding water from most rain events. If sampling opportunities become available (i.e., sustained discharge from the reservoir to Lower Marsh Creek), runoff at the Lower Marsh Creek sampling point will be collected and analyzed for SSC, mercury and methylmercury.

3.5 Stormwater Monitoring for PCBs and Mercury by BASMAA/RMP

As a contributing member of BASMAA, CCCWP is participating in a Bay Area-wide characterization study of PCBs and mercury in stormwater runoff in areas of interest. For water year 2018, ten samples are targeted for collection within Contra Costa County at locations identified in a joint effort by BASMAA's contractor, SFEI, and representatives of CCCWP.

3.6 LID Effectiveness – Infiltration Monitoring

Continued infiltration monitoring is planned for water year 2018 at BMPs monitored in water year 2017, as well as at new sites as suitable locations become available. CCCWP is engaged in an ongoing dialogue with permittees who are implementing new LID infiltration systems within their jurisdiction, with the goal of incorporating design features (e.g., monitoring wells) to facilitate field testing. The goal of continued infiltration monitoring is to gain a better understanding of stormwater treatment within BMPs over varied geography countywide, and to assess if infiltration rates vary over time.

3.7 Summary of Monitoring Planned for Water Year 2018

Based on the planned activities described in the sections above, sampling by CCCWP for water year 2018 as a whole is summarized in Table 10.

Table 10. CCCWP Monitoring Planned for WY 2018 by Pollutant Class and MRP Targets

Pollutant Class / Type of Monitoring	Management Information Need					Number of Samples Planned for WY 2018 by CCCWP (and through BASMAA Regional Projects)	Cumulative Number of Samples Collected and Analyzed in WYs 2016 and 2017	Annual Minimum Number of Samples Required by the MRP	Total Number of Samples Required By the MRP Over 5-Year Term
	Source ID	Bay Impairment	Management Action	Loads & Status	Trends				
PCBs - water	X	X	X	X	X	10[a] + 12[b] + 8[c]	27	8	80
PCBs - sediment	X	X	X		X	15 + 20[d] + 8[e]	35	8	80
Mercury - water	X	X		X	X	10[a] + 12[b] +8[c]	46	8	80
Mercury - sediment	X	X				15 + 20[d]	30	8	80
Copper[1] - water	X	X		X	X	6	4	2	20
Nutrients – water[2]	X	X		X	X	6	4	2	20
Emerging Contaminants[3]						0	0	-	-
BMP Infiltration			X			6	6[f]	0	0

1 Total and dissolved copper
2 Ammonium, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate and total phosphorus
3 Emerging contaminants (alternative flame retardants) need only be tested during one special study over the 5-year term of the permit
a Stormwater samples targeted for collection by RMP (SFEI) in Contra Costa County
b Stormwater BMP effectiveness monitoring on Cutting Blvd in Richmond by CCCWP to Complete CW4CB goals
c Stormwater samples targeted for collection for bench-scale testing of soil amendments by BASMAA regional project
d Caulk/sealant samples targeted for collection by BASMAA regional project
e HDS sediment samples targeted for collection by BASMAA regional project
f Infiltration rates monitoring was performed at 6 bioretention/infiltration BMPs in water year 2017

4 SUMMARY OF POLLUTANT MONITORING REPORTED ELSEWHERE

This section describes monitoring activities conducted by others, and are funded in part by CCCWP. In addition to directly managing monitoring programs, CCCWP participates in the RMP by direct financial contributions and participation in RMP subcommittees responsible for planning and directing monitoring projects. The RMP Sources, Pathways and Loadings Workgroup, and the associated Small Tributaries Loading Strategy subgroup, are the main points of contact between CCCWP and the RMP. CCCWP also collaborates on projects with BASMAA and supports permittees in implementing projects at the local level.

In the 2010-2011 time frame, at the outset of the previously issued MRP 1.0 implementation, the RMP reported on the results of a special reconnaissance study to identify drainages with potentially elevated concentrations of PCBs. The intention was to guide upstream source investigations. During MRP 1.0 implementation, another RMP special study monitored POC concentrations and loads at the mouths of tributaries draining to San Francisco Bay. Findings from those studies were reported in the 2014 integrated monitoring report.

During water years 2015 and 2016, the RMP conducted a second reconnaissance study. With input from CCCWP, locations were selected to provide coverage in areas where data gaps existed. Only one location was monitored by the RMP reconnaissance study in 2015-2016, at Meeker Slough in the City of Richmond. A prior assessment in December 2014 showed a PCB particle ratio of 142 ng/g, a moderate level for an urban drainage. For context, this ranks 14 of 34 locations evaluated in the 2015-2016 reconnaissance study (SFEI, 2017). In contrast, the mercury particle ratio of 1.3 µg/g was the second highest in the 2015-2016 reconnaissance study, ranking only below the Gilman Street outfall in Berkeley (mercury particle ratio of 5.3 µg/g). Clearly, there may be remaining source control opportunities for mercury in some urban settings.

To address potential source areas, passive sediment samplers were pilot tested at Meeker Slough during the 2015-2016 RMP reconnaissance study. A Hamling and a Walling type-sampler were each pilot tested. Both types of samplers rely on creating quiescent water to achieve particle settling. In the case of Meeker Slough, both devices failed because they were inadequately weighted down and, therefore, washed away when debris caught on securing lines. At eight other Bay Area locations, the passive sediment sampler pilot tests were successful. Comparison to composite samplers indicated Hamlin and Walling samplers may be useful for reconnaissance of potential source areas, though they are limited in the ability to provide information about pollutant loads.

In water year 2017, four new locations were monitored by the RMP reconnaissance study in Contra Costa County:

- Kirker Creek at the Pittsburg Antioch Highway
- East Antioch Creek near Trembath
- Refugio Creek at Tsushima Street
- Rodeo Creek at Seacliff Court

Of the four locations, only Kirker Creek had PCB particle ratios which may merit follow-up for potential source areas (289 ng/g); the rest were less than 15 ng/g, which is common in most urban settings. None of the four new locations had mercury particle ratios in excess of 0.5 µg/g. In summary, work performed by the RMP since the advent of the permit has provided five samples each for mercury and PCBs directly responsive to management information needs 1 (sources), 2 (contributions to Bay impairment), and 4 (loads and status), and indirectly supportive of progress on management information needs 3 (effectiveness) and 5 (trends).

The City of San Pablo conducted a sediment sampling program around Sutro Avenue. The motivation for collecting five new samples was to follow up on two prior samples by CCCWP which showed PCB concentrations in sediments ranging from 1,000 ng/g to nearly 5,000 ng/g. Additionally, the construction of a municipal sports complex led to redevelopment of an old industrial area, including modern stormwater treatment measures in compliance with MRP Provision C.3. Therefore, in addition to addressing potential source areas in response to management information needs 1 and 2, the investigation by the City of San Pablo may advance understanding of how redevelopment benefits reduction of the release of PCB-contaminated sediments from old industrial areas, which is directly responsive to management information need 3 (effectiveness). Thus, work performed by the City of San Pablo provides a total of five samples for PCBs responsive to management information needs 1, 2 and 3.

4.1 MRP Provision C.8.f. – Pollutant of Concern Monitoring for BMP Effectiveness

MRP Provision C.8.f. requires permittees assess inputs of POCs to San Francisco Bay from local tributaries and urban runoff, provide information to support implementation of TMDLs and other pollutant control strategies, assess progress toward achieving waste load allocations for TMDLs, and help resolve uncertainties associated with loading estimates and impairments associated with these pollutants. In particular, monitoring required by this provision must be directed toward addressing five priority POC management information needs. This project is aimed at conducting POC monitoring to address information priority need 3 (management action effectiveness); this includes providing support for planning future management actions or evaluating the effectiveness or impacts of existing management actions.

MRP permittees agreed to collectively conduct POC monitoring for management action effectiveness via BASMAA. The overall goal of this monitoring project is to evaluate the effectiveness of selected stormwater treatment controls in order to provide information needed to support RAA development. BASMAA agreed to focus this monitoring effort on two treatment options with the potential to reduce PCB discharges: hydrodynamic separators (HDS), and enhanced bioretention filters. HDS monitoring will focus on collecting sediment removed from HDS unit sumps during maintenance to evaluate the PCBs and mercury load reduction effectiveness of these units. Enhanced bioretention monitoring will focus on testing biochar media amendments to identify those which improve PCB and mercury load removal by bioretention BMPs.

In February 2017, BASMAA selected a consultant team to develop a study design and conduct POC monitoring for BMP effectiveness under the direction of a project management team consisting of members of the BASMAA Monitoring and Pollutants of Concern (MPC) Committee. Together, this project team accomplished the following tasks through the end of fiscal year 2016-2017:

- Developed an overall project schedule
- Identified the critical information needs for future RAAs in consultation with BASMAA
- Developed a draft study design
- Developed draft Sampling and Analysis Plan and Quality Assurance Project Plan
- Began outreach efforts to recruit municipalities with public HDS units to participate in the project

Over the next fiscal year (2017-2018), the project team expects to conduct all monitoring for this project and initiate data analysis and reporting. The BASMAA project management team will continue to provide oversight for the consultant team and ensure timely completion of all project deliverables. The final project report is due in December 2018.

4.2 MRP Provision C.12.e. – Evaluate PCBs Presence in Caulk/Sealants Used in Storm Drain or Roadway Infrastructure in Public Rights-of-Ways

MRP Provision C.12.e. requires permittees to collect samples of caulk and other sealants used in storm drains and between concrete curbs and street pavement and investigate whether PCBs are present in such material and in what concentrations. PCBs are most likely present in material applied during the 1970s, so the focus of this investigation is on structures installed during this era. Permittees are required to collect at least 20 composite samples throughout the permit area of caulk and sealants used in storm drains or roadway infrastructure in public rights-of way, and analyze this material for PCBs using methods which can detect a minimum PCB concentration of 200 ppb. Permittees are required to report the results of this investigation, including all data gathered, no later than the 2018 annual report.

To achieve compliance with Provision C.12.e, MRP permittees agreed to collectively conduct this sampling via BASMAA. This effort also contributes to partial fulfillment of POC monitoring required in Provision C.8.f of the MRP to address source identification, one of the five management information needs identified in the MRP. Source identification monitoring focuses on identifying which sources or watershed source areas provide the greatest opportunities for reductions of POCs in urban stormwater runoff.

In February 2017, BASMAA selected a consultant team to develop a study design for the caulk investigation and implement sampling for this investigation under the direction of a project management team consisting of members of the BASMAA MPC Committee. Together, this project team accomplished the following tasks through the end of fiscal year 2016-2017:

- Developed an overall project schedule
- Developed draft and final study designs

- Developed draft Sampling and Analysis Plan and Quality Assurance Project Plan
- Developed screening criteria to inform selection of infrastructure for sampling
- Began outreach efforts to recruit municipal partners to participate in the project

Over the next fiscal year (2017-2018), the project team expects to complete all sampling and reporting for this project. The BASMAA project management team will continue to provide oversight for the consultant team and ensure timely completion of all project deliverables, including a draft and final project report.

5 REFERENCES

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