

C/CAG

CITY/COUNTY ASSOCIATION OF GOVERNMENTS OF SAN MATEO COUNTY

*Atherton • Belmont • Brisbane • Burlingame • Colma • Daly City • East Palo Alto • Foster City • Half Moon Bay • Hillsborough • Menlo Park
Millbrae • Pacifica • Portola Valley • Redwood City • San Bruno • San Carlos • San Mateo • San Mateo County • South San Francisco • Woodside*

2:30 PM, Thursday, January 19, 2017
San Mateo County Transit District Office¹
1250 San Carlos Avenue, 2nd Floor Auditorium
San Carlos, California

STORMWATER (NPDES) COMMITTEE AGENDA

- | | | |
|--|--------------------|--------------------------|
| 1. Public comment on items not on the Agenda (presentations limited to three minutes). | Breault | No materials |
| 2. Stormwater Issues from C/CAG Board meetings: <ul style="list-style-type: none">• November – Review and approve the appointment of Ray Towne, Interim Public Works Director, to the C/CAG Stormwater Committee (Approved)• December – Review and accept the draft Countywide Stormwater Resource Plan and authorize the Executive Director to release it for public review and comment (Approved) | Fabry | No materials |
| 3. ACTION – Review and approve August 18 and November 17 Stormwater Committee meeting minutes | Fabry | Pages 1-12 |
| 4. INFORMATION – Announcements on stormwater issues <ul style="list-style-type: none">• Proposition 1 stormwater grant award recommendations• Coastal Conservancy Proposition 1 Urban Greening Grant• Unfunded mandate test claims• Caltrans trash Notice of Violation | Fabry | Verbal |
| 5. ACTION – Review and approval of approach to responding to comments on the draft Countywide Stormwater Resource Plan | Fabry/
Carter | Page 13 and presentation |
| 6. INFORMATION – Receive presentation on hydrologic and pollutant loading models being developed for San Mateo County to meet Municipal Regional Permit requirements | Fabry/
Carter | Page 14 and presentation |
| 7. INFORMATION – Receive presentation on initial assumptions and preliminary results for projecting future new and redevelopment acreage in San Mateo County | Fabry/
Erickson | Page 15 and presentation |
| 8. INFORMATION – Receive presentation on modeling assumptions for stormwater management features for Reasonable Assurance Analysis modeling | Fabry/
Carter | Pages 16-22 |
| 9. Regional Board Report | Mumley | No Materials |
| 10. Executive Director’s Report | Wong | No Materials |
| 11. Member Reports | All | No Materials |

¹ For public transit access use SamTrans Bus lines 390, 391, 292, KX, PX, RX, or take CalTrain to the San Carlos Station and walk two blocks up San Carlos Avenue. Driving directions: From Route 101 take the Holly Street (west) exit. Two blocks past El Camino Real go left on Walnut. The entrance to the parking lot is at the end of the block on the left, immediately before the ramp that goes under the building. Enter the parking lot by driving between the buildings and making a left into the elevated lot. Follow the signs up to the levels for public parking. Persons with disabilities who require auxiliary aids or services in attending and participating in this meeting should contact Mima Guilles at 650 599-1406, five working days prior to the meeting date.

C/CAG AGENDA REPORT

Date: January 19, 2017
To: Stormwater Committee
From: Matthew Fabry, Program Manager
Subject: Review and approve August 18 and November 17, 2016 Stormwater Committee meeting minutes

(For further information or questions contact Matthew Fabry at 650 599-1419)

RECOMMENDATION

Review and approve August 18 and November 17, 2016 Stormwater Committee meeting minutes, as drafted.

ATTACHMENTS

1. Draft August 18, 2016 Minutes
2. Draft November 17, 2016 Minutes

STORMWATER COMMITTEE
Regular Meeting
Thursday, August 18, 2016
2:30 p.m.

DRAFT Meeting Minutes

The Stormwater Committee met in the SamTrans Offices, 1250 San Carlos Avenue, San Carlos, CA, 2nd floor auditorium. Attendance at the meeting is shown on the attached roster. In addition to the Committee members, also in attendance were Sandy Wong (C/CAG Executive Director), Matt Fabry (C/CAG Program Manager), Jon Konnan (EOA, Inc.), Chris Sommers (EOA, Inc.), Sarah Scheidt (City of San Mateo), Azalea Mitch (Menlo Park), Keegan Black (Brisbane), Chris Valley (San Carlos), John Fuller (Daly City), and Dave Bishop (Town of Colma). Chair Breault called the meeting to order at 2:27 p.m.

1. Public comment: None
2. C/CAG staff Fabry provided an update on issues relevant to the Committee from the previous month's C/CAG Board meeting:
 - None – C/CAG did not meet in July 2016.
3. ACTION – The draft minutes from the June 16, 2016 Stormwater Committee meeting were approved unanimously (motion: Walter, second: Oskoui).
4. INFORMATION – C/CAG staff Fabry provided announcements on the following stormwater issues:
 - Pervious paving specifications – the Bay Area stormwater Municipal Regional Permit (MRP) requires submittal of these specifications with the 2016 Annual Reports. They are included in SMCWPPP's updated C.3 Technical Guidance, which was recently approved by SMCWPPP's New Development Subcommittee. Fabry will request via email that SMCWPPP's Duly Authorized Representatives approve submittal of the specifications. A committee member asked whether the specifications include maintenance recommendations. *Post-meeting note: the specifications do include maintenance recommendations.*
 - Proposition 1 stormwater grant proposals – Redwood City and the City of San Mateo worked with C/CAG to submit individual applications, each with multiple projects. A total of \$1.2M in funding was requested. Daly City and Redwood City also separately submitted Proposition 1 applications; these projects will be incorporated into the countywide Stormwater Resource Plan. Statewide, Proposition 1 applicants requested \$330M in implementation project funding but only \$85M is available. Applicants are scheduled to be notified in October and must submit within 30 days a Stormwater Resource Plan that includes any projects that received funding.
 - C/CAG stormwater staff position – Fabry noted that C/CAG has solicited for a staff position to assist him with all aspects managing SMCWPPP. The solicitation closed today and C/CAG staff will review the applications received.
 - Stormwater funding opportunities – Fabry briefed the Committee on the following and will provide further details via email:

- The California State Coastal Conservancy has issued its quarterly solicitation for applications for competitive grant funding, which includes funding for green infrastructure.
- California Urban Rivers Grant Program – Proposition 1 provides funding to the California Natural Resources Agency for green infrastructure that conserves water, buffers climate change impacts, improves water quality, water supply, public health, reduces greenhouse gas emissions and energy demand, restores and protects rivers, creeks and streams including the acquisition of resource lands. This program is currently soliciting applications for two rounds of competitive grant funding with \$9.3M available for each round. Public agencies are eligible and matching funds are not required. C/CAG is not available to assist with applications but will make the recent Proposition 1 green infrastructure applications available for use as examples. The deadline to apply for round one is October 3.
- SB 1298 is yet another attempt to secure an exemption under Proposition 218. The bill would redefine one of the Proposition 218 exemptions (in this case “sewer”) to include stormwater. Fabry encouraged committee members to have their agencies submit support letters.
- **Reminder: Annual Reporting schedule – Fabry previously emailed out a schedule and guidance package for all Annual Reporting activities. Key upcoming Annual Reporting dates are:**
 - Sept 2 - Countywide Program Annual Report emailed out for review/comment (comments due two weeks later on Sept 16).
 - Sept 1 - by this date, San Mateo County Permittees to provide their draft Annual Reports to EOA for review. EOA cannot guarantee review of any draft reports received after this date. EOA to provide comments by Sept 16 and then will upload final Annual Reports received by Sept 27).
 - Sept 30 - Countywide Program and Permittee final Annual Reports to be uploaded to Regional Water Board ftp site by this date.

5. INFORMATION – Jon Konnan (EOA, Inc.) provided a presentation on the current status of SMCWPPP’s efforts to assist San Mateo County Permittees with MRP requirements to identify PCBs management areas and controls and associated 2015/16 annual reporting. Konnan noted that PCBs were widely used from 1930s through 1970s and spread around in the environment. They are widely distributed across the urban landscape, making them challenging to control. The MRP requires a countywide PCBs load reduction in stormwater runoff of 370 grams/year by the end of the permit term. Of this, a 60 grams/year reduction is required by June 30, 2018 and a 15 grams/year reduction via green infrastructure is required by the end of the permit term. Taking credit for PCBs loads reductions associated with existing and planned activities such as redevelopment (and associated site abatement and C.3 treatment) and any enhanced stormwater conveyance cleanouts (e.g., channel dredging) in old urban (and especially old industrial) land uses may be an important part of the strategy to meet these requirements in the most cost-effective manner. Credit toward load reductions required this permit term will most likely be calculated using a regional “interim accounting” tool that the Bay Area Stormwater Management Agencies Association (BASMAA) has developed. It is called “interim” because it uses simple methods, parts of which will eventually will be replaced by a more robust modeling approach that will be developed via a “Reasonable Assurance Analysis” required by the MRP.

The major types of new PCBs controls anticipated for this permit term are:

- Source property referral or abatement (the MRP allows for a 50% credit at time of referral with O&M measures required in adjacent street or storm drain infrastructure).
- Green infrastructure, including stormwater treatment at redevelopment sites (e.g., LID via MRP Provision C.3) and retrofit of public right-of-way (e.g., bioretention curb extensions).
- Management of PCBs in building materials such as caulks during demolition.

SMCWPPP previously worked with municipal staff to perform a desktop screening of every San Mateo county parcel (based on land use and site conditions) to identify and prioritize parcels and catchments of interest for PCBs. The screening results have been and continue to be used to inform sediment and stormwater runoff field monitoring programs that are designed to attempt to identify catchments of concern and source properties. This information then informs ongoing planning of control measures to reduce PCBs loads.

The Countywide Program will continue working with local agencies in San Mateo County to conduct investigations to attempt to identify source properties and evaluate other possible controls, and to begin to develop scenarios to meet the required load reductions, in coordination with development of municipal green infrastructure plans. The Countywide Program will also continue to evaluate funding options for implementing PCBs and mercury controls.

Konnan described an example of a source property investigation in San Mateo County. Hot sediment samples (i.e., elevated PCBs) were collected at the bottom of catchment. Tracing different branches of the storm drain lines led to hot manhole sediment samples in one area and a very hot sediment sample from an inlet on a private property connected to the manhole via a lateral. A review of historic records revealed evidence that PCBs were stored, used and released on the property resulting in subsurface soil contamination, which was cleaned up to some level many years ago. Currently there is no indication of above-ground sources at the property which suggests that remaining contaminated subsurface soils may be migrating into the storm drain, possibly through cracks or breaks in underground piping.

A report is due to the Regional Water Board (RWB) by September 30, 2016 with descriptions and locations of control measures including the “Watershed Management Areas” (WMAs) they are located within, schedules, and roles and responsibilities for implementation. This information must be updated a year from now and annually thereafter, along with reporting load reductions. Although some WMAs are identified via field monitoring, any catchment that contains GI/LID that could treat PCBs or mercury will be identified as a WMA, per a request from RWB staff. The report will include a table and figure for each agency showing WMAs within its jurisdiction and controls identified or planned to-date within each WMA. A draft of the report will be distributed to Permittees by September 9 for their review.

In response to Committee member questions, Konnan explained that in order to take pollutant load reduction credit for desilting a channel, chemical analysis results showing PCBs and/or mercury would be needed and the desilting would need to be conducted at an enhanced level relative to activities before the TMDL baseline year (2005).

6. INFORMATION – Chris Sommers (EOA, Inc.) provided a presentation on the current status of SMCWPPP’s efforts to assist San Mateo County Permittees to comply with trash load reduction

requirements in the MRP and associated 2015/16 annual reporting. The MRP requires the following trash load reductions:

- 40% by 2014.
- 60% by July 1, 2016 (this is a non-enforceable performance guideline rather than a mandatory reduction).
- 70% by July 1, 2017.
- 80% by July 1, 2019.
- 100% or no adverse impact to receiving waters by trash by July 1, 2022 (the MRP states that this is a goal).

There are also requirements for minimum area treated by full capture systems, implementing a receiving water monitoring program, conducting annual creek/shoreline cleanups, and maintaining a long-term trash load reduction plan. Trash load reductions are based on a 2009 baseline (derived via trash generation mapping) vs. current trash generation, which is determined by the extent of full capture system treatment and, for other actions, on-land visual assessment results. Permittees may also receive limited offsets of part of their trash load reduction requirement for demonstrable reductions via source controls (e.g., reusable bag and expanded polystyrene food service ware ordinances) and additional creek and shoreline cleanups.

All San Mateo County Permittees have met the requirement for treating a minimal area treated by full capture systems. On-land visual assessment is the method used to account for trash reductions from actions other than full capture systems. SMCWPPP has conducted over 1,000 assessments to-date in San Mateo County, covering >190 miles of streets/sidewalks.

Annual Reports are due September 30 and are currently under development by San Mateo County Permittees with assistance from SMCWPPP (via EOA). Based on review of the data available to-date, at least 12 of 21 Permittees have achieved a greater than 60% reduction. The trash load reductions for the other Permittees are still under review. Any Permittees that have not achieved a 60% reduction by July 1, 2016 must submit an "action plan" with their Annual Report that describes the actions that will be taken to achieve 70% reduction by July 1, 2017.

A committee member asked whether San Mateo County Permittees are on track for achieving the 70% trash load reduction requirement. Sommers replied that most Permittees are on track but a few Permittees are challenged for various reasons. Sommers noted that installing full capture devices is the most certain path to compliance.

7. ACTION – C/CAG staff Fabry reviewed approaches for developing a pre-demolition building survey standard to reduce loads of PCBs to municipal storm drains and asked the Committee to identify its recommended approach. The MRP requires that Permittees develop and implement (or cause to be developed and implemented) an effective protocol for managing materials with PCBs concentrations of 50 ppm or greater in applicable structures at the time such structures undergo demolition, so that PCBs do not enter municipal storm drain systems. This protocol is an important aspect of the overall required PCBs control program since the MRP stipulates that implementation of the protocol would result in a load reduction credit equivalent to two-thirds of the total reduction mandated for this permit term. On

behalf of the MRP Permittees, BASMAA is currently conducting a project to scope development of regional tools and guidance to assist Permittees with adopting and implementing the protocol.

As part of the tools and guidance, BASMAA anticipates developing a “standard” for identification of PCBs-containing materials in buildings. The standard would likely be adopted by municipal ordinance and used during pre-demolition PCBs building surveys. The approach for development of the standard has been the subject of much recent debate among BASMAA and Permittee representatives. The two basic options are 1) to develop the standard locally or 2) through a national process such as through the American Society of the International Association for Testing and Materials (ASTM), which may provide more credibility and certainty for local agencies in mandating a control program on applicable project proponents. One of the primary concerns with pursuing an ASTM standard is whether it could be completed quickly enough to ensure compliance with the MRP requirement for Permittees to implement control programs by July 1, 2019.

It was also noted that the City of San Carlos has already begun implementing efforts to address PCBs in building materials during demolition. Chris Valley, the San Carlos building official, noted the following:

- San Carlos has a lot of redevelopment happening now and wanted to jump on this ASAP.
- San Carlos has no forms or procedures related to PCBs in building materials, they simply added “test for PCBs” (no other details) to a pre-demo checklist used during meetings with developers.
- The response they have gotten from contractors was: “I’ll do it or we already do that.”
- PCBs were found in a tilt-up building that may have been built in the 1960s.
- Valley encouraged a simple approach regionally that would not add to the burden for building officials and noted developers would appreciate that too.

Feedback from Committee members included the following:

- Engage County Environmental Health (CEH) and building officials and start by developing a local process that is simpler and less expensive. If unsuccessful or unacceptable then ASTM could be a fallback.
- Consider piggybacking on BAAQMD program with CEH a secondary choice.
- Don’t miss opportunities. San Carlos started to jump on this now because they would miss many redevelopment projects if they waited until the July 2019 MRP implementation deadline.
- Overall, Committee members implied that a simpler local approach would be desirable and stressed the importance of consistency among agencies in implementing the program. Without consistency there would likely be more pushback from developers.

Chair Breault asked if there are formal qualifications (i.e., a license) that a contractor should have to perform a PCBs survey. Konnan responded that there are for asbestos but there is nothing analogous for PCBs.

8. ACTION – C/CAG staff Fabry asked Committee members for a recommendation regarding C/CAG support for member agency unfunded mandate test claims on MRP requirements. Subsequent to the RWB issuing the MRP in 2009, C/CAG collaborated with other Bay Area stormwater programs to develop model documents to support Permittees in filing test claims with the Commission on State Mandates

(Commission). Identical test claims were filed by all but one of C/CAG's member agencies, alleging a reimbursable state mandate in regard to the MRP's trash, water quality monitoring, and mercury/PCBs diversion to sanitary sewer requirements. Similar actions took place in Alameda and Santa Clara Counties. Contra Costa and Solano County permittees chose not to file test claims.

Prior to Bay Area test claims, stormwater permit-related test claims were filed by permittees in Los Angeles and San Diego Counties. These claims were decided by the Commission and subsequently appealed back and forth through the courts by the State and claimants, to the point the Los Angeles test claim is currently under review by the State Supreme Court, with a decision expected this month. C/CAG has collaborated with the Alameda Countywide Program to provide amicus briefs on these cases as they have progressed through the courts under joint representation by the law firm of Meyers Nave. The San Diego appeal is currently on hold pending the Los Angeles decision. The Bay Area test claims have also been on hold at the Commission pending the Los Angeles decision and due to a backload of claims. The Commission recently notified Bay Area claimants that hearings on their claims have been tentatively scheduled in anticipation of the Supreme Court ruling and clearing of its backload, with the San Mateo claims slated for January 27, 2017.

Meyers Nave, at the request of the Alameda Countywide Program, provided a proposal to provide legal representation services for the 2010 San Mateo and Alameda test claims through a decision by the Commission, for a cost not-to-exceed \$70,000. Should C/CAG partner with the Alameda Countywide Program, it is anticipated that legal costs (which would likely be further negotiated) would be split evenly between the two programs. Fabry noted C/CAG staff will need to further evaluate whether costs for this effort can be covered with the existing 2016-17 budget or whether a budget change would need to be requested of the C/CAG Board. Committee chair Breault agreed with the C/CAG staff recommendation that C/CAG continue providing legal representation support for its member agencies for the time being.

The Meyers Nave proposal also provided a cost estimate of \$275,000 for supporting San Mateo and Alameda permittees in filing new test claims related to MRP 2.0 requirements. A decision on whether to file new claims would be influenced by the outcome of the California Supreme Court decision on the Los Angeles test claim. If the court rules in favor of the State, it may make filing new claims pointless. Chair Breault agreed with the C/CAG staff recommendation to wait for the Supreme Court decision to further weigh options.

9. Regional Board Report: NONE.

10. Executive Director's Report: NONE.

11. Member Reports: NONE.

Chair Breault adjourned the meeting at 4:23 p.m.

2016 Stormwater Committee Roster			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Agency	Representative	Position												
Atherton	Vacant	Public Works Director												
Belmont	Afshin Oskoui	Public Works Director	X	O		X		X		X				
Brisbane	Randy Breault	Public Works Director/City Engineer		O		X		X		X				
Burlingame	Syed Murtuza	Public Works Director	X			O		X		X				
Colma	Brad Donohue	Director of Public Works and Planning		X				X		O				
Daly City	Patrick Sweetland	Director of Water & Wastewater	O	O		O		O		O				
East Palo Alto	Kamal Fallaha	City Engineer	O	O		O								
Foster City	Jeff Moneda	Public Works Director	X	X		X		X		X				
Half Moon Bay	Peykan Abbassi	City Engineer				X		X						
Hillsborough	Paul Willis	Public Works Director	X	X		X		X		X				
Menlo Park	Justin Murphy	Public Works Director	X	O		X		X						
Millbrae	Ray Chan	Public Works Director	X					O						
Pacifica	Van Ocampo	Public Works Director/City Engineer		X		X								
Portola Valley	Howard Young	Public Works Director												
Redwood City	Saber Sarwary	Supervising Civil Engineer	X	X				X		X				
San Bruno	Jimmy Tan	City Engineer	X	X				X		X				
San Carlos	Jay Walter	Public Works Director	X	X		X		X		X				
San Mateo	Brad Underwood	Public Works Director	X	O		X		X						
South San Francisco	Brian McMinn	Public Works Director	X	O		X		X		X				
Woodside	Vacant													
San Mateo County	Jim Porter	Public Works Director	O	X		O		X						
Regional Water Quality Control Board	Tom Mumley	Assistant Executive Officer		O		O								

"X" - Committee Member Attended

"O" - Other Jurisdictional Representative Attended

STORMWATER COMMITTEE
Regular Meeting
Thursday, November 17, 2016
1:15 p.m.

DRAFT Meeting Minutes

The Stormwater Committee met in the SamTrans Offices, 1250 San Carlos Avenue, San Carlos, CA, 2nd floor auditorium. Attendance at the meeting is shown on the attached roster. In addition to the Committee members, also in attendance were Sandy Wong (C/CAG Executive Director), Matt Fabry (C/CAG Program Manager), Reid Bogert (C/CAG Stormwater Program Specialist), Jon Konnan (EOA, Inc.), Sandy Mathews (LWA), Steve Carter (Paradigm Environmental), Vicki Sherman (Redwood City), John Fuller (Daly City), Steven Machida & Sarah Scheidt (City of San Mateo), and Michelle Daher (City of East Palo Alto), and Erika Powell (San Mateo County). Chair Breault called the meeting to order at 1:22 p.m.

1. Public comment: None

2. C/CAG staff Fabry provided an update on issues relevant to the Committee from the previous C/CAG Board meetings:

- August – The Board approved the appointment of Ray Chan, Director of Public Works, to represent the City of Millbrae on the Stormwater Committee.
- September – The Board approved a resolution authorizing the C/CAG Executive Director to enter into agreements with the Alameda County Clean Water Program and the law firm of Meyers Nave for joint legal representation of stormwater unfunded mandate test claims filed by C/CAG member agencies, at a cost not to exceed \$35,000 for Fiscal Year 2016-17.
- October:
 - The Board approved the appointment of Sean Rose, Director of Public Works, to represent the Town of Woodside on the Stormwater Committee.
 - The Board approved a resolution authorizing the C/CAG Executive Director to execute a Task Order with Urban Rain|Design in an amount not to exceed \$86,745 for technical support services to the Countywide Water Pollution Prevention Program for Fiscal Year 2016-17.

3. ACTION – The draft minutes from the June 16, 2016 Stormwater Committee meeting were not approved because the committee lacked a quorum at the time this agenda item was taken up.

4. INFORMATION – C/CAG staff Fabry provided announcements on the following stormwater issues:

- New C/CAG stormwater staff – Fabry introduced Reid Bogert, who was recently hired to fill a new C/CAG staff position: “stormwater program specialist.” Bogert will assist Fabry with all aspects of managing the Countywide Water Pollution Prevention Program.
- Proposition 1 stormwater grant awards – Redwood City and the City of San Mateo worked with C/CAG to submit individual applications, each with multiple projects. These projects are included in the countywide Stormwater Resource Plan. Daly City and Redwood City also separately submitted Proposition 1 applications; if funded these projects will be incorporated into the countywide

Stormwater Resource Plan. Applicants were scheduled to be notified in October but the State Water Board postponed the announcement.

- MRP 2.0 petition – Fabry provided an update on various petitions requesting that the State Water Resources Control Board (State Water Board) review the Regional Water Board’s reissuance of the Bay Area stormwater Municipal Regional Permit (MRP). C/CAG’s Countywide Water Pollution Prevention Program signed on as a co-petitioner with the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) on behalf of C/CAG’s member agencies. Other Bay Area countywide stormwater programs and municipalities also submitted petitions. The State Water Board will set its own schedule for review of the various petitions rather than reviewing within 270 days. Petitioners have filed to place their petitions in abeyance.
- Unfunded mandate test claims – Fabry provided an update on the unfunded mandate test claims on MRP requirements. Subsequent to the RWB issuing the MRP in 2009, C/CAG collaborated with other Bay Area stormwater programs to develop model documents to support Permittees in filing test claims with the Commission on State Mandates (Commission). Identical test claims were filed by all but one of C/CAG’s member agencies, alleging a reimbursable state mandate in regard to the MRP’s trash, water quality monitoring, and mercury/PCBs diversion to sanitary sewer requirements. Similar actions took place in Alameda and Santa Clara Counties. The State Supreme Court recently reached a decision on a stormwater permit-related test claim previously filed by permittees in Los Angeles County and decided by the Commission. The State Water Board has asked the Supreme Court to reconsider the decision and a hearing is set for May 2017. C/CAG is continuing to share costs with the Alameda Countywide Program for joint representation by the law firm of Meyers Nave.
- Upcoming stormwater funding opportunities – Fabry briefed the Committee on the following opportunities:
 - The California Natural Resources Agency has \$80 million in funding for its Urban Greening Program, which is specifically for green infrastructure projects that reduce greenhouse gas emissions and provide multiple benefits. Grants will be awarded on a competitive basis. Draft guidelines are available here: <http://resources.ca.gov/grants/wp-content/uploads/2016/09/Urban-Greening-Draft-Guidelines.pdf>
 - The California State Coastal Conservancy has Bay Area specific funding for a competitive grant program for urban greening. More details will be announced at the December 9 Green Infrastructure Leadership Conference (see next item).
- December 9 Green Infrastructure Leadership Conference – this conference will be sponsored by several parties including BASMAA, the California State Coastal Conservancy, and the San Francisco Estuary Partnership. Speakers will include the mayor of the City of San Mateo and Supervisor Chris Pine. In response to a question from a committee member Fabry noted a roundtable agenda item at the conference should include discussion of funding challenges.

5. ACTION – Fabry and Steve Carter (Paradigm Environmental) provided a presentation on the Countywide Stormwater Resource Plan (SRP). C/CAG contracted with Paradigm Environmental (via subcontract to Larry Walker Associates) to develop the SRP in accordance with requirements promulgated in SB 985 and guidance from the State Water Board. SRPs are now required in order to compete for voter-approved bond funds for stormwater or dry weather capture projects. On October 17, C/CAG released an administrative draft of the SRP to its member agencies for review, with comments due November 11. Carter summarized parts of the SRP that had been presented to the Stormwater Committee at previous meetings, including information on screening and prioritization of project opportunities (regional, green street and LID) and project concepts that were developed

for each member agency. Carter then discussed the strategy for implementing the SRP and some associated web-based tools that are under development for Permittees to use to help with green infrastructure planning aimed at helping meet TMDL wasteload allocations for PCBs and mercury. Carter noted that comments received on the draft SRP were generally editorial and provided additional information and suggestions for improving the narrative and historic facts. Fabry noted Section 3 (interface with local agencies) and Section 5 (public outreach) of the SRP are not yet completed. The next major step before finalizing the document is to engage and seek input from the public and interested stakeholders. The Committee unanimously agreed to recommend that the C/CAG Board accept the SRP (as revised in response to member agency comments) as a formal public review draft at its December 8 meeting (motion: Porter, second: Van Ocampo).

6. INFORMATION – Fabry and Carter provided a presentation on watershed and pollutant control modeling efforts related to three parallel and integrated planning efforts: the SRP, Reasonable Assurance Analysis (RAA), and Green Infrastructure Plan development. An important overarching goal is to eventually help Permittees determine how much green infrastructure will be needed over the long-term in public areas to meet MRP and Total Maximum Daily Load (TMDL) requirements. One challenge is to identify the most cost-effective locations to implement green infrastructure.

C/CAG contracted with Paradigm Environmental to perform a RAA in accordance with MRP requirements to demonstrate local agency Green Infrastructure Plans will achieve mandated load reductions in mercury and PCBs within prescribed timelines. Paradigm Environmental is developing models to support the RAA and green infrastructure planning. Carter reviewed the modeling approaches including development of hydrologic and pollutant loading and stormwater capture models for San Mateo County. The hydrologic modeling is applying data from the Guadalupe River watershed due to a lack of sufficient data (e.g., stream flow gauges) for urban areas in San Mateo County, which has led to some challenges in calibrating sediment transport processes. Carter noted the models will eventually be used for green infrastructure optimization but separate RAA work will be needed to address other types of controls (e.g., source controls such as managing PCBs in building materials during demolition). Carter will continue to work with C/CAG staff and the Committee to vet the modeling assumptions as the models are further developed and calibrated.

7. Regional Board Report: NONE.

8. Executive Director's Report: C/CAG Executive Director Sandy Wong was no longer present at the meeting for this agenda item but C/CAG staff Fabry noted that the C/CAG Board approved formation of a Water Coordinating Committee as a formal C/CAG committee, consistent with the recommendation of an ad-hoc Water Committee. The committee would look for opportunities for collaboration, communication, and coordination on integrated water issues related to stormwater, flooding, and sea level rise. The committee will have five members, all elected officials, with one representing coastside municipalities, one each representing north, central, and southern Bayside municipalities, respectively, and one from the Board of Supervisors. Solicitations for committee members will go to municipal elected officials countywide.

9. Member Reports: NONE.

Chair Breault adjourned the meeting at 2:52 p.m.

2016 Stormwater Committee Roster			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Agency	Representative	Position												
Atherton	Vacant	Public Works Director												
Belmont	Afshin Oskoui	Public Works Director	X	O		X		X		X			X	
Brisbane	Randy Breault	Public Works Director/City Engineer		O		X		X		X			X	
Burlingame	Syed Murtuza	Public Works Director	X			O		X		X				
Colma	Brad Donohue	Director of Public Works and Planning		X				X		O				
Daly City	Patrick Sweetland	Director of Water & Wastewater	O	O		O		O		O			O	
East Palo Alto	Kamal Fallaha	City Engineer	O	O		O							O	
Foster City	Jeff Moneda	Public Works Director	X	X		X		X		X			X	
Half Moon Bay	Peykan Abbassi	City Engineer				X		X						
Hillsborough	Paul Willis	Public Works Director	X	X		X		X		X			X	
Menlo Park	Justin Murphy	Public Works Director	X	O		X		X		O			X	
Millbrae	Ray Chan	Public Works Director	X					O						
Pacifica	Van Ocampo	Public Works Director/City Engineer		X		X							X	
Portola Valley	Howard Young	Public Works Director												
Redwood City	Saber Sarwary	Supervising Civil Engineer	X	X				X		X			O	
San Bruno	Jimmy Tan	City Engineer	X	X				X		X			X	
San Carlos	Jay Walter	Public Works Director	X	X		X		X		X			X	
San Mateo	Brad Underwood	Public Works Director	X	O		X		X					O	
South San Francisco	Ray Towne	Public Works Director	X	O		X		X		X			X	
Woodside	Sean Rose	Public Works Director												
San Mateo County	Jim Porter	Public Works Director	O	X		O		X					X	
Regional Water Quality Control Board	Tom Mumley	Assistant Executive Officer		O		O								

"X" - Committee Member Attended

"O" - Other Jurisdictional Representative Attended

C/CAG AGENDA REPORT

Date: January 19, 2017

To: Stormwater Committee

From: Matthew Fabry, Program Manager

Subject: Review and approval of approach to responding to comments on the draft Countywide Stormwater Resource Plan.

(For further information or questions contact Matthew Fabry at 650 599-1419)

RECOMMENDATION

Review and approval of approach to responding to comments on the draft Countywide Stormwater Resource Plan.

BACKGROUND

C/CAG contracted with Paradigm Environmental (via subcontract to Larry Walker & Associates) to develop a countywide Stormwater Resource Plan (SRP) in accordance with requirements promulgated in [SB 985](#) (Pavley, 2014) and [guidance](#) from the State Water Resources Control Board (State Board). SRPs are now required in order to compete for voter-approved bond funds for stormwater or dry weather capture projects. C/CAG staff has presented various pieces of the SRP to the Stormwater Committee in previous meetings, including at the November 2016 Committee meeting at which the Committee voted to recommend to the C/CAG Board approval of the revised Administrative Draft as a public review draft. The C/CAG Board acted on the Stormwater Committee's recommendation at its December 8 meeting, approving the draft SRP for release for public review and comment through January 13.

C/CAG staff and consultants will provide an overview of the three public workshops held in early January on the draft SRP as well as comments received during the public comment period. Given that several Proposition 1 stormwater grant proposals from San Mateo municipalities were recommended for funding by the State Water Board in early December, staff needs to finalize the SRP and submit it to the State Water Board by March 1 to ensure those proposals remain eligible for funding. Staff will present its recommended approach to responding to the comments received during the public comment period and is seeking Stormwater Committee approval of the approach. Staff will then revise the document consistent with the approved approach and bring the final draft SRP to the C/CAG Board on February 9 with a recommendation for approval.

ATTACHMENTS

None

C/CAG AGENDA REPORT

Date: January 19, 2017

To: Stormwater Committee

From: Matthew Fabry, Program Manager

Subject: Receive presentation on hydrologic and pollutant loading models being developed for San Mateo County to meet Municipal Regional Permit requirements.

(For further information or questions contact Matthew Fabry at 650 599-1419)

RECOMMENDATION

Receive presentation on hydrologic and pollutant loading models being developed for San Mateo County to meet Municipal Regional Permit requirements.

BACKGROUND

C/CAG contracted with Paradigm Environmental to perform a Reasonable Assurance Analysis (RAA) in accordance with Municipal Regional Permit requirements to demonstrate local agency Green Infrastructure Plans will achieve mandated reductions in mercury and PCBs (polychlorinated biphenyls) within prescribed timelines, as required by the Total Maximum Daily Loads (TMDLs) adopted for those pollutants. Paradigm Environmental is developing models to support the RAA and green infrastructure planning.

Staff and representatives of Paradigm Environmental provide an initial presentation summarizing the modeling development and calibration efforts at the November 2016 Committee meeting. At that time, Paradigm staff indicated calibration was still underway to better refine the model. Paradigm staff will provide an updated presentation with calibrated model results for flow and sediment, mercury, and PCBs transport for the Bayside of San Mateo County.

ATTACHMENTS

None

C/CAG AGENDA REPORT

Date: January 19, 2017

To: Stormwater Committee

From: Matthew Fabry, Program Manager

Subject: Receive presentation on initial assumptions and preliminary results for projecting future new and redevelopment acreage in San Mateo County.

(For further information or questions contact Matthew Fabry at 650 599-1419)

RECOMMENDATION

Receive presentation on initial assumptions and preliminary results for projecting future new and redevelopment acreage in San Mateo County.

BACKGROUND

As part of the Municipal Regional Permit (MRP) requirements to achieve specified load reductions in mercury and PCBs (polychlorinated biphenyls) by the end of the permit term and 2040 via green infrastructure, it is important to understand how much green infrastructure is anticipated to occur on private lands via new and redevelopment in accordance with Provision C.3 requirements in the MRP. C/CAG contracted with Community Design + Architecture (CD+A) to support member agencies in developing Green Infrastructure Plans, and part of that support is to develop projections for the amount of new and redevelopment likely to occur during these timeframes.

CD+A will provide a presentation summarizing the initial assumptions and preliminary results of developing these projections. Underlying assumptions for these projections are important and C/CAG staff wants to ensure municipal buy-in before finalizing the approach. As such, staff plans to distribute the assumptions to all member agencies for review and comment following Committee input, and seeking formal Stormwater Committee approval at the February meeting.

ATTACHMENTS

None

C/CAG AGENDA REPORT

Date: January 19, 2017

To: Stormwater Committee

From: Matthew Fabry, Program Manager

Subject: Receive presentation on modeling assumptions for stormwater management features for Reasonable Assurance Analysis modeling.

(For further information or questions contact Matthew Fabry at 650 599-1419)

RECOMMENDATION

Receive presentation on modeling assumptions for stormwater management features for Reasonable Assurance Analysis modeling.

BACKGROUND

The Municipal Regional Permit (MRP) requires permittees to develop Reasonable Assurance Analyses demonstrating Green Infrastructure Plans will achieve specified load reductions in mercury and PCBs (polychlorinated biphenyls) by the end of the permit term and 2040. To do this, C/CAG's consultant, Paradigm Environmental, will be modeling numerous green infrastructure implementation scenarios to establish the most cost-effective combination of controls that will achieve San Mateo County's share of the mandated load reduction. This requires informed decisions regarding the specific design features and cost functions of the types of stormwater controls being modeled.

Paradigm Environmental staff developed the attached memorandum describing the proposed assumptions for these items and will provide an overview of the memorandum at the meeting for Committee discussion. C/CAG staff wants to ensure municipal buy-in before finalizing the modeling approach. As such, staff will distribute Paradigm Environmental's memorandum to all member agencies for review and comment, and seek formal Stormwater Committee approval at the February meeting.

ATTACHMENTS

1. January 12, 2017 Paradigm Environmental memorandum, "BMP Modeling Assumptions for the Reasonable Assurance Analysis"

To: Matt Fabry, PE, San Mateo Countywide Water Pollutant Prevention Program
From: Stephen Carter, PE, Paradigm Environmental
cc: Sandy Mathews, Larry Walker Associates
Date: 1/12/2017
Re: BMP Modeling Assumptions for the Reasonable Assurance Analysis

The following technical memorandum outlines proposed modeling assumptions which will be used to represent BMP simulation processes in the Reasonable Assurance Analysis (RAA) model representing San Mateo County watersheds. The RAA model will be used to establish relationships between the overall amount of green infrastructure (GI) implementation and the quantity of runoff volume and the overall amount of GI needed to achieve incremental reductions of mercury and PCBs loadings through stormwater capture, infiltration, and/or treatment. The RAA will establish a robust quantitative linkage between runoff volumes managed with GI and mercury and PCBs loads to demonstrate phased reductions to meet TMDL wasteload allocations. The Countywide Stormwater Resource Plan (SRP) developed by C/CAG identified suitable locations for three types of BMPs through a desktop analysis using screening criteria to identify BMP opportunity. That assessment of spatial opportunity will be used in conjunction with the physical and process parameters proposed in the following sections to represent GI, low impact development (LID), and regional stormwater capture projects in the RAA model.

1 MODELING ASSUMPTIONS

Due to the requirements outlined by the Municipal Regional Stormwater Permit (MRP) that affect the design of LID for new and redevelopment (Provision C.3), the modeling assumptions used in the RAA will reflect the minimum requirements of the permit. The MRP outlines several methods for sizing of stormwater treatment projects that will be used in the RAA. The San Mateo County Watershed Pollution Prevention Program (SMCWPPP) has also developed a technical guidance document tailored for San Mateo County that aids developers of stormwater projects to address Provision C.3 requirements. This guidance document specifies preferred methods and design criteria for stormwater treatment systems that fulfill permit requirements while addressing local standards. The methods suggested by the SMCWPPP technical guidance document are proposed as the basis for modeling assumptions that will be used in development of the RAA.

Modeling assumptions are organized into the subsequent sections according to the three project types identified in the SRP:

- Regional Stormwater Capture Projects
- Green Streets (bioretention, permeable pavement)
- Low Impact Development

1.1 Regional Stormwater Capture Projects

Regional stormwater capture projects are assumed to be subsurface infiltration systems. These types of projects are typically implemented on publicly-owned parcels below parks, open space and/or recreational facilities. Depending on specific site constraints, these facilities can capture stormwater

diverted from adjacent channels or storm drains which often results in increased captured drainage area. These situations require inclusion of a diversion structure and may require pumping at additional cost. Modeling assumptions regarding diversion will be determined on a case-by-case basis for each regional project. Based on the SMCWPPP technical guidance, these facilities will be represented using a storage depth that facilitates a 72-hour drain-down time. The modeling assumptions for regional projects are listed below in Table 1.

Table 1. Regional Projects on Public Parcels Modeling Assumptions

Groups	Item Description	Value	Units	Source ^[1] ^[2]
Storage	Design Drainage Area	<i>Sized for capture of 80% of the annual runoff volume</i>		[1] C.3.d.i.(1).(b) pg.22
	BMP Footprint			
	Storage Depth	3	ft	[2] Section 6.11 pg.6-55
	Minimum Infiltration	0.5	in/hr	[2] Section 6.11 pg.6-55
Diversion	<i>Diversion assumptions will be made on a case-by-case basis for each regional project</i>			

[1] Municipal Regional Stormwater Permit Order No. R2-2015-0049

[2] SMCWPPP C.3 Stormwater Technical Guidance

1.2 Green Streets

Green streets are implemented in the public right-of-way and typically capture runoff contributed from the street and adjacent parcels. Suitable green street locations were identified through a screening process during the development of the SRP. Green streets will be represented using a combination of bioretention and permeable pavement. Conceptually these two components are implemented in unison, although permeable pavement can be limited or removed in areas where implementation is not feasible. The modeling assumptions for both the bioretention and permeable pavement components of green streets are listed in Table 2.

Both bioretention and permeable pavement consist of three components: surface layer, media layer, and underdrain layer. The surface layer consists of captured runoff that is allowed to pond above the treatment surface and is treated as storage. The media layer is the primary component of treatment and storage. The media layer must be a minimum of 18 inches for bioretention (SMCWPPP 2016). For permeable pavement, the media layer depth is dependent on expected traffic load, runoff depth, and soil conditions (Caltrans 2014). According to design guidance in San Francisco, a minimum depth between 18 and 28 inches is required, depending on soil conditions and expected traffic load (SFPUC 2016). A depth of 2 feet will be used for permeable pavement as an intermediate assumption to account for a variety of street usage and expected runoff depths. The media infiltration rate should not be a limiting factor during design and a rate of 10 inches per hour will be assumed, compared to the minimum of 5 inches per hour specified by the MRP. Underdrains are typically required for either component when the underlying soils have low infiltration below a specific threshold. In most of San Mateo County, underdrains will generally be required unless allowed by the local jurisdiction on a case-by-case basis depending on soil permeability (SMCWPPP 2016). According to several regional design resources across the United States, underdrains should be included when underlying soils have an infiltration rate below 0.5 inches per hour (DOEE 2013; Virginia DEQ 2011; SF DPW Order No. 178,493). For bioretention, the underdrain layer can be a

minimum of 12 inches (SMCWPPP 2016; SFPUC 2016). For permeable pavement, an underdrain can have a diameter of at least 4 inches with a minimum 4 inches of aggregate on all sides (SMCWPPP 2016), resulting in an underdrain layer of 12 inches. Underdrains in permeable pavements are typically placed above the media layer (the primary component of storage) to maximize infiltration (BASMAA 2015; SMCWPPP 2016). Pollutant removal estimates for pollutants of concern, PCBs and Mercury, are from influent and underdrain concentration statistics reported by BASMAA.

Table 2. Green Street Modeling Assumptions

Groups	Item Description	Value	Units	Source ^{[1] [2] [3]}
Bioretention				
Surface	Design Drainage Area	<i>Sized for runoff from 0.2 inches per hour intensity rainfall event</i>		[1] C.3.d.i.(2).(c) pg.22
	BMP Footprint	<i>4% of drainage area</i>		[2] Section 5.1 pg.5-6
	Ponding Depth	6	in	[2] Section 6.1 pg.6-4
Media	Depth	1.5	ft	[2] Section 6.1 pg.6-5
	Soil Porosity	0.35	-	[3] Appendix A
	Soil Infiltration Rate	10	in/hr	[1] C.3.c.i.(2).(c).(ii) pg.20
Underdrain	Depth	1	ft	[2] Section 6.1 pg.6-5, [3]
	Media Porosity	0.4	-	[3] Appendix A
	Pollutant Filtration	<i>98% PCBs / 45% Hg Reductions</i>		[4] Table 4-2, pg.36
	Background Infiltration	<i>Match underlying soils</i>		
Permeable Pavement				
Surface	Design Drainage Area	<i>Sized for capture of 80% of the annual runoff volume</i>		[1] C.3.d.i.(1).(b) pg.22
	BMP Footprint	<i>1/3 of the drainage area</i>		[2] Section 6.6 pg.6-33
	Ponding Depth	0.12	in	
Underdrain	Depth	1	ft	[2] Section 6.6 pg.6-33
	Media Porosity	0.4	-	[3] Appendix A
	Pollutant Filtration	<i>No significant filtration through underdrain</i>		
Media	Depth	2	ft	[5] Appendix B
	Media Porosity	0.4	-	[3] Appendix A
	Media Infiltration Rate	10	in/hr	[1] C.3.c.i.(2).(c).(ii) pg.20
	Background Infiltration	<i>Match underlying soils</i>		

[1] Municipal Regional Stormwater Permit Order No. R2-2015-0049

[2] SMCWPPP C.3 Stormwater Technical Guidance

[3] Upper Los Angeles River EWMP

[4] BASMAA "White Paper" on Provision C.3 in MRP 2.0

[5] SFPUC San Francisco Stormwater Management Requirements and Design Guidelines

1.3 Low Impact Development

Assumptions for LID will be incorporated in the model and linked to future projections of new and re-development to represent implementation of Provision C.3. Additional LID may be considered on public parcels that are not suitable for regional projects, as identified in the SRP. LID typically treats runoff generated onsite. This means that the drainage area for LID is typically no larger than the parcel size. In the RAA model these features will be represented as bioretention, though implementation will vary with individual site constraints. The components for bioretention are discussed in Section 1.2. The modeling assumptions for LID are listed in Table 3. Underdrains are typically required for bioretention when the underlying soils have low infiltration below a specific threshold. According to several regional design resources across the United States, underdrains should be included when underlying soils have an infiltration rate below 0.5 inches per hour (DOEE 2013; Virginia DEQ 2011; SF DPW Order No. 178,493). Pollutant removal estimates for pollutants of concern, PCBs and Mercury, are from influent and underdrain concentration statistics reported by BASMAA.

Table 3. Low Impact Development Modeling Assumptions

Groups	Item Description	Value	Units	Source ^{[1][2]}
Surface	Design Drainage Area	<i>Sized for runoff from 0.2 inches per hour intensity rainfall event</i>		[1] C.3.d.i.(2).(c) pg.22
	BMP Footprint	<i>4% of drainage area</i>		[2] Section 5.1 pg.5-6
	Ponding Depth	6	in	[2] Section 6.1 pg.6-4
Media	Depth	1.5	ft	[2] Section 6.1 pg.6-5
	Soil Porosity	0.35	-	[3] Appendix A
	Soil Infiltration Rate	10	in/hr	[1] C.3.c.i.(2).(c).(ii) pg.20
Underdrain	Depth	1	ft	[2] Section 6.1 pg.6-5
	Media Porosity	0.4	-	[3] Appendix A
	Pollutant Filtration	<i>98% PCBs / 45% Hg Reductions</i>		[4] Table 4-2, pg.36
	Background Infiltration	<i>Match underlying soils</i>		

[1] Municipal Regional Stormwater Permit Order No. R2-2015-0049

[2] SMCWPPP C.3 Stormwater Technical Guidance

[3] Upper Los Angeles River EWMP

[4] BASMAA "White Paper" on Provision C.3 in MRP 2.0

2 COST ASSUMPTIONS

Due to limited cost data in San Mateo County, cost functions developed from an inventory of projects in the Los Angeles region will be used. The functions were determined for the Upper Los Angeles River Enhanced Watershed Management Program by estimating costs of all project components for each project. There will be some uncertainty regarding the true costs pertaining to San Mateo County, but the relative costs between BMP types is well represented for the optimization of project types in the RAA. In other words, although it would not be recommended to

use these cost functions for projections of county-wide or city-wide implementation costs, these functions will be sufficient for comparison of alternative implementation scenarios for selection of the most cost-effective strategy and combination of GI, LID, and regional stormwater capture projects to meet necessary pollutant reductions. The cost functions are listed in Table 4.

Table 4. BMP Cost Functions

BMP Type	BMP Subtype	Cost Estimate Formula	User inputs
Regional BMP	Infiltration basin w/o pump station	$\$10.01 (A_f) + 100,014 (S) + 2.8 (V_m)$	<ul style="list-style-type: none"> Capacity (S) Footprint area (A_f) Media volume (V_m)
	Infiltration basin w/ pump station	$\$10.01 (A_f) + 100,013.76 (S) + 2.8 (V_m) + 56,227 (P) + 1,207,736$	<ul style="list-style-type: none"> Footprint area (A_f) Capacity (S) Pumping rate in cfs (P) Media volume (V_m)
Green Streets	Bioretention and permeable pavement	$\$9.438 (A_f) + 94,307.4 (S) + 2.64 (V_m) + 25.344 (A_p)$	<ul style="list-style-type: none"> Bioretention capacity (S) Bioretention area (A_f) Media volume (V_m) Pavement area (A_p)
Low Impact Development	Bioretention retrofit w/ underdrain	$\$17.688 (A_f) + 94,307.4 (S) + 2.64 (V_m) + 10.367 (R)^2 (U)$	<ul style="list-style-type: none"> Bioretention capacity (S) Bioretention area (A_f) Media volume (V_m) Underdrain radius (R) Underdrain length (U)
	Bioretention retrofit w/o underdrain	$\$9.438 (A_f) + 94,307.4 (S) + 2.64 (V_m)$	<ul style="list-style-type: none"> Bioretention capacity (S) Bioretention area (A_f) Media volume (V_m)

Units: S [ac-ft], V_m [ft³], A_f [ft²], A_p [ft²], P [cfs], R [ft], U [ft]

3 REFERENCES

- Bay Area Stormwater Management Agencies Association (BASMAA). February 2015. *“White Paper” on Provision C.3 in MRP 2.0.*
- California Department of Transportation (Caltrans). August 2014. *Caltrans Pervious Pavement Design Guidance.*
- District of Columbia Department of Energy and Environment (DOEE). 2013. *District of Columbia Stormwater Management Guidebook.*
- San Francisco Bay RWQCB. November 2015. *Order No. R2-2015-0049, NPDES Permit No. CAS612008, Municipal Regional Stormwater Permit.*
- San Francisco Department of Public Works. *DPW Order 178,493, Approving the Use of Permeable Paving Systems.*
- San Francisco Public Utilities Commission (SFPUC). May 2016. *San Francisco Stormwater Management Requirements and Design Guidelines.*
- San Mateo County Water Pollution Prevention Program (SMCWPPP). June 2016. *C.3 Stormwater Technical Guidance, version 5.*
- Upper Los Angeles River Watershed Management Group. January 2016. *Enhanced Watershed Management Program for the Upper Los Angeles River Watershed.*
- Virginia Department of Environmental Quality (Virginia DEQ). March 2011. *Virginia DEQ Stormwater Design Specification No. 7, Permeable Pavement: version 1.8.*