APPENDIX 13A-1

SCVURPPP, URBAN RUNOFF MANAGEMENT PLAN

ACKNOWLEDGEMENTS

The Santa Clara Valley Urban Runoff Program's (Program) Urban Runoff Management Plan (URMP) was developed by the Program Manager under the direction of the Management Committee.

MANAGEMENT COMMITTEE

Dave Chesterman (Chair)	Randolph Shipes (Vice Chair)
Santa Clara Valley Water District	San Jose
Lavenia Millar, Cupertino	Lorrie Gervin, Budget & Executive Committee Chair, Sunnyvale
Larry Lind, Los Altos	Cheri Donnelly, West Valley Cities
Richard Chen, Los Altos Hills	Lynn Penoyer, Campbell
Darryl Wong, Milpitas	John Curtis, Los Gatos
Eric Anderson, Mountain View	Brian Loventhal, Monte Sereno
Joe Teresi, Palo Alto	John Cherbone, Saratoga
Rick Mauck, Santa Clara	Steve Homan, Santa Clara County

Note: The 2004 Urban Runoff Management Plan was revised on February 24, 2005 to only reflect changes to the Industrial/Commercial Discharger Control Program and Illicit Connection/Illegal Dumping Elimination Activities Performance Standards provided within Appendix A: Model Performance Standards.

ACRONYMS

ABAG	Association of Bay Area Governments
AHTG	Ad Hoc Task Group
BAAQMD	Bay Area Air Quality Management District
BACWA	Bay Area Clean Water Agencies
BASMAA	Bay Area Storm Water Management Agencies Association
BMM	Bay Monitoring and Modeling
BMP	Best Management Practice
BPP	Brake Pad Partnership
CAP	Copper Action Plan
CEP	Clean Estuary Partnership
CCMP	Comprehensive Conservation and Management Plan
CEQA	California Environmental Quality Act
CMA	Congestion Management Agency
CUPA	Certified Unified Program Agency
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments
EOA	Eisenberg, Olivieri, & Associates
EPA	Environmental Protection Agency
HMP	Hydromodification Management Plan
ICID	Illicit Connection/Illegal Dumping

IND	Industrial and Commercial Discharge
IPM	Integrated Pest Management
KLI	Kinetic Laboratories Incorporated
MCMP	Metals Control Measures Plan
MEP	Maximum Extent Practicable
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MTC	Metropolitan Transportation Commission
NAP	Nickel Action Plan
NDC	New Development and Construction
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
O&M	Operation & Maintenance
PAA	Public Agency Activities
PCB	Polychlorinated Biphenyls
PCDF	Polychlorinated dibenzofurans
PCDD	Polychlorinated dibenzo-p-dioxins
PIP	Public Information and Participation
POC	Pollutant of Concern
POTW	Publicly Owned Treatment Works

QA/QC	Quality Assurance/Quality Control
RMAS	Regional Monitoring and Assessment Strategy
RMP	Regional Monitoring Program
RWQCB	Regional Water Quality Control Board
SCBWMI	Santa Clara Basin Watershed Management Initiative
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SCVWD	Santa Clara Valley Water District
SFEI	San Francisco Estuary Institute
SIC	Standard Industrial Classification
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWMP	Storm Water Management Plan
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TATG	Trash Ad Hoc Task Group
TMDL	Total Maximum Daily Load
URMP	Urban Runoff Management Plan
USEPA	United States Environmental Protection Agency
WEO	Watershed Education and Outreach
WLA	Waste Load Allocation
WMI	Watershed Management Initiative (same as SCBWMI, above)

APPENDIX A
Model Performance Standards

APPENDIX A
Model Performance Standards

Consistent with NPDES Permit Provision C.2.b., the Program worked with Regional Board staff, during 1996, to develop the first seven model Performance Standards. All of these model Performance Standards were submitted with an "early draft" of the 1997 URMP and were accepted by the Regional Board as baseline performance standards upon which to base effectiveness evaluations and consideration of opportunities for improving them." The 1997 URMP, including all performance standards (updated December 1999) was included in the 2001 re-issued SCVURPPP NPDES Permit.

Figure A1

Model Performance Standards

- Illicit Connection and Illegal Dumping Elimination Activities
- Industrial/Commercial Discharger Control Programs
- Public Streets, Roads and Highways Operation and Maintenance
- Storm Drain System Operation and Maintenance
- Water Utility Operation and Maintenance
- Planning Procedures
- Construction Site Inspection
- Pest Management
- Rural Public Works Maintenance & Support

The Program is committed to continuous improvement of the model Performance Standards. As described in the URMP, the Program's Management Committee will review one existing Performance Standard or Program element, or create one new Performance Standard, each year. Since

1997, the Program has revised five of the Performance Standards and created two new ones. The changes are summarized in Table A-1.

Chapters 5 through 16 consist of individual Urban Runoff Management Plans for Cupertino; Los Altos; Los Altos Hills; Milpitas; Mountain View; Palo Alto; San Jose; Santa Clara, and Sunnyvale; the West Valley communities of Campbell, Los Gatos, Monte Sereno and Saratoga (combined in Chapter 14); Santa Clara County, and the Santa Clara Valley Water District. Each of these Co-permittees may adopt any or all of the model Performance Standards, or adapt them to suit local conditions. The adaptations accommodate differing local conditions and are documented in the individual URMPs.

Table A-1
Tracking Matrix: Status of Program URMP and Model Performance Standard Updates
(Updated 9/1/04)

BASELINE PROGRAM (1997)		FY 97-98 – FY 00-01 (URMP Update 2000)		FY 04-05 (URMP Update 2004)	
Program Element	**Performance Standard (PS)**	**Changes Made to Model Performance Standards**	**URMP Update Completed (Date)**	**Changes Made to Model Performance Standards**	**URMP Update Completed (Date)**
ICID	PS for ICID	ICID-2, SWID Inspections; ICID-4, Reporting CEDs and SWIDs	October 2000	None	
IND	PS for IND	IND-4, reporting SWIDs and summary of violations	October 2000	None	
PAA	PS for Streets/Roads O&M	None		None	
	PS for Rural Public Works Maintenance*			New model PS developed to meet Permit Provision C.5., approved by MC 12/20/02, incorporated into URMP	September 1, 2004
	PS for Storm Drain System Maintenance	SDOM #6, notification process between maintenance and ICID inspectors	October 2000	None	
	PS for Water Utilities	None		None	
NDS	PS for Planning Procedures	None		Model PS revised to meet Permit Provision C.3., approved by MC 12/18/03, incorporated into URMP	September 1, 2004
	PS for Construction Inspection	None		Model PS revised per RWQCB comments, approved by MC 1/17/02, incorporated into URMP	September 1, 2004
Pollutant Specific	PS for Pest Management*			New model PS developed to meet Permit Provision C.9.d., approved by MC 2/21/02, incorporated into URMP	September 1, 2004

Notes:
* = New PS not part of original URMP, added per reissued NPDES permit (Order No. 01-024).
PS = Performance Standard; MC = Program Management Committee; RWQCB = Regional Water Quality Control Board

APPENDIX B
Regulatory Background

APPENDIX B
Regulatory Background

The Urban Runoff Management Plan (URMP) has been crafted to comply with the regulatory requirements for developing and implementing an urban runoff program. The following sections summarize the federal and state regulatory mandates and guidance for urban runoff pollution prevention and control.

B1
FEDERAL LAW AND REGULATIONS

Clean Water Act. The federal Clean Water Act was amended in 1987 to require that urban runoff discharges from municipal separate storm sewer systems, such as those operated by the Santa Clara Valley municipalities and the Santa Clara Valley Water District, obtain coverage under a nationwide surface water permit program called the National Pollutant Discharge Elimination System (NPDES).[1] The U.S. Environmental Protection Agency (EPA) delegated to the State of California, and specifically to the local San Francisco Bay Regional Water Quality Control Board (Regional Board), the authority to adopt and enforce these permits in the Bay Area.

In 1990, the USEPA promulgated regulations specifying how municipalities apply for municipal urban runoff (also called storm water) NPDES permits. According to federal regulations, a municipal separate storm sewer system "means a conveyance or system of conveyances (including roads with

[1] Federal Water Pollution Control Act, as amended by the Clean Water Act. Section 402(p).

drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains...)"[2]. The discharges of urban runoff from these municipal separate storm sewer systems are regulated by the NPDES permit and addressed by the Program's URMP.

The federal Clean Water Act's 1987 amendments require municipalities to effectively prohibit non-stormwater discharges to municipal separate storm sewer systems and to implement controls to reduce pollutants in stormwater to the maximum extent practicable. The URMP focuses on complying with these two essential requirements.

In addition, in issuing NPDES stormwater permits, the State of California has exercised its discretion to require that urban runoff discharges address the attainment of water quality standards through implementation of Urban Runoff (Storm Water) Management Plans. In August 1996 EPA released its "Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits."[3] The policy states that "due to the nature of storm water discharges, and the typical lack of information on which to base numeric water quality-based effluent limitations (expressed as concentration and mass), EPA ... uses best management practices (BMPs) in first-round storm water permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards." The policy only applies to permitting actions, but USEPA expressly encourages states to adopt similar policies in issuing storm water permits. The Regional Board's Basin Plan endorses a similar approach, as is further described below.

Coastal Zone Act Reauthorization Amendments of 1990 (CZARA)[4]. These amendments added Section 6217, "Protecting Coastal Waters," to the Coastal Zone Act. The new section requires California and other coastal states with coastal zone management programs to develop and implement Coastal Nonpoint Pollution Control Programs. The purpose of these programs is to strengthen the links between Federal and state coastal zone management and water quality programs in order to improve state and local

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[2] 40 CFR 122.26(b)(8)

[3] Environmental Protection Agency (September 1996). Interim Permitting Approach for Water Quality-Based Effluent Limitations in Storm Water Permits EPA 833-D-96-0001

[4] Coastal Zone Act Reauthorization Amendments of 1990, Section 6217(a). [16 USC 1455b]

efforts to manage land use activities that degrade coastal waters and coastal habitats. The Coastal Nonpoint Pollution Control Program covers all of Santa Clara County.

The California Coastal Commission and State Board developed their "Coastal Nonpoint Pollution Control Submittal" (Submittal) in September 1995 for approval by USEPA and the National Oceanic and Atmospheric Administration (NOAA).[5] Because the statewide nonpoint source management program is presumed to have adequate mechanisms for addressing nonpoint source problems, "California has chosen not to develop a separate program for the coastal watersheds but rather will implement a statewide nonpoint source program that addresses the requirements of Section 6217, CZARA."[6]

A key feature of the Submittal is its emphasis on preventing pollution of runoff by forming partnerships among agencies at all levels of government and with the public. It is primarily through these partnerships that land-based strategies for controlling nonpoint pollutant sources are being developed and implemented. This approach is particularly suitable since the State Water Board and Regional Boards do not have direct land use authority.

The Submittal describes the management of the following nonpoint sources of pollution: 1) agricultural erosion control; 2) confined animal facilities; 3) nutrient management; 4) pesticide management; 5) grazed lands; 6) irrigated agriculture; 7) silviculture; 8) urban development; 9) onsite disposal systems; 10) recreational boating and marinas; 11) hydromodification; and 12) abandoned mines.

The urban development section of the Submittal is the most applicable to this URMP. For urban development the Submittal lists the following categories of management measures from USEPA's and NOAA's "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters" and the activities being implemented to satisfy each of the measures:

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[5] State Water Resources Control Board and the California Coastal Commission (September 1995). *Coastal Nonpoint Pollution Control Submittal.*

[6] Environmental Protection Agency and The National Oceanic Atmospheric Administration (October 16,1996). *Letter to the California Coastal Commission.*

- New Development
- Existing Development
- Transportation Development Management

Significant new requirements for urban runoff control are not listed.

The USEPA and NOAA have informally and conditionally approved California's Submittal. Formal approval is expected in 1997 following opportunities for public comment.

B2

STATE LAW AND REGULATIONS

California Water Code. The California Water Code (also called the Porter-Cologne Act) establishes the SWRCB and RWQCBs in each of the state's nine hydrologic basins. The California Water Code provides these agencies with the authority to coordinate and control water quality in waters of the State. There are no urban-runoff-specific requirements contained in this statute. The following describes several of the most pertinent provisions of the California Water Code that affect urban runoff regulation.

Ordinarily, waste discharge requirements and other orders issued under the California Water Code may not "specify the design, location, type of construction or particular manner in which compliance may be had."[7] The URMP describes what will be accomplished, but provides participating municipalities and the SCVWD with essential flexibility, and is consistent with this provision of state law.

The California Water Code also provides local Regional Boards the authority to require technical reports and investigations by any wastewater discharger or local agency, including urban runoff dischargers, "provided that the burden, including costs of such reports, bear a reasonable relationship to the need for the report and the benefits to be obtained therefrom."[8] This

[7] California Water Code Section 13360

[8] California Water Code Sections 13225 and 13267(b)

authority means that regardless of what the Santa Clara Valley Urban Runoff Pollution Prevention Program's NPDES permit or URMP require, the Regional Board's Executive Officer retains the ability, under certain circumstances, to require additional work and studies without amending the NPDES permit or holding public hearings.

The California Water Code also requires the adoption of Water Quality Control Plans that contain policies for water quality management in California. The State Water Board has adopted a number of statewide water quality control plans; and the Regional Boards have adopted regional water quality control plans, which are commonly referred to as Basin Plans. Basin Plans identify the existing and potential beneficial uses of waters of the State and establish water quality objectives to protect these uses. Water quality objectives and beneficial use designations that are approved by the USEPA become water quality standards under the Clean Water Act. Basin Plans also contain an implementation, surveillance and monitoring plan and include enforceable prohibitions against certain types of discharges. The Water Quality Control Plan for the San Francisco Bay Basin is described in more detail below.

State Water Board General Permits. The State Water Board has adopted General Permits for storm water discharges associated with construction activity, industrial activity, and utilities other than water suppliers. The State Water Board's Industrial Storm Water NPDES General Permit was adopted to cover 10 categories of industrial facilities identified as needing permit coverage in USEPA's Storm Water Regulations.[9] The Construction Activity Storm Water NPDES General Permit covers an 11th category, land disturbance associated with construction that is five acres or greater.[10] The Construction General Permit is currently being modified for re-issuance in the latter half of 1997. The State Water Board adopted the Industrial General Permit in 1991 and is expecting to adopt a re-issued permit during the first half of 1997. The newest General Permit adopted by the State Water Board is for discharges from utility companies' vaults and other underground

---

[9] State Water Resources Control Board (September 1992). *Amended General Industrial Activities Storm Water Permit.*

[10] State Water Rescues Control Board (August 1992). *General Construction Activity Storm Water Permit.*

structures that are a result of subterranean seepage and or storm water inflow. In order to obtain coverage under one of these permits, a facility must submit to the State Water Board a Notice of Intent (NOI) to comply with the applicable General Permit.

Applicability of General Permits. A fact sheet accompanying the new General Permit for utility companies states that "utility companies that are permittees and/or co-permittees under Urban Area wide Storm Water Permits which cover the intended discharges do not need to seek coverage under this general permit." In addition, the Program's NPDES permit provides that "discharges of storm water from construction sites owned or operated by the Dischargers are authorized and permitted by this Order, if they are in accordance with the conditions" specified in the permit (Provision 8). Similarly the discharges of "non-storm water from sources owned or operated by the Dischargers" are allowed if they meet the Permit's conditions.

On this basis, the municipalities and Santa Clara Valley Water District do not need to obtain coverage under either the Construction Activity Storm Water NPDES General Permit (for municipal construction projects that disturb five or more acres) or the General Permit for utility companies' vault and other underground structures' discharges (for municipalities that operate utilities other than water supply utilities) provided the relevant sections of the Program's NPDES permit are met. In contrast, any of the Co-permittees who operate an applicable industrial facility would need to obtain coverage under the Industrial Storm Water NPDES General Permit since stormwater discharges from these type of facilities are not covered in the Program's NPDES permit.

Fish and Game Code. The Fish and Game Code primarily addresses fish and wildlife protection and conservation. There are no specific references to urban runoff in this code.

One section of the code states that "it is unlawful to deposit in, permit to pass into, or place where it can pass into the waters of this State ...petroleum ... asphalt... carbonaceous material... refuse...from any factory...[and] any substance or material deleterious to fish, plant life, or bird life."[11]

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[11] Fish and Game Code Section 5650, Division 6

As part of public construction projects that impact rivers, streams, or lakes or the substantial diversion or obstruction of natural flow, the Department of Fish and Game must be notified and measures taken, as agreed to by the Department, for the protection and continuance of fish or wildlife resources. These requirements would apply regardless of whether an agency had a municipal urban runoff NPDES permit or not. The Fish and Game Code requirements are incorporated into local municipalities' and the Santa Clara Valley Water District's procedures and operations.

Water Quality Control Plan for the San Francisco Bay Basin. The San Francisco Bay Regional Board's Basin Plan describes a phased approach to attain water quality objectives in waters that receive storm water discharges: "NPDES permits for storm water discharges will require completion of technically and economically feasible control measures as soon as possible... If this first phase does not result in attainment of water quality objectives, the Regional Board will consider permit conditions which may require implementation of additional control measures."[12] This approach is consistent with EPA's "Interim Policy Approach for Water Quality-Based Effluent Limitations in Storm Water Permits" (described above).

The San Francisco Bay Regional Board's Basin Plan does not currently contain numerical water quality objectives for toxic pollutants for the South Bay below the Dumbarton Bridge. The USEPA developed new water quality objectives, as described in the California Toxics Rule, to replace those invalidated as a result of a 1994 State court decision[13] on the Enclosed Bays and Estuaries Plan[14] and the Inland Surface Waters Plan.

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[12] California Regional Water Quality Control Board. *Water Quality Control Plan for the San Francisco Bay Basin, June 21, 1995. Chapter 4 - Implementation Plan: Surface Water Protection and Management, Point Source Control Stormwater Discharges.*

[13] As a result of the unpublished decision in Water Quality Control Cases, Cal. Super. Ct., Sacramento County, Judicial Council Coordination Proceeding No. JC2610, Mar 23, 1994, the California Inland Surface Waters Plan, the California Enclosed Bays and Estuaries Plan, and all associated amendments have been rescinded by the State Water Resources Control Board, effective September 22, 1994.

[14] California Water Resources Control Board (April 1991). *California Enclosed Bays and Estuaries Plan. 91-13-WQ*

Comprehensive Conservation and Management Plan (CCMP)[15]. Although not legally binding, the CCMP presents a blueprint to restore and maintain the chemical, physical, and biological integrity of San Francisco Bay and its Delta. The CCMP was completed in 1993 and approved by the USEPA and Governor Pete Wilson with conditions. The estimated costs for implementing the CCMP over twenty years is approximately $1.6 billion.

The CCMP recommends a number of actions potentially applicable to municipal urban runoff programs. Since the San Francisco Bay Regional Board is the lead state agency for the CCMP, the Board has been able to integrate applicable CCMP actions into the Program's NPDES permit.

Municipal Storm Water Management Plan Components. In addition to the requirements for developing the 1997 URMP, as specified in the 1995 NPDES permit, Dr. Tom Mumley from the San Francisco Bay Regional Board staff prepared a memorandum in 1994 to provide a consistent, statewide, framework for municipal Urban Runoff Management Plans. Dr. Mumley used his experience with the Bay Area municipal urban runoff programs in developing his statewide model. The following categorical areas were listed as integral to the establishment of a urban runoff management plan:

- Program Management
- Illicit Discharges
- Industrial/Commercial Sources
- New Development and Re-development
- Public Agency Activities
- Residential Public Information and Participation
- Program Evaluation

[15] San Francisco Estuary Project (1993). *Comprehensive Conservation and Management Plan.*

- Monitoring

The URMP describes the Co-permittees' efforts in each of these areas.

B4

PERMIT COMPLIANCE

Compliance with NPDES Permit Provisions. All of the NPDES permit requirements for improving the URMP have been met. All of the required updated and/or newly developed performance standards are included in this updated 2004 Urban Management Plan (URMP). Each individual Co-permittee URMP is included in Chapters 5 through 16. It is expected that Annual Work Plans and Reports prepared subsequent to the approval of this URMP by the MC will contain additional refinements and improvements.

C

APPENDIX C
Status And Schedule

TABLES C-1 THROUGH C-12
CO-PERMITTEE WORK PLANS, BMPS, AND SOPS

Table C-12
Santa Clara Valley Water District
Tracking Matrix: Status of URMP and Performance Standard Updates
(Updated 9/1/04)

BASELINE PROGRAM (1997)		FY 97-98 – FY 00-01 (URMP Update 2000)		FY 01-02 – FY 03-04 (URMP Update 2004)	
Program Element	**Performance Standard (PS)**	**Changes Made to Performance Standards**	**URMP Update Completed 10-11-00**	**Changes Made to Performance Standards**	**URMP Update Completed 09-01-04**
ICID	PS for ICID	ICID-2, SWID Inspections; ICID-4, Reporting CEDs and SWIDs	October 2000	•SOPs revised 12-03	09-01-04
IND	PS for IND	IND-4, reporting SWIDs and summary of violations	October 2000	None	
PAA	PS for Streets/Roads O&M	None		None	
	PS for Rural Public Works Maintenance*			New model Rural Public Works PS (approved by MC 12/20/02)	09-01-04
	PS for Storm Drain System Maintenance	SDOM #6, notification process between maintenance and ICID inspectors	October 2000	•SOPs revised 10-01	09-01-04
	PS for Water Utilities	None		•SOPs revised 10-01	09-01-04
NDS	PS for Planning Procedures	None		•Model PS revised to comply with Provision C.3. (approved 12/18/03) •SOPs revised 03-04; 06-04	09-01-04
	PS for Construction Inspection	None		•SOPs revised 10-01 •Model CI PS revised per RWQCB staff comments (approved 1/17/02)	09-01-04
Pollutant Specific	PS for Pest Management*			•New model Pest Management PS (approved 2/21/02). •SOPs developed 07-02; 10-02	09-01-04

Notes:
* = New PS not part of original URMP, added per reissued NPDES permit (Order No. 01-024).
NA = Co-permittee will not be implementing the model Performance Standard, because activities do not apply to its community characteristics.

APPENDIX D
Related Program Documents and Plans

ATTACHMENT D-1
SCVURPPP CURRENT AND PROPOSED BMPs
PREPARED IN COMPLIANCE WITH NPDES ORDER 01-024
FOR POLLUTANTS OF CONCERN
(FY03-04 ANNUAL REPORT)

Attachment D-1
SCVURPPP Current and Proposed BMPs for Pollutants of Concern
Prepared in Compliance with NPDES Order 01-024
(FY 03-04 Annual Report)

CHEMICAL	WATER-BODY	KEY URBAN SOURCES[i]	URBAN RUNOFF CONTROLS (ONGOING PROGRAM CONTROLS)[ii]	FY 03-04 ADDITIONAL URBAN RUNOFF CONTROLS/PROGRAMS PROPOSED TO REDUCE POLLUTANTS[iii]	CONTINUOUS IMPROVEMENT (IDENTIFICATION & ASSESSMENT OF NEW URBAN RUNOFF CONTROLS/PROGRAMS)
Pollutants of Concern [iv]					
Metals (particulate form)	**Lower South Bay**	**All Urban Sources**	Performance standards[v]: • Illicit Discharge and Illegal Dumping Elimination • Industrial/Commercial Discharger Control • Public Streets, Roads and Highways O&M • Storm Drain Systems O&M • Water Utility O&M • New Development and Construction Control Measures-Planning Procedures • New Development and Construction Control Measures-Construction Inspections • Rural Public Works Maintenance and Support	Performance Standard Improvements: Implement & Track Performance (see Section 2 and 6 of Work Plan and changes to Work Plan contained in Annual Report): PI/P Work Plan: Implement and Track Watershed Education & Outreach Strategy (see Section 3 of Work Plan, Tables 2-2 and 3-1 for specific Program projects and Co-permittee Work Plans) Monitoring Program: Implement and Track monitoring projects. (see Section 4 of Work Plans). See Table 4-2 for a summary of specific projects. See Section for additional detail on status of monitoring projects and project summaries. Watershed Measures: Implement and Track watershed measures (see Section 5 for details). Five areas of effort include: • Characterizing watersheds and stormwater discharges; • Assessing existing or potential adverse impacts to beneficial uses; • Identifying potential sources of pollutants of concern; • Aiding in developing and implementing strategies for controlling adverse impacts of beneficial uses; and • Assessing the effectiveness of	Evaluate the need for additional BMPs to reduce discharges of "pollutants of concern"

ATTACHMENT D-2
CONDITIONALLY EXEMPTED DISCHARGES
CLASSIFICATION AND CONTROL MEASURES
JUNE 15, 2000

Santa Clara Valley Urban Runoff Pollution Prevention Program

CONDITIONALLY EXEMPTED DISCHARGES

Classification and Control Measures

June 15, 2000

Task SC 16-22

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vi. Irrigation Water, ... 10
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ATTACHMENT D-3
REVISED MULTI-YEAR RECEIVING WATERS MONITORING PLAN
7/1/04

REVISED
MULTI-YEAR RECEIVING WATERS MONITORING PLAN

Original Plan Submitted on March 1, 2002 in Compliance with Permit Provisions C7a & b

Draft- March 1, 2004
Final- July 1, 2004

PREFACE

On March 1, 2002, the SCVURPPP submitted a Multi-Year Receiving Waters Monitoring Plan (Multi-Year Plan) that was prepared in compliance with monitoring requirements of the permit. The previously submitted Multi-Year Plan covered the entire spectrum of the SCVURPPP monitoring activities, both programmatic and environmental, and outlined the SCVURPPP's approach to monitoring, presented monitoring priorities and described accomplishments to-date. Furthermore, the Multi-Year Plan described the SCVURPPP's linkage to, and support for the Santa Clara Basin Watershed Management Initiative (WMI).

Since its approval, the SCVURPPP has fully implemented the Multi-Year Plan and conducted a variety of special studies. In particular, screening level/baseline water quality monitoring was conducted in receiving water bodies in FY 02-03 and 03-04, and the *Assessment of Watershed Assessment Methods Technical Memorandum* (Technical Memo), dated July 31, 2003, recommended improvements to the SCVURPPP's monitoring and assessment program. Lessons learned from data collected during the first two years of implementing the Multi-Year Plan and recommendations presented in the Technical Memo provide the impetus for the revisions to the Multi-Year Plan.

The revisions presented in this Revised Multi-Year Receiving Waters Plan (Revised Multi-Year Plan) are minor and intended to: 1) more fully integrate the monitoring activities identified in the Multi-Year Plan with watershed assessments, and 2) allow for additional follow-up monitoring activities in order to better identify sources of pollutants or causes of impairment to Beneficial Uses. Additionally, the Revised Multi-Year Plan attempts to provide the SCVURPPP a framework for conducting watershed characterization, screening-level monitoring, watershed assessment, investigative monitoring and management action implementation.

Summary of Revisions

It is important to point out that a large majority of the information contained within this Revised Multi-Year Plan was originally presented in the Program's previously submitted Multi-Year Plan (dated March 1, 2002). Therefore, for the sake of the reader, we would like point out the sections of this Revised Multi-Year Plan that contain a majority of the revisions. These include:

- **Sections 2.3 & 2.4**: SCVURPPP's Monitoring and Assessment Approach and Process Flow Chart – Describes the tiered monitoring approach, the proposed framework for conducting monitoring and assessment activities, and how watershed assessments are integrated with this approach and activities.
- **Section 6.0:** Reporting and Quality Control – Describes the deliverables the Program will develop and quality control procedures which will continue to be incorporated into the SCVURPPP's Monitoring and Assessment Program.
- **Section 7.0:** Environmental Monitoring Measures Summary Matrix – Illustrates the revised environmental monitoring and assessment Program's sampling design.

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APPENDIX 13A-2

MUNICIPAL REGIONAL STORMWATER NPDES PERMIT

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

Order R2-2009-0074
NPDES Permit No. CAS612008
October 14, 2009

California Regional Water Quality Control Board
San Francisco Bay Region
Municipal Regional Stormwater NPDES Permit

ORDER R2-2009-0074
NPDES PERMIT NO. CAS612008

Issuing Waste Discharge Requirements and National Pollutant Discharge Elimination System (NPDES) Permit for the discharge of stormwater runoff from the municipal separate storm sewer systems (MS4s) of the following jurisdictions and entities, which are permitted under this San Francisco Bay Municipal Regional Stormwater Permit (MRP):

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program (Alameda Permittees)

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program (Contra Costa Permittees)

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (Santa Clara Permittees)

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program (San Mateo Permittees)

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program (Fairfield-Suisun Permittees)

The City of Vallejo and the Vallejo Sanitation and Flood Control District (Vallejo Permittees)

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The California Regional Water Quality Control Board, San Francisco Bay Region, (hereinafter referred to as the Water Board) finds that:

FINDINGS

Incorporation of Fact Sheet

1. The Fact Sheet for the San Francisco Bay Municipal Regional Stormwater National Pollutant Discharge Elimination System (NPDES) Permit (Appendix I) includes cited regulatory and legal references and additional explanatory information in support of the requirements of this Permit. This information, including any supplements thereto, and any response to comments on the Tentative Orders, is hereby incorporated by reference.

Existing Permits

2. **Alameda County—**The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County (Unincorporated area), the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District have joined together to form the Alameda Countywide Clean Water Program (hereinafter collectively referred to as the Alameda Permittees) and have submitted a permit application (Report of Waste Discharge), dated July 26, 2007, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Alameda Permittees' jurisdictions. The Alameda Permittees are currently subject to NPDES Permit No. CAS0029831 issued by Order No. R2-2003-0021 on February 19, 2003, and amended by Order No. R2-2007-0025 on March 14, 2007, to the Alameda Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

3. **Contra Costa County—**The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District have joined together to form the Contra Costa Clean Water Program (hereinafter collectively referred to as the Contra Costa Permittees) and have submitted a permit application (Report of Waste Discharge), dated September 30, 2003, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Contra Costa Permittees' jurisdictions. The Contra Costa Permittees are currently subject to NPDES Permit No. CAS0029912 issued by Order No. 99-058 on July 21, 1999, amended by Order No. R2-2003-0022 on February 9, 2003, amended by Order Nos. R2-2004-059 and R2-2004-0061 on July 21, 2004, and amended by Order No. R2-2006-0050 on July 12, 2006, to the Contra Costa Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

4. **San Mateo County—**The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District and San Mateo County have joined together to form the San Mateo Countywide Water Pollution Prevention

Program (hereinafter collectively referred to as the San Mateo Permittees) and have submitted a permit application (Report of Waste Discharge), dated January 23, 2004, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the San Mateo Permittees' jurisdictions. The San Mateo Permittees are currently subject to NPDES Permit No. CAS0029921 issued by Order No. 99-059 on July 21, 1999, amended by Order No. R2-2003-0023 on February 19, 2003, amended by Order Nos. R2-2004-0060 and R2-2004-0062 on July 21, 2004, and amended by Order R2-2007-0027 on March 14, 2007, to the San Mateo Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

5. **Santa Clara County—**The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and the County of Santa Clara have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program (hereinafter collectively referred to as the Santa Clara Permittees) and have submitted a permit application (Report of Waste Discharge), dated February 25, 2005, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Santa Clara Permittees' jurisdictions. The Santa Clara Permittees are currently subject to NPDES Permit No. CAS029718 issued by Order No. 01-024 on April 21, 2001, amended by Order No. 01-119 on October 17, 2001, and Order No. R2-2005-0035 on July 20, 2005, to the Santa Clara Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

6. **Fairfield-Suisun—**The cities of Fairfield and Suisun City have joined together to form the Fairfield-Suisun Urban Runoff Management Program (hereinafter referred to as the Fairfield-Suisun Permittees) and have submitted a permit application (Report of Waste Discharge), dated October 17, 2007, for reissuance of their waste discharge requirements under the NPDES permit to discharge stormwater runoff from storm drains and watercourses within the Fairfield-Suisun Permittees' jurisdictions. The Fairfield-Suisun Permittees are currently subject to NPDES Permit No. CAS0612005 issued by Order No. R2-2003-0034 on April 16, 2003, and amended by Order R2-2007-0026 on March 14, 2007, to the Fairfield-Suisun Permittees to discharge stormwater runoff from storm drains and watercourses within their jurisdictions.

7. **Vallejo—**The City of Vallejo and the Vallejo Sanitary District (hereinafter referred to as the Vallejo Permittees) are currently subject to NPDES Permit No. CAS612006 issued by the United States Environmental Protection Agency (USEPA) on April 27, 1999, and that became effective on May 30, 1999, for the discharge of stormwater runoff from storm drains and watercourses within the Vallejo Permittees' jurisdictions.

8. The Alameda, Contra Costa, San Mateo, Santa Clara, Fairfield-Suisun, and Vallejo Permittees are hereinafter referred to in this Order as the Permittees.

Applicable Federal, State and Regional Regulations

9. Section 402(p) of the federal Clean Water Act (CWA), as amended by the Water Quality Act of 1987, requires NPDES permits for stormwater discharges from municipal separate storm sewer systems (MS4s), stormwater discharges associated with industrial activity (including construction activities), and designated stormwater discharges, which are considered significant contributors of pollutants to waters of the United States. On November 16, 1990, USEPA published regulations (40 CFR Part 122), which prescribe permit application requirements for MS4s pursuant to CWA 402(p). On May 17, 1996, USEPA published an Interpretive Policy

Memorandum on Reapplication Requirements for Municipal Separate Storm Sewer Systems, which provided guidance on permit application requirements for regulated MS4s.

10. The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Water Board and approved by the State Water Resources Control Board (State Board), Office of Administrative Law and the USEPA, where required.

11. The Water Board finds stormwater discharges from urban and developing areas in the San Francisco Bay Region to be significant sources of certain pollutants that cause or may be causing or threatening to cause or contribute to water quality impairment in waters of the Region. Furthermore, as delineated in the CWA section 303(d) list, the Water Board has found that there is a reasonable potential that municipal stormwater discharges cause or may cause or contribute to an excursion above water quality standards for the following pollutants: mercury, PCBs, furans, dieldrin, chlordane, DDT, and selenium in San Francisco Bay segments; pesticide associated toxicity in all urban creeks; and trash and low dissolved oxygen in Lake Merritt, in Alameda County. In accordance with CWA section 303(d), the Water Board is required to establish TMDLs for these pollutants to these waters to gradually eliminate impairment and attain water quality standards. Therefore, certain early pollutant control actions and further pollutant impact assessments by the Permittees are warranted and required pursuant to this Order.

12. The San Francisco Estuary Project, established pursuant to CWA Section 320, culminated in June 1993 with completion of its Comprehensive Conservation and Management Plan (CCMP) for the preservation, restoration, and enhancement of the San Francisco Bay-Delta Estuary. The 2007 update of the CCMP includes new and revised actions, while retaining many of the original plan's actions. The CCMP includes recommended actions in the areas of aquatic resources, wildlife, wetlands, water use, pollution prevention and reduction, dredging and waterway modification, land use, public involvement and education, and research and monitoring. Recommended actions which may, in part, be addressed through implementation of this Permit include, but are not limited to, the following:

    (1) ACTION AR-9.1 (New 2007)
    Improve understanding of sources, types, and impacts of marine debris in the Estuary.

    (5) ACTION AR-9.2 (New 2007)
    Expand existing marine debris prevention and cleanup programs and develop new initiatives to reduce discharge of debris to waterways.

    (10) ACTION PO-1.2 (Revised 2007)
    Recommend institutional and financial changes needed to place more focus on pollution prevention.

    (12) ACTION PO-1.6 (Revised 2007)
    Implement a comprehensive strategy to reduce pesticides coming into the Estuary.

    (13) ACTION PO-1.7.1 (New 2007)
    Develop product stewardship program for new commercial products to minimize future pollutant releases.

(14) ACTION PO-1.8 (New 2007)
Develop and implement programs to prevent pollution of the Estuary by other harmful pollutants like trash, bacteria, sediments, and nutrients.

(15) ACTION PO-2.1 (Revised 2007)
Pursue a mass emissions strategy to reduce pollutant discharges into the Estuary from point and nonpoint sources and to address the accumulation of pollutants in estuarine organisms and sediments.

(16) ACTION PO-2.4 (Revised 2007)
Improve the management and control of urban runoff from public and private sources.

(18) ACTION PO-3.3 (New 2007)
Accomplish large-scale improvements to Bay-Delta area infrastructure and implement pollution prevention strategies to prevent pollution threats to public health and wildlife.

(19) ACTION PO-4.1 (New 2007)
Increase regulatory incentives for municipalities, through urban runoff and other programs, to invest in projects that restore or enhance stream and wetland functions.

(20) ACTION LU-1.1 (Revised 2007)
Local land use jurisdiction's General Plans should incorporate watershed protection goals for wetlands and stream environments and to reduce pollutants in runoff.

(21) ACTION LU-1.1.1 (New 2007): Provide assistance to local agencies to ensure that applicable nonpoint source control elements are incorporated into local government and business practices.

(22) ACTION LU-1.5 (LU-3.2 in 1993 CCMP; Revised 2007)
Provide incentives and promote the use of building, planning, and maintenance guidelines for site planning and implementation of best management practices (BMPs) as related to stormwater and encourage local jurisdictions to adopt these guidelines as local ordinances.

(23) ACTION LU-1.6 (New 2007)
Continue and enhance training and certification for planners, public works departments, consultants, and builders on sustainable design and building practices with the goal of preventing or minimizing alteration of watershed functions (e.g., flood water conveyance, groundwater infiltration, stream channel and floodplain maintenance), and preventing construction-related erosion and post-construction pollution.

(24) ACTION LU-2.7 (New 2007)
Adopt and implement policies and plans that protect and restore water quality, flood water storage, and other natural functions of stream and wetland systems.

(25) ACTION LU-3.1 (New 2007)
Promote, encourage, and support collaborative partnerships with broad stakeholder representation, such as watershed councils, in order to develop diverse community-based approaches to long-term stewardship.

(26) ACTION LU-4.1 (Revised 2007)
Educate the public about how human actions impact the Estuary and its watersheds.

(28) ACTION PI-2.5 (Revised 2007)
Assist in the development of long-term educational programs designed to prevent pollution to the Estuary's ecosystem and provide assistance to other programs as needed.

13. Under section 13389 of the California Water Code, this action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA).

Nature of Discharges and Sources of Pollutants

14. Stormwater runoff is generated from various land uses in all the hydrologic sub basins in the Basin and discharges into watercourses, which in turn flow into Central, Lower and South San Francisco Bay.

15. The quality and quantity of runoff discharges vary considerably and are affected by hydrology, geology, land use, season, and sequence and duration of hydrologic events. Pollutants of concern in these discharges are certain heavy metals; excessive sediment production from erosion due to anthropogenic activities; petroleum hydrocarbons from sources such as used motor oil; microbial pathogens of domestic sewage origin from illicit discharges; certain pesticides associated with acute aquatic toxicity; excessive nutrient loads, which can cause or contribute to the depletion of dissolved oxygen and/or toxic concentrations of dissolved ammonia; trash, which impairs beneficial uses including, but not limited to, support for aquatic life; and other pollutants which can cause aquatic toxicity in the receiving waters.

16. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Order, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Order. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under its NPDES permitting scheme pursuant to US EPA Phase II stormwater regulations. Under Phase II, the Water Board can permit these federal, State, and regional entities through use of the Statewide Phase II NPDES General Permit.

17. Certain pollutants present in stormwater and/or urban runoff can be derived from extraneous sources over which the Permittees have limited or no direct jurisdiction. Examples of such pollutants and their respective sources are polycyclic aromatic hydrocarbons (PAHs), which are products of internal combustion engine operation and other sources; heavy metals, such as copper from vehicle brake pad wear and zinc from vehicle tire wear; dioxins as products of combustion; polybrominated diphenyl ethers that are incorporated in many household products as flame retardants; mercury resulting from atmospheric deposition; and naturally occurring minerals from local geology. All these pollutants, and others, can be deposited on paved surfaces, rooftops, and other impervious surfaces as fine airborne particles—thus yielding stormwater runoff pollution that is unrelated to the activity associated with a given project site.

18. The Water Board will notify interested agencies and interested persons of the availability of reports, plans, and schedules, including Annual Reports, and will provide interested persons with an opportunity for a public hearing and/or an opportunity to submit their written views and recommendations. The Water Board will consider all comments and may modify the reports, plans, or schedules or may modify this Order in accordance with applicable law. All submittals required by this Order conditioned with acceptance by the Water Board will be subject to these notification, comment, and public hearing procedures.

19. This Order supersedes and rescinds Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, R2-2003-0034, and supersedes NPDES Permit Nos. CAS0029831, CAS0029912, CAS0029921, CAS029718, CAS0612005, and CAS612006.

    This Order serves as a NPDES permit, pursuant to CWA section 402, or amendments thereto, and shall become effective December 1, 2009, provided the Regional Administrator, USEPA, Region 9, has no objections.

IT IS HEREBY ORDERED that the Permittees, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act as amended and regulations and guidelines adopted hereunder, shall comply with the following:

A. DISCHARGE PROHIBITIONS

A.1. The Permittees shall, within their respective jurisdictions, effectively prohibit the discharge of non-stormwater (materials other than stormwater) into, storm drain systems and watercourses. NPDES-permitted discharges are exempt from this prohibition. Provision C.15 describes a tiered categorization of non-stormwater discharges based on potential for pollutant content that may be discharged upon adequate assurance that the discharge contains no pollutants of concern at concentrations that will impact beneficial uses or cause exceedances of water quality standards.

A.2. It shall be prohibited to discharge rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas.

B. RECEIVING WATER LIMITATIONS

B.1. The discharge shall not cause the following conditions to create a condition of nuisance or to adversely affect beneficial uses of waters of the State:

- **a.** Floating, suspended, or deposited macroscopic particulate matter, or foam;
- **b.** Bottom deposits or aquatic growths;
- **c.** Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
- **d.** Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
- **e.** Substances present in concentrations or quantities that would cause deleterious effects on aquatic biota, wildlife, or waterfowl, or that render any of these unfit for human consumption.

B.2. The discharge shall not cause or contribute to a violation of any applicable water quality standard for receiving waters. If applicable water quality objectives are adopted and approved by the State Board after the date of the adoption of this Order, the Water Board may revise and modify this Order as appropriate.

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

The Permittees shall comply with Discharge Prohibitions A.1 and A.2 and Receiving Water Limitations B.1 and B.2 through the timely implementation of control measures and other actions as specified in Provisions C.2 through C.15.

If exceedance(s) of water quality standards or water quality objectives (collectively, WQSs) persist in receiving waters, the Permittees shall comply with the following procedure:

C.1.a. Upon a determination by either the Permittee(s) or the Water Board that discharges are causing or contributing to an exceedance of an applicable WQS, the Permittee(s) shall notify, within no more than 30 days, and thereafter, except for any exceedances of WQSs for pesticides, trash, mercury, polychlorinated biphenols, copper, polybrominated diphenyl ethers, and selenium that are addressed pursuant to Provisions C.8 through C.14 of this Order, submit a report to the Water Board that describes BMPs that are currently being implemented, and the current level of implementation, and additional BMPs that will be implemented, and/or an increased level of implementation, to prevent or reduce the discharge of pollutants that are causing or contributing to the exceedance of WQSs. The report may be submitted in conjunction with the Annual Report, unless the Water Board directs an earlier submittal, and shall constitute a request to the Water Board for amendment of this NPDES Permit. The report and application for amendment shall include an implementation schedule. The Water Board may require modifications to the report and application for amendment; and

C.1.b. Submit any modifications to the report required by the Water Board within 30 days of notification.

As long as the Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same WQSs unless directed by the Water Board to develop additional control measures and BMPs and reinitiate the Permit amendment process.

C.2. Municipal Operations

The purpose of this provision is to ensure development and implementation of appropriate BMPs by all Permittees to control and reduce non-stormwater discharges and polluted stormwater to storm drains and watercourses during operation, inspection, and routine repair and maintenance activities of municipal facilities and infrastructure.

C.2.a. Street and Road Repair and Maintenance

i. Task Description – Asphalt/Concrete Removal, Cutting, Installation and Repair - The Permittees shall develop and implement appropriate BMPs at street and road repair and/or maintenance sites to control debris and waste materials during road and parking lot installation, repaving or repair maintenance activities, such as those described in the California Stormwater Quality Association's Handbook for Municipal Operations.

ii. Implementation Levels

(1) The Permittees shall require proper management of concrete slurry and wastewater, asphalt, pavement cutting, and other street and road maintenance materials and wastewater to avoid discharge to storm drains from such work sites. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer system is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

(2) The Permittees shall require sweeping and/or vacuuming to remove debris, concrete, or sediment residues from such work sites upon completion of work. The Permittees shall require cleanup of all construction remains, spills and leaks using dry methods (e.g., absorbent materials, rags, pads, and vacuuming), as described in the Bay Area Stormwater Management Agencies Association's (BASMAA's) Blueprint for a Clean Bay.

iii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in the Annual Report

C.2.b. Sidewalk/Plaza Maintenance and Pavement Washing

i. Task Description – The Permittees shall implement, and require to be implemented, BMPs for pavement washing, mobile cleaning, pressure wash operations in such locations as parking lots and garages, trash areas, gas station fueling areas, and sidewalk and plaza cleaning, which prohibit the discharge of polluted wash water and non-stormwater to storm drains. The Permittees shall implement the BMPs included in BASMAA's Mobile Surface Cleaner Program. The Permittees shall coordinate with sanitary sewer agencies to determine if disposal to the sanitary sewer is available for the wastewater generated from these activities provided that appropriate approvals and pretreatment standards are met.

ii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.c. Bridge and Structure Maintenance and Graffiti Removal

i. Task Description

(1) The Permittees shall implement appropriate BMPs to prevent polluted stormwater and non-stormwater discharges from bridges and structural maintenance activities directly over water or into storm drains.

(2) The Permittees shall implement BMPs for graffiti removal that prevent non-stormwater and wash water discharges into storm drains.

ii. Implementation Levels

(1) The Permittees shall prevent all debris, including structural materials and coating debris, such as paint chips, or other debris and pollutants generated in bridge and structure maintenance or graffiti removal from entering storm drains or water courses.

(2) The Permittees shall protect nearby storm drain inlets before removing graffiti from walls, signs, sidewalks or other structures. The Permittees shall prevent any discharge of debris, cleaning compound waste, paint waste or wash water due to graffiti removal from entering storm drains or watercourses.

(3) The Permittees shall determine the proper disposal method for wastes generated from these activities. The Permittees shall train their employees and/or specify in contracts about these proper capture and disposal methods for the wastes generated.

iii. Reporting – The Permittees shall report on implementation of and compliance with these BMPs in their Annual Report.

C.2.d. Stormwater Pump Stations

The objective of this sub-provision is to prevent the discharge of water with low dissolved oxygen (DO) from pump stations, and to explore the use of pump stations for trash capture and removal from waters to protect beneficial uses of receiving waters.

i. Task Description – Operation and Maintenance of Stormwater Pump Stations – The Permittees shall develop and implement measures to operate, inspect, and maintain these facilities to eliminate non-stormwater discharges containing pollutants, and to reduce pollutant loads in the stormwater discharges to comply with WQSs.

ii. Implementation Levels – The Permittees shall comply with the following implementation measures to reduce polluted water discharges from Permittee-owned or operated pump stations:

(1) Complete an inventory of pump stations within each Permittee's jurisdiction, including locations, and key characteristics[1] by March 1, 2010.

(2) Inspect and collect DO data from all pump stations twice a year during the dry season after July 1, starting in 2010. DO monitoring is exempted where all discharge from a pump station remains in the stormwater collection system or infiltrates into a dry creek immediately downstream.

(3) If DO levels are at or below 3 milligrams per liter (3 mg/L), apply corrective actions, such as continuous pumping at a low flow rate, aeration, or other appropriate methods to maintain DO concentrations of the discharge above 3 mg/L. Verify corrective actions are effective by increasing DO monitoring interval to weekly until two weekly samples are above 3 mg/L.

(4) Starting in fall 2010, inspect pump stations a minimum of two times during the wet season in the first business day after ¼-inch and larger storm events after a minimum of a two week antecedent period with no precipitation. Post-storm inspections shall collect and report presence and quantity estimates of trash, including presence of odor, color, turbidity, and floating hydrocarbons. Remove debris and trash and replace any oil absorbent booms, as needed.

iii. Reporting – The Permittees shall report information resulting from C.2.d.ii.(2)-(4), including DO monitoring data and subsequent corrective actions taken to verify compliance with the 3 mg/L implementation level, in their Annual Report, and maintain records of inspection and maintenance activities and volume or mass of waste materials removed from pump stations.

C.2.e. Rural Public Works Construction and Maintenance

i. Task Description – Rural Road and Public Works Construction and Maintenance - For the purpose of this provision, rural means any watershed or portion thereof that is developed with large lot home-sites, such as one acre or larger, or with primarily agricultural, grazing or open space uses. The Permittees shall implement and require contractors to implement BMPs for erosion and sediment control during and after construction for maintenance activities on rural roads, particularly in or adjacent to stream channels or wetlands. The Permittees shall notify the Water Board, the California Department of Fish and Game and the U.S. Army Corps of Engineers, where applicable, and obtain appropriate agency permits for rural public works activities before work in or near creeks and wetlands.

[1] Characteristics include name of pump station, latitude and longitude in WGS 84, number of pumps, drainage area in acres, dominant land use(s), first receiving water body, maximum pumping capacity of station in gallons per minute (gpm), flow measurement capability (Y or N), flow measurement method, average wet season discharge rate in gpm, dry season discharge (Y, N, or unknown), nearest municipal wastewater treatment plant, wet well storage capacity in gallons, trash control (Y or N), trash control measure, and date built or last updated.

ii. Implementation Level

(1) The Permittees shall develop, where they do not already exist, and implement BMPs for erosion and sediment control measures during construction and maintenance activities on rural roads, including developing and implementing appropriate training and technical assistance resources for rural public works activities, by April 1, 2010.

(2) The Permittees shall develop and implement appropriate BMPs for the following activities, which minimize impacts on streams and wetlands in the course of rural road and public works maintenance and construction activities:

(a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport;

(b) Identification and prioritization of rural road maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources;

(c) Construction of roads and culverts that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability;

(d) Development and implementation of an inspection program to maintain rural roads' structural integrity and prevent impacts on water quality;

(e) Maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts and excessive erosion;

(f) Re-grading of unpaved rural roads to slope outward where consistent with road engineering safety standards, and installation of water bars as appropriate; and

(g) Replacement of existing culverts or design of new culverts or bridge crossings shall use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

(3) The Permittees shall develop or incorporate existing training and guidance on permitting requirements for rural public works activities so as to stress the importance of proper planning and construction to avoid water quality impacts.

(4) The Permittees shall provide training incorporating these BMPs to rural public works maintenance staff at least twice within this Permit term.

iii. Reporting – The Permittees shall report on the implementation of and compliance with BMPs for the rural public works construction and maintenance activities in their Annual Report, including reporting on increased maintenance in priority areas.

C.2.f. Corporation Yard BMP Implementation

i. Task Description – Corporation Yard Maintenance

(1) The Permittees shall prepare, implement, and maintain a site specific Stormwater Pollution Prevention Plan (SWPPP) for corporation yards, including municipal vehicle maintenance, heavy equipment and maintenance vehicle parking areas, and material storage facilities to comply with water quality standards. Each SWPPP shall incorporate all applicable BMPs that are described in the California Stormwater Quality Association's Handbook for Municipal Operations and the Caltrans Storm Water Quality Handbook Maintenance Staff Guide, May 2003, and its addenda, as appropriate.

(2) The requirements in this provision shall apply only to facilities that are not already covered under the State Board's Industrial Stormwater NPDES General Permit.

(3) The site specific SWPPPs for corporation yards shall be completed by July 1, 2010.

ii. Implementation Level

(1) Implement BMPs to minimize pollutant discharges in stormwater and prohibit non-stormwater discharges, such as wash waters and street sweeper, vactor, and other related equipment cleaning wash water. Pollution control actions shall include, but not be limited to, good housekeeping practices, material and waste storage control, and vehicle leak and spill control.

(2) Routinely inspect corporation yards to ensure that no non-stormwater discharges are entering the storm drain system and, during storms, pollutant discharges are prevented to the maximum extent practicable. At a minimum, an inspection shall occur before the start of the rainy season.

(3) Plumb all vehicle and equipment wash areas to the sanitary sewer after coordination with the local sanitary sewer agency and equip with a pretreatment device (if necessary) in accordance with the requirements of the local sanitary sewer agency.

(4) Use dry cleanup methods when cleaning debris and spills from corporation yards. If wet cleaning methods must be used (e.g., pressure washing), the Permittee shall ensure that wash water is collected and disposed in the sanitary sewer after coordination with the local sanitary sewer agency and in accordance with the requirements of the local sanitary sewer agency. Any private companies hired by the Permittee to perform cleaning activities on Permittee-owned property shall follow the same requirements. In areas where sanitary sewer connection is not available, the Permittees shall collect and haul the wash water to a municipal

wastewater treatment plant, or implement appropriate BMPs and dispose of the wastewater to land in a manner that does not adversely impact surface water or groundwater.

(5) Outdoor storage areas containing waste pollutants shall be covered and/or bermed to prevent discharges of polluted stormwater runoff or run-on to storm drain inlets.

iii. Reporting – The Permittees shall report on implementation of SWPPPs, the results of inspections, and any follow-up actions in their Annual Report.

C.3. New Development and Redevelopment

The goal of Provision C.3 is for the Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

C.3.a. New Development and Redevelopment Performance Standard Implementation

i. Task Description – At a minimum each Permittee shall:

(1) Have adequate legal authority to implement all requirements of Provision C.3;

(2) Have adequate development review and permitting procedures to impose conditions of approval or other enforceable mechanisms to implement the requirements of Provision C.3. For projects discharging directly to CWA section 303(d)-listed waterbodies, conditions of approval must require that post-development runoff not exceed pre-development levels for such pollutants that are listed;

(3) Evaluate potential water quality effects and identify appropriate mitigation measures when conducting environmental reviews, such as under CEQA;

(4) Provide training adequate to implement the requirements of Provision C.3 for staff, including interdepartmental training;

(5) Provide outreach adequate to implement the requirements of Provision C.3, including providing education materials to municipal staff, developers, contractors, construction site operators, and owner/builders, early in the planning process and as appropriate;

(6) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; protection and/or restoration of riparian areas and wetlands as project amenities;

(7) For all new development and redevelopment projects that are subject to the Permittee's planning, building, development, or other comparable review, but not regulated by Provision C.3, encourage the inclusion of adequate source control measures to limit pollutant generation, discharge, and runoff. These source control measures should include:

- Storm drain stenciling.

- Landscaping that minimizes irrigation and runoff, promotes surface infiltration where possible, minimizes the use of pesticides and fertilizers, and incorporates appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping.
- Appropriate covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas.
- Covered trash, food waste, and compactor enclosures.
- Plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:
  - Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants.
  - Dumpster drips from covered trash and food compactor enclosures.
  - Discharges from outdoor covered wash areas for vehicles, equipment, and accessories.
  - Swimming pool water, if discharge to onsite vegetated areas is not a feasible option.
  - Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option.

(8) Revise, as necessary, General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies (e.g., referencing the Bay-Friendly Landscape Guidelines).

ii. Implementation Level – Most of the elements of this task should already be fully implemented because they are required in the Permittees' existing stormwater permits.

Due Dates for Full Implementation – Immediate for C.3.a.i.(1)-(5), May 1, 2010 for C.3.a.i.(6)-(7), and December 1, 2010 for C.3.a.i.(8). For Vallejo Permittees: December 1, 2010 for C.3.a.i.(1)-(8)

iii. Reporting – Provide a brief summary of the method(s) of implementation of Provisions C.3.a.i.(1)–(8) in the 2011 Annual Report.

C.3.b. Regulated Projects

i. Task Description – The Permittees shall require all projects fitting the category descriptions listed in Provision C.3.b.ii below (hereinafter called Regulated Projects) to implement LID source control, site design, and stormwater treatment onsite or at a joint stormwater treatment facility[2] in accordance with Provisions C.3.c and C.3.d, unless the Provision C.3.e alternate compliance options are evoked. For adjacent Regulated Projects that will discharge runoff to a joint stormwater treatment facility, the treatment facility must be completed by

[2] **Joint stormwater treatment facility** – Stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other,

the end of construction of the first Regulated Project that will be discharging runoff to the joint stormwater treatment facility.

Regulated Projects, as they are defined in this Provision, do not include detached single-family home projects that are not part of a larger plan of development.

ii. Regulated Projects are defined in the following categories:

(1) **Special Land Use Categories**

(a) **New Development or redevelopment projects** that fall into one of the categories listed below and that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site). This category includes development projects of the following four types on public or private land that fall under the planning and building authority of a Permittee:

(i) Auto service facilities, described by the following Standard Industrial Classification (SIC) Codes: 5013, 5014, 5541, 7532-7534, and 7536-7539;

(ii) Retail gasoline outlets;

(iii) Restaurants (SIC Code 5812); or

(iv) Uncovered parking lots that are stand-alone or part of any other development project. This category includes the top uncovered portion of parking structures unless drainage from the uncovered portion is connected to the sanitary sewer along with the covered portions of the parking structure.

(b) For redevelopment projects in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv), specific exclusions are:

(i) Interior remodels;

(ii) Routine maintenance or repair such as:

- roof or exterior wall surface replacement,
- pavement resurfacing within the existing footprint.

(c) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **more than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(d) Where a redevelopment project in the categories specified in Provision C.3.b.ii.(1)(a)(i)-(iv) results in an alteration of **less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

(e) For any private development project in the categories specified in Provisions C.3.b.ii.(1)(a)(i)-(iv) for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for the 5000 square feet threshold, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the lower 5000 square feet impervious surface threshold specified in Provision C.3.b.ii.(1).

(f) For any private development project in the categories specified in Provisions C.3.b.ii.(1)(a)(i)-(iv) with an application deemed complete after the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011, for the 5000 square feet threshold.

(g) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the lower 5000 square feet of impervious surface threshold (for classification as a Regulated Project) shall not apply.

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

Beginning December 1, 2011, all references to 10,000 square feet in Provision C.3.b.ii.(1) change to 5,000 square feet.

(2) **Other Development Projects**

New development projects that create 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. This category includes development projects on public or private land that fall under the planning and building authority of a Permittee. Detached single-family home projects that are not part of a larger plan of development are specifically excluded.

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

(3) **Other Redevelopment Projects**

Redevelopment projects that create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) including commercial, industrial, residential housing subdivisions (i.e., detached single-family home subdivisions, multi-family attached subdivisions (town homes), condominiums, and apartments), mixed-use, and public projects. Redevelopment is any land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred. This category includes redevelopment projects on public or private land that fall under the planning and building authority of a Permittee.

Specific exclusions to this category are:

- Interior remodels.
- Routine maintenance or repair such as:
  - roof or exterior wall surface replacement, or
  - pavement resurfacing within the existing footprint.

(a) Where a redevelopment project results in an alteration of **more than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire redevelopment project).

(b) Where a redevelopment results in an alteration **of less than 50 percent** of the impervious surface of a previously existing development that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the new and/or replaced impervious surface of the project).

Effective Date – Immediate, except December 1, 2010, for Vallejo Permittees.

(4) **Road Projects**

Any of the following types of road projects that create 10,000 square feet or more of newly constructed contiguous impervious surface and that fall under the building and planning authority of a Permittee:

(a) Construction of new streets or roads, including sidewalks and bicycle lanes built as part of the new streets or roads.

(b) Widening of existing streets or roads with additional traffic lanes.

(i) Where the addition of traffic lanes results in an alteration of **more than 50 percent** of the impervious surface of an existing street or road that was not subject to Provision C.3, **the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design** (i.e.,

stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

(ii) Where the addition of traffic lanes results in an alteration **of less than 50 percent** of the impervious surface of an existing street or road that was not subject to Provision C.3, **only the new and/or replaced impervious surface of the project must be included in the treatment system design** (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system must be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e, the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

(c) Construction of impervious trails that are greater than 10 feet wide or are creek-side (within 50 feet of the top of bank).

(d) Specific exclusions to Provisions C.3.b.ii.(4)(a)-(c) are:

- Sidewalks built as part of new streets or roads and built to direct stormwater runoff to adjacent vegetated areas.
- Bicycle lanes that are built as part of new streets or roads but are not hydraulically connected to the new streets or roads and that direct stormwater runoff to adjacent vegetated areas.
- Impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees.
- Sidewalks, bicycle lanes, or trails constructed with permeable surfaces.[3]
- Caltrans highway projects and associated facilities.

(e) For any private road or trail project described by Provisions C.3.b.ii.(4)(b) or (c) for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, the requirements of Provisions C.3.b.ii.(4)(b) or (c) to classify the project as a Regulated Project shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for Provisions C.3.b.ii.(4)(b) and (c), the project applicant has not taken

[3] **Permeable surfaces** include pervious concrete, porous asphalt, unit pavers, and granular materials.

any action to obtain the necessary approvals from the Permittee, the project will then be classified as a Regulated Project under Provisions C.3.b.ii.(4)(b) or (c).

(f) For any private road or trail project with an application deemed complete after the Permit effective date, the requirements of Provisions C.3.b.i.(4)(b) or (c) to classify the project as a Regulated Project shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011, for Provisions C.3.b.ii.(4)(b) and (c).

(g) For any public road or trail project for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.b.i.(4)(b) or (c) to classify the project as a Regulated Project shall not apply.

Effective Date – Immediate for C.3.b.ii.(4)(a) and (d)-(g), and December 1, 2011, for C.3.b.ii.(4)(b) and (c). For Vallejo Permittees: Immediate for C.3.b.ii.(4)(d)-(g), and December 1, 2011 for C.3.b.ii.(4)(a)-(c).

iii. Green Street Pilot Projects

The Permittees shall cumulatively complete ten pilot green street projects that incorporate LID techniques for site design and treatment in accordance with Provision C.3.c and that provide stormwater treatment sized in accordance with Provision C.3.d. It is also desirable that they meet or exceed the Bay-Friendly Landscape Scorecard minimum requirements (see www.BayFriendly.org).

(1) Parking lot projects that provide LID treatment in accordance with Provisions C.3.c and Provision C.3.d. for stormwater runoff from the parking lot and street may be considered pilot green street projects.

(2) A Regulated Project (as defined in Provision C.3.b.ii) may not be counted as one of the ten pilot green street projects.

(3) At least two pilot green street projects must be located in each of the following counties: Alameda, Contra Costa, San Mateo, and Santa Clara.

(4) The Permittees shall construct the ten pilot green street projects in such a manner that they, as a whole:

(a) Are representative of the various types of streets: arterial, collector, and local; and

(b) Contain the following key elements:

(i) Stormwater storage for landscaping reuse or stormwater treatment and/or infiltration for groundwater replenishment through the use of natural feature systems;

(ii) Creation of attractive streetscapes that enhance neighborhood livability by enhancing the pedestrian environment and introducing park-like elements into neighborhoods;

(iii) Service as an urban greenway segment that connects neighborhoods, parks, recreation facilities, schools, mainstreets, and wildlife habitats;

(iv) Parking management that includes maximum parking space requirements as opposed to minimum parking space requirements, parking requirement credits for subsidized transit or shuttle service, parking structures, shared parking, car sharing, or on-street diagonal parking;

(v) Meets broader community goals by providing pedestrian and, where appropriate, bicycle access; and

(vi) Located in a Priority Development Area as designated under the Association of Bay Area Government's and Metropolitan Transportation Commission's FOCUS[4] program.

(5) The Permittees shall conduct appropriate monitoring of these projects to document the water quality benefits achieved. Appropriate monitoring may include modeling using the design specifications and specific site conditions.

Due Date – All pilot green street projects shall be completed by December 1, 2014.

iv. Implementation Level – All elements of Provision C.3.b.i.-iii shall be fully implemented by the effective/due dates set forth in their respective sub-provision, and a database or equivalent tabular format shall be developed and maintained that contains all the information listed under Reporting (Provision C.3.b.v.).

Due Dates for Full Implementation – See specific Effective Dates listed under Provisions C.3.b.ii& iii. .The database or equivalent tabular format required by Provision C.3.b.iv shall be developed by December 1, 2010. (For Vallejo Permittees: December 1, 2011)

v. Reporting

(1) **Annual Reporting – C.3.b.ii. Regulated Projects**

For each Regulated Project approved during the fiscal year reporting period, the following information shall be reported electronically in the fiscal year Annual Report, in tabular form (as set forth in the attached Provision C.3.b. Sample Reporting Table):

(a) Project Name, Number, Location (cross streets), and Street Address;

(b) Name of Developer, Phase No. (if project is being constructed in phases, each phase should have a separate entry), Project Type (e.g., commercial, industrial, multiunit residential, mixed-use, public), and description;

(c) Project watershed;

(d) Total project site area and total area of land disturbed;

[4] FOCUS is a regional incentive-based development and conservation strategy for the Bay Area.

(e) Total new impervious surface area and/or total replaced impervious surface area;

(f) If redevelopment or road widening project, total pre-project impervious surface area and total post-project impervious surface area;

(g) Status of project (e.g., application date, application deemed complete date, project approval date);

(h) Source control measures;

(i) Site design measures;

(j) All post-construction stormwater treatment systems installed onsite, at a joint stormwater treatment facility, and/or at an offsite location;

(k) Operation and maintenance responsibility mechanism for the life of the project.

(l) Hydraulic Sizing Criteria used;

(m) Alternative compliance measures for Regulated Project (if applicable)

(i) If alternative compliance will be provided at an offsite location in accordance with Provision C.3.e.i.(1), include information required in Provision C.3.b.v.(a) – (l) for the offsite project; and

(ii) If alternative compliance will be provided by paying in-lieu fees in accordance with Provision C.3.e.i.(2), provide information required in Provision C.3.b.v.(a) – (l) for the Regional Project. Additionally, provide a summary of the Regional Project's goals, duration, estimated completion date, total estimated cost of the Regional Project, and estimated monetary contribution from the Regulated Project to the Regional Project; and

(n) Hydromodification (HM) Controls (see Provision C.3.g.) – If not required, state why not. If required, state control method used.

(2) **Pilot Green Streets Project Reporting - Provision C.3.b.iii.**

(a) On an annual basis, the Permittees shall report on the status of the pilot green street projects.

(b) For each completed project, the Permittees shall report the capital costs, operation and maintenance costs, legal and procedural arrangements in place to address operation and maintenance and its associated costs, and the sustainable landscape measures incorporated in the project including, if relevant, the score from the Bay-Friendly Landscape Scorecard.

(c) The 2013 Annual Report shall contain a summary of all green street projects completed by January 1, 2013. The summary shall include for each completed project the following information:

(i) Location of project

(ii) Size of project, including total impervious surface treated

(iii) Map(s) of project showing areas where stormwater runoff will be treated by LID measures

(iv) Specific type(s) of LID treatment measures included

(v) Total and specific costs of project

(vi) Specific funding sources for project and breakdown of percentage paid by each funding source

(vii) Lessons learned, including recommendations to facilitate funding and building of future projects

(viii) Identification of responsible party and funding source for operation and maintenance.

C.3.c. Low Impact Development (LID)

The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treats stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as rain barrels and cisterns, green roofs, permeable pavement, preserving undeveloped open space, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

Task Description

i. The Permittees shall, at a minimum, implement the following LID requirements:

(1) **Source Control Requirements**

Require all Regulated Projects to implement source control measures onsite that at a minimum, shall include the following:

(a) Minimization of stormwater pollutants of concern in urban runoff through measures that may include plumbing of the following discharges to the sanitary sewer, subject to the local sanitary sewer agency's authority and standards:

- Discharges from indoor floor mat/equipment/hood filter wash racks or covered outdoor wash racks for restaurants;
- Dumpster drips from covered trash, food waste and compactor enclosures;
- Discharges from covered outdoor wash areas for vehicles, equipment, and accessories;
- Swimming pool water, if discharge to onsite vegetated areas is not a feasible option; and
- Fire sprinkler test water, if discharge to onsite vegetated areas is not a feasible option;

(b) Properly designed covers, drains, and storage precautions for outdoor material storage areas, loading docks, repair/maintenance bays, and fueling areas;

(c) Properly designed trash storage areas;

(d) Landscaping that minimizes irrigation and runoff, promotes surface infiltration, minimizes the use of pesticides and fertilizers, and incorporates other appropriate sustainable landscaping practices and programs such as Bay-Friendly Landscaping;

(e) Efficient irrigation systems; and

(f) Storm drain system stenciling or signage.

(2) **Site Design and Stormwater Treatment Requirements**

(a) Require each Regulated Project to implement at least the following design strategies onsite:

(i) Limit disturbance of natural water bodies and drainage systems; minimize compaction of highly permeable soils; protect slopes and channels; and minimize impacts from stormwater and urban runoff on the biological integrity of natural drainage systems and water bodies;

(ii) Conserve natural areas, including existing trees, other vegetation, and soils;

(iii) Minimize impervious surfaces;

(iv) Minimize disturbances to natural drainages; and

(v) Minimize stormwater runoff by implementing one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[3]
- Construct driveways, bike lanes, and/or uncovered parking lots with permeable surfaces.[3]

(b) Require each Regulated Project to treat 100% of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility.

(i) LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment.

(ii) A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site.

(iii) Infeasibility to implement harvesting and re-use, infiltration, or evapotranspiration at a project site may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

(iv) By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report on the criteria and procedures the Permittees shall employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. This report shall, at a minimum, contain the information required in Provision C.3.c.iii.(1).

(v) By December 1, 2013, the Permittees, collaboratively or individually, shall submit a report on their experience with determining infeasibility of harvesting and re-use, infiltration, or evapotranspiration at Regulated Project sites. This report shall, at a minimum, contain the information required in Provision C.3.iii.(2).

(vi) Biotreatment systems shall be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate. The planting and soil media for biotreatment systems shall be designed to sustain plant growth and maximize stormwater runoff retention and pollutant removal. By December 1, 2010, the Permittees, working collaboratively or individually, shall submit for Water Board approval, a proposed set of model biotreatment soil media specifications and soil infiltration testing methods to verify a long-term infiltration rate of 5 to 10 inches/hour. This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(3). Once the Water Board approves biotreatment soil media specifications and soil infiltration testing methods, the Permittees shall ensure that biotreatment systems installed to meet the requirements of Provision C.3.c and d comply with the Water Board-approved minimum specifications and soil infiltration testing methods.

(vii) Green roofs may be considered biotreatment systems that treat roof runoff only if they meet certain minimum specifications. By May 1, 2011, the Permittees shall submit for Water Board approval, proposed minimum specifications for green roofs.

This submittal to the Water Board shall, at a minimum, contain the information required in Provision C.3.c.iii.(4). Once the Water Board approves green roof minimum specifications, the Permittees shall ensure that green roofs installed to meet the requirements of Provision C.3.c and d comply with the Water Board-approved minimum specifications.

(c) Require any Regulated Project that does not comply with Provision C.3.c.i.(2)(b) above to meet the requirements established in Provision C.3.e for alternative compliance.

ii. Implementation Level – All elements of the tasks described in Provision C.3.c.i shall be fully implemented.

Due Date for Full Implementation – December 1, 2011

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provision C.3.c.i shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.c.i.

(2) For any private development project with an application deemed complete after the Permit effective date, the requirements of Provision C.3.c.i shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011.

(3) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provision C.3.c.i shall not apply.

iii. Reporting

(1) Feasibility/Infeasibility Criteria Report - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Literature review and discussion of documented cases/sites, particularly in the Bay Area and California, where infiltration, harvesting and reuse, or evapotranspiration have been demonstrated to be feasible and/or infeasible.
- Discussion of proposed feasibility and infeasibility criteria and procedures the Permittees shall employ to make a determination of when biotreatment will be allowed at a Regulated Project site.

(2) Status Report on Application of Feasibility/Infeasibility Criteria – By December 1, 2013, the Permittees shall submit a report to the Water Board containing the following information:

- Discussion of the most common feasibility and infeasibility criteria employed since implementation of Provision C.3.c requirements, including site-specific examples;
- Discussion of barriers, including institutional and technical site specific constraints, to implementation of harvesting and reuse, infiltration, or evapotranspiration, and proposed strategies for removing these identified barriers;
- If applicable, discussion of proposed changes to feasibility and infeasibility criteria and rationale for the changes; and
- Guidance for the Permittees to make a consistent and appropriate determination of the feasibility of harvesting and reuse, infiltration, or evapotranspiration for each Regulated Project.

(3) Model Biotreatment Soil Media Specifications - By December 1, 2010, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Proposed soil media specifications for biotreatment systems;
- Proposed soil testing methods to verify a long-term infiltration rate of 5-10 inches/hour;
- Relevant literature and field data showing the feasibility of the minimum design specifications;
- Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria; and
- Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.

(4) Green Roof Minimum Specifications - By May 1, 2011, the Permittees, collaboratively or individually, shall submit a report to the Water Board containing the following information:

- Proposed minimum design specifications for green roofs;
- Relevant literature and field data showing the feasibility of the minimum design specifications;
- Relevant literature, field, and analytical data showing adequate pollutant removal and compliance with the Provision C.3.d hydraulic sizing criteria;
- Discussion of data and lessons learned from already installed green roofs;
- Discussion of barriers, including institutional and technical site specific constraints, to installation of green roofs and proposed strategies for removing these identified barriers; and

- Guidance for the Permittees to apply the minimum specifications in a consistent and appropriate manner.

(5) Report the method(s) of implementation of Provisions C.3.c.i above in the 2012 Annual Report. For specific tasks listed above that are reported using the reporting tables required for Provision C.3.b.v, a reference to those tables will suffice.

C.3.d. Numeric Sizing Criteria for Stormwater Treatment Systems

i. Task Description – The Permittees shall require that stormwater treatment systems constructed for Regulated Projects meet at least one of the following hydraulic sizing design criteria:

(1) **Volume Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to:

(a) The maximized stormwater capture volume for the area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175–178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or

(b) The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology set forth in Section 5 of the California Stormwater Quality Association's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

(2) **Flow Hydraulic Design Basis** – Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:

(a) 10 percent of the 50-year peak flowrate;

(b) The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or

(c) The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

(3) **Combination Flow and Volume Design Basis** – Treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data.

ii. Implementation Level – The Permittees shall immediately require the controls in this task.

Due Date for Full Implementation – Immediate, except December 1, 2010, for Vallejo Permittees.

iii. Reporting – Permittees shall use the reporting tables required in Provision C.3.b.v.

iv. Limitations on Use of Infiltration Devices in Stormwater Treatment Systems

(1) For Regulated Projects, each Permittee shall review planned land use and proposed treatment design to verify that installed stormwater treatment systems with no under-drain, and that function primarily as infiltration devices, should not cause or contribute to the degradation of groundwater quality at project sites. An infiltration device is any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. Infiltration devices include dry wells, injection wells, and infiltration trenches (includes french drains).

(2) For any Regulated Project that includes plans to install stormwater treatment systems which function primarily as infiltration devices, the Permittee shall require that:

(a) Appropriate pollution prevention and source control measures are implemented to protect groundwater at the project site, including the inclusion of a minimum of two feet of suitable soil to achieve a maximum 5 inches/hour infiltration rate for the infiltration system;

(b) Adequate maintenance is provided to maximize pollutant removal capabilities;

(c) The vertical distance from the base of any infiltration device to the seasonal high groundwater mark is at least 10 feet. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater vertical distance from the base of the infiltration device to the seasonal high groundwater mark may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety);

(d) Unless stormwater is first treated by a method other than infiltration, infiltration devices are not approved as treatment measures for runoff from areas of industrial or light industrial activity; areas subject to high vehicular traffic (i.e., 25,000 or greater average daily traffic on a main roadway or 15,000 or more average daily traffic on any intersecting roadway); automotive repair shops; car washes; fleet storage areas (e.g., bus, truck); nurseries; and other land uses that pose a high threat to water quality;

(e) Infiltration devices are not placed in the vicinity of known contamination sites unless it has been demonstrated that increased infiltration will not increase leaching of contaminants from soil, alter groundwater flow conditions affecting contaminant migration in groundwater, or adversely affect remedial activities; and

(f) Infiltration devices are located a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and

underground storage tanks with hazardous materials. (Note that some locations within the Permittees' jurisdictions are characterized by highly porous soils and/or high groundwater tables. In these areas, a greater horizontal distance from the infiltration device to known water supply wells, septic systems, or underground storage tanks with hazardous materials may be appropriate, and treatment system approvals should be subject to a higher level of analysis that considers the potential for pollutants (such as from onsite chemical use), the level of pretreatment to be achieved, and other similar factors in the overall analysis of groundwater safety).

C.3.e. Alternative or In-Lieu Compliance with Provision C.3.c.

i. The Permittees may allow a Regulated Project to provide alternative compliance with Provision C.3.c in accordance with one of the two options listed below:

(1) **Option 1: LID Treatment at an Offsite Location**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at an offsite project in the same watershed. The offsite LID treatment measures must provide hydraulically-sized treatment (in accordance with Provision C.3.d) of an equivalent quantity of both stormwater runoff and pollutant loading and achieve a net environmental benefit.

(2) **Option 2: Payment of In-Lieu Fees**
Treat a portion of the amount of runoff identified in Provision C.3.d for the Regulated Project's drainage area with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility **and** pay equivalent in-lieu fees[5] to treat the remaining portion of the Provision C.3.d runoff with LID treatment measures at a Regional Project.[6] The Regional Project must achieve a net environmental benefit.

(3) For the alternative compliance options described in Provision C.3.e.i.(1) and (2) above, offsite projects must be constructed by the end of construction of the Regulated Project. If more time is needed to construct the offsite project, for each additional year, up to three years, after the construction of the Regulated Project, the offsite project must provide an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading. Regional Projects must be completed within three years after the end of construction of the Regulated Project. However, the timeline for completion of the Regional Project may be

[5] **In-lieu fees** – Monetary amount necessary to provide both hydraulically-sized treatment (in accordance with Provision C.3.d) with LID treatment measures of an equivalent quantity of stormwater runoff and pollutant loading, and a proportional share of the operation and maintenance costs of the Regional Project.

[6] **Regional Project –** A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.

extended, up to five years after the completion of the Regulated Project, with prior Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

ii. Special Projects

(1) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and automobile-related pollutant impacts. Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Special Projects.

(2) By December 1, 2010, the Permittees shall submit a proposal to the Water Board containing the following information:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this Permit for each type of project;
- Identification of institutional barriers and/or technical site-specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite;
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations;
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite;
- Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit; and
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.

iii. Effective Date – December 1, 2011.

iv. Implementation Level

(1) For any private development project for which a planning application has been deemed complete by a Permittee on or before the Permit effective date, Provisions C.3.e.i-ii shall not apply so long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary

approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the requirements of Provision C.3.e.i-ii.

(2) For public projects for which funding has been committed and construction is scheduled to begin by December 1, 2012, the requirements of Provisions C.3.e.i-ii shall not apply.

(3) Provisions C.3.e.i-ii supersede any Alternative Compliance Policies previously approved by the Executive Officer

(4) For all offsite projects and Regional Projects installed in accordance with Provision C.3.e.i-ii, the Permittees shall meet the Operation & Maintenance (O&M) requirements of Provision C.3.h.

v. Reporting –The Permittees shall submit the ordinance/legal authority and procedural changes made, if any, to implement Provision C.3.e with their 2012 Annual Report. Annual reporting thereafter shall be done in conjunction with reporting requirements under Provision C.3.b.v.

Any Permittee choosing to require 100% LID treatment onsite for all Regulated Projects and not allow alternative compliance under Provision C.3.e, shall include a statement to that effect in the 2012 Annual Report and all subsequent Annual Reports.

C.3.f. Alternative Certification of Stormwater Treatment Systems

i. Task Description – In lieu of reviewing a Regulated Project's adherence to Provision C.3.d, a Permittee may elect to have a third party conduct detailed review and certify the Regulated Project's adherence to Provision C.3.d. The third party reviewer must be a Civil Engineer or a Licensed Architect or Landscape Architect registered in the State of California, or staff of another Permittee subject to the requirements of this Permit.

ii. Implementation Level – Any Permittee accepting third-party reviews must make a reasonable effort to ensure that the third party has no conflict of interest with regard to the Regulated Project in question. That is, any consultant or contractor (or his/her employees) hired to design and/or construct a stormwater treatment system for a Regulated Project shall not also be the certifying third party. The Permittee must verify that the third party certifying any Regulated Project has current training on stormwater treatment system design (within three years of the certification signature date) for water quality and understands the groundwater protection principles applicable to Regulated Project sites.

Training conducted by an organization with stormwater treatment system design expertise (such as a college or university, the American Society of Civil Engineers, American Society of Landscape Architects, American Public Works Association, California Water Environment Association (CWEA), BASMAA, National Association of Flood & Stormwater Management Agencies, California

Stormwater Quality Association (CASQA), or the equivalent, may be considered qualifying training.

iii. Reporting – Projects reviewed by third parties shall be noted in reporting tables for Provision C.3.b.

C.3.g. Hydromodification Management

i. Hydromodification Management (HM) Projects are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded within the requirements of Attachments B–F. A project that does not increase impervious surface area over the pre-project condition is not an HM Project. All HM Projects shall meet the Hydromodification Management Standard of Provision C.3.g.ii.

ii. HM Standard

Stormwater discharges from HM Projects shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition. Increases in runoff flow and volume shall be managed so that post-project runoff shall not exceed estimated pre-project rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force. The demonstration that post-project stormwater runoff does not exceed estimated pre-project runoff rates and durations shall include the following:

(1) **Range of Flows to Control:** For Alameda, Contra Costa, San Mateo, and Santa Clara Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 % of the pre-project 2-year peak flow[7] up to the pre-project 10-year peak flow. For Fairfield-Suisun Permittees, HM controls shall be designed such that post-project stormwater discharge rates and durations shall match from 20 percent of the 2-year peak flow up to the pre-project 10-year peak flow. Contra Costa Permittees, when using pre-sized and pre-designed Integrated Management Practices (IMPs) per Attachment C of this Order, are not required to meet the low-flow criterion of 10% of the 2-year peak flow. These IMPs are designed to control 20% of the 2-year peak flow. After the Contra Costa Permittees conduct the required monitoring specified in Attachment C, the design of these IMPs will be reviewed.

(2) **Goodness of Fit Criteria:** The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent

[7] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35-50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

over more than 10 percent of the length of the curve corresponding to the range of flows to control.

(3) **Precipitation Data:** Precipitation data used in the modeling of HM controls shall, at a minimum, be 30 years of hourly rainfall data representative of the area being modeled. Where a longer rainfall record is available, the longer record shall be used.

(4) **Calculating Post-Project Runoff:** Retention and detention basins shall be considered impervious surfaces for purposes of calculating post-project runoff. Pre- and post-project runoff shall be calculated and compared for the entire site, without separating or excluding areas that may be considered self-retaining.

(5) **Existing HM Control Requirements:** The Water Board has adopted HM control requirements for all Permittees (except for the Vallejo Permittees), and these adopted requirements are attached to this Order as listed below. The Permittees shall comply with all requirements in their own Permittee-specific Attachment, unless otherwise specified by this Order. In all cases, the HM Standard shall be achieved.

- Attachment B for Alameda Permittees
- Attachment C for Contra Costa Permittees
- Attachment D for Fairfield-Suisun Permittees
- Attachment E for San Mateo Permittees
- Attachment F for Santa Clara Permittees

iii. Types of HM Controls

Projects shall meet the HM Standard using any of the following HM controls or a combination thereof.

(1) **Onsite HM controls** are flow duration control structures and hydrologic source controls that collectively result in the HM Standard being met at the point(s) where stormwater runoff discharges from the project site.

(2) **Regional HM controls** are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which shall incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional HM control discharges.

(3) **In-stream measures** shall be an option only where the stream, which receives runoff from the project, is already impacted by erosive flows and shows evidence of excessive sediment, erosion, deposition, or is a hardened channel.

In-stream measures involve modifying the receiving stream channel slope and geometry so that the stream can convey the new flow regime without increasing the potential for erosion and aggradation. In-stream measures are intended to improve long-term channel stability and prevent erosion by reducing the erosive forces imposed on the channel boundary.

In-stream measures, or a combination of in-stream and onsite controls, shall be designed to achieve the HM Standard from the point where the project(s) discharge(s) to the stream to the mouth of the stream or to achieve an equivalent degree of flow control mitigation (based on amount of impervious surface mitigated) as part of an in-stream project located in the same watershed. Designing in-stream controls requires a hydrologic and geomorphic evaluation (including a longitudinal profile) of the stream system downstream and upstream of the project. As with all in-stream activities, other regulatory permits must be obtained by the project proponent.[8]

iv. Reporting

For each HM Project approved during the reporting period, the following information shall be reported electronically in tabular form. This information shall be added to the required reporting information specified in Provision C.3.b.v.

(1) Device(s) or method(s) used to meet the HM Standard, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control;

(2) Method used by the project proponent to design and size the device or method used to meet the HM Standard; and

(3) Other information as required in the Permittee's existing HM requirements, as shown in Attachments B–F.

v. Vallejo Permittees shall complete the following tasks in lieu of complying with Provisions C.3.g.i-iv.

(1) Develop a Hydrograph Modification Management Plan (HMP) for meeting the requirements of Provisions C.3.g.i–iv. The Vallejo Permittees' HMP shall be subject to approval by the Water Board.

(2) Vallejo Permittees shall include the following in their HMP:

(a) A map of the City of Vallejo, delineating areas where the HM Standard applies. The HM Standard shall apply in all areas except where a project:

- discharges stormwater runoff into creeks or storm drains that are concrete-lined or significantly hardened (e.g., with rip-rap, sackrete) downstream to their outfall in San Francisco Bay;
- discharges to an underground storm drain discharging to the Bay; or
- is located in a highly developed watershed.[9]

[8] In-stream control projects require a Stream Alteration Agreement from the California Department of Fish & Game, a CWA section 404 permit from the U.S. Army Corps of Engineers, and a section 401 certification from the Water Board. Early discussions with these agencies on the acceptability of an in-stream modification are necessary to avoid project delays or redesign.

[9] Within the context of Provision C.3.g., "highly developed watersheds" refers to catchments or subcatchments that are 65% impervious or more.

However, plans to restore a creek reach may reintroduce the applicability of HM controls, and would need to be addressed in the HMP;

(b) A thorough technical description of the methods project proponents may use to meet the HM Standard. Vallejo Permittees shall use the same methodologies, or similar methodologies, to those already in use in the Bay Area to meet the HM Standard. Contra Costa sizing charts may be used on projects up to ten acres after any necessary modifications are made to the sizes to control runoff rates and durations from ten percent of the pre-project 2-year peak flow to the pre-project 10-year peak flow, and adjustments are made for local rainfall and soil types;

(c) A description of any land use planning measures the City of Vallejo will take (e.g., stream buffers and stream restoration activities, including restoration-in-advance of floodplains, revegetation, and use of less-impacting facilities at points of discharge) to allow expected changes in stream channel cross sections, stream vegetation, and discharge rates, velocities, and/or durations without adverse impacts on stream beneficial uses;

(d) A description of how the Vallejo Permittees will incorporate these requirements into their local approval processes, and a schedule for doing so; and

(e) Guidance for City of Vallejo project proponents explaining how to meet the HM Standard.

(3) Vallejo Permittees shall complete the HMP according to the schedule below. All required documents shall be submitted acceptable to the Executive Officer, except the HMP, which shall be submitted to the Water Board for approval. Vallejo Permittees shall report on the status of HMP development and implementation in each Annual Report and shall also provide a summary of projects incorporating measures to address Provision C.3.g and the measures used.

- By April 1, 2011, submit a detailed workplan and schedule for completion of the information required in Provision C.3.g.v.(2).
- By December 1, 2011, submit the map required in Provision C.3.g.v.(2)(a).
- By April 1, 2012, submit a draft HMP.
- By December 1, 2012, provide responses to Water Board comments on the draft HMP so that the final HMP is submitted for Water Board approval by July 1, 2013.
- Upon adoption by the Water Board, implement the HMP, which shall include the requirements of this measure. Before approval of the HMP by the Water Board, Vallejo Permittees shall encourage early implementation of measures likely to be included in the HMP.

C.3.h. Operation and Maintenance of Stormwater Treatment Systems

i. Task Description – Each Permittee shall implement an Operation and Maintenance (O&M) Verification Program.

ii. Implementation Level – At a minimum, the O&M Verification Program shall include the following elements:

(1) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that, at a minimum, require at least one of the following from all project proponents and their successors in control of the Project or successors in fee title:

(a) The project proponent's signed statement accepting responsibility for the O&M of the installed onsite, joint, and/or offsite stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(b) Written conditions in the sales or lease agreements or deed for the project that requires the buyer or lessee to assume responsibility for the O&M of the onsite, joint, and/or offsite installed stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity;

(c) Written text in project deeds, or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the installed onsite, joint, and/or offsite stormwater treatment system(s) and HM control(s) (if any) until such responsibility is legally transferred to another entity; or

(d) Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns the O&M responsibility for the installed onsite, joint, and/or offsite treatment system(s) and HM control(s) (if any) to the project owner(s) or the Permittee.

(2) Coordination with the appropriate mosquito and vector control agency with jurisdiction to establish a protocol for notification of installed stormwater treatment systems and HM controls.

(3) Conditions of approval or other legally enforceable agreements or mechanisms for all Regulated Projects that require the granting of site access to all representatives of the Permittee, local mosquito and vector control agency staff, and Water Board staff, for the sole purpose of performing O&M inspections of the installed stormwater treatment system(s) and HM control(s) (if any).

(4) A written plan and implementation of the plan that describes O&M (including inspection) of all Regional Projects and regional HM controls that are Permittee-owned and/or operated.

(5) A database or equivalent tabular format of all Regulated Projects (public and private) that have installed onsite, joint, and/or offsite stormwater

treatment systems. This database or equivalent tabular format shall include the following information for each Regulated Project:

(a) Name and address of the Regulated Project;

(b) Specific description of the location (or a map showing the location) of the installed stormwater treatment system(s) and HM control(s) (if any);

(c) Date(s) that the treatment system(s) and HM controls (if any) is/are installed;

(d) Description of the type and size of the treatment system(s) and HM control(s) (if any) installed;

(e) Responsible operator(s) of each treatment system and HM control (if any);

(f) Dates and findings of inspections (routine and follow-up) of the treatment system(s) and HM control(s) (if any) by the Permittee; and

(g) Any problems and corrective or enforcement actions taken.

(6) A prioritized plan for inspecting all installed stormwater treatment systems and HM controls. At a minimum, this prioritized plan must specify the following for each fiscal year:

(a) Inspection by the Permittee of all newly installed stormwater treatment systems and HM controls within 45 days of installation to ensure approved plans have been followed;

(b) Inspection by the Permittee of at least 20 percent of the total number (at the end of the preceding fiscal year) of installed stormwater treatment systems and HM controls;

(c) Inspection by the Permittee of at least 20 percent of the total number (at the end of the preceding fiscal year) of installed vault-based systems; and

(d) Inspection by the Permittee of all installed stormwater treatment systems subject to Provision C.3, at least once every five years.

iii. Maintenance Approvals: The Permittees shall ensure that onsite, joint, and offsite stormwater treatment systems and HM controls installed by Regulated Projects are properly operated and maintained for the life of the projects. In cases where the responsible party for a stormwater treatment system or HM control has worked diligently and in good faith with the appropriate State and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment system or HM control, but these approvals are not granted, the Permittees shall be deemed to be in compliance with this Provision. Permittees shall ensure that constructed wetlands installed by Regulated Projects and used for urban runoff treatment shall abide by the Water Board's Resolution No. 94-102: Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control and the O&M requirements contained therein.

Due Date for Full Implementation: Immediate for Provisions C.3.h.i, C.3.h.ii.(1), and C.3.h.iii, and December 1, 2010, for Provisions C.3.h.ii.(2)-(6). For Vallejo Permittees: December 1, 2010, for Provisions C.3.h.i-iii.

iv. Reporting: Beginning with the 2010 Annual Report

(1) For each Regulated Project inspected during the reporting period (fiscal year) the following information shall be reported to the Water Board electronically in tabular form as part of the Annual Report (as set forth in the Provision C.3.h. Sample Reporting Table attached):

- Name of facility/site inspected.
- Location (street address) of facility/site inspected.
- Name of responsible operator for installed stormwater treatment systems and HM controls.
- For each inspection:
  - Date of inspection.
  - Type of inspection (e.g., initial, annual, follow-up, spot).
  - Type(s) of stormwater treatment systems inspected (e.g., swale, bioretention unit, tree well, etc.) and an indication of whether the treatment system is an onsite, joint, or offsite system.
  - Type of HM controls inspected.
  - Inspection findings or results (e.g., proper installation, proper operation and maintenance, system not operating properly because of plugging, bypass of stormwater because of improper installation, maintenance required immediately, etc.).
  - Enforcement action(s) taken, if any (e.g., verbal warning, notice of violation, administrative citation, administrative order).

(2) On an annual basis, before the wet season, provide a list of newly installed (installed within the reporting period) stormwater treatment systems and HM controls to the local mosquito and vector control agency and the Water Board. This list shall include the facility locations and a description of the stormwater treatment measures and HM controls installed.

(3) Each Permittee shall report the following information in the Annual Report each year:

(a) A discussion of the inspection findings for the year and any common problems encountered with various types of treatment systems and/or HM controls. This discussion should include a general comparison to the inspection findings from the previous year.

(b) A discussion of the effectiveness of the Permittee's O&M Program and any proposed changes to improve the O&M Program (e.g., changes in prioritization plan or frequency of O&M inspections, other changes to improve effectiveness of program).

C.3.i. Required Site Design Measures for Small Projects and Detached Single-Family Home Projects

i. Task Description – The Permittees shall require all development projects, which create and/or replace $\geq$ 2500 ft^2 to < 10,000 ft^2 of impervious surface, and

detached single-family home projects,[10] which create and/or replace 2,500 square feet or more of impervious surface, to install one or more of the following site design measures:

- Direct roof runoff into cisterns or rain barrels for reuse.
- Direct roof runoff onto vegetated areas.
- Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas.
- Direct runoff from driveways and/or uncovered parking lots onto vegetated areas.
- Construct sidewalks, walkways, and/or patios with permeable surfaces.[3]
- Construct bike lanes, driveways, and/or uncovered parking lots with permeable surfaces.[3]

This provision applies to all development projects that require approvals and/or permits issued under the Permittee's' planning, building, or other comparable authority.

ii. **Implementation Level** – All elements of this task shall be fully implemented by December 1, 2012.

iii. **Reporting** – On an annual basis, discuss the implementation of the requirements of Provision C.3.i, including ordinance revisions, permit conditions, development of standard specifications and/or guidance materials, and staff training.

iv. **Task Description** – The Permittees shall develop standard specifications for lot-scale site design and treatment measures (e.g., for roof runoff and paved areas) as a resource for single-family homes and small development projects.

v. **Implementation Level** – This task may be fulfilled by the Permittees cooperating on a countywide or regional basis.

Due Date for Full Implementation – December 1, 2012.

vi. **Reporting** – A report containing the standard specifications for lot-scale treatment BMPs shall be submitted by December 1, 2012.

[10] **Detached single-family home project** – The building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

C.4. Industrial and Commercial Site Controls

Each Permittee shall implement an industrial and commercial site control program at all sites which could reasonably be considered to cause or contribute to pollution of stormwater runoff, with inspections and effective follow-up and enforcement to abate actual or potential pollution sources consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent discharge of pollutants and impacts on beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective BMPs and other pollutant controls by industrial and commercial site operators.

C.4.a. Legal Authority for Effective Site Management

i. Task Description – Permittees shall have sufficient legal enforcement authority to obtain effective stormwater pollutant control on industrial sites. Permittees shall have the ability to inspect and require effective stormwater pollutant control and to escalate progressively stricter enforcement to achieve expedient compliance and pollutant abatement at commercial and industrial sites within their jurisdiction.

ii. Implementation Level

(1) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and pollution abatement at all industrial and commercial sites which may be reasonably considered to cause or contribute to pollution of stormwater runoff. Permittees shall have the legal authority to require implementation of appropriate BMPs at industrial and commercial to address pollutant sources associated with outdoor process and manufacturing areas, outdoor material storage areas, outdoor waste storage and disposal areas, outdoor vehicle and equipment storage and maintenance areas, outdoor parking areas and access roads, outdoor wash areas, outdoor drainage from indoor areas, rooftop equipment, and contaminated and erodible surface areas, and other sources determined by the Permittees or Water Board Executive Officer to have a reasonable potential to contribute to pollution of stormwater runoff.

(2) Permittees shall notify the discharger of any actual or potential pollutant sources and violations and require problem correction within a reasonably short and expedient time frame commensurate with the threat to water quality. Permittees shall require timely correction of problems involving rapid temporary repair, and may allow longer time periods for implementation of more permanent solutions, if these require significant capital expenditure or construction. Violations shall be corrected prior to the next rain event or within 10 business days after the violations are noted. If more than 10 business days are required for correction, a rationale shall be given in the tabulated sheets.

C.4.b. Industrial and Commercial Business Inspection Plan (Inspection Plan)

i. Task Description – Permittees shall develop and implement an inspection plan that will serve as a prioritized inspection workplan. This inspection plan will allow inspection staff to categorize the commercial and industrial sites within the Permittee's jurisdiction by pollutant threat and inspection frequency, change inspection frequency based on site performance, and add and remove sites as businesses open and close.

The Inspection Plan shall contain the following information:

(1) Total number and a list of industrial and commercial facilities requiring inspection, within each Permittee's jurisdiction, to be determined on the basis of a prioritization criteria designed to assign a more frequent inspection schedule to the highest priority facilities per Section C.4.b.ii. below.

(2) A description of the process for prioritizing inspections and frequency of inspections. If any geographical areas are to be targeted for inspections due to high potential for stormwater pollution, these areas should be indicated in the Inspection Plan. A mechanism to include newly opened businesses that warrant inspection shall be included.

ii. Implementation Level – Each Permittee shall annually update and maintain a list of industrial and commercial facilities in the Inspection Plan to inspect that could reasonably be considered to cause or contribute to pollution of stormwater runoff. The following are some of the functional aspects of businesses and types of businesses that shall be included in the Inspection Plans:

(1) Sites that include the following types of functions that may produce pollutants when exposed to stormwater include, but are not limited to:

(a) Outdoor process and manufacturing areas

(b) Outdoor material storage areas

(c) Outdoor waste storage and disposal areas

(d) Outdoor vehicle and equipment storage and maintenance areas

(e) Outdoor wash areas

(f) Outdoor drainage from indoor areas

(g) Rooftop equipment

(h) Other sources determined by the Permittee or Water Board to have a reasonable potential to contribute to pollution of stormwater runoff

(2) The following types of Industrial and Commercial businesses that have a reasonable likelihood to be sources of pollutants to stormwater and non-stormwater discharges:

(a) Industrial facilities, as defined at 40 CFR 122.26(b)(14), including those subject to the State General NPDES Permit for Stormwater Discharges Associated with Industrial Activity (hereinafter the Industrial General Permit);

(b) Vehicle Salvage yards;

(c) Metal and other recycled materials collection facilities, waste transfer facilities;

(d) Vehicle mechanical repair, maintenance, fueling, or cleaning;

(e) Building trades central facilities or yards, corporation yards;

(f) Nurseries and greenhouses;

(g) Building material retailers and storage;

(h) Plastic manufacturers; and

(i) Other facilities designated by the Permittee or Water Board to have a reasonable potential to contribute to pollution of stormwater runoff.

(3) **Prioritization of Facilities**

Facilities of the types described in Provision 4.b.ii.(2) above and identified by the Permittees as having the reasonable potential to contribute to pollution of stormwater runoff shall be prioritized on the basis of the potential for water quality impact using criteria such as pollutant sources on site, pollutants of concern, proximity to a waterbody, violation history of the facility, and other relevant factors.

(4) **Types/Contents of Inspections**

Each Permittee shall conduct inspections to determine compliance with its ordinances and this Permit. Inspections shall include but not be limited to the following:

(a) Prevention of stormwater runoff pollution or illicit discharge by implementing appropriate BMPs;

(b) Visual observations for evidence of unauthorized discharges, illicit connections, and potential discharge of pollutants to stormwater;

(c) Noncompliance with Permittee ordinances and other local requirements; and

(d) Verification of coverage under the Industrial General Permit, if applicable.

(5) **Inspection Frequency** – Permittees shall establish appropriate inspection frequencies for facilities based on Provision 4.b.ii (3) priority, potential for contributing pollution to stormwater runoff, and commensurate with the threat to water quality.

(6) **Record Keeping** – For each facility identified in Provision 4.b.ii, the Permittee shall maintain a database or equivalent of the following information at a minimum:

(a) Name and address of the business and local business operator;

(b) A brief description of business activity including SIC code;

(c) Inspection priority and inspection frequency; and

(d) If coverage under the Industrial General Permit is required.

iii. Reporting – The Permittees shall include the following in the Annual Report:

(1) The list of facilities identified in Provision 4.b.ii in the 2010 Annual Report and revisions or updates in subsequent annual reports; and

(2) The list of facilities scheduled for inspection during the current fiscal year.

C.4.c. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all commercial and industrial site operators.

ii. Implementation Level – The ERP shall contain the following:

(1) **Required enforcement actions** – including timeframes for corrections of problems – for various field violation scenarios. The ERP will provide guidance on appropriate use of the various enforcement tools, such as verbal and written notices of violation, citations, cleanup requirements, administrative and criminal penalties.

(2) **Timely Correction of Violations** – All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

A description of the Permittee's procedures for follow-up inspections and enforcement actions or referral to another agency, including appropriate time periods for each level of corrective action.

(3) **Referral and Coordination with Water Board** – Each Permittee shall enforce its stormwater ordinances as necessary to achieve compliance at sites with observed violations. For cases in which Permittee enforcement tools are inadequate to remedy the noncompliance, the Permittee shall refer the case to the Water Board, district attorney or other relevant agencies for additional enforcement.

(4) **Recordkeeping** – Permittees shall maintain adequate records to demonstrate compliance and appropriate follow-up enforcement responses for facilities inspected.

Permittees shall maintain an electronic database or equivalent tabular system that contains the following information regarding industrial commercial site inspections:

(a) Name of Facility/Site Inspected
(b) Inspection Date
(c) Industrial General Permit coverage required (Yes or No)
(d) Compliance Status
(e) Type of Enforcement (if applicable)
(f) Type of Activity or Pollutant Source

Examples: Outdoor process/manufacturing areas, Outdoor material storage areas, Outdoor waste storage/disposal areas, outdoor vehicle and equipment storage/maintenance areas, Outdoor parking areas and access roads, Outdoor wash areas, Rooftop equipment, Outdoor drainage from indoor areas

(g) Specific Problems

(h) Problem Resolution

(i) Additional Comments

The electronic database or equivalent tabular system shall be made readily available to the Executive Officer and during inspections and audits by the Water Board staff or its representatives.

(5) The ERP shall be developed and implemented by April 1, 2010.

iii. Reporting – Permittees shall include the following information in each Annual Report:

(1) Number of inspections conducted, Number of violations issued (excluding verbal warnings), Percentage of sites inspected in violation, and number and percent of violations resolved within 10 working days or otherwise deemed resolved in a longer but still timely manner;

(2) Frequency and Types/categories of violations observed, Frequency and type of enforcement conducted;

(3) Summary of types of violations noted by business category; and

(4) Facilities that are required to have coverage under the Industrial General Permit, but have not filed for coverage.

C.4.d. Staff Training

i. Task Description

Permittees shall provide focused training for inspectors annually. Trainings may be Program-wide, Region-wide, or Permittee-specific.

ii. Implementation Level

At a minimum, train inspectors, within the 5-year term of this Permit, in the following topics:

(1) Urban runoff pollution prevention;

(2) Inspection procedures;

(3) Illicit Discharge Detection, Elimination and follow-up; and

(4) Implementation of typical BMPs at Industrial and Commercial Facilities.

Permittees, either countywide or regionally, if they have not already done so, are encouraged to create or adopt guidance for inspectors or reference existing inspector guidance including the California Association of Stormwater Quality Agencies (CASQA) Industrial BMP Handbook.

iii. Reporting

The Permittees shall include the following information in the Annual Report:

(1) Dates of trainings;

(2) Training topics that have been covered; and

(3) Percentage of Permittee inspectors attending training.

C.5. Illicit Discharge Detection and Elimination

The purpose of this provision is to implement the illicit discharge prohibition and to ensure illicit discharges are detected and controlled that are not otherwise controlled under provision C4, Industrial and Commercial Site Controls and C6, Construction Site Controls. Permittees shall develop and implement an illicit discharge program that includes an active surveillance component and a centralized complaint collection and follow-up component to target illicit discharge and non-stormwater sources. Permittees shall maintain a complaint tracking and follow-up data system as their primary accountability reporting for this provision.

C.5.a. Legal Authority

i. Task Description – Permittees shall have the legal authority to prohibit and control illicit discharges and escalate stricter enforcement to achieve expedient compliance.

ii. Implementation Level

(1) Permittees shall have adequate legal authority to address stormwater and non-stormwater pollution associated with, but not limited to the following:

(a) Sewage;

(b) Discharges of wash water resulting from the cleaning of exterior surfaces and pavement, or the equipment and other facilities of any commercial business, or any other public or private facility;

(c) Discharges of runoff from material storage areas, including containing chemicals, fuels, or other potentially polluting or hazardous materials;

(d) Discharges of pool or fountain water containing chlorine, biocides, or other chemicals; discharges of pool or fountain filter backwash water;

(e) Discharges of sediment, pet waste, vegetation clippings, or other landscape or construction-related wastes; and

(f) Discharges of food-related wastes (e.g., grease, fish processing, and restaurant kitchen mat and trash bin wash water, etc.).

(2) Permittees shall have adequate legal authority to prohibit, discover through inspection and surveillance, and eliminate illicit connections and discharges to storm drains.

(3) Permittees shall have adequate legal authority to control the discharge of spills, dumping, or disposal of materials other than storm water to storm drains.

C.5.b. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as guidance for inspection staff to take consistent actions to achieve timely and effective abatement of illicit discharges.

ii. Implementation Level – The ERP shall contain the following:

(1) Recommended responses and enforcement actions – including timeframes for corrections of problems – for various types and degree of violations. The ERP shall provide guidelines on when to employ the range of regulatory responses from warnings, citations and cleanup and cost recovery, to administrative or criminal penalties.

(2) Timely Correction of Violations: All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system. Immediate correction can be temporary and short-term if a long-term, permanent correction will involve significant resources and construction time. An example would be replumbing of a wash area to the sanitary sewer, which would involve an immediate short-term, temporary fix followed by permanent replumbing.

(3) If corrective actions are not implemented promptly or if there are repeat violations, Permittees shall escalate responses as needed to achieve compliance, including referral to other agencies were necessary.

(4) The ERP shall be developed and implemented by April 1, 2010.

C.5.c. Spill and Dumping Response, Complaint Response, and Frequency of Inspections

i. Task Description – Permittees shall have a central contact point, including a phone number for complaints and spill reporting, and publicize this number to both internal Permittee staff and the public. If 911 is selected, also maintain and publicize a staffed, non-emergency phone number with voicemail, which is checked during normal business hours.

Permittees shall develop a spill/dumping response flow chart and phone tree or contact list for internal use that shows the various responsible agencies and their contacts, who would be involved in illicit discharge incident response that goes beyond the Permittees immediate capabilities. The list shall be maintained and updated as changes occur.

Permittees shall conduct reactive inspections in response to complaints and follow-up inspections as needed to ensure that corrective measures have been implemented to achieve and maintain compliance.

ii. Implementation Level – Permittees will have the phone number and contact information available and integrated into training and outreach both to Permittee staff and the public by July 1, 2010.

iii. Reporting – Submit the complaint and spill response phone number and spill contact list with the 2010 Annual Report and update annually if changes occur.

C.5.d. Control of Mobile Sources

i. Task Description – The purpose of this section is to establish oversight and control of pollutants associated with mobile business sources.

ii. Implementation Level – Each Permittee shall develop and implement a program to reduce the discharge of pollutants from mobile businesses.

(1) The program shall include the following:

(a) Development and implementation of minimum standards and BMPs to be required for each of the various types of mobile businesses such as automobile washing, power washing, steam cleaning, and carpet cleaning. This guidance can be developed via county-wide or regional collaboration.

(b) Development and implementation of an enforcement strategy which specifically addresses the unique characteristics of mobile businesses.

(c) Outreach to mobile businesses operating within the Permittee's jurisdiction with minimum standards and BMP requirements and local ordinances through an outreach and education strategy.

(d) Inspection of mobile businesses as needed.

(2) Permittees should cooperate regionally in developing and implementing their programs for mobile businesses, including sharing of mobile business inventories, BMP requirements, enforcement action information, and education.

iii. Reporting – Permittees shall report on implementation of minimum standards and BMPs for mobile business and their enforcement strategy in each Annual Report.

C.5.e. Collection System Screening - Municipal Separate Storm Sewer System (MS4) Map Availability

i. Task Description – Permittees shall perform routine surveys for illicit discharges and illegal dumping in above ground check points in the collection system including elements that are typically inspected for other maintenance purposes, such as end of pipes, creeks, flood conveyances, storm drain inlets and catch basins, in coordination with public works/flood control maintenance surveys, video inspections of storm drains, and during other routine Permittee maintenance and inspection activities when Permittee staff are working in or near the MS4 system.

ii. Implementation Level – Permittees shall develop and implement a screening program utilizing the USEPA/Center for Watershed Protection publication, "Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessment." Permittees shall implement the screening program by conducting a survey of strategic collection system check points (one screening point per square mile of Permittee urban and suburban jurisdiction area, less open space) including some key major outfalls draining industrial areas as defined in 40 CFR 122.26 (b)(5) once each year in dry weather conditions meaning no significant rainfall within the past 3 weeks. Routine surveys that occur on an ongoing basis during regular conveyance system inspections may be credited toward this requirement. Make maps of the MS4 publicly available, either electronically or in hard copy by July 1, 2010. The public availability shall be through a publicized single point of contact that

is convenient for the public, such as a staffed counter or web accessible maps. The MS4 map availability shall be publicized through Permittee directories and web pages.

iii. Reporting – Permittees shall provide a summary of their collection screening program, a summary of problems found during collection system screening, and any changes to the screening program in each Annual Report.

C.5.f. Tracking and Case Follow-up

i. Task Description – All incidents or discharges reported to the complaint/spill system that might pose a threat to water quality shall be logged to track follow-up and response through problem resolution. The data collected shall be sufficient to demonstrate escalating responses for repeated problems, and inter/intra-agency coordination, where appropriate.

ii. Implementation Level – Create and maintain a water quality spill and discharge complaint tracking and follow-up in an electronic database or equivalent tabular system by April 1, 2010.

The spill and discharge complaint tracking system shall contain the following information:

(1) Complaint information:
- (a) Date and time of complaint
- (b) Type of pollutant
- (c) Problem Status (potential or actual discharge.)

(2) Investigation information:
- (a) Date and time started
- (b) Type of pollutant
- (c) Entered storm drain and/or receiving water
- (d) Date abated
- (e) Type of enforcement (if applicable)

(3) Response time (days)
- (a) Call to investigation
- (b) Investigation to abatement
- (c) Call to abatement

The electronic database or equivalent tabular system shall be made available to Water Board staff as needed for review of enforcement response through problem resolution.

iii. Reporting – Permittees shall provide the following information in the Annual Report:

(1) Number of discharges reported;

(2) Number of discharges reaching storm drains and/or receiving waters;

(3) Number and percentage of discharges resolved in a timely manner; and

(4) Summary of major types of discharges and complaints.

C.6. Construction Site Control

Each Permittee shall implement a construction site inspection and control program at all construction sites, with follow-up and enforcement consistent with each Permittee's respective Enforcement Response Plan (ERP), to prevent construction site discharges of pollutants and impacts on beneficial uses of receiving waters. Inspections shall confirm implementation of appropriate and effective erosion and other construction pollutant controls by construction site operators/developers; and reporting shall demonstrate the effectiveness of this inspection and problem solution activity by the Permittees.

C.6.a. Legal Authority for Effective Site Management

i. Task Description – Permittees shall have the ability to require effective stormwater pollutant controls, and escalate progressively stricter enforcement to achieve expedient compliance and clean up at all public and private construction sites.

ii. Implementation Level

(1) Permittees shall have the legal authority to require at all construction sites year round effective erosion control, run-on and runoff control, sediment control, active treatment systems (as appropriate), good site management, and non storm water management through all phases of construction (including but not limited to site grading, building, and finishing of lots) until the site is fully stabilized by landscaping or the installation of permanent erosion control measures.

(2) Permittees shall have the legal authority to oversee, inspect, and require expedient compliance and clean up at all construction sites year round.

iii. Reporting – Permittees shall certify adequacy of their respective legal authority in the 2010 Annual Report.

C.6.b. Enforcement Response Plan (ERP)

i. Task Description – Permittees shall develop and implement an ERP that will serve as a reference document for inspection staff to take consistent actions to achieve timely and effective compliance from all public and private construction site owners/operators.

ii. Implementation Level

(1) The ERP shall include required enforcement actions – including timeframes for corrections of problems – for various field violation scenarios. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded in the electronic database or equivalent tabular system.

(2) If site owners/operators do not implement appropriate corrective actions in a timely manner, or if violations repeat, Permittees shall take progressively stricter responses to achieve compliance. The ERP shall include the structure for progressively stricter responses and various violation scenarios that evoke progressively stricter responses.

(3) The ERP shall be developed and implemented by April 1, 2010.

C.6.c. Best Management Practices Categories

i. Task Description – Permittees shall require all construction sites to have site specific, and seasonally- and phase-appropriate, effective Best Management Practices (BMPs) in the following six categories:

- Erosion Control
- Run-on and Run-off Control
- Sediment Control
- Active Treatment Systems (as necessary)
- Good Site Management
- Non Stormwater Management.

Theses BMP categories are listed in State General NPDES Permit for Stormwater Discharges Associated with Construction Activities (hereinafter the Construction General Permit).

ii. Implementation Level

The BMPs targeting specific pollutants within the six categories listed in C.6.c.i. shall be site specific. Site specific BMPs targeting specific pollutants from the six categories listed in C.6.c.i. can be a combination of BMPs from:

- California BMP Handbook, Construction, January 2003.
- Caltrans Stormwater Quality Handbooks, Construction Site Best Management Practices Manual, March 2003, and addenda.
- California Regional Water Quality Control Board, San Francisco Bay Region, Erosion and Sediment Control Field Manual, 2002.
- New BMPs available since the release of these Handbooks.

C.6.d. Plan Approval Process

i. Task Description – Permittees shall review erosion control plans for consistency with local requirements, appropriateness and adequacy of proposed BMPs for each site before issuance of grading permits for projects. Permittees shall also verify that sites disturbing one acre or more of land <u>have filed a Notice of Intent for</u> coverage under the Construction General Permit.

ii. Implementation Level – Before approval and issuance of local grading permits, each Permittee shall perform the following:

(1) Review the site operator's/developer's erosion/pollution control plan or Stormwater Pollution Prevention Plan (SWPPP) to verify compliance with the Permittee's grading ordinance and other local requirements. Also review the site operator's/developer's erosion/pollution control plan or SWPPP to verify that seasonally appropriate and effective BMPs for the six categories listed in C.6.c.i. are planned;

(2) For sites disturbing one acre or more of soil, verify that the site operators/developers have filed a Notice of Intent for permit coverage under the Construction General Permit; and

(3) Provide construction stormwater management educational materials to site operators/developers, as appropriate.

C.6.e. Inspections

i. Task Description – Permittees shall conduct inspections to determine compliance with local ordinances (grading and stormwater) and determine the effectiveness of the BMPs in the six categories listed in C.6.c.i.; and Permittees shall require timely corrections of all actual and threatened violations of local ordinances observed.

ii. Implementation Level

(1) **Wet Season Notification**

By September 1st of each year, each Permittee shall remind all site developers and/or owners disturbing one acre or more of soil to prepare for the upcoming wet season.

(2) **Frequency of Inspections**

Inspections shall be conducted monthly during the wet season[11] at the following sites:

(a) All construction sites disturbing one or more acre of land; and

(b) **High Priority Sites** – Other sites determined by the Permittee or the Water Board as significant threats to water quality. In evaluating threat to water quality, the following factors shall be considered:

(i) Soil erosion potential or soil type;

(ii) Site slope;

(iii) Project size and type;

(iv) Sensitivity or receiving waterbodies;

(v) Proximity to receiving waterbodies;

(vi) Non-stormwater discharges; and

(vii) Any other relevant factors as determined by the local agency or the Water Board.

[11] For the purpose of inspections, the wet season is defined as October through April, but sites need to implement seasonally appropriate BMPs in the six categories listed in C.6.c.i throughout the year.

(3) **Contents of Inspections**

Inspections shall focus on the adequacy and effectiveness of the site specific BMPs implemented for the six categories listed in C.6.c.i. Permittees shall require timely corrections of all actual and potential problems observed. Inspections of construction sites shall include, but are not limited to, the following:

(a) Assessment of compliance with Permittee's ordinances and permits related to urban runoff, including the implementation and maintenance of the verified erosion/pollution control plan or SWPPP (from C.6.d.ii.(1));

(b) Assessment of the adequacy and effectiveness of the site specific BMPs implemented for the six categories listed in C.6.c.i.;

(c) Visual observations for:

- actual discharges of sediment and/or construction related materials into stormdrains and/or waterbodies.
- evidence of sediment and/or construction related materials discharges into stormdrains and/or waterbodies.
- illicit connections.
- potential illicit connections.

(d) Education on stormwater pollution prevention, as needed.

(4) **Tracking**

All inspections must be recorded on a written or electronic inspection form. Inspectors shall follow the ERP if a violation is noted and shall require timely corrections of all actual and threatened violations of local ordinances observed. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered. If more than 10 business days are required for compliance, a rationale shall be recorded on the inspection form.

Permittees shall track in an electronic database or tabular format all inspections. This electronic database or tabular format shall be made readily available to the Executive Officer and during inspections and audits by the Water Board staff or its representatives. This electronic database or tabular format shall record the following information for each site inspection:

(a) Site name;

(b) Inspection date;

(c) Weather during inspection;

(d) Has there been rainfall with runoff since the last inspection?;

(e) Enforcement Response Level (Use ERP);

(f) Problem(s) observed using Illicit Discharge and the six BMP categories listed in C.6.c.i.;

(g) Specific Problem(s) (List the specific problem(s) within the BMP categories);

(h) Resolution of Problems noted using the following three standardized categories: Problems Fixed, Need More Time, and Escalate Enforcement; and

(i) Comments, which shall include all Rationales for Longer Compliance Time, all escalation in enforcement discussions, and any other information that may be relevant to that site inspection.

iii. Reporting

(1) In each Annual Report, each Permittee shall summarize the following information:

(a) Total number of active sites disturbing less than one acre of soil requiring inspection;

(b) Total number of active sites disturbing 1 acre or more of soil;

(c) Total number of inspections conducted;

(d) Number and percentage[12] of violations in each of the six categories listed in C.6.c.i.;

(e) Number and percentage[13] of each type of enforcement action taken as listed in each Permittee's ERP;

(f) Number of discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(g) Number of sites with discharges, actual and those inferred through evidence, of sediment or other construction related materials;

(h) Number and percentage[14] of violations fully corrected prior to the next rain event but no longer than 10 business days after the violations are discovered or otherwise considered corrected in a timely, though longer period; and

(i) Number and percentage[15] of violations not fully corrected 30 days after the violations are discovered.

(2) In each Annual Report, each Permittee shall evaluate its respective electronic database or tabular format and the summaries produced in C.6.e.ii.(4) above. This evaluation shall include findings on the program's strength, comparison to previous years' results, as well as areas that need

[12] Percentage shall be calculated as number of violations in each category divided by total number of violations in all six categories.

[13] Percentage shall be calculated as number of each type of enforcement action divided by the total number of enforcement actions.

[14] Percentage shall be calculated as follows: number of violations fully corrected prior to the goal of the next rain event but no later than10 business days after the violations are discovered divided by the total number of violations for the reporting year.

[15] Percentage shall be calculated as follows: number of violations not fully corrected 30 days after the violations are discovered divided by the total number of violations for the reporting year.

more focused education for site owners, operators, and developers the following year.

(3) The Executive Officer may require that the information recorded and tracked by C.6.e.ii.(4) be submitted electronically or in a tabular format. Permittees shall submit the information within 10-working days of the Executive Officer's requirement. Submittal of the information in tabular form for the reporting year is not required in each Annual Report but encouraged.

C.6.f. Staff Training

i. Task Description – Permittees shall provide training or access to training for staff conducting construction stormwater inspections.

ii. Implementation Level – Permittees shall provide training at least every other year to municipal staff responsible for conducting construction site stormwater inspections. Training topics will include information on correct uses of specific BMPs, proper installation and maintenance of BMPs, Permit requirements, local requirements, and ERP.

iii. Reporting – Permittees shall include in each Annual Report the following information: training topics covered, dates of training, and the percentage of Permittees' inspectors attending each training. If no training in that year, so state.

C.7. Public Information and Outreach

Each Permittee shall increase the knowledge of the target audiences regarding the impacts of stormwater pollution on receiving water and potential solutions to mitigate the problems caused; change the waste disposal and runoff pollution generation behavior of target audiences by encouraging implementation of appropriate solutions; and involve various citizens in mitigating the impacts of stormwater pollution.

C.7.a. Storm Drain Inlet Marking

i. Task Description – Permittees shall mark and maintain at least 80 percent of municipally-maintained storm drain inlets with an appropriate stormwater pollution prevention message, such as "No dumping, drains to Bay" or equivalent. At least 80% of municipally-maintained storm drain inlet markings shall be inspected and maintained at least once per 5-year permit term. For newly approved, privately maintained streets, Permittees shall require inlet marking by the project developer upon construction and maintenance of markings through the development maintenance entity. Markings shall be verified prior to acceptance of the project.

ii. Implementation Level

(1) Inspect and maintain markings of at least 80 percent of municipality maintained inlets to ensure they are legibly labeled with a no dumping message or equivalent once per permit term.

(2) Verify that newly developed streets are marked prior to acceptance of the project.

iii. Reporting

(1) In the 2013 Annual Report, each Permittee shall report prior years' annual percentages of municipality maintained inlet markings inspected and maintained as legible with a no dumping message or equivalent.

(2) In the 2013 Annual Report, each Permittee shall report prior years' annual number of projects accepted after inlet markings were verified.

C.7.b. Advertising Campaigns

i. Task Description – Permittees shall participate in or contribute to advertising campaigns on trash/litter in waterways and pesticides with the goal of significantly increasing overall awareness of stormwater runoff pollution prevention messages and behavior changes in target audience.

ii. Implementation Level

(1) Target a broad audience with two separate advertising campaigns, one focused on reducing trash/litter in waterways and one focused on reducing the impact of urban pesticides. The advertising campaigns may be coordinated regionally or county-wide.

(2) Permittees shall conduct a pre-campaign survey and a post-campaign survey to identify and quantify the audiences' knowledge, trends, and

attitudes and/or practices; and to measure the overall population's awareness of the messages and behavior changes achieved by the two advertising campaigns. These surveys may be done regionally or county-wide.

iii. Reporting

(1) In the Annual Report following the pre-campaign survey, each Permittee (or the Countywide Program, if the survey was done county-wide or regionally) shall provide a report of the survey completed, which at a minimum, shall include the following:

- A summary of how the survey was implemented.
- A copy of the survey.
- A copy of the survey results.
- An analysis of the survey results.
- A discussion of the outreach strategies based on the survey results.
- A discussion of the planned or future advertising campaigns to influence awareness and behavior changes regarding trash/litter and pesticides.

(2) In the Annual Report following the post campaign survey, each Permittee (or the Countywide Program, if survey was done county-wide or regionally) shall provide a report of the survey completed, which at minimum shall include the information required in the pre-campaign report (C.7.b.iii.(1)) and the following:

- A discussion of the campaigns.
- A discussion of the measurable changes in awareness and behavior achieved.
- An update of outreach strategies based on the survey results.

C.7.c. Media Relations – Use of Free Media

i. Task Description – Permittees shall participate in or contribute to a media relations campaign. Maximize use of free media/media coverage with the objective of significantly increasing the overall awareness of stormwater pollution prevention messages and associated behavior change in target audiences, and to achieve public goals.

ii. Implementation Level – Conduct a minimum of six pitches (e.g., press releases, public service announcements, and/or other means) per year at the county-wide program, regional, and/or local levels.

iii. Reporting – In each Annual Report, each Permittee (or the Countywide Program, if the media relations campaign was done county-wide or regionally) shall include the details of each media pitch, such as the medium, date, and content of the pitch.

C.7.d. Stormwater Point of Contact

i. Task Description – Permittees shall individually or collectively create and maintain a point of contact, e.g., phone number or website, to provide the public with information on watershed characteristics and stormwater pollution prevention alternatives.

ii. Implementation Level – Maintain and publicize one point of contact for information on stormwater issues. Permittees may combine this function with the complaint/spill contact required in C.5.

iii. Reporting – In the 2010 Annual Report, each Permittee shall discuss how this point of contact is publicized and maintained. If any change occurs in this contact, report in subsequent annual report.

C.7.e. Public Outreach Events

i. Task Description – Participate in and/or host events such as fairs, shows, workshops, (e.g., community events, street fairs, and farmers' markets), to reach a broad spectrum of the community with both general and specific stormwater runoff pollution prevention messages. Pollution prevention messages shall include encouraging residents to (1) wash cars at commercial car washing facilities, (2) use minimal detergent when washing cars, and (3) divert the car washing runoff to landscaped area.

ii. Implementation Level – Each Permittee shall annually participate and/or host the number of events according to its population, as shown in the table below:

Table 7.1 Public Outreach Events[16]

Permittee Population	Number of Outreach Events
< 10,000	2
10,001– 40,000	3
40,001 – 100,000	4
100,001 – 175,000	5
175,001 – 250,000	6
> 250,000	8
Non-population-based Permittees[17]	6

Should a public outreach event contain significant citizen involvement elements, the Permittee may claim credit for both Public Outreach Events (C.7.e.) and Citizen Involvement Events (C.7.g.).

iii. Reporting – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in and assess the effectiveness

[16] Permittees may claim individual credits for all events in which their Countywide Program or BASMAA participates, supports, and/or hosts, which are publicized to reach the Permittees jurisdiction.

[17] Alameda County Flood Control and Water Conservation District, Contra Costa Flood Control and Water Conservation District, Santa Clara Valley Water District, Vallejo Sanitation and Flood Control District, and Zone 7 of the Alameda County Flood Control and Water Conservation District

of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event survey results, quantity/volume materials cleaned up and comparisons to previous efforts).

C.7.f. Watershed Stewardship Collaborative Efforts

i. Task Description – Permittees shall individually or collectively encourage and support watershed stewardship collaborative efforts of community groups such as the Contra Costa Watershed Forum, the Santa Clara Basin Watershed Management Initiative, "friends of creek" groups, and other organizations that benefit the health of the watershed such as the Bay-Friendly Landscaping and Gardening Coalition. If no such organizations exist, encourage and support development of grassroots watershed groups or engagement of an existing group, such as a neighborhood association, in watershed stewardship activities. Coordinate with existing groups to further stewardship efforts.

ii. Implementation Level – Annually demonstrate effort.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, describe the support given, state what efforts were undertaken and the results of these efforts, and provide an evaluation of the effectiveness of these efforts.

C.7.g. Citizen Involvement Events

i. Task Description – Permittees shall individually or collectively, support citizen involvement events, which provide the opportunity for citizens to directly participate in water quality and aquatic habitat improvement, such as creek/shore clean-ups, adopt-an-inlet/creek/beach programs, volunteer monitoring, service learning activities such as storm drain inlet marking, community riparian restoration activities, community grants, other participation and/or host volunteer activities.

ii. Implementation Level – Each Permittee shall annually sponsor and/or host the number of citizen involvement events according to its population, as shown in the table below:

Table 7.2 Community Involvement Events[18]

Permittee Population	Number of Involvement Events
< 10,000	1
10,001 – 40,000	1
40,001 – 100,000	2
100,001 – 175,000	3
175,001 – 250,000	4
> 250,000	5
Non-population-based Permittees	2

[18] Permittees can claim individual credit for all events sponsored or hosted by their Countywide Program or BASMAA, which are publicized to reach the Permittee's jurisdiction.

Should a citizen involvement event contain significant public outreach elements, the Permittee may claim credit for both Citizen Involvement Events (C.7.g.) and Public Outreach Events (C.7.e.).

iii. Reporting – In each Annual Report, each Permittee shall list the events (name of event, event location, and event date) participated in and assess the effectiveness of efforts with appropriate measures (e.g., success at reaching a broad spectrum of the community, number of participants compared to previous years, post-event survey results, number of inlets/creeks/shores/parks/and such adopted, quantity/volume materials cleaned up, data trends, and comparisons to previous efforts).

C.7.h. School-Age Children Outreach

i. Task Description – Permittees shall individually or collectively implement outreach activities designed to increase awareness of stormwater and/or watershed message(s) in school-age children (K through 12).

ii. Implementation Level – Implement annually and demonstrate effectiveness of efforts through assessment.

iii. Reporting – In each Annual Report, each Permittee shall state the level of effort, spectrum of children reached, and methods used, and provide an evaluation of the effectiveness of these efforts.

C.7.i. Outreach to Municipal Officials

i. Task Description – Permittees shall conduct outreach to municipal officials. One alternative means of accomplishing this is through the use of the Nonpoint Education for Municipal Officials program (NEMO) to significantly increase overall awareness of stormwater and/or watershed message(s) among regional municipal officials.

ii. Implementation Level – At least once per permit cycle, or more often.

iii. Reporting – Permittees shall summarize efforts in the 2013 Annual Report.

C.8. Water Quality Monitoring

C.8.a. Compliance Options

i. Regional Collaboration – All Permittees shall comply with the monitoring requirements in C.8, however, Permittees may choose to comply with any requirement of this Provision through a collaborative effort to conduct or cause to be conducted the required monitoring in their jurisdictions. Where all or a majority of the Permittees collaborate to conduct water quality monitoring, this shall be considered a regional monitoring collaborative.

Where an existing collaborative body has initiated plans, before the adoption of this Permit, to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request the Executive Officer adjust the due date(s) to synchronize with such efforts.

The types, quantities, and quality of data required within Provision C.8 establish the minimum level-of-effort that a regional monitoring collaborative must achieve. Provided these data types, quantities, and quality are obtained, a regional monitoring collaborative may develop its own sampling design. For Pollutants of Concern and Long-Term monitoring required under C.8.e, an alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described under C.8.e; or an equivalent level of monitoring effort is employed to answer the management information needs stated under C.8.e.

ii. Implementation Schedule – Monitoring conducted through a regional monitoring collaborative shall commence data collection by October 2011. All other Permittee monitoring efforts shall commence data collection by October 2010. By July 1, 2010, each Permittee shall provide documentation to the Water Board, such as a written agreement, letter, or similar document that confirms whether the Permittee will conduct monitoring individually or through a regional monitoring collaborative.[19]

iii. Permittee Responsibilities – A Permittee may comply with the requirements in Provision C.8 by performing the following:

(1) Contributing to its stormwater countywide program, as determined appropriate by the Permittee members, so that the stormwater countywide Program conducts monitoring on behalf of its members;

(2) Contributing to a regional collaborative effort;

[19] This documentation will allow the Water Board to know when monitoring will commence for each Permittee. Permittees who commit to monitoring individually may join the regional monitoring collaborative at any time. Any Permittee who discontinues monitoring through the regional collaborative must commence complying with all requirements of Provision C.8 immediately.

(3) Fulfilling monitoring requirements within its own jurisdictional boundaries; or

(4) A combination of the previous options, so that all requirements are fulfilled.

iv. Third-party Monitoring – Permittees may choose to fulfill requirements of Provision C.8 using data collected by citizen monitors or other third-party organizations, provided the data are demonstrated to meet the data quality objectives described in Provision C.8.h. Where an existing third-party organization has initiated plans to conduct monitoring that would fulfill a requirement(s) of this Provision, but the monitoring would not meet this Provision's due date(s) by a year or less, the Permittees may request that the Executive Officer adjust the due date(s) to synchronize with such efforts.

C.8.b. San Francisco Estuary Receiving Water Monitoring

With limited exceptions, urban runoff from the Permittees' jurisdictions ultimately discharges to the San Francisco Estuary. Monitoring of the Estuary is intended to answer questions[20] such as:

- Are chemical concentrations in the Estuary potentially at levels of concern and are associated impacts likely?
- What are the concentrations and masses of contaminants in the Estuary and its segments?
- What are the sources, pathways, loadings, and processes leading to contaminant related impacts in the Estuary?
- Have the concentrations, masses, and associated impacts of contaminants in the Estuary increased or decreased?
- What are the projected concentrations, masses, and associated impacts of contaminants in the Estuary?

Permittees shall participate in implementing an Estuary receiving water monitoring program, at a minimum equivalent to the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP), by contributing their fair-share financially on an annual basis.

C.8.c. Status Monitoring/Rotating Watersheds

i. Status Monitoring is intended to answer these questions: Are water quality objectives, both numeric and narrative, being met in local receiving waters,

[20] These are the management questions approved by the Regional Monitoring Program's Steering Committee on May 9, 2008, and stated at http://www.sfei/rmp/rmp_steering_meetings/rmp_steering_meeting_5_09_08/Item%2010a%20Attachment%201%20%20Draft%20RMP%20Management%20Questions%2005-02-08%20Annotated.pdf. While the stated objectives may change over time, the intent of this provision is for Permittees to continue contributing financially and as stakeholders in such a program as the RMP, which monitors the quality of San Francisco Bay.

including creeks, rivers and tributaries? Are conditions in local receiving waters supportive of or likely to be supportive of beneficial uses?

ii. Parameters and Methods – Permittees shall conduct Status Monitoring using the parameters, methods, occurrences, durations, and minimum number of sampling sites as described in Table 8.1. Spring sampling shall be conducted during the April - June timeframe; dry weather sampling shall be conducted during the July - September timeframe. Minor variations of the parameters and methods may be allowed with Executive Officer concurrence.

iii. Frequency – Permittees shall complete the Status Monitoring in Table 8.1 at the following frequencies:

- Alameda Permittees – annually
- Contra Costa Permittees – annually
- Fairfield-Suisun Permittees – twice during the Permit term
- San Mateo Permittees – annually
- Santa Clara Permittees – annually
- Vallejo Permittees – once during the Permit term

Table 8.1 Status Monitoring Elements

Status Monitoring Parameter	**Sampling and/or Analytical Method**[21]	**Minimum Sampling Occurrence**[22]	**Duration of Sampling**	**Minimum # Sample Sites to Monitor/Yr**[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	**Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.**
Biological Assessment[24] (Includes Physical Habitat Assessment and General Water Quality Parameters[25]) Nutrients (total phosphorus, dissolved orthophosphate, total nitrogen, nitrate, ammonia, silica, chloride,	SWAMP Std Operating Procedure[26,27,28] for Biological Assessments & PHab; SWAMP	1/yr (Spring Sampling)	Grab sample	Spring 20 / 10 / 4	BMI metrics that indicate substantially degraded community as per Attachment H, Table H-1 For Nutrients: 20% of results in one waterbody exceed one or more water quality standard

21 Refers to field protocol, instrumentation and/or laboratory protocol.

22 Refers to the number of sampling events at a specific site in a given year.

23 The number of sampling sites shown is based on the relative population in each Regional Stormwater Countywide Program and is listed in this order: Santa Clara & Alameda Countywide / Contra Costa & San Mateo Countywide / Vallejo & Fairfield-Suisun Programs.

24 The same general location must be used to collect benthic community, sediment chemistry, and sediment toxicity samples. General Water Quality Parameters need not be collected twice, where it is collected by a multi-parameter probe at a subset of these sample sites (see next row of Table 8.1).

25 Includes dissolved oxygen, temperature, conductivity, and pH.

26 Ode, P.R. 2007. Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California, California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised (http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/phab_sopr6.pdf). Permittees may coordinate with Water Board staff to modify their sampling procedures if these referenced procedures change during the Permit term.

27 Biological assessments shall include benthic macroinvertebrates and algae. Bioassessment sampling method shall be multihabitat reach-wide. Macroinvertebrates shall be identified according to the Standard Taxonomic Effort Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists, using the most current SWAMP approved method. Current methods are documented in (1) SWAMP Standard Operating Procedure (SOP) and Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 5-21-07, and (2) Amendment to SWAMP Interim Guidance on Quality Assurance for SWAMP Bioassessments, Memorandum to SWAMP Roundtable from Beverly H. van Buuren and Peter R. Ode, 9-17-08. For algae, include mass (ash-free dry weight), chlorophyll a, diatom and soft algae taxonomy, and reachwide algal percent cover. Physical Habitat (PHab) Assessment shall include the SWAMP basic method plus 1) depth and pebble count + CPOM, 2) cobble embeddedness, 3) discharge measurements, and 4) in-stream habitat. Permittees may coordinate with Water Board staff to modify these sampling procedures if SWAMP procedures change during the Permit term.

28 Algae shall be collected in a consistent timeframe as Regional SWAMP. For guidance on algae sampling and evaluation: Fetscher, A. and K. McLaughlin, May 16, 2008. Incorporating Bioassessment Using Freshwater Algae into California's Surface Water Ambient Monitoring Program (SWAMP). Technical Report 563 and current SWAMP-approved updates to Standard Operating Procedures therein. Available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/563_periphyton_bioassessment.pdf.

Status Monitoring Parameter	**Sampling and/or Analytical Method**[21]	**Minimum Sampling Occurrence**[22]	**Duration of Sampling**	**Minimum # Sample Sites to Monitor/Yr**[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	**Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.**
dissolved organic carbon, suspended sediment concentration)	comparable methods for Nutrients				or established threshold
General Water Quality[29]	Multi-Parameter Probe	2/yr (Concurrent with bioassessment & during the Aug. - Sept. timeframe)	15-minute intervals for 1-2 weeks	3 / 2 / 1	20% of results in one waterbody exceed one or more water quality standard or established threshold
Chlorine (Free and Total)	USEPA Std. Method 4500 Cl F[30]	2/yr Spring & Dry Seasons	Grab sample	Spring 20 / 10 / 2 Dry 3 / 2 / 1	After immediate resampling, concentrations remain > 0.08 mg/L
Temperature	Digital Temperature Logger	60-minute intervals	60-minute intervals April through Sept.	8 / 4 / 1	20% of results in one waterbody exceed applicable temperature threshold[31]
Toxicity – Water Column[32]	Applicable SWAMP Comparable Method	2/yr (1/Dry Season & 1 Storm Event)	Grab or composite sample	3 / 2 / 1	If toxicity results < 50% of control results, repeat sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

[29] Includes dissolved oxygen, temperature, conductivity, and pH.

[30] The method of analysis shall achieve a method detection limit at least as low as that achieved by the Amperometric Titration Method (4500-Cl from *Standard Methods for Examination of Water and Wastewater*, Edition 20).

[31] If temperatures exceed applicable threshold (e.g., Maximum Weekly Average Temperature, Sullivan K., Martin, D.J., Cardwell, R.D., Toll, J.E., Duke, S. 2000. *An Analysis of the Effects of Temperature on Salmonids of the Pacific Northwest with Implications for Selecting Temperature Criteria, Sustainable Ecosystem Institute*) or spike with no obvious natural explanation observed.

[32] *US EPA three species toxicity tests: Selenastrum* growth and *Ceriodaphnia* and *Pimephales* with lethal and sublethal endpoints. Also H*yalella azteca with lethal endpoint.*

Status Monitoring Parameter	**Sampling and/or Analytical Method**[21]	**Minimum Sampling Occurrence**[22]	**Duration of Sampling**	**Minimum # Sample Sites to Monitor/Yr**[23] Santa Clara & Alameda Permittees/ Contra Costa & San Mateo Permittees/ Fairfield-Suisun & Vallejo Permittees	**Result(s) that Trigger a Monitoring Project in Provision C.8.d.i.**
Toxicity– Bedded Sediment, Fine-grained[33]	Applicable SWAMP Comparable Method	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pollutants – Bedded Sediment,[34] fine-grained	Applicable SWAMP Comparable Method inc. grain size	1/yr	Grab sample	3 / 2 / 1 At fine-grained depositional area at bottom of watershed	See Attachment H, Table H-1
Pathogen Indicators[35]	U.S. EPA protocol[36]	1/yr (During Summer)	Follow U.S. EPA protocol	5 / 5 / * *Fairfield-Suisun & Vallejo Permittees: 3 sites twice in permit term	Exceedance of USEPA criteria
Stream Survey (stream walk & mapping)[37]	USA[38] or equivalent	1 waterbody/yr	N/A	9 / 6 / 3 stream miles/year	N/A

[33] Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Coordinate with TMDL Provision requirements as applicable.

[34] Bedded sediments should be fine-grain from depositional areas. Grain size and TOC must be reported. Analytes shall include all of those reported in MacDonald et al. 2000 (including copper, nickel, mercury, PCBs, DDT, chlordane, dieldrin) as well as pyrethroids (see Table 8.4 for list of pyrethroids). Coordinate with TMDL Provision requirements as applicable. MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31.

[35] Includes fecal coliform and *E. Coli.*

[36] Rather than collecting samples over five separate days, Permittees may use Example #2, pg. 54, of USEPA's *Implementation Guidance for Ambient Water Quality Criteria for Bacteria*, March 2004 Final.

[37] The Stream Surveys need not be repeated on a watershed if a Stream Survey was completed on that waterbody within the previous five years. The number of stream miles to be surveyed in any given year may be less than that shown in Table 8-1 in order to avoid repeating surveys at areas surveyed during the previous five years.

[38] Center for Watershed Protection, Manual 10: *Unified Stream Assessment: A User's Manual*, February 2005.

iv. Locations – For each sampling year (per C.8.c.iii.), Permittees shall select at least one waterbody to sample from the applicable list below. Locations shall be selected so that sampling is sufficient to characterize segments of the waterbody(s). For example, Permittees required to collect a larger number of samples should sample two or more waterbodies, so that each sampling effort represents a reasonable segment length and/or type. Samples shall be collected in reaches that receive urban stormwater discharges, except in possible infrequent instances where non-urban-impacted stream samples are needed for comparison[39]. Waterbody selection shall be based on factors such as watershed area, land use, likelihood of urban runoff impacts, and existing monitoring data.

Table 8.2 Status Monitoring Locations – Waterbodies

SCVURPPP	ACCWP	CCCWP	SMCWPPP	FSUMRP	VALLEJO
Coyote Creek and tributaries	Arroyo Valle (below Livermore or lower)	Kirker Creek	San Pedro Creek and tributaries	Laurel Creek	Chabot Creek
Guadalupe River and tributaries	Arroyo Mocho	Mt. Diablo Creek	Pilarcitos Creek	Ledgewood Creek	Austin Creek & tributaries
San Tomas Creek and tributaries	Tassajara Creek	Walnut Creek and tributaries	Colma Creek		
Calabazas Creek	Alamo Creek	Rodeo Creek	San Bruno Creek and tributaries		
Permanente Creek and tributaries	Arroyo de la Laguna	Pinole Creek	Millbrae Creek and tributaries		
Stevens Creek and tributaries	Alameda Creek (at Fremont or below)	San Pablo Creek	Mills Creek and tributaries		
Matadero Creek and tributaries	San Lorenzo Creek & tribs	Alhambra Creek	Easton Creek and tributaries		
Adobe Creek	San Leandro Creek & tribs	Wildcat Creek	Sanchez Creek and tributaries		
Lower Penitencia Creek and tributaries	Oakland, Berkeley, or Albany Creeks		Burlingame Creek and tributaries		
Barron Creek			San Mateo Creek (below dam only)		
San Francisquito Creek & tributaries			Borel Creek & tributaries		
			Laurel Creek & tribs		
			Belmont Creek & tribs		
			Pulgas Creek & tribs		
			Cordilleras & tributaries		
			Redwood Creek & tribs		
			Atherton Creek & tribs		
			San Francisquito Creek and tributaries		

[39] Sampling efforts shall focus on stream reaches with urban stormwater system discharges. Sampling upstream of urban outfalls is not precluded where needed to meet sampling plan objectives.

v. Status Monitoring Results – When Status Monitoring produces results such as those described in the final column of Table 8.1, Permittees shall conduct Monitoring Project(s) as described in C.8.d.i.

C.8.d. Monitoring Projects – Permittees shall conduct the Monitoring Projects listed below.

i. Stressor/Source Identification – When Status results trigger a follow-up action as indicated in Table 8.1, Permittees shall take the following actions, as also required by Provision C.1. If the trigger stressor or source is already known, proceed directly to step 2. The first follow-up action shall be initiated as soon as possible, and no later than the second fiscal year after the sampling event that triggered the Monitoring Project.

(1) Conduct a site specific study (or non-site specific if the problem is wide-spread) in a stepwise process to identify and isolate the cause(s) of the trigger stressor/source. This study should follow guidance for Toxicity Reduction Evaluations (TRE)[40] or Toxicity Identification Evaluations (TIE).[41] A TRE, as adapted for urban stormwater data, allows Permittees to use other sources of information (such as industrial facility stormwater monitoring reports) in attempting to determine the trigger cause, potentially eliminating the need for a TIE. If a TRE does not result in identification of the stressor/source, Permittees shall conduct a TIE.

(2) Identify and evaluate the effectiveness of options for controlling the cause(s) of the trigger stressor/source.

(3) Implement one or more controls.

(4) Confirm the reduction of the cause(s) of trigger stressor/source.

(5) Stressor/Source Identification Project Cap: Permittees who conduct this monitoring through a regional collaborative shall be required to initiate no more than ten Stressor/Source Identification projects during the Permit term in total, and at least two must be toxicity follow-ups, unless monitoring results do not indicate the presence of toxicity. If conducted through a stormwater countywide program, the Santa Clara and Alameda

[40] USEPA. August 1999. *Toxicity Reduction Evaluation Guidance for Municipal Wastewater Treatment Plants*. EPA/833B-99/002. Office of Wastewater Management, Washington, D.C.

[41] Select TIE methods from the following references after conferring with SWAMP personnel: For sediment: (1) Ho KT, Burgess R., Mount D, Norberg-King T, Hockett, RS. 2007. *Sediment toxicity identification evaluation: interstitial and whole methods for freshwater and marine sediments*. USEPA, Atlantic Ecology Division/Mid-Continental Ecology Division, Office of Research and Development, Narragansett, RI, or (2) Anderson, BS, Hunt, JW, Phillips, BM, Tjeerdema, RS. 2007. *Navigating the TMDL Process: Sediment Toxicity*. Final Report- 02-WSM-2. Water Environment Research Federation. 181 pp. For water column: (1) USEPA. 1991. *Methods for aquatic toxicity identification evaluations. Phase I Toxicity Characterization Procedures*. EPA 600/6-91/003. Office of Research and Development, Washington, DC., (2) USEPA. 1993. *Methods for aquatic toxicity identification evaluations. Phase II Toxicity Identification Procedures for Samples Exhibiting Acute and Chronic Toxicity*. EPA 600/R-92/080. Office of Research and Development, Washington, DC., or (3) USEPA. 1996. *Marine Toxicity Identification Evaluation (TIE), Phase I Guidance Document*. EPA/600/R-95/054. Office of Research and Development, Washington, DC.

Permittees each shall be required to initiate no more than five (two for toxicity); the Contra Costa and San Mateo Permittees each shall be required to initiate no more than three (one for toxicity); and the Fairfield-Suisun and Vallejo Permittees each shall be required to initiate no more than one Stressor/Source Identification project(s) during the Permit term.

(6) As long as Permittees have complied with the procedures set forth above, they do not have to repeat the same procedure for continuing or recurring exceedances of the same receiving water limitations unless directed to do so by the Water Board.

ii. BMP Effectiveness Investigation – Investigate the effectiveness of one BMP for stormwater treatment or hydrograph modification control. Permittees who do this project through a regional collaborative are required to initiate no more than one BMP Effectiveness Investigation during the Permit term. If conducted through a stormwater countywide program, the Santa Clara, Alameda, Contra Costa, and San Mateo Permittees shall be required to initiate one BMP Effectiveness Investigation each, and the Fairfield-Suisun and Vallejo Permittees shall be exempt from this requirement. The BMP(s) used to fulfill requirements of C.3.b.iii., C.11.e. and C.12.e. may be used to fulfill this requirement, provided the BMP Effectiveness Investigation includes the range of pollutants generally found in urban runoff. The BMP Effectiveness Investigation will not trigger a Stressor/Source Identification Project. Data from this Monitoring Project need not be SWAMP-comparable.

iii. Geomorphic Project – This monitoring is intended to answer the questions: How and where can our creeks be restored or protected to cost-effectively reduce the impacts of pollutants, increased flow rates, and increased flow durations of urban runoff?

Permittees shall select a waterbody/reach, preferably one that contains significant fish and wildlife resources, and conduct one of the following projects within each county, except that only one such project must be completed within the collective Fairfield-Suisun and Vallejo Permittees' jurisdictions:

(1) Gather geomorphic data to support the efforts of a local watershed partnership[42] to improve creek conditions; or

(2) Inventory locations for potential retrofit projects in which decentralized, landscape-based stormwater retention units can be installed; or

(3) Conduct a geomorphic study which will help in development of regional curves which help estimate equilibrium channel conditions for different-sized drainages. Select a waterbody/reach that is not undergoing changing land use. Collect and report the following data:

- Formally surveyed channel dimensions (profile), planform, and cross-sections. Cross-sections shall include the topmost floodplain terrace and

[42] A list of local watershed partnerships may be obtained from Water Board staff.

be marked by a permanent, protruding (not flush with ground) monument.

- Contributing drainage area.
- Best available information on bankfull discharges and width and depth of channel formed by bankfull discharges.
- Best available information on average annual rainfall in the study area.

Permittees shall complete the selected geomorphic project so that project results are reported in the Integrated Monitoring Report (see Provision C.8.g.v).

C.8.e. Pollutants of Concern and Long-Term Trends Monitoring

Pollutants of Concern (POC) monitoring is intended to assess inputs of Pollutants of Concern to the Bay from local tributaries and urban runoff, assess progress toward achieving wasteload allocations (WLAs) for TMDLs and help resolve uncertainties associated with loading estimates for these pollutants. In particular, there are four priority management information needs toward which POC monitoring must be directed: 1) identifying which Bay tributaries (including stormwater conveyances) contribute most to Bay impairment from pollutants of concern; 2) quantifying annual loads or concentrations of pollutants of concern from tributaries to the Bay; 3) quantifying the decadal-scale loading or concentration trends of pollutants of concern from small tributaries to the Bay; and 4) quantifying the projected impacts of management actions (including control measures) on tributaries and identifying where these management actions should be implemented to have the greatest beneficial impact.

Permittees shall implement the following POC monitoring components or pursue an alternative approach that addresses each of the aforementioned management information needs. An alternative approach may be pursued by Permittees provided that: either similar data types, data quality, data quantity are collected with an equivalent level of effort described; or an equivalent level of monitoring effort is employed to answer the management information needs.

Long-Term monitoring is intended to assess long-term trends in pollutant concentrations and toxicity in receiving waters and sediment, in order to evaluate if stormwater discharges are causing or contributing to toxic impacts on aquatic life. Permittees shall implement the following Long-Term monitoring components or, following approval by the Executive Officer, an equivalent monitoring program.

i. Pollutants of Concern Loads Monitoring Locations – Permittees shall conduct Pollutants of Concern monitoring at stations listed below. Permittees may install these stations in two phases providing at least half of the stations are monitored in the water year beginning October 2010, and all the stations are monitored in the water year beginning October 2012. Upon approval by the Executive Officer, Permittees may use alternate POC monitoring locations.

(1) Castro Valley Creek S3 at USGS gauging station in Castro Valley

(2) Guadalupe River

(3) Zone 4 Line A at Chabot Road in Hayward

(4) Rheem Creek at Giant Road in Richmond

(5) Walnut Creek at a downstream location

(6) Calabazas Creek at Lakeside Drive in Sunnyvale, at border with Santa Clara

(7) San Mateo Creek at downstream location

(8) Laurel Creek at Laurie Meadows park, off Casanova Drive in City of San Mateo.

ii. Long-Term Monitoring Locations – Permittees shall conduct Long-Term monitoring at stations listed below. After conferring with the Regional SWAMP program, and upon approval by the Executive Officer, Permittees may use alternate Long-Term monitoring locations.

Table 8.3. Long-Term Monitoring Locations

Stormwater Countywide Program	Waterbody	Suggested Location
Alameda Permittees	Alameda Creek OR	East of Alvarado Blvd*
	Lower San Leandro Creek	Empire Road*
Contra Costa Permittees	Kirker Creek OR	Floodway*
	Walnut Creek	Concord Avenue*
Santa Clara Permittees	Guadalupe River OR	USGS Gaging Station 11169025*
	Coyote Creek	Montague*
San Mateo Permittees	San Mateo Creek	Gateway Park*

* SWAMP is scheduled to collect sediment toxicity and sediment chemistry samples annually at these stations during the month of June.

iii. Parameters and Frequencies – Permittees shall conduct Pollutants of Concern sampling pursuant to Table 8.4, Categories 1 and 2. In Table 8.4, Category 1 pollutants are those for which the Water Board has active water quality attainment strategies (WQAS), such as TMDL or site-specific objective projects. Category 2 pollutants are those for which WQAS are in development. The lower monitoring frequency for Category 2 pollutants is sufficient to develop preliminary loading estimates for these pollutants.

Permittees shall conduct Long-Term monitoring pursuant to Table 8.4, Category 3. SWAMP has scheduled collection of Category 3 data at the Long-Term monitoring locations stated in C.8.e.ii. As stated in Provision C.8.a.iv., Permittees may use SWAMP data to fulfill Category 3 sampling requirements.

iv. Protocols – At a minimum, sampling and analysis protocols shall be consistent with 40 CFR 122.21(g)(7)(ii).

v. **Methods** – Methyl mercury samples shall be grab samples collected during storm events that produce rainfall of at least 0.10 inch, shall be frozen immediately upon collection, and shall be kept frozen during transport to the laboratory. All other Category 1 and 2 samples shall be wet weather flow-weighted composite samples, collected during storm events that produce rainfall of at least 0.10 inch. Sampled storms should be separated by 21 days of dry weather, but, at a minimum, sampled storms must have 72 hours of antecedent dry weather. Samples must include the first rise in the hydrograph. Category 3 monitoring data shall be SWAMP-comparable.

Table 8.4 Pollutants of Concern Loads & Long-Term Monitoring Elements

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Category 1 • Total and Dissolved Copper • Total Mercury[43] • Methyl Mercury • Total PCBs[44] • Suspended Sediments (SSC) • Total Organic Carbon • Toxicity – Water Column • Nitrate as N • Hardness	Annually	Average of 4 wet weather events per year For methyl mercury only: average of 2 wet & 2 dry weather events per year	Flow-weighted composite For methyl mercury only: grab samples collected during the first rise in the hydrograph of a storm event.
Category 2 • Total and Dissolved Selenium • Total PBDEs (Polybrominated Diphenyl Ethers) • Total PAHs (Poly-Aromatic Hydrocarbons) • Chlordane • DDTs (Dichloro-Diphenyl-Trichloroethane) • Dieldrin • Nitrate as N • Pyrethroids - bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin • Carboryl and fipronil • Total and Dissolved Phosphorus	Oct. 2010 - 2011 water year and Oct. 2012 - 2013 water year	2 times per year	Flow-weighted composite
Category 3 Toxicity – Bedded Sediment, fine-grained[45]	Biennially, Coordinate	Once per year, during April-June,	Grab sample

[43] The monitoring type and frequency shown for mercury is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

[44] The monitoring type and frequency shown for PCBs is not sufficient to determine progress toward achieving TMDL load allocations. Progress toward achieving load allocations will be accomplished by assessing loads avoided resulting from treatment, source control, and pollution prevention actions.

Category/Parameter	Sampling Years	Minimum Sampling Occurrence	Sampling Interval
Pollutants – Bedded Sediment, fine-grained	with SWAMP	coordinate with SWAMP	

vi. Sediment Delivery Estimate/Budget – The objective of this monitoring is to develop a strong estimate of the amount of sediment entering the Bay from local tributaries and urban drainages. By July 1, 2011, Permittees shall develop a design for a robust sediment delivery estimate/sediment budget in local tributaries and urban drainages. Permittees shall implement the study by July 1, 2012.

vii. Emerging Pollutants – Permittees shall develop a work plan and schedule for initial loading estimates and source analyses for emerging pollutants: endocrine-disrupting compounds, PFOS/PFAS (Perfluorooctane Sulfonates (PFOS), Perfluoroalkyl sulfonates (PFAS); these perfluorocompounds are related to Teflon products), and NP/NPEs (nonylphenols/nonylphenol esters —estrogen-like compounds). This work plan, which is to be implemented in the next Permit term, shall be submitted with the Integrated Monitoring Report (see Provision C.8.g.).

C.8.f. Citizen Monitoring and Participation

i. Permittees shall encourage Citizen Monitoring.

ii. In developing Monitoring Projects and evaluating Status & Trends data, Permittees shall make reasonable efforts to seek out citizen and stakeholder information and comment regarding waterbody function and quality.

iii. Permittees shall demonstrate annually that they have encouraged citizen and stakeholder observations and reporting of waterbody conditions. Permittees shall report on these outreach efforts in the annual Urban Creeks Monitoring Report.

C.8.g. Reporting

i. Water Quality Standard Exceedence – When data collected pursuant to C.8.a.-C.8.f. indicate that stormwater runoff or dry weather discharges are or may be causing or contributing to exceedance(s) of applicable water quality standards, including narrative standards, a discussion of possible pollutant sources shall be included in the Urban Creeks Monitoring Report. When data collected pursuant to C.8.a.-C.8.f. indicate that discharges are causing or contributing to an exceedance of an applicable water quality standard, Permittees shall notify the Water Board within no more than 30 days of such a determination and submit a follow-up report in accordance with Provision C.1 requirements. The preceding reporting requirements shall not apply to

[45] If Ceriodaphnia, H*yalella azteca*, or Pimephales survival or Selenastrum growth is < 50% of control results, repeat wet weather sample. If 2nd sample yields < 50% of control results, proceed to C.8.d.i.

continuing or recurring exceedances of water quality standards previously reported to the Water Board or to exceedances of pollutants that are to be addressed pursuant to Provisions C.8 through C.14 of this Order in accordance with Provision C.1.

ii. Status Monitoring Electronic Reporting – Permittees shall submit an Electronic Status Monitoring Data Report no later than January 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period. Electronic Status Monitoring Data Reports shall be in a format compatible with the SWAMP database.[46] Water Quality Objective exceedances shall be highlighted in the Report.

iii. Urban Creeks Monitoring Report – Permittees shall submit a comprehensive Urban Creeks Monitoring Report no later than March 15 of each year, reporting on all data collected during the foregoing October 1–September 30 period, with the initial report due March 15, 2012, unless the Permittees choose to monitor through a regional collaborative, in which case the due date is March 15, 2013. Each Urban Creeks Monitoring Report shall contain summaries of Status, Long-Term, Monitoring Projects, and Pollutants of Concern Monitoring including, as appropriate, the following:

(1) Maps and descriptions of all monitoring locations;

(2) Data tables and graphical data summaries; Constituents that exceed applicable water quality standards shall be highlighted;

(3) For all data, a statement of the data quality;

(4) An analysis of the data, which shall include the following:

- Calculations of biological metrics and physical habitat endpoints.
- Comparison of biological metrics to:
  - Each other
  - Any applicable, available reference site(s)
  - Any applicable, available index of biotic integrity
  - Physical habitat endpoints.
- Identification and analysis of any long-term trends in stormwater or receiving water quality.

(5) A discussion of the data for each monitoring program component, which shall:

- Discuss monitoring data relative to prior conditions, beneficial uses and applicable water quality standards as described in the Basin Plan, the Ocean Plan, or the California Toxics Rule or other applicable water quality control plans.

[46] See http://mpsl.mlml.calstate.edu/swdataformats.htm. Permittees shall maintain an information management system that will support electronic transfer of data to the Regional Data Center of the ***California Environmental Data Exchange Network*** (***CEDEN***), located within the San Francisco Estuary Institute.

- Where appropriate, develop hypotheses to investigate regarding pollutant sources, trends, and BMP effectiveness.
- Identify and prioritize water quality problems.
- Identify potential sources of water quality problems.
- Describe follow-up actions.
- Evaluate the effectiveness of existing control measures.
- Identify management actions needed to address water quality problems.

iv. Monitoring Project Reports – Permittees shall report on the status of each ongoing Monitoring Project in each annual Urban Creeks Monitoring Report. In addition, Permittees shall submit stand-alone summary reports within six months of completing BMP Effectiveness and Geomorphic Projects; these reports shall include: a description of the project; map(s) of project locations; data tables and summaries; and discussion of results.

v. Integrated Monitoring Report – No later than March 15, 2014, Permittees shall prepare and submit an Integrated Monitoring Report through the regional collaborative monitoring effort on behalf of all participating Permittees, or on a countywide basis on behalf of participating Permittees, so that all monitoring conducted during the Permit term is reported.[47] This report shall be in lieu of the Annual Urban Creeks Monitoring Report due on March 15, 2014.

The report shall include, but not be limited to, a comprehensive analysis of all data collected pursuant to Provision C.8., and may include other pertinent studies. For Pollutants of Concern, the report shall include methods, data, calculations, load estimates, and source estimates for each Pollutant of Concern Monitoring parameter. The report shall include a budget summary for each monitoring requirement and recommendations for future monitoring. This report will be part of the next Report of Waste Discharge for the reissuance of this Permit.

vi. Standard Report Content –All monitoring reports shall include the following:

- The purpose of the monitoring and briefly describe the study design rationale.
- Quality Assurance/Quality Control summaries for sample collection and analytical methods, including a discussion of any limitations of the data.
- Brief descriptions of sampling protocols and analytical methods.
- Sample location description, including waterbody name and segment and latitude and longitude coordinates.
- Sample ID, collection date (and time if relevant), media (e.g., water, filtered water, bed sediment, tissue).
- Concentrations detected, measurement units, and detection limits.

[47] Permittees who do not participate in the Regional Monitoring Group or in a stormwater countywide program must submit an individual Integrated Receiving Water Impacts Report.

- Assessment, analysis, and interpretation of the data for each monitoring program component.
- Pollutant load and concentration at each mass emissions station.
- A listing of volunteer and other non-Permittee entities whose data are included in the report.
- Assessment of compliance with applicable water quality standards.
- A signed certification statement.

vii. Data Accessibility – Permittees shall make electronic reports available through a regional data center, and optionally through their web sites. Permittees shall notify stakeholders and members of the general public about the availability of electronic and paper monitoring reports through notices distributed through appropriate means, such as an electronic mailing list.

C.8.h. Monitoring Protocols and Data Quality

Where applicable, monitoring data must be SWAMP comparable. Minimum data quality shall be consistent with the latest version of the SWAMP Quality Assurance Project Plan (QAPP)[48] for applicable parameters, including data quality objectives, field and laboratory blanks, field duplicates, laboratory spikes, and clean techniques, using the most recent Standard Operating Procedures. A Regional Monitoring Collaborative may adapt the SWAMP QAPP for use in conducting monitoring in the San Francisco Bay Region, and may use such QAPP if acceptable to the Executive Officer.

[48] The current SWAMP QAPP at the time of Permit issuance is dated September 1, 2008, and is available at http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.

C.9. Pesticides Toxicity Control

To prevent the impairment of urban streams by pesticide-related toxicity, the Permittees shall implement a pesticide toxicity control program that addresses their own and others' use of pesticides within their jurisdictions that pose a threat to water quality and that have the potential to enter the municipal conveyance system. This provision implements requirements of the TMDL for Diazinon and Pesticide related Toxicity for Urban Creeks in the region. The TMDL includes urban runoff allocations for Diazinon of 100 ng/l and for pesticide related toxicity of 1.0 Acute Toxicity Units (TUa) and 1.0 Chronic Toxicity Units (TUc) to be met in urban creek waters. However, urban runoff management agencies (i.e., the Permittees) are not solely responsible for attaining the allocations because their authority to regulate pesticide use is constrained by federal and State law. Accordingly, the Permittees' requirements for addressing the allocations are set forth in the TMDL implementation plan and are included in this provision.

Pesticides of concern include: organophosphorous pesticides (chlorpyrifos, diazinon, and malathion); pyrethroids (bifenthrin, cyfluthrin, beta-cyfluthrin, cypermethrin, deltamethrin, esfenvalerate, lambda-cyhalothrin, permethrin, and tralomethrin); carbamates (e.g., carbaryl); and fipronil. The Permittees may coordinate with BASMAA, the Urban Pesticide Pollution Prevention Project, the Urban Pesticide Committee, the Bay-Friendly Landscaping and Gardening Coalition, and other agencies and organizations in carrying out these activities.

C.9.a. Adopt an Integrated Pest Management (IPM) Policy or Ordinance

i. Task Description – In their IPM policies or ordinances, the Permittees shall include provisions to minimize reliance on pesticides that threaten water quality and to require the use of IPM in municipal operations and on municipal property.

ii. Implementation Level – If not already in place, the Permittees shall adopt IPM policies or ordinances no later than July 1, 2010.

iii. Reporting – The Permittees shall submit a copy of their IPM ordinance(s) or policy(s) in their 2010 Annual Report.

C.9.b. Implement IPM Policy or Ordinance

i. Task Description – The Permittees shall establish written standard operating procedures for pesticide use that ensure implementation of the IPM policy or ordinance and require municipal employees and contractors to adhere to the IPM standard operating procedures.

ii. Reporting

(1) In their Annual Reports, the Permittees shall report on IPM implementation by showing trends in quantities and types of pesticide used, and suggest reasons for increases in use of pesticides that threaten water quality, specifically organophosphorous pesticides, pyrethroids, carbaryl, and fipronil.

(2) The Permittees shall maintain pesticide application standard operating procedures and submit them upon request.

C.9.c. Train Municipal Employees

i. Task Description – The Permittees shall ensure that all municipal employees who, within the scope of their duties, apply or use pesticides that threaten water quality are trained in IPM practices and the Permittee's IPM policy. This training may also include other training opportunities such as Bay-Friendly Landscape Maintenance Training & Qualification Program and EcoWise Certified.

ii. Reporting

(1) In their Annual Reports, the Permittees shall report the percentage of municipal employees who apply pesticides who have received training in IPM policy and IPM standard operating procedures within the last three years.

(2) The Permittees shall submit training materials (e.g., course outline, date, attendees) upon request.

C.9.d. Require Contractors to Implement IPM

i. Task Description – The Permittees shall hire IPM-certified contractors or include contract specifications requiring contractors to implement IPM no later than July 1, 2010.

ii. Reporting – In their Annual Reports, the Permittees shall submit documentation to confirm compliance, such as the Permittee's standard contract specification or copy of contractors' certification(s).

C.9.e. Track and Participate in Relevant Regulatory Processes (may be done jointly with other Permittees, such as through CASQA or BASMAA and/or the Urban Pesticide Pollution Prevention Project)

i. Task Description

(1) The Permittees shall track USEPA pesticide evaluation and registration activities as they relate to surface water quality, and when necessary, encourage USEPA to coordinate implementation of the Federal Insecticide, Fungicide, and Rodenticide Act and the CWA and to accommodate water quality concerns within its pesticide registration process;

(2) The Permittees shall track California Department of Pesticide Regulation (DPR) pesticide evaluation activities as they relate to surface water quality, and when necessary, encourage DPR to coordinate implementation of the California Food and Agriculture Code with the California Water Code and to accommodate water quality concerns within its pesticide evaluation process;

(3) The Permittees shall assemble and submit information (such as monitoring data) as needed to assist DPR and County Agricultural Commissioners in

ensuring that pesticide applications comply with water quality standards; and

(4) As appropriate, the Permittees shall submit comment letters on USEPA and DPR re-registration, re-evaluation, and other actions relating to pesticides of concern for water quality.

ii. Reporting – In their Annual Reports, the Permittees who participate in a regional effort to comply with C.9.e. may reference a regional report that summarizes regional participation efforts, information submitted, and how regulatory actions were affected. All other Permittees shall list their specific participation efforts, information submitted, and how regulatory actions were affected.

C.9.f. Interface with County Agricultural Commissioners

i. Task Description – The Permittees shall maintain regular communications with county agricultural commissioners (or other appropriate State and/or local agencies) to (1) get input and assistance on urban pest management practices and use of pesticides, (2) inform them of water quality issues related to pesticides, and (3) report violations of pesticide regulations (e.g., illegal handling) associated with stormwater management.

ii. Reporting – In their Annual Reports, the Permittees shall summarize improper pesticide usage reported to county agricultural commissioners and report follow-up actions to correct violations.

C.9.g. Evaluate Implementation of Source Control Actions Relating to Pesticides

i. Task Description – The Permittees shall evaluate the effectiveness of the control measures implemented, evaluate attainment of pesticide concentration and toxicity targets for water and sediment from monitoring data (Provision C.8.), and identify improvements to existing control measures and/or additional control measures, if needed, to attain targets with an implementation time schedule.

ii. Reporting – In their 2013 Annual Reports, the Permittees shall report the evaluation results, and if needed, submit a plan to implement improved and/or new control measures.

C.9.h. Public Outreach (may be done jointly with other Permittees, such as through CASQA or BASMAA and/or the Urban Pesticide Pollution Prevention Project or the Bay-Friendly Landscaping and Gardening Coalition).

i. Point of Purchase Outreach: The Permittees shall:

(1) Conduct outreach to consumers at the point of purchase;

(2) Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control; and

(3) Participate in and provide resources for the "Our Water, Our World" program or a functionally equivalent pesticide use reduction outreach program.

ii. **Reporting** – In their Annual Reports, the Permittees who participate in a regional effort to comply with C.9.h.i. may reference a report that summarizes these actions. All other Permittees shall summarize activities completed and document any measurable awareness and behavior changes resulting from outreach.

iii. **Pest Control Contracting Outreach:** The Permittees shall conduct outreach to residents who use or contract for structural or landscape pest control and shall:

(1) Provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control, including IPM;

(2) Incorporate IPM messages into general outreach;

(3) Provide information to residents about "Our Water, Our World" or functionally equivalent program;

(4) Provide information to residents about EcoWise Certified IPM certification in Structural Pest Management, or functionally equivalent certification program; and

(5) Coordinate with household hazardous-waste programs to facilitate appropriate pesticide waste disposal, conduct education and outreach, and promote appropriate disposal.

iv. **Reporting** – In their 2013 Annual Reports, the Permittees who participate in a regional effort to comply with C.9.h.iii. may reference a report that summarizes these actions. All other Permittees shall document the effectiveness of their actions in their 2013 Annual Reports. This documentation may include percentages of residents hiring certified IPM providers and the change in this percentage.

v. **Outreach to Pest Control Operators:** The Permittees shall conduct outreach to pest control operators (PCOs) and landscapers; Permittees are encouraged to work with DPR, county agricultural commissioners, UC-IPM, BASMAA, the Urban Pesticide Committee, the EcoWise Certified Program (or functionally equivalent certification program), the Bio-integral Resource Center and others to promote IPM to PCOs and landscapers.

vi. **Reporting** – In each Annual Report, the Permittees who participate in a regional effort to comply with C.9.h.v. may reference a report that summarizes these actions. All other Permittees shall summarize how they reached PCOs and landscapers and reduced pesticide use.

C.10. Trash Load Reduction

The Permittees shall demonstrate compliance with Discharge Prohibition A.2 and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems (MS4s) by 40% by 2014, 70% by 2017, and 100% by 2022 as further specified below.

During this permit term, the Permittees shall develop and implement a Short-Term Trash Load Reduction Plan. This includes implementation of a mandatory minimum level of trash capture; cleanup and abatement progress on a mandatory minimum number of Trash Hot Spots; and implementation of other control measures and best management practices, such as trash reduction ordinances, to prevent or remove trash loads from MS4s to attain a 40% reduction in trash loads by July 1, 2014. The Permittees shall also develop and begin implementation of a Long-Term Trash Load Reduction Plan to attain a 70% reduction in trash loads from their MS4s by 2017 and 100% by 2022. Flood management agencies, which are non-population-based Permittees that do not have jurisdiction over urban watershed land, are not subject to these trash reduction requirements except for minimum full trash capture and Trash Hot Spot requirements, as specified in subsections C.10.a.iii and C.10.b below.

C.10.a. Short-Term Trash Load Reduction

i. Short-Term Trash Loading Reduction Plan – Each Permittee shall submit a Short-Term Trash Load Reduction Plan, including an implementation schedule, to the Water Board by February 1, 2012. The Plan shall describe control measures and best management practices, including any trash reduction ordinances, that are currently being implemented and the current level of implementation and additional control measures and best management practices that will be implemented, and/or an increased level of implementation designed to attain a 40% trash load reduction from its MS4 by July 1, 2014.

The Short-Term Trash Load Reduction Plan shall account for required mandatory minimum Full Trash Capture devices called for in Provision C.10.a.iii and Trash Hot Spot Cleanup called for in Provision C.10.b.

ii. Baseline Trash Load and Trash Load Reduction Tracking Method – Each Permittee, working collaboratively or individually, shall determine the baseline trash load from its MS4 to establish the basis for trash load reductions and submit the determined load level to the Water Board by February 1, 2012, along with documentation of methodology used to determine the load level. The submittal shall also include a description of the trash load reduction tracking method that will be used to account for trash load reduction actions and to demonstrate progress and attainment of trash load reduction levels. The submittal shall account for the drainage areas of a Permittee's jurisdiction that are associated with the baseline trash load from its MS4, and the baseline trash load level per unit area by land use type and drainage area characteristics used to derive the total baseline trash load level for each Permittee.

In the determination of applicable areas that generate trash loads for inclusion in the Baseline Trash Load, the Permittees may propose areas for exclusion, with supporting documentation, which meet Discharge Prohibition A.2 and trash-

related Receiving Water Limitations. Documentation demonstrating no material trash presence or adverse impact may include data from the maintenance of existing trash capture devices, data from trash flux measurements in the MS4 and the water column of streams during wet weather, Trash Hot Spot assessments, and litter audits of street curb and gutter areas in high pedestrian traffic and high commercial activity areas.

If proposed areas for exclusion are commercial, industrial, or high density residential areas, or adjacent to schools or event venues, the Permittee shall collect and submit by February 1, 2013, an additional year of documentation to further support the basis for the exclusion. If the data continue to support the exclusion determination, further trash reduction actions are not required in these areas, unless the Water Board notifies the Permittee otherwise.

Each Permittee shall submit a progress report by February 1, 2011, that indicates whether it is determining its baseline trash load and trash load reduction method individually or collaboratively with other Permittees and a summary of the approach being used. The report shall also include the types and examples of documentation that will be used to propose exclusion areas, and the land use characteristics and estimated area of potentially excluded areas.

iii. Minimum Full Trash Capture – Except as excluded below, population-based Permittees shall install and maintain a mandatory minimum number of full trash capture devices by July 1, 2014, to treat runoff from an area equivalent to 30% of Retail/Wholesale Land[49] that drains to MS4s within their jurisdictions (see Table 10.1 in Attachment J). If the sum of the areas that generate trash loads determined pursuant to C.10.a.ii above is a smaller acreage than the required trash capture acreage, a population-based Permittee may reduce its minimum full trash capture requirement to the smaller acreage. A population-based Permittee with a population less than 12,000 and retail/wholesale land less than 40 acres, or a population less than 2000, is exempt from this trash capture requirement. The minimum number of trash capture devices required to be installed and maintained by non-population-based Permittees is included in Attachment J.

All installed devices that meet the following full trash capture definition may be counted toward this requirement regardless of date of installation. A full capture system or device is any single device or series of devices that traps all particles retained by a 5 mm mesh screen and has a design treatment capacity of not less than the peak flow rate Q resulting from a one-year, one-hour, storm in the sub-drainage area.

C.10.b. Trash Hot Spot Selection and Cleanup

Trash Hot Spots in receiving waters shall be cleaned annually to achieve the multiple benefits of beginning abatement of these impacts as mitigation and to learn more about the sources and patterns of trash loading.

[49] [http://quake.abag.ca.gov/mitigation/pickdbh2.html] and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

i. **Hot Spot Cleanup and Definition –** The Permittees shall cleanup selected Trash Hot Spots to a level of "no visual impact" at least one time per year for the term of the permit. Trash Hot Spots shall be at least 100 yards of creek length or 200 yards of shoreline length.

ii. **Hot Spot Selection –** Population-based Permittees shall identify high trash-impacted locations on State waters totaling at least one Trash Hot Spot per 30,000 population, or one per 100 acres of Retail/Wholesale Commercial Land Area, within their jurisdictions based on Association of Bay Area Governments (ABAG) 2005 data1, whichever is greater. If the hot spot number by one of the two determination methods is more than twice that determined by the other method, double the smaller hot spot number shall be used. Otherwise, the larger hot spot number determined by the two methods shall be the Trash Hot Spot assignment for a population-based Permittee. Each population-based Permittee shall select at least one Trash Hot Spot. The Permittees shall each submit selected Trash Hot Spots to the Water Board by July 1, 2010. The list should include photo documentation (one photo per 50 feet) and initial assessment results for the proposed hot spots. The minimum number of Trash Hot Spots per Permittee is included in Attachment J for population and non-population-based Permittees. The Permittees shall proceed with cleanup of selected Trash Hot Spots unless informed otherwise by the Water Board.

iii. **Hot Spot Assessments –** The Permittees shall quantify the volume of material removed from each Trash Hot Spot cleanup, and identify the dominant types of trash (e.g., glass, plastics, paper) removed and their sources to the extent possible. Documentation shall include the trash condition before and after clean up of the entire hot spot using photo documentation with a minimum of one photo per 50 feet of hot spot length. Trash Hot Spots may also be assessed using either the Rapid Trash Assessment (RTA v.8) or the SCVURPPP Urban RTA variation of that method.

C.10.c. Long-Term Trash Load Reduction

Each Permittee shall submit a Long-Term Trash Load Reduction Plan, including an implementation schedule, to the Water Board by February 1, 2014. The Plan shall describe control measures and best management practices, including any trash reduction ordinances, that are being implemented and the level of implementation and additional control measures and best management practices that will be implemented, and/or an increased level of implementation designed to attain a 70% trash load reduction from its MS4 by July 1, 2017, and 100% by July 1, 2022.

C.10.d. Reporting

i. In each Annual Report, each Permittee shall provide a summary of its trash load reduction actions (control measures and best management practices) including the types of actions and levels of implementation, the total trash loads and dominant types of trash removed by its actions, and the total trash loads and dominant types of trash for each type of action. The latter shall include each Trash Hot Spot selected pursuant to C.10.b. Beginning with the 2012 Annual

Report, each Permittee shall also report its percent annual trash load reduction relative to its Baseline Trash Load.

ii. The Permittees shall retain records for review providing supporting documentation of trash load reduction actions and the volume and dominant type of trash removed from full trash capture devices, from each Trash Hot Spot cleanup, and from additional control measures or best management practices implemented. Data may be combined for specific types of full trash capture devices deployed in the same drainage area. These records shall have the specificity required for the trash load reduction tracking method established pursuant to subsection C.10.a.iii.

C.11. Mercury Controls

The Permittees shall implement the following control programs for mercury. The Permittees shall perform the control measures and provide reporting on those control measures according to the provisions below. The purpose of this provision is to implement the urban runoff requirements of the San Francisco Bay mercury TMDL and reduce mercury loads to make substantial progress toward achieving the urban runoff mercury load allocation established for the TMDL. The aggregate, regionwide, urban runoff wasteload load allocation is 82 kg/yr. This allocation should be achieved by February 2028 and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved by February 2018. If the interim loading milestone is not achieved, the Permittees shall demonstrate reasonable and measurable progress toward achieving the milestone. The Permittees may comply with any requirement of this provision through a collaborative effort.

C.11.a. Mercury Collection and Recycling Implemented throughout the Region

i. Task Description – The Permittees shall promote, facilitate, and/or participate in collection and recycling of mercury containing devices and equipment at the consumer level (e.g., thermometers, thermostats, switches, bulbs).

ii. Reporting – The Permittees shall report on these efforts in their Annual Report, including an estimate of the mass of mercury collected.

C.11.b. Monitor Methylmercury

i. Task Description – The Permittees shall monitor methymercury in runoff discharges. The objective of the monitoring is to investigate a representative set of drainages and obtain seasonal information and to assess the magnitude and spatial/temporal patterns of methylmercury concentrations.

ii. Implementation Level – The Permittees shall analyze aqueous grab samples already being collected for total mercury analysis for methylmercury as specified in Provision C.8.f.

iii. Reporting – The Permittees shall report monitoring results annually beginning with their 2010 Annual Report.

C.11.c. Pilot Projects To Investigate and Abate Mercury Sources in Drainages, Including Public Rights-Of-Way, and Stormwater Conveyances with Accumulated Sediment that Contains Elevated Mercury Concentrations.

i. Task Description – The Permittees shall investigate and abate mercury sources in or to their storm drain systems in conjunction with the Water Board and other appropriate regulatory agencies with investigation and cleanup authorities. The purpose of this task is to implement and evaluate the benefit of a suite of abatement measures at five pilot project locations. The Permittees shall document the knowledge and experience gained through pilot implementation,

and this documentation will provide a basis for determining the scope of abatement implementation in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads abated resulting from implementation of these measures.

ii. Implementation Level – Reducing loads of PCBs is the main pilot location selection factor for this Provision, and reducing loads of mercury is a secondary criterion. Accordingly, for PCB pilot project locations selected as part of Provision C.12.c, the Permittees shall conduct reconnaissance in the pilot project drainage areas. The Permittees shall test sediments in storm drains and conveyances to characterize the extent and magnitude of mercury concentrations. They shall evaluate monitoring data and determine if a mercury sediment abatement program would reduce mercury loading significantly. If so determined, the Permittees shall cause abatement activities to be conducted at those sites under Permittee jurisdiction with identified remedial activities. When contamination is located on private property, a Permittee must either exercise direct authority to require cleanup or notify and request other appropriate authorities to exercise their cleanup authority.

iii. Reporting – Report on mercury-related aspects of work and loads abated as part of reporting requirements for Provision C.12.c.

C.11.d. Pilot Projects to Evaluate and Enhance Municipal Sediment Removal and Management Practices

i. Task Description – The Permittees shall jointly evaluate ways to enhance mercury load reduction benefits of operation and maintenance actives that remove or manage sediment. The purpose of this task is to implement these management practices at the pilot scale in five drainages during this permit term. The knowledge and experience gained through pilot implementation will be used to determine the implementation scope of enhanced sediment removal and management practices in subsequent permit terms. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of enhanced sediment removal management practices in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. Implementation Level – In all pilot program drainages selected as part of Provision C.12.c, the Permittees shall jointly evaluate ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits for the control of mercury. This evaluation shall also include consideration of street flushing and capture, collection, or routing to the sanitary sewer (in coordination and consultation with local sanitary sewer agencies) as a potential enhanced management practice in coordination and consultation with local sanitary sewer agencies.

Beginning July 1, 2011, the Permittees shall implement pilot studies for the most potentially effective measures(s) based on the evaluation of Provision C.11.d.ii in all drainages for which PCB pilot projects are being conducted.

iii. Reporting

(1) The Permittees shall present a progress report on the results of the evaluation in their 2010 Annual Report and the final evaluation results in their 2011 Annual Report.

(2) In their March 15, 2014 Integrated Monitoring Report, the Permittees shall report the effectiveness of enhanced practices pilot implementation, report estimates of loads reduced, and present a plan and schedule for possible expanded implementation for subsequent permit terms.

C.11.e. Conduct Pilot Projects to Evaluate On-Site Stormwater Treatment via Retrofit

i. Task Description – The Permittees shall evaluate and quantify the removal of mercury by on-site treatment systems via retrofit of such systems into existing storm drain systems. The purpose of this task is to implement on-site treatment projects at the pilot scale in ten locations during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of on-site treatment retrofits in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. Implementation Level – The Permittees, working collaboratively, shall identify at least ten locations throughout the Permittees' jurisdictions that present opportunities to install and evaluate[50] on-site treatment systems (e.g., detention basins, bioretention units, sand filters, infiltration basins, treatment wetlands) and shall assess best treatment options for those locations. Every county (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano) should have at least one location. This effort shall identify potential locations draining a variety of land uses; evaluate technical feasibility; and discuss economical feasibility. The pilot locations may be the same as those chosen for Provision C.12.e, but consideration should be given to areas of elevated mercury concentrations.

On the basis of the Provision C.11.e.ii report, the Permittees shall select sites to perform pilot studies and shall conduct pilot studies in ten selected locations. Pilot studies shall span treatment types and drainage characteristics.

iii. Reporting –

(1) In their 2011 Annual Report, the Permittees shall report on candidate locations and types of treatment retrofit for each location. The report shall include assessment of at least ten locations.

[50] Permittees may evaluate a maximum of two pre-existing treatment systems of the ten total required systems to be evaluated provided that these existing treatment systems are applicable to the intent of this provision..

(2) In their March 15, 2014 Integrated Monitoring Report, the Permittees shall report status, results, mercury removal effectiveness, and lessons learned from the ten pilot studies and their plan for implementing this type of treatment on an expanded basis throughout their jurisdictions during the next permit term.

C.11.f. Diversion of Dry Weather and First Flush Flows to Publicly Owned Treatment Works (POTWs)

i. Task Description – The Permittees shall evaluate the reduced loads of mercury from diversion of dry weather and first flush stormwater flows to sanitary sewers. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of urban runoff diversion projects in subsequent permit terms. The Permittees shall also quantify and report the amount of mercury loads removed or avoided resulting from implementation of these measures.

ii. Implementation Level – The Permittees shall implement pilot projects to divert dry weather and first flush flows to POTWs to address these flows as a source of PCBs and mercury to receiving waters. The Permittees are strongly encouraged to make use of stormwater pump stations in this effort because pump station characterization work performed pursuant to Provisions C.2 and C.10, addressing dissolved oxygen depletion and trash impacts, may be efficiently leveraged for the initial phase of these diversion pilot projects. The objectives of this Provision are to: implement five pilot projects for urban runoff diversion from stormwater pump stations to POTWs; evaluate the reduced loads of mercury and PCBs resulting from each diversion; and gather information to guide the selection of additional diversion projects in future permits. Collectively, the Permittees shall select five stormwater pump stations and five alternates by evaluating drainage characteristics and the feasibility of diverting flows to the sanitary sewer.

(1) The Permittees should work with local POTWs on a watershed, county, or regional level to evaluate feasibility and to establish cost sharing agreements. The feasibility evaluation shall include, but not be limited to, costs, benefits, and impacts on the stormwater and wastewater agencies and the receiving waters relevant to the diversion and treatment of the dry weather and first flush flows.

(2) From this feasibility evaluation, the Permittees shall select five pump stations and five alternates for pilot diversion studies. At least one urban runoff diversion pilot project shall be implemented in each of the five counties (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano). The pilot and alternate locations should be located in industrially-dominated catchments where elevated PCB concentrations are documented.

(3) The Permittees shall implement flow diversion to the sanitary sewer at five pilot pump stations. As part of the pilot studies, the Permittees shall monitor, measure, and report mercury load reduction.

iii. Reporting

(1) The Permittees shall summarize the results of the feasibility evaluation in their 2010 Annual Report, including:

- Selection criteria leading to the identification of the five candidate and five alternate pump stations for pilot studies.
- Time schedules for conducting the pilot studies.
- A proposed method for distributing mercury load reductions to participating wastewater and stormwater agencies.

(2) The Permittees shall report annually on the status of the pilot studies in each subsequent Annual Report.

(3) The Permittees shall include in their March 15, 2014 Integrated Monitoring Report:

- Evaluation of pilot program effectiveness.
- Mercury loads reduced.
- Updated feasibility evaluation procedures to guide future diversion project selection.

C.11.g. Monitor Stormwater Mercury Pollutant Loads and Loads Reduced

i. Task Description – The Permittees shall develop and implement a monitoring program to quantify mercury loads and loads reduced through source control, treatment and other management measures as required in Provision C.8.f.

ii. Implementation Level – The Permittees shall demonstrate progress toward (a) the interim loading milestones, or (b) attainment of the program area allocations, by using the following methods:

(1) Quantify through estimates the annual average mercury load reduced by implementing pollution prevention, source control and treatment control efforts required by the provisions of this permit or other relevant efforts; or

(2) Quantify the mercury load as a rolling five-year annual average using data on flow and water column mercury concentrations; or

(3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the target of 0.2 mg mercury/kg dry weight.

iii. Reporting

(1) The Permittees shall report in their 2010 Annual Report methods used to assess progress toward meeting WLA goals and a full description of the

measurement and estimation methodology and rationale for the approaches.

(2) The Permittees shall report in their March 15, 2014 Integrated Monitoring Report results of chosen monitoring/measurement approach concerning loads assessment and estimation of loads reduced.

C.11.h. Fate and Transport Study of Mercury in Urban Runoff

i. Task Description – The Permittees shall conduct or cause to be conducted studies aimed at better understanding the fate, transport, and biological uptake of mercury discharged in urban runoff to San Francisco Bay and tidal areas.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of mercury discharged in urban runoff, the influence of urban runoff on the patterns of food web mercury accumulation, and the identification of drainages where urban runoff mercury is particularly important in food web accumulation.

iii. Reporting – The Permittees shall submit in their 2010 Annual Report a work plan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a schedule. The Permittees shall report on status of these studies in their 2010, 2011, and 2012 Annual Reports. In the March 15, 2014 Integrated Monitoring Report, the Permittees shall report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.11.i. Development of a Risk Reduction Program Implemented Throughout the Region.

i. Task Description – The Permittees shall develop and implement or participate in effective programs to reduce mercury-related risks to humans and quantify the resulting risk reductions from these activities.

ii. Implementation Level – The risk reduction activities shall include investigating ways to address public health impacts of mercury in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of health impacts to those people and communities most likely to be affected by mercury in San Francisco Bay-caught fish, such as subsistence fishers and their families. Such strategies should include public participation in developing effective programs in order to ensure their effectiveness. The Permittees may include studies needed to establish effective exposure reduction activities and risk communication messages as part of their planning. The risk reduction activities may be performed by a third party if the Permittees wish to provide funding for this purpose. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts.

iii. Reporting – The Permittees shall submit in their 2010 Annual Report the specific manner in which these risk reduction activities will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report on the status of the risk reduction efforts in their 2011 and 2012 Annual Reports. The Permittees shall report the findings and results of the studies completed, planned, or in progress as well as the status of other risk reduction actions in their March 15, 2014 Integrated Monitoring Report.

C.11.j. Develop Allocation Sharing Scheme with Caltrans.

i. Task Description – The wasteload allocations for urban stormwater developed through the San Francisco Bay mercury TMDL implicitly include California Department of Transportation (Caltrans) roadway and non-roadway facilities within the geographic boundaries of urban runoff management agencies. Consistent with the TMDL, the Permittees are required to develop an equitable mercury allocation-sharing scheme in consultation with Caltrans to address the Caltrans facilities in the program area, and report the details to the Water Board. Alternatively, Caltrans may choose to implement mercury load reduction actions on a watershed or regionwide basis in lieu of sharing a portion of an urban runoff management agencies' mercury allocation. In such a case, the Water Board will consider a separate allocation for Caltrans for which it may demonstrate progress toward attaining an allocation or load reduction in the same manner as municipal programs.

ii. Reporting – The Permittees shall report on the status of the efforts to develop this allocation sharing scheme in their 2010, 2011, and 2012 Annual Reports. The Permittees shall submit in their March 15, 2014 Integrated Monitoring Report the manner in which the urban runoff mercury TMDL allocation will be shared between the Permittees and Caltrans.

C.12. Polychlorinated Biphenyls (PCBs) Controls

The Permittees shall implement the following control programs for PCBs. The Permittees shall perform the control measures and provide reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the urban runoff requirements of the PCBs TMDL and reduce PCBs loads to make substantial progress toward achieving the urban runoff PCBs load allocation. The Permittees may comply with any requirement of this Provision through a collaborative effort.

C.12.a. Implement Project throughout Region to Incorporate PCBs and PCB-Containing Equipment Identification into Existing Industrial Inspections

i. Task Description – The Permittees shall develop training materials and train municipal industrial building inspectors to identify, in the course of their existing inspections, PCBs or PCB-containing equipment. The Permittees shall incorporate such PCB identification into industrial inspection programs.

ii. Implementation Level – Where inspectors identify during inspections PCBs or PCB-containing equipment, the Permittees shall document incidents in inspection reports and refer to appropriate regulatory agencies (e.g. county health departments, Department of Toxic Substances Control, California Department of Public Health, and the Water Board) as necessary.

iii. Reporting – The Permittees shall report the results of training in their 2010 Annual Report and report on both ongoing training development and inspections for PCB identification in their 2011, and following, Annual Reports.

C.12.b. Conduct Pilot Projects to Evaluate Managing PCB-Containing Materials and Wastes during Building Demolition and Renovation (e.g., Window Replacement) Activities

i. Task Description – The Permittees shall evaluate potential presence of PCBs at construction sites, current material handling and disposal regulations/programs (e.g., municipal ordinances, RCRA, TSCA) and current level of implementation.

ii. Implementation Level –

(1) The Permittees shall develop a sampling and analysis plan to evaluate PCBs at construction sites that involve demolition activities (including research on when, where, and which materials potentially contained PCBs).

(2) The Permittees shall implement a sampling and analysis plan at a minimum of 10 sites distributed throughout the combined Permittees' jurisdiction areas.

(3) The Permittees shall develop/select BMPs to reduce or prevent discharges of PCBs during demolition/remodeling. The BMPs will focus on methods

to identify, handle, contain, transport and dispose of PCB-containing building materials.

(4) The Permittees shall develop model ordinances or policies, train and deploy inspectors, and pilot test BMPs at 5 sites.

iii. Reporting –

(1) In their 2010 Annual Report, the Permittees shall submit the sampling and analysis plan (of Provision C.12.b.ii.).

(2) In their 2010 Annual Report, the Permittees shall submit a status report on sampling and analysis along with whatever sampling results are available.

(3) In their 2011 Annual Report, the Permittees shall submit the results of the evaluation (Provision C.12.b.i.) of current regulations, level of implementation, and regulatory gaps as well as the final sampling and analysis report, a list of appropriate BMPs, BMP training program, and model ordinances and policies to prevent PCB discharges from building demolition and improvement activities.

(4) In the March 15, 2014 Integrated Monitoring Report, the Permittees shall submit the results of pilot program effectiveness evaluation.

C.12.c. Pilot Projects to Investigate and Abate On-land Locations with Elevated PCB Concentrations, Including Public Rights-of-way, and Stormwater Conveyances with Accumulated Sediments with Elevated PCBs Concentrations.

i. Task Description – The Permittees shall investigate and abate PCBs sources in or to their storm drain systems in conjunction with the Water Board and other appropriate regulatory agencies with investigation and cleanup authorities. The purpose of this task is to implement and evaluate the benefit of a suite of abatement measures at five pilot project locations. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of abatement projects in subsequent permit terms. The Permittees shall also quantify and report the amount of PCBs loads abated resulting from implementation of these measures.

ii. Implementation Level –

(1) The Permittees, working collaboratively, shall identify 5 drainage areas that contain high levels of PCBs and conduct pilot projects to investigate and abate these high PCB concentrations. To accomplish this, the Permittees shall interview municipal staff and review municipal databases, data collected or compiled through grant-funded efforts, other agency files, and other available information to identify potential PCB source areas and areas where PCB-contaminated sediment accumulates, including within stormwater conveyances. The Permittees shall qualitatively rank and map potential PCB source areas within each drainage. Investigation of mercury (Provision C.11.c.) shall be included in these efforts unless not

appropriate. When contamination is located on private property, the Permittees must either exercise direct authority to require cleanup or notify and request other appropriate authorities to exercise their cleanup authority.

(2) The Permittees shall conduct reconnaissance surveys of the identified drainages and gather information concerning past or current use of PCBs to further identify potential source areas and determine whether runoff from such locations is likely to convey soils/sediments with PCBs to municipal stormwater conveyances.

(3) The Permittees shall validate existence of elevated PCB concentrations through surface soil/sediment sampling and analysis where visual inspections and/or other information suggest potential source areas within each drainage.

Where data confirm significantly elevated PCB concentrations in surface soils/sediments within the subject pilot drainage, the Permittees shall provide available information on current site conditions and owner/operators and other potentially responsible parties to Water Board and other appropriate regulatory agencies to facilitate their issuance of orders for further investigation and remediation of subject sites. The Permittees shall assist the Water Board and other appropriate agencies to identify/evaluate funding to perform abatement and/or responsible parties and abatement options.

(4) The Permittees shall identify areas for expedited abatement on the basis of loading potential including factors such as PCB concentration, mass of sediment, and mobilization potential and/or human health protection thresholds, such as California Human Health Screening Levels.

(5) The Permittees shall conduct an abatement program in portions of drainages under their jurisdiction in conjunction with the Water Board and other appropriate agencies.

iii. Reporting

(1) The Permittees shall report on the identified suspect drainage areas [Provision C.12.c.ii (1)] in their 2010 Annual Report and results of the surveys [Provision C.12.c.ii.(2)] in their 2011 Annual Report.

(2) The Permittees shall report sampling and chemical analysis results at pilot locations [Provision C.12.c.ii.(3)] in their 2011 Annual Reports.

(3) The Permittees shall report on proposed abatement opportunities and activities [Provision C.12.c.ii.(4) and (5)], responsible parties, funding, agency oversight, and schedules in their 2012 Annual Report.

(4) The Permittees shall report results of abatement program effectiveness and estimates of loads reduced (see C.11.g) in the March 15, 2014 Integrated Monitoring Report.

C.12.d. Conduct Pilot Projects to Evaluate and Enhance Municipal Sediment Removal and Management Practices

i. **Task Description** – The Permittees shall jointly evaluate ways to enhance PCBs load reduction benefits of operation and maintenance activities that remove or manage sediment. The purpose of this task is to implement these management practices at the pilot scale in five drainages during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of enhanced sediment removal and management practices in subsequent permit terms. The Permittees shall also quantify and report the amount of PCBs loads removed or avoided resulting from implementation of these measures.

ii. **Implementation Level** – In all pilot program drainages selected as part of Provision C.12.c, the Permittees shall jointly evaluate ways to enhance existing sediment removal and management practices such as municipal street sweeping, curb clearing parking restrictions, inlet cleaning, catch basin cleaning, stream and stormwater conveyance system maintenance, and pump station cleaning via increased effort and/or retrofits. This evaluation shall also include consideration of street flushing and capture, collection, or routing to the sanitary sewer (in coordination and consultation with local sanitary sewer agency) as a potential enhanced management practice. The Permittees shall also jointly evaluate existing information on high-efficiency street sweepers. The goal is to evaluate the cost-effectiveness of high-efficiency street sweeping relative to reducing pollutant loads. The Permittees shall develop recommendations for follow-up studies to be conducted.

iii. **Reporting** – The Permittees shall submit a progress report on the results of these two evaluations in their 2010 Annual Report and the final evaluation results in their 2011 Annual Report.

iv. Beginning July 1, 2011, the Permittees shall implement pilot studies for the most potentially effective measure(s) based on the evaluation of Provision C.12.d. ii. throughout the region.

v. **Reporting** – The Permittees shall report effectiveness of enhanced practices pilot implementation in the March 15, 2014 Integrated Monitoring Report, and their plan for implementing enhanced practices in the next permit term.

C.12.e. Conduct Pilot Projects to Evaluate On-Site Stormwater Treatment via Retrofit

i. **Task Description** – The Permittees shall evaluate and quantify the removal of PCBs by on-site treatment systems via retrofit of such systems into existing storm drain systems. The purpose of this task is to implement on-site treatment projects at the pilot scale in ten locations during this permit term. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of on-site treatment retrofits in subsequent permit terms.

ii. Implementation Level – The Permittees, working collaboratively, shall identify at least 10 locations throughout the Permittees' jurisdictions that present opportunities to install and evaluate[51] on-site treatment systems (e.g., detention basins, bioretention units, sand filters, infiltration basins, treatment wetlands) and shall assess the best treatment options for those locations. Every county (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano) should have at least one location. This assessment shall identify potential locations draining a variety of land uses, discuss technical feasibility, and discuss economical feasibility. The Permittees shall choose pilot study locations primarily on the basis of elevated PCBs concentrations with additional consideration to mercury concentrations.

iii. On the basis of the Provision C.12.e.ii. report, the Permittees shall select sites to perform pilot studies and shall conduct pilot studies in selected locations. Taken as a group, these 10 pilot study locations should span treatment types and drainage characteristics.

iv. Reporting –

(1) In their 2011 Annual Report, the Permittees shall report on candidate locations with types of treatment retrofit for each location. The report shall include assessment of at least 10 locations.

(2) In the March 15, 2014 Integrated Monitoring Report, the Permittees shall report status, results, PCBs-removal effectiveness, and lessons learned from the pilot studies and their plan for implementing this type of treatment on an expanded basis throughout the region during the next permit term.

C.12.f. Diversion of Dry Weather and First Flush Flows to POTWs

i. Task Description – The Permittees shall evaluate the reduced loads of PCBs from diversion of dry weather and first flush stormwater flows to sanitary sewers. The knowledge and experience gained through pilot implementation will be used to determine the implementation scope of urban runoff diversion in subsequent permit terms. The Permittees shall document the knowledge and experience gained through pilot implementation, and this documentation will provide a basis for determining the implementation scope of urban runoff diversion projects in subsequent permit terms.

ii. Implementation Level – The Permittees shall implement pilot projects to address the role of pump stations as a source of pollutants of concern (primarily PCBs and secondarily mercury). This work is in addition to Provisions C.2 and C.10 that address dissolved oxygen depletion and trash impacts in receiving waters. The objectives of this provision are: to implement five pilot projects for urban runoff diversion from stormwater pump stations to POTWs; evaluate the reduced loads of mercury and PCBs resulting from the diversion; and gather

[51] The Permittees may evaluate a maximum of two pre-existing treatment systems of the ten total required systems to be evaluated provided that these existing treatment systems are applicable to the intent of this provision.

information to guide the selection of additional diversion projects required in future permits. Collectively, the Permittees shall select 5 stormwater pump stations and 5 alternates by evaluating drainage characteristics and the feasibility of diverting flows to the sanitary sewer.

(1) The Permittees should work with the local POTW on a watershed, program, or regional level to evaluate feasibility and to establish cost sharing agreements. The feasibility evaluation shall include, but not be limited to, costs, benefits, and impacts on the stormwater and wastewater agencies and the receiving waters relevant to the diversion and treatment of the dry weather and first flush flows.

(2) From this feasibility evaluation, the Permittees shall select 5 pump stations and 5 alternates for pilot diversion studies. At least one urban runoff diversion pilot project shall be implemented in each of the five counties (San Mateo, Contra Costa, Alameda, Santa Clara, and Solano). The pilot and alternate locations should be located in industrially dominated catchments where elevated PCB concentrations are documented.

(3) The Permittees shall implement flow diversion to the sanitary sewer at the 5 pilot pump stations. As part of the pilot studies, they shall monitor and measure PCBs load reduction.

iii. Reporting –

(1) The Permittees shall summarize the results of the feasibility evaluation in their 2010 Annual Report, including:

- Selection criteria leading to the identification of the 5 candidate and 5 alternate pump station for pilot studies.
- Time schedules for conducting the pilot studies.
- A proposed method for distributing PCBs load reductions to participating wastewater and stormwater agencies.

(2) The Permittees shall report annually on the status of the pilot studies in each subsequent annual report.

(3) The March 15, 2014 Integrated Monitoring Report shall include:

- Evaluation of pilot program effectiveness.
- PCBs loads reduced.
- Updated feasibility evaluation procedures to guide future diversion project selection.

C.12.g. Monitor Stormwater PCB Pollutant Loads and Loads Reduced

The Permittees shall develop and implement a monitoring program as required in Provision C.8.f to quantify PCBs loads and loads reduced (see C.11.g for details) through the source control, treatment and other management measures implemented as part of the pilot studies of C.12.a through C.12.f.

C.12.h. Fate and Transport Study of PCBs in Urban Runoff

i. Task Description – The Permittees shall conduct or cause to be conducted studies aimed at better understanding the fate, transport, and biological uptake of PCBs discharged in urban runoff.

ii. Implementation Level – The specific information needs include understanding the in-Bay transport of PCBs discharged in urban runoff, the influence of urban runoff on the patterns of food web PCBs accumulation, and the identification of drainages where urban runoff PCBs are particularly important in food web accumulation.

iii. Reporting – The Permittees shall submit in their 2010 Annual Report a workplan describing the specific manner in which these information needs will be accomplished and describing the studies to be performed with a schedule. The Permittees shall report on status of the studies in their 2011 and 2012 Annual Reports. The Permittees shall report in the March 15, 2014 Integrated Monitoring Report the findings and results of the studies completed, planned, or in progress as well as implications of studies on potential control measures to be investigated, piloted or implemented in future permit cycles.

C.12.i. Development of a Risk Reduction Program Implemented throughout the Region

i. Task Description – The Permittees shall develop and implement or participate in effective programs to reduce PCBs-related risks to humans and quantify the resulting risk reductions from these activities.

ii. Implementation Level – The risk reduction activities shall include investigating ways to address public health impacts of PCBs in San Francisco Bay/Delta fish, including activities that reduce actual and potential exposure of health impacts to those people and communities most likely to be affected by PCBs in San Francisco Bay-caught fish, such as subsistence fishers and their families. Such strategies should include public participation in developing effective programs in order to ensure their effectiveness. The Permittees may include studies needed to establish effective exposure reduction activities and risk communication messages as part of their planning. The risk reduction activities may be performed by a third party if the Permittees wish to provide funding for this purpose. This requirement may be satisfied by a combination of related efforts through the Regional Monitoring Program or other similar collaborative efforts.

iii. Reporting – The Permittees shall submit in their 2010 Annual Report the specific manner in which these risk reduction activities will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report on status of the studies in their 2011 and 2012 Annual Reports. The Permittees shall report the findings and results of the studies completed, planned, or in progress as well as the status of other risk reduction actions in the March 15, 2014 Integrated Monitoring Report.

C.13. Copper Controls

The control program for copper is detailed below. The Permittees shall implement the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to implement the control measures identified in the Basin Plan amendment necessary to support the copper site-specific objectives in San Francisco Bay. The Permittees may comply with any requirement of C.13 Provisions through a collaborative effort.

C.13.a. Manage Waste Generated from Cleaning and Treating of Copper Architectural Features, Including Copper Roofs, during Construction and Post-Construction.

i. Task Description – The Permittees shall ensure that local ordinance authority is established to prohibit the discharge of wastewater to storm drains generated from the installation, cleaning, treating, and washing of the surface of copper architectural features, including copper roofs to storm drains.

ii. Implementation Level

(1) The Permittees shall develop BMPs on how to manage the waste during and post-construction.

(2) The Permittees shall require use of appropriate BMPs when issuing building permits.

(3) The Permittees shall educate installers and operators on appropriate BMPs.

(4) The Permittees shall enforce against noncompliance.

iii. Reporting

(1) The Permittees shall certify adequate legal authority in their 2011 Annual Report or otherwise provide justification for schedule not to exceed one year to comply.

(2) The Permittees shall report annually, starting with their 2012 Annual Report, on training, permitting and enforcement activities.

(3) In their 2013 Annual Report, the Permittees shall evaluate the effectiveness of these measures, including BMP implementation and propose any additional measures to address this source.

C.13.b. Manage Discharges from Pools, Spas, and Fountains that Contain Copper-Based Chemicals

i. Task Description – By adopting local ordinances, the Permittees shall prohibit discharges to storm drains from pools, spas, and fountains that contain copper-based chemicals.

ii. Implementation Level – The Permittees shall either: 1) require installation of a sanitary sewer discharge connection for pools, spas, and fountains, including

connection for filter backwash, with a proper permit from the POTWs; or 2) require diversion of discharge for use in landscaping or irrigation.

iii. Reporting – The Permittees shall certify adequate legal authority in their 2011 Annual Report or otherwise provide justification for schedule not to exceed one year to comply.

C.13.c. Vehicle Brake Pads

i. Task Description – The Permittees shall engage in efforts to reduce the copper discharged from automobile brake pads to surface waters via urban runoff.

ii. Implementation Level – The Permittees shall participate in the Brake Pad Partnership (BPP) process to develop California legislation phasing out copper from certain automobile brake pads sold in California.

iii. Reporting – The Permittees shall report on legislation development and implementation status in Annual Reports during the permit term. In their 2013 Annual Report, the Permittees shall assess status of copper water quality issues associated with automobile brake pads and recommend brake pad-related actions for inclusion in subsequent permits if needed.

C.13.d. Industrial Sources

i. Task Description – The Permittees shall ensure industrial facilities do not discharge elevated levels of copper to storm drains by ensuring, through industrial facility inspections, that proper BMPs are in place.

ii. Implementation Level –

(1) As part of industrial site controls required by Provision C.4, the Permittees shall identify facilities likely to use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers) and include them in their inspection program plans.

(2) The Permittees shall educate industrial inspectors on industrial facilities likely to use copper or have sources of copper and proper BMPs for them.

(3) As part of the industrial inspection, inspectors shall ensure that proper BMPs are in place at such facilities to minimize discharge of copper to storm drains, including consideration of roof runoff that might accumulate copper deposits from ventilation systems on-site.

iii. Reporting

The Permittees shall highlight copper reduction results in the industrial inspection component in the C.13 portion of each Annual Report beginning September 2010.

C.13.e. Studies to Reduce Copper Pollutant Impact Uncertainties

i. Task Description – The Permittees shall conduct or cause to be conducted technical studies to investigate possible copper sediment toxicity and technical studies to investigate sub-lethal effects on salmonids.

ii. Implementation Level – Technical uncertainties regarding copper effects in the Bay are described in the Basin Plan's implementation program for copper site-specific objectives. These uncertainties include toxicity to Bay benthic organisms possibly caused by high copper concentrations as well as possible impacts to the olfactory system of salmonids. The Permittees shall ensure that these studies are supported and conducted. Similar requirements are included in NPDES permits for wastewater discharges. The Permittees shall submit in their 2010 Annual Report the specific manner in which these information needs will be accomplished and describe the studies to be performed with a schedule. The Permittees shall report the findings and results of the studies completed, planned, or in progress in their 2012 Annual Report.

C.14. Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides and Selenium

The control program for PBDEs, legacy pesticides, and selenium is detailed below. The Permittees shall perform the control measures and accomplish the reporting on those control measures according to the provisions below. The purpose of these provisions is to gather concentration and loading information on a number of pollutants of concern (e.g., PBDEs, DDT, dieldrin, chlordane, selenium) for which TMDLs are planned or are in the early stages of development. The Permittees may comply with any requirement of C.14 Provisions through a collaborative effort.

C.14.a. Control Program for PBDEs, Legacy Pesticides, and Selenium.

i. **Task Description** – To determine if urban runoff is a conveyance mechanism associated with the possible impairment of San Francisco Bay for PBDEs, legacy pesticides (such as DDT, dieldrin, and chlordane), and selenium, the Permittees shall work with the other municipal stormwater management agencies in the Bay Region to implement a plan (PBDEs/Legacy Pesticides/Selenium Plans) to identify, assess, and manage controllable sources of PBDEs, legacy pesticides, and selenium found in urban runoff, if any. The Water Board recognizes that these three pollutants are distinct in terms of origin and transport, but they have been grouped into a single permit provision because the requirements are identical. The Water Board anticipates that some of the control measures that are developed for PCBs consistent with aforementioned efforts warrant consideration for the control of PBDEs and possibly legacy pesticides.

ii. **Implementation Level** – The PBDEs/Legacy Pesticides/Selenium Plan shall include actions to do the following:

Characterize the representative distribution of PBDEs, legacy pesticides, and selenium in the urban areas of the Bay Region covered by this permit to determine:

(1) If PBDEs, legacy pesticides, and selenium are present in urban runoff;

(2) If PBDEs, legacy pesticides, or selenium are distributed relatively uniformly in urban areas; and

(3) Whether storm drains or other surface drainage pathways are sources of PBDEs, legacy pesticides, or selenium in themselves, or whether there are specific locations within urban watersheds where prior or current uses result in land sources contributing to discharges of PBDEs, legacy pesticides, or selenium to San Francisco Bay via urban runoff conveyance systems.

iii. Report on progress in 2010 and 2011 Annual Reports. Submit in the 2012 Annual Report a report with the results of the characterization of PBDEs, legacy pesticides, and selenium in urban areas throughout the Bay Region.

iv. Provide information to allow calculation of PBDEs, legacy pesticides, and selenium loads to San Francisco Bay from urban runoff conveyance systems.

v. Submit in the 2013 Annual Report a report with the information required to compute such loads to San Francisco Bay of PBDEs, legacy pesticides, and selenium from urban runoff conveyance systems throughout the Bay.

vi. Identify control measures and/or management practices to eliminate or reduce discharges of PBDEs, legacy pesticides, or selenium conveyed by urban runoff conveyance systems.

vii. Submit in the 2013 Annual Report a report identifying such control measures/management practices.

C.15. Exempted and Conditionally Exempted Discharges

The objective of this provision is to exempt unpolluted non-stormwater discharges from Discharge Prohibition A.1 and to conditionally exempt non-stormwater discharges that are potential sources of pollutants. In order for non-stormwater discharges to be conditionally exempted from Discharge Prohibition A.1, the Permittees must identify appropriate BMPs, monitor the non-stormwater discharges where necessary, and ensure implementation of effective control measures – as listed below – to eliminate adverse impacts to waters of the State consistent with the discharge prohibitions of the Order.

C.15.a. Exempted Non-Stormwater Discharges (Exempted Discharges):

i. Discharge Type – In carrying out Discharge Prohibition A.1, the following unpolluted discharges are exempted from prohibition of non-stormwater discharges:

(1) Flows from riparian habitats or wetlands;

(2) Diverted stream flows;

(3) Flows from natural springs;

(4) Rising ground waters;

(5) Uncontaminated and unpolluted groundwater infiltration;

(6) Single family homes' pumped groundwater, foundation drains, and water from crawl space pumps and footing drains;

(7) Pumped groundwater from drinking water aquifers; and

(8) NPDES permitted discharges (individual or general permits).

ii. Implementation Level – The non-stormwater discharges listed in Provision C.15.a.i above are exempted unless they are identified by the Permittees or the Executive Officer as sources of pollutants to receiving waters. If any of the above categories of discharges, or sources of such discharges, are identified as sources of pollutants to receiving waters, such categories or sources shall be addressed as conditionally exempted discharges in accordance with Provision C.15.b below.

C.15.b. Conditionally Exempted Non-Stormwater Discharges:

The following non-stormwater discharges are also exempt from Discharge Prohibition A.1 if they are either identified by the Permittees or the Executive Officer as not being sources of pollutants to receiving waters, or if appropriate control measures to eliminate adverse impacts of such sources are developed and implemented in accordance with the tasks and implementation levels of each category of Provision C.15.b.i-viii below.

i. Discharge Type – Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains

(1) **Pumped Groundwater from Non Drinking Water Aquifers** –
Groundwater pumped from monitoring wells, used for groundwater basin management, which are owned and/or operated by the Permittees who pump groundwater as drinking water. These aquifers tend to be shallower, when compared to drinking water aquifers.

(a) **Implementation Level** – Twice a year (once during the wet season and once during the dry season), representative samples shall be taken from each aquifer that potentially will discharge or has discharged into a storm drain. Samples collected and analyzed for compliance in accordance with self-monitoring requirements of other NPDES permits or sample data collected for drinking water regulatory compliance may be submitted to comply with this requirement as long as they meet the following criteria:

(i) The water samples shall meet water quality standards consistent with the existing effluent limitations in the Water Board's NPDES General Permits, such as NPDES Nos. CAG912002 and CAG912003 for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by fuel and VOCs, respectively, and NPDES No. CAG912004 for discharges of low-level, incidental, and potentially contaminated groundwater.

(ii) The water samples shall be analyzed using approved USEPA Methods (e.g., (a) USEPA Method 160.2 for total suspended solids; (b) USEPA Method 8015 Modified for total petroleum hydrocarbons; (c) USEPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (d) USEPA Method 3005 for metals.

(iii) The water samples shall be analyzed for pH and turbidity.

(iv) If a Permittee is unable to comply with the above criteria, the Permittee shall notify the Water Board upon becoming aware of the compliance issue.

(b) **Required BMPs** – When uncontaminated (meeting the criteria in C.15.b.i.(1)(a)(i)) groundwater is discharged from these monitoring wells, the following shall be implemented:

(i) Discharges shall be properly controlled and maintained to prevent erosion at the discharge point and at a rate that avoids scouring of banks and excess sedimentation in the receiving waterbody.

(ii) Appropriate BMPs shall be implemented to remove total suspended solids and silt to allowable discharge levels. Appropriate BMPs may include filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(iii) Turbidity of the discharged groundwater shall be maintained below 50 NTUs for discharges to dry creeks, 110 percent of the

ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for flowing streams with turbidities less than or equal to 50 NTU.

(iv) pH of the discharged groundwater shall be maintained within the range of 6.5 to 8.5.

(c) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

(2) **Pumped[52] Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains**

(a) Proposed new discharges of uncontaminated groundwater at flows of 10,000 gallons/day or more and all new discharges of potentially contaminated groundwater shall be reported to the Water Board so that they can be subject to NPDES permitting requirements.

(b) Proposed new discharges of uncontaminated groundwater at flows of less than 10,000 gallons/day shall be encouraged to discharge to a landscaped area or bioretention unit that is large enough to accommodate the volume.

(c) If the discharge options in C.15.b.i.(2)(b) above are not feasible and these discharges must enter a storm drain, sampling shall be done to verify that the discharge is uncontaminated.

(i) The discharge shall meet water quality standards consistent with the existing effluent limitations in the Water Board's NPDES General Permits, such as NPDES Nos. CAG912002 and CAG912003 for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by fuel and VOCs, respectively, and NPDES No. CAG912004 for discharges of low-level, incidental, and potentially contaminated groundwater.

(ii) The Permittees shall require that water samples from these discharge types be analyzed using approved USEPA Methods (e.g., (a) USEPA Method 160.2 for total suspended solids; (b) USEPA Method 8015 Modified for total petroleum hydrocarbons; (c) USEPA Method 8260B and 8270C or equivalent for volatile and semi-volatile organic compounds; and (d) USEPA Method 3005 for metals.

(d) **Required BMPs** – When the discharge has been verified as uncontaminated per sampling completed in C.15.b.i.(2)(c) above, the Permittees shall require the following during discharge:

(i) Proper control and maintain to prevent erosion at the discharge point and at a rate that avoids scouring of banks and excess sedimentation in the receiving waterbody.

(ii) Appropriate BMPs to render pumped groundwater free of pollutants and therefore exempted from prohibition may include

[52] Pumped groundwater not exempted in C.15.a or conditionally exempted in C.15.b.i.(1).

the following: filtration, settling, coagulant application with no residual coagulant discharge, minor odor or color removal with activated carbon, small scale peroxide addition, or other minor treatment.

(iii) Testing of water samples for turbidity and pH on the first two consecutive days of dewatering.

(iv) Turbidity of discharged groundwater shall be maintained below 50 NTU for discharges to dry creeks, 110 percent of the ambient stream turbidity for a flowing stream with turbidities greater than 50 NTU, or 5 NTU above ambient turbidity for a flowing stream with turbidities less than or equal to 50 NTU.

(v) pH of discharged water shall be maintained within the range of 6.5 to 8.5.

(e) If a Permittee determines that a discharger or a project proponent is unable to comply with the above criteria, the discharger shall be directed to obtain approval or permits directly from the Water Board.

(f) **Reporting** – The Permittees shall maintain records of these discharges, BMPs implemented, and any monitoring data collected.

ii. Discharge Type – Air Conditioning Condensate

Required BMPs – Condensate from air conditioning units shall be directed to landscaped areas or the ground. Discharge to a storm drain system may be allowed if discharge to landscaped areas or the ground is not feasible.

iii. Discharge Types – Planned,[53] Unplanned,[54] and Emergency Discharges of the Potable Water System

(1) **Planned Discharges** – Planned discharges are routine operation and maintenance activities in the potable water distribution system that can be scheduled in advance, such as disinfecting water mains, testing fire hydrants, storage tank maintenance, cleaning and lining pipe sections, routine distribution system flushing, reservoir dewatering, and water main dewatering activities. The following requirements only apply to those Permittees that are water purveyors and pertain to their planned discharges of potable water to their storm drain systems.

(a) **Required BMPs[55]** – The Permittees shall implement appropriate BMPs for dechlorination, and erosion and sediment controls for all planned potable water discharges.

[53] Planned discharges typically result from required routine operation and maintenance activities that can be scheduled in advance. Planned discharges are easier to control than unplanned discharges, and the BMPs are significantly easier to plan and implement.

[54] Unplanned discharges are non-routine, the result of accidents or incidents that cannot be scheduled or planned for in advance.

[55] Reference for BMPs, monitoring methods: *Guidelines for the Development of Your BMP Manual for Drinking Water System Releases.* Developed by the California-Nevada Sections of the American Water Works Association (CA-NV AWWA), Environmental Compliance Committee (ECC) 2005.

(b) **Notification Requirements**

(i) The Permittees shall notify the Water Board staff at least one week in advance for planned discharges with a flow rate of 250,000 gallons per day or more, or a total volume of 500,000 gallons or more. The Permittees shall also notify other interested parties who may be impacted by planned discharges, such as flood control agencies, downstream jurisdictions, and non-governmental organizations such as creek groups, before discharge. The notification shall include the following information, but is not limited to: (1) project name; (2) type of discharges; (3) receiving waterbody(ies); (4) date of discharge; (5) time of discharge (in military time); (6) estimated volume (gallons); and (7) estimated flow rate (gallons per day); and (8) monitoring plan of the discharges and receiving water. If receiving water monitoring is infeasible or is not practicable, justification shall be provided.

(c) **Monitoring and Reporting Requirements**

(i) The Permittees shall monitor planned discharges for pH, chlorine residual, and turbidity.

(ii) The following discharge benchmarks shall be used to evaluate the effectiveness of BMPs for all planned discharges:

- Chlorine residual 0.05 mg/L using the field test (Standard Methods 4500-Cl F and F) or equivalent
- pH ranges between 6.5 and 8.5
- Turbidity of 50 NTU post-BMPs or limit increase in turbidity above background level as follows:

Receiving Water Background	Incremental Increase
Dry Creek	50 NTU
< 50 NTU	5 NTU
50–100 NTU	10 NTU
> 100 NTU	10% of background

(iii) The Permittees shall submit the following information with the Annual Report in tabular form for all planned discharges. Reporting content shall include, but is not limited to the following parameters: (1) project name; (2) type of discharge; (3) receiving waterbody(ies); (4) date of discharge; (5) duration of discharge (in military time); (6) estimated volume (gallons); (7) estimated flow rate (gallons per day); (8) chlorine residual (mg/L); (9) pH; (10) turbidity (NTU) for receiving water where feasible and point of discharge, and (11) description of implemented BMPs or corrective actions.

(2) **Unplanned Discharges** – Unplanned discharges are non-routine activities such as water line breaks, leaks, overflows, fire hydrant shearing, and emergency flushing. The following requirements only apply to those Permittees that are water purveyors and pertain to their unplanned discharges of potable water to their storm drain systems.

(a) **Required BMPs –** The Permittees shall implement appropriate BMPs for dechlorination and erosion and sediment control for all unplanned discharges upon containing the discharge and attaining safety of the discharge site.

(b) **Administrative BMPs –** In some instances, the Permittees shall implement Administrative BMPs, such as source control measures, managerial practices, operations and maintenance procedures, or other measures to reduce or prevent potential pollutants from being discharged during unplanned discharges upon containing the discharge and attaining safety of the discharge site.

(c) **Notification Requirements**

(i) The Permittees shall report to the State Office of Emergency Services as soon as possible, but no later than two hours after becoming aware of (1) any aquatic impacts (e.g., fish kill) as a result of the unplanned discharges, or (2) when the discharge might endanger or compromise public health and safety.

(ii) The Permittees shall report to Water Board staff, by telephone or email as soon as possible, but no later than 24 hours after becoming aware of any unplanned discharges, where the total chlorine residual is greater than 0.05 mg/L and the total volume is approximately 50,000 gallons or more.

- Within five working days after the 24-hour telephone or email report, the Permittees shall submit a report documenting the discharge and corrective actions taken to Water Board staff and other interested parties.

(d) Monitoring and Reporting Requirements

(i) The Permittees shall monitor at least 10% of their unplanned discharges for pH and chlorine residual, and visually assess each discharge for turbidity immediately downstream of implemented BMPs to demonstrate their effectiveness. After the implementation of appropriate BMPs, the discharge pH levels outside the discharge ranges (below 6.5 and above 8.5), chlorine residual above 0.05 mg/l, or moderate and high turbidity shall trigger BMP improvement. If the Permittees monitor more than 10% of the unplanned discharges, all monitoring results shall be included in the Annual Report.

(ii) The Permittees shall submit the following information with the Annual Report in tabular form for all unplanned discharges. The reporting format and content shall be as described in Provision C.15.b.ii.(1)(c)(iii) of the Planned Discharges above. In addition, these reports shall also state the time of discharge discovery, notification time, inspector arrival time, and responding crew arrival time.

(iii) After 18 months of consecutive data gathering, a Permittee may propose, to the Executive Officer, a reduced monitoring plan targeting specific “high-risk” or “environmentally sensitive”

areas (i.e., areas that are prone to erosion and excess sedimentation at high flows, support rare or endangered species, or provide aquatic habitat with proven effective BMPs). Until the Executive Officer approves the reduced monitoring plan, the Permittee shall continue the monitoring plan prescribed in C.15.b.iii.(2)(d)(i).

(3) **Emergency Discharges** – Emergency discharges are the result of firefighting, unauthorized hydrant openings, natural or man-made disasters (e.g., earthquakes, floods, wildfires, accidents, terrorist actions).

Required BMPs

(a) The Permittees shall implement or require fire fighting personnel to implement BMPs for emergency discharges. However, the BMPs should not interfere with immediate emergency response operations or impact public health and safety. BMPs may include, but are not limited to, the plugging of the storm drain collection system for temporary storage, the proper disposal of water according to jurisdictional requirements, and the use of foam where there may be toxic substances on the property the fire is located.

(b) During emergency situations, priority of efforts shall be directed toward life, property, and the environment (in descending order). The Permittees or fire fighting personnel shall control the pollution threat from their activities to the extent that time and resources allow.

(c) **Reporting Requirements** – Reporting requirements will be determined by Water Board staff on a case-by-case basis, such as for fire incidents at chemical plants.

iv. Discharge Type – Individual Residential Car Washing

Required BMPs

(1) The Permittees shall discourage through outreach efforts individual residential car washing within their jurisdictional areas that discharge directly into their MS4s.

(2) The Permittees shall encourage individuals to direct car wash waters to landscaped areas, use as little detergent as necessary, wash cars at commercial car wash facilities, etc.

v. Discharge Type – Swimming Pool, Hot Tub, Spa, and Fountain Water Discharges

(1) **Required BMPs**

(a) The Permittees shall prohibit discharge of water that contains chlorine residual, copper algaecide, filter backwash or other pollutants to storm drains or to waterbodies. Such polluted discharges from pools, hot tubs, spas, and fountains shall be directed to the sanitary sewer (with the local sanitary sewer agency's approval) or to landscaped areas that can accommodate the volume.

(b) Discharges from swimming pools, hot tubs, spas and fountains shall be allowed into storm drain collection systems only if there are no

other feasible disposal alternatives (e.g., disposal to sanitary sewer or landscaped areas) and if the discharge is properly dechlorinated to non-detectable levels of chlorine consistent with water quality standards.

(c) The Permittees shall require that new or rebuilt swimming pools, hot tubs, spas and fountains within their jurisdictions have a connection[56] to the sanitary sewer to facilitate draining events. The Permittees shall coordinate with local sanitary sewer agencies to determine the standards and requirements necessary for the installation of a sanitary sewer discharge location to allow draining events for pools, hot tubs, spas, and fountains to occur with the proper permits from the local sanitary sewer agency.

(d) The Permittees shall improve their public outreach and educational efforts and ensure implementation of the required BMPs and compliance in commercial, municipal, and residential facilities.

(e) The Permittees shall implement the Illicit Discharge Enforcement Response Plan from C.5.b for polluted (contains chlorine, copper algaecide, filter backwash, or other pollutants) swimming pool, hot tub, spa, or fountain waters that get discharged into the storm drain.

(2) **Reporting** – The Permittees shall keep records of the authorized major discharges of dechlorinated pool, hot tubs, spa and fountain water to the storm drain, including BMPs employed; such records shall be available for inspection by the Water Board.

vi. Discharge Type – Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering

(1) **Required BMPs** – The Permittees shall promote measures that minimize runoff and pollutant loading from excess irrigation via the following:

(a) Promoting and/or working with potable water purveyors to promote conservation programs that minimize discharges from lawn watering and landscape irrigation practices;

(b) Promoting outreach messages regarding the use of less toxic options for pest control and landscape management;

(c) Promoting and/or working with potable water purveyors to promote the use of drought tolerant, native vegetation to minimize landscape irrigation demands;

(d) Promoting and/or working with potable water purveyors to promote outreach messages that encourage appropriate applications of water needed for irrigation and other watering practices; and,

(e) Implementing the Illicit Discharge Enforcement Response Plan from C.5.b, as necessary, for ongoing, large-volume landscape irrigation runoff to their MS4s.

[56] This connection could be a drain in the pool to the sanitary sewer or a sanitary sewer clean out located close enough to the pool so that a hose can readily direct the pool discharge into the sanitary sewer clean out.

(2) **Reporting** – The Permittees shall provide implementation summaries in their Annual Report.

vii. Additional Discharge Types –The Permittees shall identify and describe additional types and categories of discharges not yet listed in Provision C.15.b that they propose to conditionally exempt from Prohibition A.1 in periodic submissions to the Executive Officer. For each such category, the Permittees shall identify and describe, as necessary and appropriate to the category, either documentation that the discharges are not sources of pollutants to receiving waters or circumstances in which they are not found to be sources of pollutants to receiving waters. Otherwise, the Permittees shall describe control measures to eliminate adverse impacts of such sources, procedures and performance standards for their implementation, procedures for notifying the Water Board of these discharges, and procedures for monitoring and record management.

viii. Permit Authorization for Exempted Non-Stormwater Discharges

(1) Discharges of non-stormwater from sources owned or operated by the Permittees are authorized and permitted by this Permit, if they are in accordance with the conditions of this provision.

(2) The Water Board may require dischargers of non-stormwater, other than the Permittees, to apply for and obtain coverage under an NPDES permit and to comply with the control measures pursuant to Provision C.15.b. Non-stormwater discharges that are in compliance with such control measures may be accepted by a Permittee and are not subject to Prohibition A.1.

(3) The Permittees may propose, as part of their annual updates consistent with the requirements of Provision C.15.b of this Permit, additional categories of non-stormwater discharges with BMPs, to be included in the exemption to Prohibition A.1. Such proposals may be subject to approval by the Executive Officer as a minor modification of the Permit.

C.16. Annual Reports

C.16.a. The Permittees shall submit Annual Reports electronically and in paper copy upon request by September 15 of each year. Each Annual Report shall report on the previous fiscal year beginning July 1 and ending June 30. The annual reporting requirements are set forth in Provisions C.1 – C.15. The Permittees shall retain documentation as necessary to support their Annual Report. The Permittees shall make this supporting information available upon request within a timely manner, generally no more that ten business days unless otherwise agreed to by the Executive Officer.

C.16.b. The Permittees shall collaboratively develop a common annual reporting format for acceptance by the Executive Officer by April 1, 2010. The resulting Annual Report Form, once approved, shall be used by all Permittees. The Annual Report Form may be changed by April 1 of each year for the following annual report, to more accurately reflect the reporting requirements of Provisions C.1 – C.15, with the agreement of the Permittees and by the approval of the Executive Officer.

C.16.c. The Permittees shall certify in each Annual Report that they are in compliance with all requirements of the Order. If a Permittee is unable to certify compliance with a requirement, it must submit in the Annual Report the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance, and an estimated date for achieving full compliance.

C.17. Modifications to this Order

This Order may be modified, or alternatively, revoked or reissued, before the expiration date as follows:

C.17.a. To address significant changed conditions identified in the technical or Annual Reports required by the Water Board, or through other means or communication, that were unknown at the time of the issuance of this Order;

C.17.b. To incorporate applicable requirements of statewide water quality control plans adopted by the State Board or amendments to the Basin Plan approved by the State Board; or

C.17.c. To comply with any applicable requirements, guidelines, or regulations issued or approved under section 402(p) of the CWA, if the requirement, guideline, or regulation so issued or approved contains different conditions or additional requirements not provided for in this Order. The Order as modified or reissued under this paragraph shall also contain any other requirements of the CWA then applicable.

C.18. Standard Provisions

Each Permittee shall comply with all parts of the Standard Provisions contained in Attachment K of this Order.

C.19. Expiration Date

This Order expires on November 30, 2014, five years from the effective date of this Order. The Permittees must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of such date as application for reissuance of waste discharge requirements.

C.20. Rescission of Old Orders

Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, and R2-2003-0034 are hereby rescinded on the effective date of this Order, which shall be December 1, 2009, provided that the Regional Administrator of USEPA, Region IX, does not object.

C.21. Effective Date

The Effective Date of this Order and Permit shall be December 1, 2009, provided that the Regional Administrator of USEPA, Region IX, does not object.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on October 14, 2009.

_____
Bruce H. Wolfe
Executive Officer

Appendix I: Municipal Regional Stormwater Permit Fact Sheet
Attachment A: Provision C.3.b. Sample Reporting Table
Attachment B: Provision C.3.g. Alameda Permittees Hydromodification Requirements
Attachment C: Provision C.3.g. Contra Costa Permittees Hydromodification Requirements
Attachment D: Provision C.3.g. Fairfield-Suisun Permittees Hydromodification Requirements
Attachment E: Provision C.3.g. San Mateo Permittees Hydromodification Requirements
Attachment F: Provision C.3.g. Santa Clara Permittees Hydromodification Requirements
Attachment G: Provision C.3.h. Sample Reporting Table
Attachment H: Provision C.8. Status & Long-Term Monitoring Follow-up Analysis and Actions
Attachment I: Provision C.8. Standard Monitoring Provisions
Attachment J: Provision C.10. Minimum Trash Capture Areas and Minimum Number of Trash Hot Spots
Attachment K: Standard NPDES Stormwater Permit Provisions

ACRONYMS & ABBREVIATIONS

ACCWP	Alameda Countywide Clean Water Program
BAHM	Bay Area Hydrology Model
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
BASMAA	Bay Area Stormwater Management Agencies Association
BMPs	Best Management Practices
CASQA	California Stormwater Quality Association
CCC	California Coastal Commission
CCCWP	Contra Costa Clean Water Program
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedures
CWA	Federal Clean Water Act
CWC	California Water Code
DCIA	Directly Connected Impervious Area
ERP	Enforcement Response Plan
FR	Federal Register
GIS	Geographic information System
HBANC	Homebuilders Association of Northern California
HM	Hydromodification Management
HMP	Hydromodification Management Plan
IC/ID	Illicit Connections and Illicit Discharges
IPM	Integrated Pest Management
LID	Low Impact Development
MEP	Maximum Extent Practicable
MRP	Municipal Stormwater Regional Permit
MS4	Municipal Separate Storm Sewer System
MTC	Metropolitan Transportation Commission

NAFSMA	National Association of Flood & Stormwater Management Agencies
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRDC	Natural Resources Defense Council
O&M	Operation and Maintenance
PBDE	Polybrominated Diphenyl Ether
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
RMP	Regional Monitoring Program
ROWD	Report of Waste Discharge
RTA	Rapid Trash Assessment
SARA	Superfund Amendments and Reauthorization Act
SCURTA	Santa Clara Urban Rapid Trash Assessment
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFRWQCB	San Francisco Bay Regional Water Quality Control Board
SIC	Standard Industrial Classification
SMWPPP	San Mateo Countywide Water Pollution Prevention Program
SOP	Standard Operating Procedure
SWAMP	Surface Water Ambient Monitoring Program
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TIE	Toxicity Identification Evaluation
TMDLs	Total Maximum Daily Loads
TSCA	Toxic Substances Control Act
USEPA	Unites States Environmental Protection Agency
Water Board	San Francisco Bay Regional Water Quality Control Board
WLAs	Wasteload Allocations

GLOSSARY

Arterial Roads	Freeways, multilane highways, and other important roadways that supplement the Interstate System. Arterial roads connect, as directly as practicable, principal urbanized areas, cities, and industrial centers.
Beneficial Uses	The uses of water of the state protected against degradation, such as domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation and preservation of fish and wildlife, and other aquatic resources or preserves.
Collector Roads	Major and minor roads that connect local roads with arterial roads. Collector roads provide less mobility than arterial roads at lower speeds and for shorter distances.
Commercial Development	Development or redevelopment to be used for commercial purposes, such as office buildings, retail or wholesale facilities, restaurants, shopping centers, hotels, and warehouses.
Construction Site	Any project, including projects requiring coverage under the General Construction Permit, that involves soil disturbing activities including, but not limited to, clearing, grading, paving, disturbances to ground such as stockpiling, and excavation. Construction sites are all sites with disturbed or graded land area not protected by vegetation, or pavement, that are subject to a building or grading permit.
Conditionally Exempted Non-Stormwater Discharge	Non-stormwater discharges that are prohibited by A.1. of this permit, unless such discharges are authorized by a separate NPDES permit or are not in violation of water quality standards because appropriate BMPs have been implemented to reduce pollutants to the maximum extent practicable, consistent with Provision C.15.
Discharger	Any responsible party or site owner or operator within the Permittees' jurisdiction whose site discharges stormwater runoff, or a non-stormwater discharge
Detached Single-family Home Project	The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.
Development	Construction, rehabilitation, redevelopment, or reconstruction of any public or private residential project (whether single-family, multi-unit, or planned unit development); or industrial, commercial, retail or other nonresidential project, including public agency projects.
Estate Residential Development	Development zoned for a minimum 1 acre lot size
Emerging Pollutants	Pollutants in water that either: (1) May not have been thoroughly studied to date but are suspected by the scientific community to be a source of impairment of beneficial uses and/or present a health risk; or (2) Are not yet part of a monitoring program.
Erosion	The diminishing or wearing away of land due to wind, or water. Often the eroded debris (silt or sediment) becomes a pollutant via stormwater runoff. Erosion occurs

	naturally, but can be intensified by land disturbing and grading activities such as farming, development, road building, and timber harvesting.
Full Trash Capture Device	Full trash capture systems are defined as "any device or series of devices that traps all particles retained by a 5mm mesh screen and has a design treatment capacity of not less than the peak flow rate resulting from a one-year, one-hour, storm in the tributary drainage catchment area." Trash collection booms and sea curtains do not meet this definition, but are effective for removal of floating trash if properly maintained. Because these devices do not meet the Full Trash Capture Device definition, only ¼ of the catchment area treated by these measures is credited toward meeting the trash management area requirement of C.10.a.
General Permits	Waste Discharge Requirements or NPDES Permits containing requirements that are applicable to a class or category of dischargers. The State of California has general stormwater permits for construction sites that disturb soil of 1 acre or more; industrial facilities; `Phase II smaller municipalities (including nontraditional Small MS4s, which are governmental facilities, such as military bases, public campuses, and prison and hospital complexes); and small linear underground/overhead projects disturbing at least 1 acre, but less than 5 acres (including trenching and staging areas).
Grading	The cutting and/or filling of the land surface to a slope or elevation.
Hydrologic source control measures	Site design techniques that minimize and/or slow the rate of stormwater runoff from the site.
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.
Illicit Discharge	Any discharge to a municipal separate storm sewer (storm drain) system (MS4) that is prohibited under local, state, or federal statutes, ordinances, codes, or regulations. The term *illicit discharge* includes all non-stormwater discharges not composed entirely of stormwater and discharges that are identified under Section A. (Discharge Prohibitions) of this Permit. The term illicit discharge does not include discharges that are regulated by an NPDES permit (other than the NPDES permit for discharges from the MS4) or authorized by the Regional Water Board Executive Officer.
Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under

	Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.
Industrial Development	Development or redevelopment of property to be used for industrial purposes, such as factories; manufacturing buildings; and research and development parks.
Infill Site	A site in an urbanized area where the immediately adjacent parcels are developed with one or more qualified urban uses or at least 75% of the perimeter of the site adjoins parcels that are developed with qualified urban uses and the remaining 25% of the site adjoins parcels that have previously been developed for qualified urban uses and no parcel within the site has been created within the past 10 years.
Infiltration Device	Any structure that is deeper than wide and designed to infiltrate stormwater into the subsurface, and, as designed, bypass the natural groundwater protection afforded by surface soil. These devices include dry wells, injection wells, and infiltration trenches (includes French drains).
Joint Stormwater Treatment Facility	A stormwater treatment facility built to treat the combined runoff from two or more Regulated Projects located adjacent to each other,
Local Roads	Roads that provide limited mobility and are the primary access to residential areas, businesses, farms, and other local areas. Local roads offer the lowest level of mobility and usually contain no bus routes. Service to through traffic movement usually is deliberately discouraged in local roads.
Maximum Extent Practicable (MEP)	A standard for implementation of stormwater management actions to reduce pollutants in stormwater. Clean Water Act (CWA) 402(p)(3)(B)(iii) requires that municipal stormwater permits "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants." Also see State Board Order WQ 2000-11.
Mixed-use Development or Redevelopment	Development or redevelopment of property to be used for two or more different uses, all intended to be harmonious and complementary. An example is a high-rise building with retail shops on the first 2 floors, office space on floors 3 through 10, apartments on the next 10 floors, and a restaurant on the top floor.
Municipal Separate Storm Sewer System (MS4)	A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), as defined in 40 CFR 122.26(b)(8): (1) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization or a designated and approved management agency under section 208 of the CWA) that discharges into waters of the United States; (2) Designed or used for collecting or conveying stormwater; (3) Which is not a combined sewer; and (4) Which is not part of a Publicly Owned Treatment Works (POTW), as defined in

	40 CFR 122.2.
Municipal Corporation Yards, Vehicle Maintenance/Material Storage Facilities/	Any Permittee-owned or -operated facility, or portion thereof, that: (1) Conducts industrial activity, operates or stores equipment, and materials; (2) Performs fleet vehicle service/maintenance including repair, maintenance, washing, or fueling; (3) Performs maintenance and/or repair of machinery/equipment;
National Pollutant Discharge Elimination System (NPDES)	A national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under sections 307, 402, 318, and 405 of the CWA.
Notice of Intent (NOI)	The application form by which dischargers seek coverage under General Permits, unless the General Permit requires otherwise.
Parking Lot	Land area or facility for the parking or storage of motor vehicles used for business, commerce, industry, or personal use.
Permittee/Permittees	Municipal agency/agencies that are named in and subject to the requirements of this Permit.
Permit Effective Date	The date at least 45 days after Permit adoption, provided the Regional Administrator of U.S. EPA Region 9 has no objection, whichever is later.
Pervious Pavement	Pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in C.3.d.
Point Source	Any discernible, confined, and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operations, landfill leachate collection systems, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.
Pollutants of Concern	Pollutants that impair waterbodies listed under CWA section 303(d), pollutants associated with the land use type of a development, including pollutants commonly associated with urban runoff. Pollutants commonly associated with stormwater runoff include, but are not limited to, total suspended solids; sediment; pathogens (e.g., bacteria, viruses, protozoa); heavy metals (e.g., copper, lead, zinc, and cadmium); petroleum products and polynuclear aromatic hydrocarbons; synthetic organics (e.g., pesticides, herbicides, and PCBs); nutrients (e.g., nitrogen and phosphorus fertilizers); oxygen-demanding substances (e.g., decaying vegetation and animal waste) litter and trash.
Potable Water	Water that is safe for domestic use, drinking, and cooking.
Pre-Project Runoff Conditions	Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.
Public Development	Any construction, rehabilitation, redevelopment or reconstruction of any public agency project, including but not limited to, libraries, office buildings, roads, and

	highways.
Redevelopment	Land-disturbing activity that results in the creation, addition, or replacement of exterior impervious surface area on a site on which some past development has occurred.
Regional Monitoring Program (RMP)	A monitoring program aimed at determining San Francisco Bay Region receiving water conditions. The program was established in 1993 through an agreement among the Water Board, wastewater discharger agencies, dredgers, Municipal Stormwater Permittees and the San Francisco Estuary Institute to provide regular sampling of Bay sediments, water, and organisms for pollutants. The program is funded by the dischargers and managed by San Francisco Estuary Institute.
Regional Project	A regional or municipal stormwater treatment facility that discharges into the same watershed that the Regulated Project does.
Regulated Projects	Development projects as defined in Provision C.3.b.ii.
Residential Housing Subdivision	Any property development of multiple single-family homes or of dwelling units intended for multiple families/households (e.g., apartments, condominiums, and town homes).
Retrofitting	Installing improved pollution control devices at existing facilities to attain water quality objectives.
Sediments	Soil, sand, and minerals washed from land into water, usually after rain.
Solid Waste	All putrescible and nonputrescible solid, semisolid, and liquid wastes as defined by California Government Code Section 68055.1 (h).
Source Control BMP	Land use or site planning practices, or structural or nonstructural measures, that aim to prevent runoff pollution by reducing the potential for contact with rainfall runoff at the source of pollution. Source control BMPs minimize the contact between pollutants and urban runoff.
Standard Industrial Classification (SIC)	A federal system for classifying establishments by the type of activity in which they are engaged using a four-digit code.
Stormwater Pumping Station	Mechanical device (or pump) that is installed in MS4s or pipelines to discharge stormwater runoff and prevent flooding.
Stormwater Treatment System	Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process. This includes landscape-based systems such as grassy swales and bioretention units as well as proprietary systems.
Surface Water Ambient Monitoring Program (SWAMP)	The State Water Board's program to monitor surface water quality; coordinate consistent scientific methods; and design strategies for improving water quality monitoring, assessment, and reporting.
Total Maximum Daily Loads (TMDLs)	The maximum amount of a pollutant that can be discharged into a waterbody from all sources (point and nonpoint) and still maintain water quality standards. Under CWA section 303(d), TMDLs must be developed for all waterbodies that do not meet water quality standards even after application of technology-based controls,

	more stringent effluent limitations required by a state or local authority, and other pollution control requirements such as BMPs.
Toxicity Identification Evaluation (TIE)	TIE is a series of laboratory procedures used to identify the chemical(s) responsible for toxicity to aquatic life. These procedures are designed to decrease, increase, or transform the bioavailable fractions of contaminants to assess their contributions to sample toxicity. TIEs are conducted separately on water column and sediment samples.
Trash and Litter	Trash consists of litter and particles of litter. California Government Code Section 68055.1 (g) defines litter as all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.
Treatment	Any method, technique, or process designed to remove pollutants and/or solids from polluted stormwater runoff, wastewater, or effluent.
Waste Load Allocations (WLAs)	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.
Water Quality Control Plan (Basin Plan)	The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State within the Region, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives and discharge prohibitions. The Basin Plan was duly adopted and approved by the State Water Resources Control Board, U.S. EPA, and the Office of Administrative Law where required. The latest version is effective as of December 22, 2006.
Water Quality Objectives	The limits or levels of water quality elements or biological characteristics established to reasonably protect the beneficial uses of water or to prevent pollution problems within a specific area. Water quality objectives may be numeric or narrative.
Water Quality Standards	State-adopted and USEPA-approved water quality standards for waterbodies. The standards prescribe the use of the waterbody and establish the water quality criteria that must be met to protect designated uses. Water quality standards also include the federal and state anti-degradation policy.
Wet Season	October 1 through April 30 of each year

APPENDIX I

MUNICIPAL REGIONAL STORMWATER PERMIT

FACT SHEET

FACT SHEET/RATIONALE
TECHNICAL REPORT

for

ORDER NO. R2-2009-0074

NPDES Permit No. CAS612008

Municipal Regional Stormwater NPDES Permit
and
Waste Discharge Requirements

for

The cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City, Alameda County, the Alameda County Flood Control and Water Conservation District, and Zone 7 of the Alameda County Flood Control and Water Conservation District, which have joined together to form the Alameda Countywide Clean Water Program

The cities of Clayton, Concord, El Cerrito, Hercules, Lafayette, Martinez, Orinda, Pinole, Pittsburg, Pleasant Hill, Richmond, San Pablo, San Ramon, and Walnut Creek, the towns of Danville and Moraga, Contra Costa County, and the Contra Costa County Flood Control and Water Conservation District, which have joined together to form the Contra Costa Clean Water Program

The cities of Campbell, Cupertino, Los Altos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, and Sunnyvale, the towns of Los Altos Hills and Los Gatos, the Santa Clara Valley Water District, and Santa Clara County, which have joined together to form the Santa Clara Valley Urban Runoff Pollution Prevention Program

The cities of Belmont, Brisbane, Burlingame, Daly City, East Palo Alto, Foster City, Half Moon Bay, Menlo Park, Millbrae, Pacifica, Redwood City, San Bruno, San Carlos, San Mateo, and South San Francisco, the towns of Atherton, Colma, Hillsborough, Portola Valley, and Woodside, the San Mateo County Flood Control District, and San Mateo County, which have joined together to form the San Mateo Countywide Water Pollution Prevention Program

The cities of Fairfield and Suisun City, which have joined together to form the Fairfield-Suisun Urban Runoff Management Program

The City of Vallejo and the Vallejo Sanitation and Flood Control District

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I. CONTACT INFORMATION

Water Board Staff Contact: Dale Bowyer, 1515 Clay Street, Suite 1400, Oakland, CA 94612, 510-622-2323, 510-622-2501 (fax), email: dbowyer@waterboards.ca.gov

The Permit and other related documents can be downloaded from the Water Board website at: http://www.waterboards.ca.gov/sanfranciscobay/mrp.htm

Comments can be electronically submitted to mrp@waterboards.ca.gov.

All documents referenced in this Fact Sheet and in the Order are available for public review at the Water Board office, located at the address listed above. Public records are available for inspection during regular business hours, from 9:00 am to 4:00 pm, Monday through Friday, 12 - 1 pm excluded. Per the Governor's order calling for furloughs, the Water Board office will be closed the first three Fridays of each month through June 2010. To schedule an appointment to inspect public records, contact Melinda Wong at 510-622-2430.

II. PERMIT GOALS AND PUBLIC PROCESS

Goals

The Goals for the Municipal Regional Stormwater Permit (hereinafter, the Permit) Development Process include:

1. Consolidate six Phase I municipal stormwater NPDES permits into one consistent permit which is regional in scope.
2. Include more specificity in NPDES permit order language and requirements. Create (A) required stormwater management actions, (B) a specific level of implementation for each action or set of actions, and (C) reporting and effectiveness evaluation requirements for each action sufficient to determine compliance.
3. Incorporate the Stormwater Management Plan level of detail and specificity into the Permit. Stormwater Management Plans have always been considered integral to the municipal stormwater NPDES permits, but have not received the level of public review in the adoption process necessary relative to their importance in adequate stormwater pollutant management implementation.
4. Implement and enhance actions to control 303(d) listed pollutants, pollutants of concern, and achieve Waste Load Allocations adopted under Total Maximum Daily Loads.
5. Implement more specific and comprehensive stormwater monitoring, including monitoring for 303(d) listed pollutants.

Public Process

Water Board staff conducted a series of stakeholder meetings and workshops with the Permittees and other interested parties to develop this Permit over the past 3 years. These meetings included Water Board staff, representatives of the Permittees, representatives of

environmental groups, homebuilders, private citizens, and other interested parties. The following is a summary of the lengthy stakeholder process.

(2004–2005) Water Board staff and the Bay Area Stormwater Management Agencies Association (BASMAA) agreed to develop a municipal regional stormwater permit. Board staff and BASMAA held monthly meetings to agree on the regional permit approach and developed concepts and ground rules for a Steering Committee. The Steering Committee for the Permit began regular monthly meetings, and there was agreement to form work groups to develop options for permit program components in table format.

(2006) Water Board staff, BASMAA, and nongovernmental groups met and discussed the Performance Standard (i.e., actions, implementation levels, and reporting requirements) tables from six workgroups. In addition to the Steering Committee, Work Group Stakeholder meetings focused on the six program elements to complete the Performance Standard Tables and discuss other issues in preparation for creating the first Draft Permit Provisions. Two large public workshops were held in November with all interested stakeholders to discuss Work Group products.

(2007) The Water Board held a public workshop in March to receive public input. Board staff distributed an Administrative Draft Permit dated May 1, 2007, held multiple meetings and received comment.

(2007- 2008) On December 14, 2007, Board staff distributed the Tentative Order for a 77-day written public comment period ending February 29, 2008. A public hearing for oral testimony was held on March 11, 2008. During the remainder of 2008 there were additional meetings with stakeholders, and Board staff worked on revisions to the Tentative Order and produced responses to both written comments received by February 29, 2008, and oral comments received at the March 11, 2008, hearing. The Revised Tentative Order for the MRP was released on February 11, 2009, and a May 13, 2009, hearing before the Water Board was scheduled. Written comments on the revisions to the Tentative Order were received until April 3, 2009.

(2009) After the May 2009 MRP Public Hearing, Water Board staff held numerous meetings with the Permittees (via the Bay Area Stormwater Management Agencies Association) and other key stakeholders including Save the Bay, NRDC, the Northern California Homebuilders, S.F. BayKeeper and the U.S. EPA. These meetings have been focused on discussion of revisions to the MRP Tentative Order in response to comments received, in an effort to resolve issues primarily related to Provisions C.3 New Development, C.8 Monitoring, C.10 Trash Load Reduction, C.11 Mercury Controls, C.12 PCBs Controls, and C.15 Exempt Non-Stormwater Discharges.

Implementation

It is the Water Board's intent that this Permit shall ensure attainment of applicable water quality objectives and protection of the beneficial uses of receiving waters and associated habitat. This Permit requires that discharges shall not cause exceedances of water quality objectives nor shall they cause certain conditions to occur that create a condition of nuisance or water quality impairment in receiving waters. Accordingly, the Water Board is

requiring that these standard requirements be addressed through the implementation of technically and economically feasible control measures to reduce pollutants in stormwater discharges to the maximum extent practicable as provided in Provisions C.1 through C.15 of this Permit and section 402(p) of the CWA. Compliance with the Discharge Prohibitions, Receiving Water Limitations, and Provisions of this Permit is deemed compliance with the requirements of this Permit. If these measures, in combination with controls on other point and nonpoint sources of pollutants, do not result in attainment of applicable water quality objectives, the Water Board may invoke Provision C.1. and may reopen this Permit pursuant to Provisions C.1 and C.15 of this Permit to impose additional conditions that require implementation of additional control measures.

Each of the Permittees is individually responsible for adoption and enforcement of ordinances and policies, for implementation of assigned control measures or best management practices (BMPs) needed to prevent or reduce pollutants in stormwater, and for providing funds for the capital, operation, and maintenance expenditures necessary to implement such control measures/BMPs within its jurisdiction. Each Permittee is also responsible for its share of the costs of the area-wide component of the countywide program to which the Permittee belongs. Enforcement actions concerning non-compliance with the Permit will be pursued against individual Permittee(s) responsible for specific violations of the Permit.

III. BACKGROUND

Early Permitting Approach

The federal Clean Water Act (CWA) was amended in 1987 to address urban stormwater runoff pollution of the nation's waters. One requirement of the amendment was that many municipalities throughout the United States were obligated for the first time to obtain National Pollutant Discharge Elimination System (NPDES) permits for discharges of urban runoff from their Municipal Separate Storm Sewer Systems (MS4s). In response to the CWA amendment (and the pending federal NPDES regulations which would implement the amendment), the Water Board issued a municipal storm water Phase I permits in the early 1990s. These permits were issued to the entire county-wide urban areas of Santa Clara, Alameda, San Mateo and Contra Costa Counties, rather than to individual cities over 100,000 population threshold. The cities chose to collaborate in countywide groups, to pool resources and expertise, and share information, public outreach and monitoring costs, among other tasks.

During the early permitting cycles, the county-wide programs developed many of the implementation specifics which were set forth in their Stormwater Pollution Prevention Management Plans (Plans). The permit orders were relatively simple documents that referred to the stormwater Plans for implementation details. Often specific aspects of permit and Plan implementation evolved during the five year permit cycle, with relatively significant changes approved at the Water Board staff level without significant public review and comment.

Merging Permit Requirements and Specific Requirements Previously Contained in Stormwater Management Plans

US EPA stormwater rules for Phase I stormwater permits envisioned a process in which municipal stormwater management programs contained the detailed BMP and specific level of implementation information, and are reviewed and approved by the permitting agency before the municipal NPDES stormwater permits are adopted. The current and previous permits established a definition of a stormwater management program and required each Permittee to submit an urban runoff management plan and annual work plans for implementing its stormwater management program. An advantage to this approach was that it provided flexibility for Permittees to tailor their stormwater management programs to reflect local priorities and needs. However, Water Board staff found it difficult to determine Permittees' compliance with the current permits, due to the lack of specific requirements and measurable outcomes of some required actions. Furthermore, federal stormwater regulations require that modifications to stormwater management programs, such as annual revisions to urban runoff management plans, be approved through a public process.

Recent court decisions have reiterated that federal regulations and State law require that the implementation specifics of Municipal Stormwater NPDES permits be adopted after adequate public review and comment, and that no significant change in the permit requirements except minor modifications can occur during the permit term without a similar level of public review and comment.

This Permit introduces a modification to these previous approaches by establishing the stormwater management program requirements and defining up front, as part of the Permit Development Process, the minimum acceptable elements of the municipal stormwater management program. The advantages of this approach are that it satisfies the public involvement requirements of both the federal Clean Water Act and the State Water Code. An advantage for Permittees and the public of this approach is that the permit requirements are known at the time of permit issuance and not left to be determined later through iterative review and approval of work plans. While it may still be necessary to amend the Permit prior to expiration, any need to this should be minimized.

This Permit does not include approval of all Permittees' stormwater management programs or annual reports as part of the administration of the Permit. To do so would require significantly increased staff resources. Instead, minimum measures have been established to simplify assessment of compliance and allow the public to more easily assess each Permittee's compliance. Each Permit provision and its reporting requirements are written with this in mind. That is, each provision establishes the required actions, minimum implementation levels (i.e., minimum percentage of facilities inspected annually, escalating enforcement, reporting requirements for tracking projects, number of monitoring sites, etc.), and specific reporting elements to substantiate that these implementation levels have been met. Water Board staff will evaluate each individual Permittee's compliance through annual report review and the audit process.

The challenge in drafting the Permit is to provide the flexibility described above considering the different sizes and resources while ensuring that the Permit is still enforceable. To achieve this, the Permit frequently prescribes minimum measurable

outcomes, while providing Permittees with flexibility in the approaches they use to meet those outcomes. Enforceability has been found to be a critical aspect of the Permit. To avoid these types of situations, a balance between flexibility and enforceability has been crafted into the Permit.

Current Permit Approach

In the previous permit issuances, the detailed actions to be implemented by the Permittees were contained in Stormwater Management Plans, which were separate from the NPDES permits, and incorporated by reference. Because those plans were legally an integral part of the permits and were subject to complete public notice, review and comment, this permit reissuance incorporates those plan level details in the permit, thus merging the Permittees' stormwater management plans into the permit in one document. This Permit specifies the actions necessary to reduce the discharge of pollutants in stormwater to the maximum extent practicable, in a manner designed to achieve compliance with water quality standards and objectives, and effectively prohibit non-stormwater discharges into municipal storm drain systems and watercourses within the Permittees' jurisdictions. This set of specific actions is equivalent to the requirements that in past permit cycles were included in a separate stormwater management plan for each Permittee or countywide group of Permittees. With this permit reissuance, that level of specific compliance detail is integrated into permit language and is not a separate document.

The Permit includes requirements for the following components:

- Municipal Operations
- New Development and Redevelopment
- Industrial and Commercial Site Controls
- Illicit Discharge and Elimination
- Construction Site Controls
- Public Information and Outreach
- Water Quality Monitoring
- Pesticides Toxicity Controls
- Trash Reduction
- Mercury Controls
- PCBs Controls
- Copper Controls
- Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides, and Selenium
- Exempt and Conditionally Exempt Discharges

IV. ECONOMIC ISSUES

Economic discussions of urban runoff management programs tend to focus on costs incurred by municipalities in developing and implementing the programs. This is appropriate, and these costs are significant and a major issue for the Permittees. However, when considering the cost of implementing the urban runoff programs, it is also important

to consider the alternative costs incurred by not fully implementing the programs, as well as the benefits which result from program implementation.

It is very difficult to ascertain the true cost of implementation of the Permittees' urban runoff management programs because of inconsistencies in reporting by the Permittees. Reported costs of compliance for the same program element can vary widely from Permittee to Permittee, often by a very wide margin that is not easily explained.[57] Despite these problems, efforts have been made to identify urban runoff management program costs, which can be helpful in understanding the costs of program implementation.

In 1999, United States Environmental Protection Agency (USEPA) reported on multiple studies it conducted to determine the cost of urban runoff management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 per household annually.[58]

A study on program cost was also conducted by the Los Angeles Regional Water Quality Control Board (LARWQCB), where program costs reported in the municipalities' annual reports were assessed. The LARWQCB estimated that average per household cost to implement the MS4 program in Los Angeles County was $12.50.

The State Water Resources Control Board (State Water Board) also commissioned a study by the California State University, Sacramento to assess costs of the Phase I MS4 program. This study is current and includes an assessment of costs incurred by the City of Encinitas in implementing its program. Annual cost per household in the study ranged from $18-46, with the City of Encinitas representing the upper end of the range.[59] The cost of the City of Encinitas' program is understandable, given the City's coastal location, reliance on tourism, and consent decree with environmental groups regarding its program. For these reasons, as well as the general recognition the City of Encinitas receives for implementing a superior program, the City's program cost can be considered as the high end of the spectrum for Permittee urban runoff management program costs.

It is important to note that reported program costs are not all attributable to compliance with MS4 permits. Many program components, and their associated costs, existed before any MS4 permits were issued. For example, street sweeping and trash collection costs cannot be solely or even principally attributable to MS4 permit compliance, since these practices have long been implemented by municipalities. Therefore, true program cost resulting from MS4 permit requirements is some fraction of reported costs. The California State University, Sacramento study found that only 38% of program costs are new costs fully attributable to MS4 permits. The remainder of program costs were either pre-existing or resulted from enhancement of pre-exiting programs.[60] The County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement its Drainage Area Management Plan, its municipal

[57] LARWQCB, 2003. Review and Analysis of Budget Data Submitted by the Permittees for Fiscal Years 2000-2003.p.2
[58] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791-68792.
[59] State Water Board, 2005. NPDES Stormwater Cost Survey. P. ii
[60] Ibid. P. 58.

stormwater permit requirements, is less than 20% of the total budget. The remaining 80% is attributable to pre-existing programs.[61]

It is also important to acknowledge that the vast majority of costs that will be incurred as a result of implementing the Order are not new. Urban runoff management programs have been in place in this region for over 15 years. Any increase in cost to the Permittees will be incremental in nature.

Urban runoff management programs cannot be considered in terms of their costs only. The programs must also be viewed in terms of their value to the public. For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210.[62] This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study corroborates USEPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180.[63] When viewed in comparison to household costs of existing urban runoff management programs, these household willingness to pay estimates exhibit that per household costs incurred by Permittees to implement their urban runoff management programs remain reasonable.

Another important way to consider urban runoff management program costs is to consider the implementation cost in terms of costs incurred by not improving the programs. Urban runoff in southern California has been found to cause illness in people bathing near storm drains.[64] A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8% among bathers at those beaches resulted in about $3 million annually in health-related expenses.[65] Extrapolation of such numbers to the beaches and other water contact recreation in San Francisco Bay and the tributary creeks of the region could result in huge expenses to the public.

Urban runoff and its impact on receiving waters also places a cost on tourism. the California Division of Tourism has estimated that each out-of-state visitor spends $101.00 a day. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999, impacting beach visitation and the local economy.

Finally, it is important to consider the benefits of urban runoff management programs in conjunction with their costs. A recent study conducted by USC/UCLA assessed the costs and benefits of implementing various approaches for achieving compliance with the MS4 permits in the Los Angeles Region. The study found that non-structural systems would cost $2.8 billion but provide $5.6 billion in benefit. If structural systems were determined to be needed, the study found that total costs would be $5.7 to $7.4 billion, while benefits could

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[61] County of Orange, 2000. A NPDES Annual Progress Report. P. 60. More current data from the County of Orange is not used in this discussion because the County of Orange no longer reports such information.

[62] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68793.

[63] State Water Board, 2005. NPDES Stormwater Cost Survey. P. iv.

[64] Haile, R.W., et al, 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Santa Monica Bay Restoration Project.

[65] Los Angeles Times, May 2, 2005. Here's What Ocean Germs Cost You: A UC Irvine Study Tallies the Cost of Treatment and Lost Wages for Beachgoers Who Get Sick.

reach $18 billion.[66] Costs are anticipated to be borne over many years – probably ten years at least. As can be seen, the benefits of the programs are expected to considerably exceed their costs. Such findings are corroborated by USEPA, which found that the benefits of implementation of its Phase II storm water rule would also outweigh the costs.[67]

V. LEGAL AUTHORITY

The following statutes, regulations, and Water Quality Control Plans provide the basis for the requirements of Order No. R2-2009-0074: CWA, California Water Code (CWC), 40 CFR Parts 122, 123, 124 (National Pollutant Discharge Elimination System Permit Application Regulations for Storm Water Discharges, Final Rule), Part II of 40 CFR Parts 9, 122, 123, and 124 (National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule), Water Quality Control Plan – Ocean Waters of California (California Ocean Plan), Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), 40 CFR 131Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule), and the California Toxics Rule Implementation Plan.

The legal authority citations below generally apply to directives in Order No. R2-2009-0074, and provide the Water Board with ample underlying authority to require each of the directives of Order No. R2-2009-0074.. Legal authority citations are also provided with each permit provision in this Fact Sheet.

CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

CWA 402(p)(3)(B)(iii) – The CWA requires in section 402(p)(3)(B)(iii) that permits for discharges from municipal storm sewers "shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."

40 CFR 122.26(d)(2)(i)(B,C,E, and F) – Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B,C,D,E, and F) require that each Permittee's permit application "shall consist of: (i) Adequate legal authority. A demonstration that the applicant can operate pursuant to legal authority established by statute, ordinance or series of contracts which authorizes or enables the applicant at a minimum to: […] (B) Prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer; (C) Control through ordinance, order or similar means the discharge to a municipal separate storm sewer of spills, dumping or disposal of materials other than storm water; (D) Control through interagency agreements among co-applicants the contribution of pollutants from one portion of the municipal system to another portion of the municipal system; (E) Require compliance with condition in ordinances, permits, contracts or orders; and (F) Carry out all

[66] LARWQCB, 2004. Alternative Approaches to Stormwater Control.
[67] Federal Register / Vol. 64, No. 235 / Wednesday, December 8, 1999 / Rules and Regulations. P. 68791.

inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

40 CFR 122.26(d)(2)(iv) – Federal NPDES regulation 40 CFR 122.26(d)(2)(iv) requires "a comprehensive planning process which involves public participation and where necessary intergovernmental coordination, to reduce the discharge of pollutants to the maximum extent practicable using management practices, control techniques and system, design and engineering methods, and such other provisions which are appropriate. The program shall also include a description of staff and equipment available to implement the program. […] Proposed programs may impose controls on a system wide basis, a watershed basis, a jurisdiction basis, or on individual outfalls. […] Proposed management programs shall describe priorities for implementing controls."

40 CFR 122.26(d)(2)(iv)(A -D) – Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A - D) require municipalities to implement controls to reduce pollutants in urban runoff from new development and significant redevelopment, construction, and commercial, residential, industrial, and municipal land uses or activities. Control of illicit discharges is also required.

CWC 13377 – CWC section 13377 requires that "Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or authorized by the CWA, as amended, issue waste discharge requirements and dredged or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with anymore stringent effluent standards or limitation necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance."

Order No. R2-2009-0074 is an essential mechanism for achieving the water quality objectives that have been established for protecting the beneficial uses of the water resources in the San Francisco Bay Region. Federal NPDES regulation 40 CFR 122.44(d)(1) requires MS4 permits to include any requirements necessary to "achieve water quality standards established under CWA section 303, including State narrative criteria for water quality." The term "water quality standards" in this context refers to a water body's beneficial uses and the water quality objectives necessary to protect those beneficial uses, as established in the Basin Plan.

State Mandates

This Permit does not constitute an unfunded local government mandate subject to subvention under Article XIIIB, Section (6) of the California Constitution for several reasons, including, but not limited to, the following. First, this Permit implements federally mandated requirements under CWA section 402, subdivision (p)(3)(B). (33 U.S.C. § 1342(p)(3)(B).) This includes federal requirements to effectively prohibit non-stormwater discharges, to reduce the discharge of pollutants to the maximum extent practicable, and to include such other provisions as the Administrator or the State determines appropriate for the control of such pollutants. Federal cases have held that these provisions require the development of permits and permit provisions on a case-by-case basis to satisfy federal requirements. (Natural Resources Defense Council, Inc. v. USEPA

(9th Cir. 1992) 966 F.2d 1292, 1308, fn. 17.) The authority exercised under this Permit is not reserved state authority under the CWA's savings clause (cf. Burbank v. State Water Resources Control Bd. (2005) 35 Cal.4th 613, 627-628 [relying on 33 U.S.C. § 1370, which allows a state to develop requirements that are not less stringent than federal requirements]), but instead, is part of a federal mandate to develop pollutant reduction requirements for MS4. To this extent, it is entirely federal authority that forms the legal basis to establish the permit provisions. (See, City of Rancho Cucamonga v. Regional Water Quality Control Bd.-Santa Ana Region (2006) 135 Cal.App.4th 1377, 1389; Building Industry Association of San Diego County v. State Water Resources Control Bd. (2004) 124 Cal.App.4th 866, 882-883.)

Likewise, the provisions of this Permit to implement total maximum daily loads (TMDLs) are federal mandates. The CWA requires TMDLs to be developed for waterbodies that do not meet federal water quality standards. (33 U.S.C. § 1313(d).) Once USEPA or a state develops a TMDL, federal law requires that permits must contain effluent limitations consistent with the assumptions of any applicable WLA. (40 CFR 122.44(d)(1)(vii)(B).)

Second, the local agencies' (Permittees') obligations under this Permit are similar to, and in many respects less stringent than, the obligations of nongovernmental dischargers who are issued NPDES permits for stormwater discharges. With a few inapplicable exceptions, the CWA regulates the discharge of pollutants from point sources (33 U.S.C. § 1342) and the Porter-Cologne regulates the discharge of waste (Water Code, section 13263), both without regard to the source of the pollutant or waste. As a result, the costs incurred by local agencies to protect water quality reflect an overarching regulatory scheme that places similar requirements on governmental and nongovernmental dischargers. (See County of Los Angeles v. State of California (1987) 43 Cal.3d 46, 57-58 [finding comprehensive workers compensation scheme did not create a cost for local agencies that was subject to state subvention].)

The CWA and the Porter-Cologne Water Quality Control Act largely regulate stormwater with an even hand, but to the extent that there is any relaxation of this evenhanded regulation, it is in favor of the local agencies. Except for MS4s, the CWA requires point source dischargers, including discharges of stormwater associated with industrial or construction activity, to comply strictly with water quality standards. (33 U.S.C. § 1311(b)(1)(C), Defenders of Wildlife v. Browner (1999) 191 F.3d 1159, 1164-1165 [noting that industrial stormwater discharges must strictly comply with water quality standards].) As discussed in prior State Water Board decisions, this Permit does not require strict compliance with water quality standards. (SWRCB Order No. WQ 2001-15, p. 7.) The Permit, therefore, regulates the discharge of waste in municipal stormwater more leniently than the discharge of waste from nongovernmental sources.

Third, the Permittees have the authority to levy service charges, fees, or assessments sufficient to pay for compliance with this Permit. The fact sheet demonstrates that numerous activities contribute to the pollutant loading in the MS4. Permittees can levy service charges, fees, or assessments on these activities, independent of real property ownership. (See, e.g., Apartment Association of Los Angeles County, Inc. v. City of Los Angeles (2001) 24 Cal.4th 830, 842 [upholding inspection fees associated with renting property].) The ability of a local agency to defray the cost of a program without raising

taxes indicates that a program does not entail a cost subject to subvention. (County of Fresno v. State of California (1991) 53 Cal.3d 482, 487-488.)

Fourth, the Permittees have requested permit coverage in lieu of compliance with the complete prohibition against the discharge of pollutants contained in CWA section 301, subdivision (a) (33 U.S.C. § 1311(a)) and in lieu of numeric restrictions on their discharges. To the extent Permittees have voluntarily availed themselves of the Permit, the program is not a state mandate. (Accord County of San Diego v. State of California (1997) 15 Cal.4th 68, 107-108.) Likewise, the Permittees have voluntarily sought a program-based municipal stormwater permit in lieu of a numeric limits approach. (See City of Abilene v. USEPA (5th Cir. 2003) 325 F.3d 657, 662-663 [noting that municipalities can choose between a management permit or a permit with numeric limits].) The Permittees' voluntary decision to file a report of waste discharge proposing a program-based permit is a voluntary decision not subject to subvention. (See Environmental Defense Center v. USEPA (9th Cir. 2003) 344 F.3d 832, 845-848.)

Fifth, the Permittees' responsibility for preventing discharges of waste that can create conditions of pollution or nuisance from conveyances that are within their ownership or control under State law predates the enactment of Article XIIIB, Section (6) of the California Constitution.

This Permit is based on the federal CWA, the Porter-Cologne Water Quality Control Act (Division 7 of the CWC, commencing with Section 13000), applicable State and federal regulations, all applicable provisions of statewide Water Quality Control Plans and Policies adopted by the State Water Board, the Basin Plan, the California Toxics Rule, and the California Toxics Rule Implementation Plan.

Discussion: In 1987, Congress established CWA Amendments to create requirements for storm water discharges under the NPDES program, which provides for permit systems to regulate the discharge of pollutants. Under the Porter-Cologne Water Quality Control Act, the State Water Board and Regional Water Quality Control Boards (Water Boards) have primary responsibility for the coordination and control of water quality, including the authority to implement the CWA. Porter-Cologne (section 13240) directs the Water Boards to set water quality objectives via adoption of Basin Plans that conform to all state policies for water quality control. As a means for achieving those water quality objectives, Porter-Cologne (section 13243) further authorizes the Water Boards to establish waste discharge requirements (WDRs) to prohibit waste discharges in certain conditions or areas. Since 1990, the Water Board has issued area-wide MS4 NPDES permits. The Permit will re-issue Order Nos. 99-058, 99-059, 01-024, R2-2003-0021, R2-2003-0034 to comply with the CWA and attain water quality objectives in the Basin Plan by limiting the contributions of pollutants conveyed by urban runoff. Further discussions of the legal authority associated with the prohibitions and directives of the Permit are provided in section V. of this document.

This Permit supersedes NPDES Permit Nos. CAS029718, CAS029831, CAS029912, CAS029921, CAS612005, and CAS612006.

Basin Plan

The Urban Runoff Management, Comprehensive Control Program section of the Basin Plan requires the Permittees to address existing water quality problems and prevent new problems associated with urban runoff through the development and implementation of a comprehensive control program focused on reducing current levels of pollutant loading to storm drains to the maximum extent practicable. The Basin Plan comprehensive program requirements are designed to be consistent with federal regulations (40 CFR Parts 122-124) and are implemented through issuance of NPDES permits to owners and operators of MS4s. A summary of the regulatory provisions is contained in Title 23 of the California Code of Regulations at section 3912. The Basin Plan identifies beneficial uses and establishes water quality objectives for surface waters in the Region, as well as effluent limitations and discharge prohibitions intended to protect those uses. This Permit implements the plans, policies, and provisions of the Water Board's Basin Plan.

Statewide General Permits

The State Water Board has issued NPDES general permits for the regulation of stormwater discharges associated with industrial activities and construction activities. To effectively implement the New Development (and significant redevelopment) and Construction Controls, Illicit Discharge Controls, and Industrial and Commercial Discharge Controls components in this Permit, the Permittees will conduct investigations and local regulatory activities at industrial and construction sites covered by these general permits. However, under the CWA, the Water Board cannot delegate its own authority to enforce these general permits to the Permittees. Therefore, Water Board staff intends to work cooperatively with the Permittees to ensure that industries and construction sites within the Permittees' jurisdictions are in compliance with applicable general permit requirements and are not subject to uncoordinated stormwater regulatory activities.

Regulated Parties

Each of the Permittees listed in this Permit owns or operates a MS4, through which it discharges urban runoff into waters of the United States within the San Francisco Bay Region. These MS4s fall into one or more of the following categories: (1) a medium or large MS4 that services a population of greater than 100,000 or 250,000 respectively; or (2) a small MS4 that is "interrelated" to a medium or large MS4; or (3) an MS4 which contributes to a violation of a water quality standard; or (4) an MS4 which is a significant contributor of pollutants to waters of the United States.

Permit Coverage

The Permittees each have jurisdiction over and maintenance responsibility for their respective MS4s in the Region. Federal, State or regional entities within the Permittees' boundaries, not currently named in this Permit, operate storm drain facilities and/or discharge stormwater to the storm drains and watercourses covered by this Permit. The Permittees may lack jurisdiction over these entities. Consequently, the Water Board recognizes that the Permittees should not be held responsible for such facilities and/or discharges. The Water Board will consider such facilities for coverage under NPDES permitting pursuant to USEPA Phase II stormwater regulations. Under Phase II, the Water

Board intends to permit these federal, State, and regional entities through use of a Statewide Phase II NPDES General Permit.

Discussion: Section 402 of the CWA prohibits the discharge of any pollutant to waters of the United States from a point source, unless that discharge is authorized by a NPDES permit. Though urban runoff comes from a diffuse source, it is discharged through MS4s, which are point sources under the CWA. Federal NPDES regulation 40 CFR 122.26(a) (iii) and (iv) provide that discharges from MS4s, which service medium or large populations greater than 100,000 or 250,000 respectively, shall be required to obtain a NPDES permit. Federal NPDES regulation 40 CFR 122.26(a)(v) also provides that a NPDES permit is required for "A [storm water] discharge which the Director, or in States with approved NPDES programs, either the Director or the USEPA Regional Administrator, determines to contribute to a violation of a water quality standard or is a significant contributor of pollutants to waters of the United States." Such sources are then designated into the program.

VI. PERMIT PROVISIONS

A. Discharge Prohibitions

Prohibition A.1. Legal Authority – CWA 402(p)(3)(B)(ii) – The CWA requires in section 402(p)(3)(B)(ii) that permits for discharges from municipal storm sewers "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."

Prohibition A.2. Legal Authority – San Francisco Bay Basin Plan, 2006 Revision, Chapter 4 Implementation, Table 4-1, Prohibition 7.

B. Receiving Water Limitations

Receiving Water Limitation B.1. Legal Authority – Receiving Water Limitations are retained from previous Municipal Stormwater Runoff NPDES permits. They reflect applicable water quality standards from the Basin Plan.

Receiving Water Limitation B.2. Legal Authority – Receiving Water Limitations are retained from previous Municipal Stormwater Runoff NPDES permits. They reflect applicable water quality standards from the Basin Plan.

C. Provisions

C.1. Compliance with Discharge Prohibitions and Receiving Water Limitations

<u>Legal Authority</u>

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: The Water Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) contains the following waste discharge prohibition: "The discharge of waste to waters of the state in a manner causing, or threatening to cause a condition of pollution, contamination, or nuisance as defined in California Water Code Section 13050, is prohibited."

California Water Code section 13050(l) states "(1) 'Pollution' means an alteration of the quality of waters of the state by waste to a degree which unreasonably affects either of the following: (A) The water for beneficial uses. (B) Facilities which serve beneficial uses. (2) 'Pollution' may include "contamination."

California Water Code section 13050(k) states "'Contamination' means an impairment of the quality of waters of the state by waste to a degree which creates a hazard to public health through poisoning or through the spread of disease. 'Contamination' includes any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected."

California Water Code section 13050(m) states "'Nuisance' means anything which meets all of the following requirements: (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal. (3) Occurs during, or as a result of, the treatment or disposal of wastes."

California Water Code section 13241 requires each water board to "establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance […]."

California Water Code Section 13243 provides that a water board, "in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted."

California Water Code Section 13263(a) provides that waste discharge requirements prescribed by the water board implement the Basin Plan.

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(A -D) require municipalities to implement controls to reduce pollutants in urban runoff from commercial, residential, industrial, and construction land uses or activities.

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(A -D) require municipalities to have legal authority to control various discharges to their MS4.

Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal storm water permits to include any requirements necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

State Water Resources Control Board ("State Water Board") Order WQ 1999-05, is a precedential order requiring that municipal stormwater permits achieve water quality standards and water quality standard based discharge prohibitions through the implementation of control measures, by which Permittees' compliance with the permit can be determined. The State Water Board Order specifically requires that Provision C.1 include language that Permittees shall comply with water quality standards based discharge prohibitions and receiving water limitations through timely implementation of control measures and other actions to reduce pollutants in the discharges. State Water Board Order WQ 2001-15 refines Order 1999-05 by requiring an iterative approach to compliance with water quality standards that involves ongoing assessments and revisions.

C.2. Municipal Operations

Legal Authority

The following legal authority applies to Provision C.2:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), California Water Code (CWC) section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(1) requires, "A description of maintenance activities and a maintenance schedule for structural controls to reduce pollutants (including floatables) in discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(3) requires, "A description for operating and maintaining public streets, roads and highways and procedures for reducing the impact on receiving waters of discharges from municipal storm sewer systems, including pollutants discharged as a result of deicing activities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(4) requires, "A description of procedures to assure that flood management projects assess the impacts on the water quality of receiving waterbodies and that existing structural flood control devices have been evaluated to determine if retrofitting the device to provide additional pollutant removal from storm water is feasible."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(5) requires, "A description of a program to monitor pollutants in runoff from operating or closed municipal landfills or other treatment, storage or disposal facilities for municipal waste, which shall identify priorities and procedures for inspections and establishing and implementing control measures for such discharges."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires, "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.2

C.2-1 Municipal maintenance activities are potential sources of pollutants unless appropriate inspection, pollutant source control, and cleanup measures are implemented during routine maintenance works to minimize pollutant discharges to storm drainage facilities.

Sediment accumulated on paved surfaces, such as roads, parking lots, parks, sidewalks, landscaping, and corporation yards, is the major source of point source pollutants found in urban runoff. Thus, Provision C.2 requires the Permittees to designate minimum BMPs for all municipal facilities and activities as part of their ongoing pollution prevention efforts as set forth in this Permit. Such prevention measures include, but are not limited to, activities as described below. The work of municipal maintenance personnel is vital to minimize stormwater pollution, because personnel work directly on municipal storm drains and other municipal facilities. Through work such as inspecting and cleaning storm drain drop inlets and pipes and conducting municipal construction and maintenance activities upstream of the storm drain, municipal maintenance personnel are directly responsible for preventing and removing pollutants from the storm drain. Maintenance personnel also play an important role in educating the public and in reporting and cleaning up illicit discharges.

C.2-2 Road construction and other activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. In particular, poorly designed roads can act as man-made drainages that carry runoff and sediment into natural streams, impacting water quality.

Provision C.2 also requires the Permittees to implement effective BMPs for the following rural works maintenance and support activities: (a) Road design, construction, maintenance, and repairs in rural areas that prevent and control road-related erosion and sediment transport; (b)Identification and prioritization of rural roads maintenance on the basis of soil erosion potential, slope steepness, and stream habitat resources; (c) Road and culvert construction designs that do not impact creek functions. New or replaced culverts shall not create a migratory fish passage barrier, where migratory fish are present, or lead to stream instability; (d) Development and implement an inspection program to maintain roads structural integrity and prevent impacts on water quality; (e) Provide adequate maintenance of rural roads adjacent to streams and riparian habitat to reduce erosion, replace damaging shotgun culverts, re-grade roads to slope outward where consistent with road engineering safety standards, and install water bars; and (f) When replacing existing culverts or redesigning new culverts or bridge crossings use measures to reduce erosion, provide fish passage and maintain natural stream geomorphology in a stable manner.

Road construction, culvert installation, and other rural maintenance activities can disturb the soil and drainage patterns to streams in undeveloped areas, causing excess runoff and thereby erosion and the release of sediment. Poorly

designed roads can act as preferential drainage pathways that carry runoff and sediment into natural streams, impacting water quality. In addition, other rural public works activities, including those the BMP approach would address, have the potential to significantly affect sediment discharge and transport within streams and other waterways, which can degrade the beneficial uses of those waterways. This Provision would help ensure that these impacts are appropriately controlled.

Specific Provision C.2 Requirements

Provision C.2.a-f. (Operation and Maintenance of Municipal Separate Storm Sewer Systems (MS4) facilities) requires that the Permittees implement appropriate pollution control measures during maintenance activities and to inspect and, if necessary, clean municipal facilities such as conveyance systems, pump stations, and corporation yards, before the rainy season. The requirements will assist the Permittees to prioritize tasks, implement appropriate BMPs, evaluate the effectiveness of the implemented BMPs, and compile and submit annual reports.

Provision C.2.d. (Stormwater Pump Stations) In late 2005, Board staff investigated the occurrence of low salinity and dissolved oxygen conditions in Old Alameda Creek (Alameda County) and Alviso Slough (Santa Clara County) in September and October of 2005. Board staff became aware of this problem in their review of receiving water and discharge sampling conducted by the U.S. Geological Survey as part of its routine monitoring on discharges associated with the former salt ponds managed by the U.S. Fish and Wildlife Service in Santa Clara County and the California Department of Fish and Game in Alameda County.

In the case of Old Alameda Creek, discharge of black-colored water from the Alvarado pump station to the slough was observed at the time of the data collection on September 7, 2005, confirming dry weather urban runoff as the source of the documented violations of the 5 mg/L dissolved oxygen water quality objective. Such conditions were measured again on September 21, 2005.

On October 17, 2005, waters in Alviso Slough were much less saline than the salt ponds and had the lowest documented dissolved oxygen of the summer, suggesting a dry weather urban runoff source. The dissolved oxygen sag was detected surface to bottom at 2.3 mg/L at a salinity of less than 1 part per thousand (ppt), mid-day, when oxygen levels should be high at the surface. The sloughs have a typical depth of 6 feet.

Board staff's investigations of these incidents, documented in a memorandum,[68] found that "storm water pump stations, universally operated by automatic float triggers, have been confirmed as the cause in at least one instance, and may represent an overlooked source of controllable pollution to the San Francisco Bay Estuary and its tidal sloughs. . . the discharges of dry weather urban runoff from these pump stations are not being

[68] Internal Water Board Memo dated December 2, 2005: "Dry Weather Urban Weather Urban Runoff Causing or Contributing to Water Quality Violations: Low Dissolved Oxygen (DO) in Old Alameda Creek and Alviso Slough"

managed to protect water quality, and [that] surveillance monitoring has detected measurable negative water quality consequences of this current state of pump station management."

Pump station discharges of dry weather urban runoff can cause violations of water quality objectives. These discharges are controllable point sources of pollution that are virtually unregulated. The Water Board needs a complete inventory of dry weather urban runoff pump stations and to require BMP development and implementation for these discharges now. In the long term, Water Board staff should prioritize the sites from the regional inventory for dry weather diversion to sanitary sewers and encourage engineering feasibility studies to accomplish the diversions in a cost-effective manner. Structural treatment alternatives should be explored for specific pump stations.

To address the short term goals identified in the previous paragraph, Provision C.2.g. requires the Permittees to implement the following measures to reduce pollutant discharges to stormwater runoff from Permittee-owned or operated pump stations:

1. Establish an inventory of pump stations within each Permittee's jurisdiction, including pump station locations and key characteristics, and inspection frequencies.
2. Inspect these pump stations regularly, but at least two times a year, to address water quality problems, including trash control and sediment and debris removal.
3. Inspect trash racks and oil absorbent booms at pump stations in the first business day after ¼-inch within 24 hours and larger storm events. Remove debris in trash racks and replace oil absorbent booms, as needed.

C.3. New Development and Redevelopment

Legal Authority

Broad Legal Authority: CWA Sections 402(p)(3)(B)(ii-iii), CWA Section 402(a), CWC Section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F), 40 CFR 131.12, and 40 CFR 122.26(d)(2)(iv).

Fact Sheet Findings in Support of Provision C.3

C.3-1 Urban development begins at the land use planning phase; therefore, this phase provides the greatest cost-effective opportunities to protect water quality in new development and redevelopment. When a Permittee incorporates policies and principles designed to safeguard water resources into its General Plan and development project approval processes, it has taken a critical step toward the preservation and most of local water resources for current and future generations.

C.3-2 Provision C.3. is based on the assumption that Permittees are responsible for considering potential stormwater impacts when making planning and land use decisions. The goal of Provision C.3. is for Permittees to use their planning authority to include appropriate source control, site design, and stormwater treatment measures to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flow from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques. Neither Provision C.3. nor any of its requirements are intended to restrict or control local land use decision-making authority.

C.3-3 Certain control measures implemented or required by Permittees for urban runoff management might create a habitat for vectors (e.g., mosquitoes and rodents) if not properly designed or maintained. Close collaboration and cooperative efforts among Permittees, local vector control agencies, Water Board staff, and the State Department of Public Health are necessary to minimize potential nuisances and public health impacts resulting from vector breeding.

C.3-4 The Water Board recognized in its Policy on the Use of Constructed Wetlands for Urban Runoff Pollution Control (Resolution No. 94-102) that urban runoff treatment wetlands that are constructed and operated pursuant to that Resolution and are constructed outside a creek or other receiving water are stormwater treatment systems and, as such, are not waters of the United States subject to regulation pursuant to Sections 401 or 404 of the federal Clean Water Act. Water Board staff is working with the California Department of Fish and Game (CDFG) and U.S. Fish and Wildlife Service (USFWS) to identify how maintenance for stormwater treatment controls required under permits such as this Permit can be appropriately streamlined, given CDFG and USFWS requirements, and particularly those that address special status species. This Permit requires Permittees to ensure that constructed wetlands installed by

Regulated Projects are consistent with Resolution No. 94-102 and the operation and maintenance requirements contained therein.

C.3-5 The Permit requires Permittees to ensure that onsite, joint, and offsite stormwater treatment systems and HM controls installed by Regulated Projects are properly operated and maintained for the life of the projects. In cases where the responsible parties for the treatment systems or HM controls have worked diligently and in good faith with the appropriate state and federal agencies to obtain approvals necessary to complete maintenance activities for the treatment systems or HM controls, but these approvals are not granted, the Permittees shall be considered by the Water Board to be in compliance with Provision C.3.h.iii. of the Permit.

Specific Provision C.3 Requirements

Provision C.3.a. (New Development and Redevelopment Performance Standard Implementation) sets forth essentially the same legal authority, development review and permitting, environmental review, training, and outreach requirements that are contained in the existing permits. This Provision also requires the Permittees to encourage all projects not regulated by Provision C.3., but that are subject to the Permittees' planning, building, development , or other comparable review, to include adequate source control and site design measures, which include discharge of appropriate wastestreams to the sanitary sewer, subject to the local sanitary agency's authority and standards. Lastly, this Provision requires Permittees to revise, as necessary, their respective General Plans to integrate water quality and watershed protection with water supply, flood control, habitat protection, groundwater recharge, and other sustainable development principles and policies. Adequate implementation time has been allocated to Provisions C.3.a.i.(6)-(8), which may be considered new requirements.

Provision C.3.b. (Regulated Projects) establishes the different categories of new development and redevelopment projects that Permittees must regulate under Provision C.3. These categories are defined on the basis of the land use and the amount of impervious surface created and/or replaced by the project because all impervious surfaces contribute pollutants to stormwater runoff and certain land uses contribute more pollutants. Impervious surfaces can neither absorb water nor remove pollutants as the natural, vegetated soil they replaced can. Also, urban development creates new pollution by bringing higher levels of car emissions that are aerially deposited, car maintenance wastes, pesticides, household hazardous wastes, pet wastes, and trash, which can all be washed into the storm sewer.

Provision C.3.b.ii.(1) lists Special Land Use Categories that are already regulated under the current stormwater permits. Therefore, extra time is not necessary for the Permittees to comply with this Provision, so the Permit Effective Date is set as the required implementation date. For these categories, the impervious surface threshold (for classification as a Regulated Project subject to Provision C.3.) will be decreased from the current 10,000 ft^2 to 5,000 ft^2 beginning two years from the Permit Effective Date. These special land use categories represent land use types

that may contribute more polluted stormwater runoff. Regulation of these special land use categories at the lower impervious threshold of 5,000 square feet is considered the maximum extent practicable and is consistent with State Board guidance, court decisions, and other Water Boards' requirements. In the precedential decision contained in its WQ Order No. 2000-11, the State Board upheld the SUSMP (Standard Urban Stormwater Mitigation Plan) requirements issued by the Los Angeles Water Board's Executive Officer on March 8, 2000, and found that they constitute MEP for addressing pollutant discharges resulting from Priority Development Projects. The State Board re-affirmed that SUSMP requirements constitute MEP in their Order WQ 2001-15. Provision C.3.b.ii.(1)'s requirement that development projects in the identified Special Land Use Categories adding and/or replacing > 5000 ft^2 of impervious surface shall install hydraulically sized stormwater treatment systems is consistent with the SUSMP provisions upheld by the State Board. Provision C.3.b.ii.(1) is also consistent with Order No. R9-2007-0001 issued by the San Diego Water Board, Order Nos. R4-2009-0057 and R4-2001-182 issued by the Los Angeles Water Board, Order No. 2009-0030 issued by the Santa Ana Water Board, and State Board's Order WQ 2003-0005 issued to Phase II MS4s. Under Order WQ 2003-0005, Phase II MS4s with populations of 50,000 and greater must apply the lower 5000 ft^2 threshold for requiring stormwater treatment systems by April 2008. The MRP allows two years from the MRP effective date for the Permittees to implement the lower 5000 ft^2 threshold for the special land use categories, three and half years later than the Phase II MS4s. However, the additional time is necessary for the Permittees to revise ordinances and permitting procedures and conduct training and outreach.

This Provision contains a "grandfathering" clause, which allows any private development project in a special land use category for which a planning application has been deemed complete by a Permittee on or before the Permit effective date to be exempted from the lower 5,000 square feet impervious surface threshold (for classification as a Regulated Project) as long as the project applicant is diligently pursuing the project. Diligent pursuance may be demonstrated by the project applicant's submittal of supplemental information to the original application, plans, or other documents required for any necessary approvals of the project by the Permittee. If during the time period between the Permit effective date and the required implementation date of December 1, 2011, for the 5000 square feet threshold, the project applicant has not taken any action to obtain the necessary approvals from the Permittee, the project will then be subject to the lower 5000 square feet impervious surface threshold specified in Provision C.3.b.ii.(1).

For any private development project in a special land use category with an application deemed complete after the Permit effective date, the lower 5000 square feet impervious surface threshold (for classification as a Regulated Project) shall not apply if the project applicant has received final discretionary approval for the project before the required implementation date of December 1, 2011 for the 5000 square feet threshold.

Previous stormwater permits also used the "application deemed complete" date as the date for determining Provision C.3. applicability, but it was tied to the implementation date for new requirements and not the Permit effective date. The Permit Streamlining Act requires that a public agency must determine whether a permit application is complete within 30 days after receipt; if the public agency does not make this determination, the application is automatically deemed complete after 30 days. Data we have collected from audits and file reviews as well as reported to us by Permittees confirm that in many cases, the development permit applications have indeed not been reviewed for compliance with Provision C.3. requirements and yet have automatically been deemed complete 30 days after the application submittal date. As soon as the Permit is adopted, there is certainty about any new requirements that must be implemented during the Permit term. Therefore, the "application deemed complete" date should only be used to exempt projects that have reached this milestone by the Permit effective date and not years later at a new requirement's implementation date. However, this change requires consideration of those applications that are deemed complete after the Permit effective date. Because there is certainty with regard to new requirements as soon as the Permit becomes effective, we have tied the "final discretionary approval" date to a new requirement's implementation date for determining whether to exempt the projects with applications deemed complete after the Permit effective date. After a project receives "final discretionary approval" it would be too late in the permitting process to implement new requirements, particularly since this type of approval requires actions by city councils or boards of supervisors. Therefore, the "grandfathering" language is a hybrid that makes use of both the "application deemed complete" date and the "final discretionary approval" date, two known and recognized milestones in development planning.

As for private projects, public projects should be far enough along in the design and approval process to warrant being grandfathered and essentially exempted from complying with the lower 5000 ft^2 threshold when it becomes effective. Previous stormwater permits grandfathered projects that only had funds committed by the new threshold's effective date, which was too early because projects can be held for years before design can begin, well after funding commitments have been made. Conversely, application of the grandfathering exemption to projects that have construction scheduled to begin by the threshold effective date (or 2 years after the MRP effective date) may be too late in the permitting process to implement new threshold requirements, particularly since this type of approval requires actions by city councils or boards of supervisors. Therefore, the Permit provides the grandfathering exemption for projects that have construction set to begin within 1 year of the threshold effective date (or 3 years after the MRP effective date).

Provisions C.3.b.ii.(2)-(3) describe land use categories that are already regulated under the current stormwater permits; therefore, extra time is not necessary for the Permittees to comply with these Provisions and the implementation date is the Permit effective date. Because the Vallejo Permittees do not have post-

construction requirements in their current stormwater permit, the Permit allows an extra year for them to comply with these Provisions.

Provision C.3.b.ii.(4) applies to road projects adding and/or replacing 10,000 ft^2 of impervious surface, which include the construction of new roads and sidewalks and bicycle lanes built as part of the new roads; widening of existing roads with additional traffic lanes; and construction of impervious trails that are greater than 10 feet wide or are creekside (within 50 feet of the top of bank). Although widening existing roads with bike lanes and sidewalks increases impervious surface and therefore increases stormwater pollutants because of aerial deposition, they have been excluded from this Provision because we recognize the greater benefit that bike lanes and sidewalks provide by encouraging less use of automobiles. Likewise, this Provision also contains specific exclusions for: sidewalks built as part of a new road and built to direct stormwater runoff to adjacent vegetated areas; bike lanes built as part of a new road but not hydraulically connected to the new road and built to direct stormwater runoff to adjacent vegetated areas; impervious trails built to direct stormwater runoff to adjacent vegetated areas, or other non-erodible permeable areas, preferably away from creeks or towards the outboard side of levees; and sidewalks, bike lanes, or trails constructed with permeable surfaces.

In the case of road widening projects where additional lanes of traffic are added, the 50% rule also applies. That is, the addition of traffic lanes resulting in an alteration of more than 50 percent of the impervious surface of an existing street or road that was not subject to Provision C.3, the entire project, consisting of all existing, new, and/or replaced impervious surfaces, must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from the entire street or road that had additional traffic lanes added).

Where the addition of traffic lanes results in an alteration of less than 50 percent of the impervious surface of an existing street or road that was not subject to Provision C.3, only the new and/or replaced impervious surface of the project must be included in the treatment system design (i.e., stormwater treatment systems must be designed and sized to treat stormwater runoff from only the new traffic lanes). However, if the stormwater runoff from the existing traffic lanes and the added traffic lanes cannot be separated, any onsite treatment system must be designed and sized to treat stormwater runoff from the entire street or road. If an offsite treatment system is installed or in-lieu fees paid in accordance with Provision C.3.e., the offsite treatment system or in-lieu fees must address only the stormwater runoff from the added traffic lanes.

Because road widening and trail projects belong to a newly added category of Regulated Projects, adequate implementation time has been included as well as "grandfathering" language. (See discussion under Provision C.3.b.ii.(1).)

Provision C.3.b.iii. requires that the Permittees cumulatively complete 10 pilot "green street" projects within the Permit term. This Provision was originally intended to require stormwater treatment for road rehabilitation projects on

arterial roads that added and/or replaced > 10,000 ft^2 of impervious surface. We acknowledge the logistical difficulties in retrofitting roads with stormwater treatment systems as well as the funding challenges facing municipalities in the Bay Area. However, we are aware that some cities have or will have funding for "green street" retrofit projects that will provide water quality benefits as well as meet broader community goals such as fostering unique and attractive streetscapes that protect and enhance neighborhood livability, serving to enhance pedestrian and bike access, and encouraging the planting of landscapes and vegetation that contribute to reductions in global warming. Therefore, instead of requiring post-construction treatment for all road rehabilitation of arterial streets, this Provision requires the completion of 10 pilot "green street" projects by the Permittees within the Permit term. These projects must incorporate LID techniques for site design and treatment in accordance with Provision C.3.c. and provide stormwater treatment pursuant to Provision C.3.d. and must be representative of the three different types of streets: arterial, collector, and local. To ensure equity and an even distribution of projects, at least two pilot projects must be located in each of the following counties: Alameda, Contra Costa, San Mateo, and Santa Clara. Parking lot projects are acceptable as pilot projects as long as both parking lot and street runoff is addressed. Because these are pilot projects, we have not specified a minimum or maximum size requirement and the details of which cities will have these projects are to be determined by the Permittees.

Provision C.3.c (Low Impact Development (LID)) recognizes LID as a cost-effective, beneficial, holistic, integrated stormwater management strategy[69]. The goal of LID is to reduce runoff and mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover and then infiltrating, storing, detaining, evapotranspiring, and/or biotreating stormwater runoff close to its source. LID employs principles such as preserving and recreating natural landscape features and minimizing imperviousness to create functional and appealing site drainage that treat stormwater as a resource, rather than a waste product. Practices used to adhere to these LID principles include measures such as preserving undeveloped open space, rain barrels and cisterns, green roofs, permeable pavement, and biotreatment through rain gardens, bioretention units, bioswales, and planter/tree boxes.

This Provision sets forth a three-pronged approach to LID with source control, site design, and stormwater treatment requirements. The concepts and techniques for incorporating LID into development projects, particularly for site design, have been extensively discussed in BASMAA's Start at the Source manual (1999) and its companion document, Using Site Design Techniques to Meet Development Standards for Stormwater Quality (May 2003), as well as in various other LID reference documents.

Provision C.3.c.i.(1) lists source control measures that must be included in all Regulated Projects as well as some that are applicable only to certain types of

[69] USEPA, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices* **(**Publication Number EPA 841-F-07-006, December 2007) http://www.epa.gov/o**wow/nps/lid/costs07)**

businesses and facilities. These measures are recognized nationwide as basic, effective techniques to minimize the introduction of pollutants into stormwater runoff. The current stormwater permits also list these methods; however, they are encouraged rather than required. By requiring these source control measures, this Provision sets a consistent, achievable standard for all Regulated Projects and allows the Board to more systematically and fairly measure permit compliance. This Provision retains enough flexibility such that Regulated Projects are not forced to include measures inappropriate, or impracticable, to their projects. This Provision does not preclude Permittees from requiring additional measures that may be applicable and appropriate.

Provision C.3.c.i.(2)(a) lists site design elements that must be implemented at all Regulated Projects. These design elements are basic, effective techniques to minimize pollutant concentrations in stormwater runoff as well as the volume and frequency of discharge of the runoff. On the basis of the Board staff's review of the Permittees' Annual Reports and CWA section 401 certification projects, these measures are already being done at many projects. One design element requires all Regulated Projects to include at least one site design measure from a list of six which includes recycling of roof runoff, directing runoff into vegetated areas, and installation of permeable surfaces instead of traditional paving. All these measures serve to reduce the amount of runoff and its associated pollutants being discharged from the Regulated Project.

Provision C.3.c.i.(2)(b) requires each Regulated Project to treat 100% of the Provision C.3.d. runoff with LID treatment measures onsite or with LID treatment measures at a joint stormwater treatment facility. LID treatment measures are harvesting and re-use, infiltration, evapotranspiration, or biotreatment. A properly engineered and maintained biotreatment system may be considered only if it is infeasible to implement harvesting and re-use, infiltration, or evapotranspiration at a project site. Infeasibility may result from conditions including the following:

- Locations where seasonal high groundwater would be within 10 feet of the base of the LID treatment measure.
- Locations within 100 feet of a groundwater well used for drinking water.
- Development sites where pollutant mobilization in the soil or groundwater is a documented concern.
- Locations with potential geotechnical hazards.
- Smart growth and infill or redevelopment sites where the density and/or nature of the project would create significant difficulty for compliance with the onsite volume retention requirement.
- Locations with tight clay soils that significantly limit the infiltration of stormwater.

This Provision recognizes the benefits of harvesting and reuse, infiltration and evapotranspiration and establishes these methods at the top of the LID treatment hierarchy. This Provision also acknowledges the challenges, both institutional and technical, to providing these LID methods at all Regulated Projects. There

are certainly situations where biotreatment is a valid LID treatment measure and this Provision allows Permittees the flexibility to make this determination so that Regulated Projects are not forced to include measures inappropriate or impracticable to the project sites. However, Permittees are required to submit a report within 18 months of the Permit effective date and prior to the required implementation date on the criteria and procedures that Permittees will employ to determine when harvesting and re-use, infiltration, or evapotranspiration is feasible and infeasible at a Regulated Project site. The Permittees are also required to submit a second report two years after implementing the new LID requirements that documents their experience with determining the feasibility and infeasibility of harvesting and reuse, infiltration, and evapotranspiration at Regulated Project sites. This report shall also discuss barriers, including institutional and technical site specific constraints, to implementation of infiltration, harvesting and reuse, or evapotranspiration and proposed strategies for removing these identified barriers.

This Provision specifies minimum specifications for biotreatment systems to be considered as LID treatment and requires Permittees to develop soil media specifications. Because this Provision recognizes green roofs as biotreatment systems for roof runoff, it also requires Permittees to develop minimum specifications for green roofs.

Provision C.3.c.ii. establishes the implementation date for the new LID requirements of Provision C.3.c.i. to be two years after the Permit effective date. Grandfathering language consistent with Provision C.3.b.ii.(1) has been included in this Provision to exempt private development projects (that are far along in their permitting and approval process) and public projects (that are far along in their funding and design) from the requirements of Provision C.3.c.i.

Provision C.3.d (Numeric Sizing Criteria for Stormwater Treatment Systems) lists the hydraulic sizing design criteria that the stormwater treatment systems installed for Regulated Projects must meet. The volume and flow hydraulic design criteria are the same as those required in the current stormwater permits. These criteria ensure that stormwater treatment systems will be designed to treat the optimum amount of relatively smaller-sized runoff-generating storms each year. That is, the treatment systems will be sized to treat the majority of rainfall events generating polluted runoff but will not have to be sized to treat the few very large annual storms as well. For many projects, such large treatment systems become infeasible to incorporate into the projects. Provision C.3.d. also adds a new combined flow and volume hydraulic design criteria to accommodate those situations where a combination approach is deemed most efficient.

Provision C.3.d.iv. defines infiltration devices and establishes limits on the use of stormwater treatment systems that function primarily as infiltration devices The intent of the Provision is to ensure that the use of infiltration devices, where feasible and safe from the standpoint of structural integrity, must also not cause or contribute to the degradation of groundwater quality at the project sites. This Provision requires infiltration devices to be located a minimum of 10 feet

(measured from the base) above the seasonal high groundwater mark and a minimum of 100 feet horizontally away from any known water supply wells, septic systems, and underground storage tanks with hazardous materials, and other measures to ensure that any potential threat to the beneficial uses of ground water is appropriately evaluated and avoided.

Provision C.3.e (Alternative or In-Lieu Compliance with Provision C.3.c.) recognizes that not all Regulated Projects may be able to install LID treatment systems onsite because of site conditions, such as existing underground utilities, right-of-way constraints, and limited space.

Provision C.3.e.i. In keeping with LID concepts and strategies, we expect new development projects to provide LID treatment onsite and to allocate the appropriate space for these systems because they do not have the site limitations of redevelopment and infill site development in the urban core. However, this Provision does not restrict alternative compliance to redevelopment and infill projects because the Permittees have requested flexibility to make the determination of when alternative compliance is appropriate. Based on the lack of offsite alternative compliance projects installed during the current stormwater permit terms, it seems that having to find offsite projects is already a great disincentive. Therefore, this Provision allows any Regulated Project to provide LID treatment for up to 100% of the required Provision C.3.d. stormwater runoff at an offsite location or pay equivalent in-lieu fees to provide LID treatment at a Regional Project, as long as the offsite and Regional Projects are in the same watershed as the Regulated Project.

For the LID Treatment at an Offsite Location alternative compliance option, offsite projects must be constructed by the end of construction of the Regulated Project. We acknowledge that a longer timeframe may be required to complete construction of offsite projects because of administrative, legal, and/or construction delays. Therefore, up to 3 years additional time is allowed for construction of the offsite project; however, to offset the untreated stormwater runoff from the Regulated Project that occurs while construction of the offsite project is taking place, the offsite project must be sized to treat an additional 10% of the calculated equivalent quantity of both stormwater runoff and pollutant loading for each year that it is delayed. Permittees have commented that for projects that are delayed, requiring treatment of an additional (10-30)% of stormwater runoff may result in costly re-design of treatment systems. In those cases, payment of in-lieu fees to provide the additional treatment at a Regional Project is a viable alternative.

For the Payment of In-Lieu Fees to a Regional Project alternative compliance option, the Regional Project must be completed within 3 years after the end of construction of the Regulated Project. We acknowledge that a longer timeframe may be required to complete construction of Regional Projects because they may involve a variety of public agencies and stakeholder groups and a longer planning and construction phase. Therefore, the timeline for completion of a Regional Project may be extended, up to 5 years after the completion of the Regulated

Project, with prior Water Board Executive Officer approval. Executive Officer approval will be granted contingent upon a demonstration of good faith efforts to implement the Regional Project, such as having funds encumbered and applying for the appropriate regulatory permits.

Provision C.3.e.ii. (Special Projects) When considered at the watershed scale, certain types of smart growth, high density, and transit-oriented development can either reduce existing impervious surfaces, or create less "accessory" impervious areas and auto-related pollutant impacts. Incentive LID treatment reduction credits approved by the Water Board may be applied to these types of Special Projects.

This Provision requires that by December 1, 2010, Permittees shall submit a proposal to the Water Board containing the following information:

- Identification of the types of projects proposed for consideration of LID treatment reduction credits and an estimate of the number and cumulative area of potential projects during the remaining term of this permit for each type of project..
- Identification of institutional barriers and/or technical site specific constraints to providing 100% LID treatment onsite that justify the allowance for non-LID treatment measures onsite.
- Specific criteria for each type of Special Project proposed, including size, location, minimum densities, minimum floor area ratios, or other appropriate limitations.
- Identification of specific water quality and environmental benefits provided by these types of projects that justify the allowance for non-LID treatment measures onsite.
- Proposed LID treatment reduction credit for each type of Special Project and justification for the proposed credits. The justification shall include identification and an estimate of the specific water quality benefit provided by each type of Special Project proposed for LID treatment reduction credit.
- Proposed total treatment reduction credit for Special Projects that may be characterized by more than one category and justification for the proposed total credit.

Provision C.3.f (Alternative Certification of Adherence to Numeric Sizing Criteria for Stormwater Treatment Systems) allows Permittees to have a third-party review and certify a Regulated Project's compliance with the hydraulic design criteria in Provision C.3.d. Some municipalities do not have the staffing resources to perform these technical reviews. The third-party review option addresses this staffing issue. This Provision requires Permittees to make a reasonable effort to ensure that the third-party reviewer has no conflict of interest with regard to the Regulated Project being reviewed. That is, any consultant, contractor or their employees hired to design and/or construct a stormwater treatment system for a Regulated Project can not also be the certifying third party.

Provision C.3.g. (Hydromodification Management, HM) requires that certain new development projects manage increases in stormwater runoff flow and volume so that post-project runoff shall not exceed estimated pre-project runoff rates and durations, where such increased flow and/or volume is likely to cause increased potential for erosion of creek beds and banks, silt pollutant generation, or other adverse impacts on beneficial uses due to increased erosive force.

Background for Provision C.3.g. Based on Hydrograph Modification Management Plans prepared by the Permittees, the Water Board adopted hydromodification management (HM) requirements for Alameda Permittees (March 2007), Contra Costa Permittees (July 2006), Fairfield-Suisun Permittees (March 2007), Santa Clara Permittees (July 2005), and San Mateo Permittees (March 2007). Within Provision C.3.g, the major common elements of these HM requirements are restated. Attachments B–F contain the HM requirements as adopted by the Water Board, with some changes to correct minor errors and to provide consistency across the Region. Attachment F contains updated HM requirements for the Santa Clara Permittees. Permittees will continue to implement their adopted HM requirements; where Provision C.3.g. contradicts the Attachments, Provision C.3.g. shall be implemented. Additional requirements and/or options contained in the Attachments, above and beyond what is specified in Provision C.3.g., remain unaltered by Provision C.3.g. In all cases, the HM Standard must be achieved.

The Alameda, Santa Clara and San Mateo Permittees have adapted the Western Washington Hydrology Model[70] for modeling runoff from development project sites, sizing flow duration control structures, and determining overall compliance of such structures and other HM control structures (HM controls) in controlling runoff from the project sites to manage hydromodification impacts as described in the Permit. The adapted model is called the Bay Area Hydrology Model (BAHM).[71] All Permittees may use the BAHM if its inputs reflect actual conditions at the project site and surrounding area, including receiving water conditions. As Permittees gain experience in designing and operating HM controls, the Programs may make adjustments in the BAHM to improve its function in controlling excess runoff and managing hydromodification impacts. Notification of all such changes shall be given to the Water Board and the public through such mechanism as an electronic email list.

The Contra Costa Permittees have developed sizing charts for the design of flow duration control devices. Attachment C requires the Contra Costa Permittees to conduct a monitoring program to verify the performance of these devices. Following the satisfactory conclusion of this monitoring program, or conclusion of other study(s) that demonstrate devices built according to Attachment C specifications satisfactorily protect streams from excess erosive flows, the Water Board intends to allow the use of the Contra Costa sizing charts, when tailored to local conditions, by other stormwater programs and Permittees. Similarly, any other control strategies or criteria approved by the Board would be made available across the Region. This would be accomplished

[70] http://www.ecy.wa.gov/programs/wq/stormwater/wwhm_training/wwhm/wwhm_v2/instructions_v2.html
[71] See www.bayareahydrologymodel.org , Resources.

through Permit amendment or in another appropriate manner following appropriate public notification and process.

The Fairfield-Suisun Permittees have developed design procedures, criteria, and sizing factors for infiltration basins and bioretention units. These procedures, criteria, and sizing factors have been through the public review process already, and are not subject to public review at this time. Water Board staff's technical review found that the procedures, criteria, and sizing factors are acceptable in all ways except one: they are based on an allowable low flow rate that exceeds the criteria established in this Permit. Fairfield-Suisun Permittees may choose to change the design criteria and sizing factors to the allowable criterion of 20 percent of the 2-year peak flow, and seek Executive Officer approval of the modified sizing factors. This criterion, which is greater than the criterion allowed for other Bay Area Stormwater Countywide Programs, is based on data collected from Laurel and Ledgewood Creeks and technical analyses of these site-specific data. Following approval by the Executive Officer and notification of the public through such mechanism as an email list-serve, project proponents in the Fairfield-Suisun area may meet the HM Standard by using the Fairfield-Suisun Permittees' design procedures, criteria, and sizing factors for infiltration basins and/or bioretention units.

Attachments B and F allow the Alameda and Santa Clara Permittees to prepare a user guide to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This user guide would reiterate and collate established stream stability assessment methods that have been presented in these Programs' HMPs, which have undergone Water Board staff review and been made available for public review. After the Programs have collated their methods into user guide format, received approval of the user guide from the Executive Officer, and informed the public through such process as an email list-serve, the user guide may be used to guide preparation of technical reports for: implementing the HM standard using in-stream or regional measures; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in this Permit); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp[72] for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow).

The Water Board recognizes that the collective knowledge of management of erosive flows and durations from new and redevelopment is evolving, and that the topics listed below are appropriate topics for further study. Such a study may be initiated by Water Board staff, or the Executive Officer may request that all Bay Region municipal stormwater Permittees jointly conduct investigations as appropriate. Any future

[72] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

proposed changes to the Permittees' HM provisions may reflect improved understanding of these issues:

- Potential incremental costs, and benefits to waterways, from controlling a range of flows up to the 35- or 50-year peak flow, versus controlling up to the 10-year peak flow, as required by this Permit;
- The allowable low-flow (also called Qcp and currently specified as 10–20 percent of the pre-project 2-year runoff from the site) from HM controls;
- The effectiveness of self-retaining areas for management of post-project flows and durations; and/or
- The appropriate basis for determining cost-based impracticability of treating stormwater runoff and controlling excess runoff flows and durations.

Within Attachments B-F, this Permit allows for alternative HM compliance when on-site and regional HM controls and in-stream measures are not practicable. Alternative HM compliance includes contributing to or providing mitigation at other new or existing development projects that are not otherwise required by this Permit or other regulatory requirements to have HM controls. The Permit provides flexibility in the type, location, and timing of the mitigation measure. The Board recognizes that handling mitigation funds may be difficult for some municipalities because of administrative and legal constraints. The Board intends to allow flexibility for project proponents and/or Permittees to develop new or retrofit stormwater treatment or HM control projects within a broad area and reasonable time frame. Toward the end of the Permit term, the Board will review alternative projects and determine whether the impracticability criteria and options should be broadened or made narrower.

Provision C.3.g.i. defines the subset of Regulated Projects that must install hydromodification controls (HM controls). This subset, called HM Projects, are Regulated Projects that create and/or replace one acre or more of impervious surface and are not specifically excluded within Attachments B–F of the Permit. Within these Attachments, the Permittees have identified areas where the potential for single-project and/or cumulative development impacts to creeks is minimal, and thus HM controls are not required. Such areas include creeks that are concrete-lined or significantly hardened (e.g., with concrete) from point of discharge and continuously downstream to their outfall into San Francisco Bay; underground storm drains discharging to the Bay; and construction of infill projects in highly developed watersheds.[73]

Provision C.3.g.ii. establishes the standard hydromodification controls must meet. The HM Standard is based largely on the standards proposed by Permittees in their Hydrograph Modification Management Plans. The method for calculating post-project runoff in regards to HM controls is standard practice in Washington State and is equally applicable in California.

[73] Within the context of Provision C.3.g., "highly developed watersheds; refer to catchments or sub-catchments that are 65 percent impervious or more.

Provision C.3.g.iii. identifies and defines three methods of hydromodification management.

Provision C.3.g.iv. sets forth the information on hydromodification management to be submitted in the Permittees' Annual Reports.

Provision C.3.g.v. requires the Vallejo Permittees to develop a Hydromodification Management Plan (HMP), because the Vallejo Permittees have not been required to address HM impacts to date. Vallejo's current permit was issued by USEPA and does not require the Vallejo Permittees' to develop an HMP. The Vallejo Permittees may choose to adopt and implement one or a combination of the approaches in Attachments B–F.

Provision C.3.h (Operation and Maintenance of Stormwater Treatment Systems) establishes permitting requirements to ensure that proper maintenance for the life of the project is provided for all onsite, joint, and offsite stormwater treatment systems installed. The Provision requires Permittees to inspect at least 20% of these systems annually, at least 20% of all vault-based systems annually, and every treatment system at least once every 5 years. Requiring inspection of at least 20% of the total number of treatment and HM controls serves to prevent failed or improperly maintained systems from going undetected until the 5th year. We have the additional requirement to inspect at least 20% of all installed vault-based systems because they require more frequent maintenance and problems arise when the appropriate maintenance schedules are not followed. Also, problems with vault systems may not be as readily identified by the projects' regular maintenance crews. Neither of these inspection frequency requirements interferes with the Permittees' current ability to prioritize their inspections based on factors such as types of maintenance agreements, owner or contractor maintained systems, maintenance history, etc. This Provision also requires the development of a database or equivalent tabular format to track the operation and maintenance inspections and any necessary enforcement actions against Regulated Projects and submittal of Reporting Table C.3.h., which requires standard information that should be collected on each operation and maintenance inspection. We require this type of information to evaluate a Permittee's inspection and enforcement program and to determine compliance with the Permit. Summary data alone without facility-specific inspection findings does not allow us to determine whether Permittees are doing timely follow-up inspections at problematic facilities and taking appropriate enforcement actions.

Stormwater treatment system maintenance has been identified as a critical aspect of addressing urban runoff from Regulated Projects by many prominent urban runoff authorities, including CASQA, which states that "long-term performance of BMPs [stormwater treatment systems] hinges on ongoing and proper maintenance."[74] USEPA also stresses the importance of BMP [stormwater treatment system] maintenance,

[74] California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook – New Development and Redevelopment, p. 6-1.

stating that "Lack of maintenance often limits the effectiveness of stormwater structure controls such as detention/retention basins and infiltration devices."[75]

Provision C.3.i. (Required Site Design Measures for Small Project and Detached Single-Family Homes Projects) introduces new requirements on single-family home projects that create and/or replace 2500 square feet or more of impervious surface and small development projects that create and/or replace > 2500 ft^2 to <10,000 ft^2 impervious surface (collectively over the entire project). A detached single-family home project is defined as the building of one single new house or the addition and/or replacement of impervious surface to one single existing house, which is not part of a larger plan of development.

This Provision requires these projects to select and implement one or more stormwater site design measures from a list of six. These site design measures are basic methods to reduce the amount and flowrate of stormwater runoff from projects and provide some pollutant removal treatment of the runoff that does leave the projects. Under this Provision, only projects that already require approvals and/or permits under the Permittees' current planning, building, or other comparable authority are regulated. Hence this Provision does not require Permittees to regulate small development and single-family home projects that would not otherwise be regulated under the Permittees' current ordinances or authorities. Water Board staff recognizes that the stormwater runoff pollutant and volume contribution from each one of these projects may be small; however, the cumulative impacts could be significant. This Provision serves to address some of these cumulative impacts in a simple way that will not be too administratively burdensome on the Permittees. To assist these small development and single-family home projects, this Provision also requires the Permittees to develop standard specifications for lot-scale site design and treatment measures.

[75] USEPA. 1992. *Guidance Manual for the Preparation of Part II of the NPDES Permit Application for Discharges from Municipal Separate Storm Sewer Systems*. EPA 833-B-92-002.

C.4. Industrial and Commercial Site Controls

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C) requires, "A description of a program to monitor and control pollutants in storm water discharges to municipal systems from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and industrial facilities that the municipal permit applicant determines are contributing a substantial pollutant loading to the municipal storm sewer system."

Specific Provision C.4. Requirements

Provision C.4.a (Legal Authority for Effective Site Management)

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section also describes requirements for effective follow-up and resolution of actual or threatened discharges of either polluted non-stormwater or polluted stormwater runoff from industrial/commercial sites.

Provision C.4.b (Inspection Plan)

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(C)(1) provides that Permittees must "identify priorities and procedures for inspections and establishing and implementing control measures for such discharges." The Permit requires Permittees to implement an industrial and commercial site controls program to reduce pollutants in runoff from all industrial and commercial sites/sources.

Provision C.4.b.ii.(1) (Commercial and Industrial Source Identification)

Federal NPDES regulation 40 CFR 122.26(d)(2)(ii) provides that Permittees "Provide an inventory, organized by watershed of the name and address, and a description (such as SIC codes) which best reflects the principal products or services provided by each facility which may discharge, to the municipal separate storm sewer, storm water associated with industrial activity."

USEPA requires "measures to reduce pollutants in storm water discharges to municipal separate storm sewers from municipal landfills, hazardous waste treatment, disposal and recovery facilities, industrial facilities that are subject to section 313 of title III of the Superfund Amendments and Reauthorization Act of

1986 (SARA)."[76] USEPA "also requires the municipal storm sewer Permittees to describe a program to address industrial dischargers that are covered under the municipal storm sewer permit."[77] To more closely follow USEPA's guidance, this Permit also includes operating and closed landfills, and hazardous waste treatment, disposal, storage and recovery facilities.

The Permit requires Permittees to identify various industrial sites and sources subject to the General Industrial Permit or other individual NPDES permit. USEPA supports the municipalities regulating industrial sites and sources that are already covered by an NPDES permit:

> Municipal operators of large and medium municipal separate storm sewer systems are responsible for obtaining system-wide or area permits for their system's discharges. These permits are expected to require that controls be placed on storm water discharges associated with industrial activity which discharge through the municipal system. It is anticipated that general or individual permits covering industrial storm water discharges to these municipal separate storm sewer systems will require industries to comply with the terms of the permit issued to the municipality, as well as other terms specific to the Permittee.[78]

And:

> Although today's rule will require industrial discharges through municipal storm sewers to be covered by separate permit, USEPA still believes that municipal operators of large and medium municipal systems have an important role in source identification and the development of pollutant controls for industries that discharge storm water through municipal separate storm sewer systems is appropriate. Under the CWA, large and medium municipalities are responsible for reducing pollutants in discharges from municipal separate storm sewers to the maximum extent practicable. Because storm water from industrial facilities may be a major contributor of pollutants to municipal separate storm sewer systems, municipalities are obligated to develop controls for storm water discharges associated with industrial activity through their system in their storm water management program.[79]

Provision C.4.b.ii.(5) (Inspection Frequency)
USEPA guidance[80] says, "management programs should address minimum frequency for routine inspections." The USEPA Fact Sheet—Visual Inspection[81] says, "To be effective, inspections must be carried out routinely."

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[76] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. P. 48056.
[77] Ibid.
[78] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990, Rules and Regulations. P. 48006.
[79] Ibid. P. 48000
[80] USEPA. 1992. Guidance 833-8-92-002, section 6.3.3.4 "Inspection and Monitoring".
[81] USEPA. 1999. 832-F-99-046, "Storm Water Management Fact Sheet – Visual Inspection".

Provision C.4.c (Enforcement Response Plan) requires the Permittees to establish an Enforcement Response Plan (ERP) that ensures timely response to actual or potential stormwater pollution problems discovered in the course of industrial/commercial stormwater inspections. The ERP also provides for progressive enforcement of violations of ordinances and/or other legal authorities. The ERP will provide guidance on the appropriate use of the various enforcement tools, such as verbal and written notices of violation, when to issue a citations, and require cleanup requirements, cost recovery, and pursue administrative or and criminal penalties. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer than 10 business days after the violations are discovered.

Provision C.4.d (Staff Training) section of the Permit requires the Permittees to conduct annual staff trainings for inspectors. Trainings are necessary to keep inspectors current on enforcement policies and current MEP BMPs for industrial and commercial stormwater runoff discharges.

C.5. Illicit Discharge Detection and Elimination

Legal Authority

The following legal authority applies to section C.5:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) provides that the Permittee shall include in their application, "the location of known municipal storm sewer system outfalls discharging to waters of the United States."

Federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(5) provides that the Permittee shall include in their application, "The location of major structural controls for storm water discharge (retention basins, detention basins, major infiltration devices, etc."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall have, "adequate legal authority to prohibit through ordinance, order or similar means, illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B) provides that the Permittee shall, "Carry out all inspection, surveillance and monitoring procedures necessary to determine compliance and noncompliance with permit conditions including the prohibition on illicit discharges to the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires, "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) requires, "a program, including inspections, to implement and enforce an ordinance, orders or similar means to prevent illicit discharges to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires, "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(5) requires, "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(7) requires, "a description of controls to limit infiltration of seepage from municipal sanitary sewers to municipal separate storm sewer systems where necessary."

Fact Sheet Findings in Support of Provision C.5

C.5-1 Illicit and inadvertent connections to MS4 systems result in the discharge of waste and chemical pollutants to receiving waters. Every Permittee must have the ability to discover, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

C.5-2 Illicit discharges to the storm drain system can be detected in several ways. Permittee staff can detect discharges during their course of other tasks, and business owners and other aware citizens can observe and report suspect discharges. The Permittee must have a direct means for these reports of suspected polluted discharges to receive adequate documentation, tracking, and response through problem resolution.

Specific Provision C.5 Requirements

Provision C.5.a (Legal Authority) requires each Permittee have adequate legal authority to effectuate cessation, abatement, and/or clean up of non-exempt non-stormwater discharges per Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B). Illicit and inadvertent connections to MS4 systems result in the discharge of waste and chemical pollutants to receiving waters. Every Permittee must have the ability to discover, track, and clean up stormwater pollution discharges by illicit connections and other illegal discharges to the MS4 system.

Provision C.5.b (ERP) requires Permittees to establish an ERP that ensures timely response to illicit discharges and connections to the MS4 and provides progressive enforcement of violations of ordinances and/or other legal authorities. This section also requires Permittees to establish criteria for triggering follow-up investigations. Additional language has been added to this section to clarify the minimum level of effort and time frames for follow-up investigations when violations are discovered. Timely investigation and follow up when action levels are exceeded is necessary to identify sources of illicit discharges, especially since many of the discharges are transitory. The requirements for all violations to be corrected before the next rain event but no longer than 10 business days when there is evidence of illegal non-stormwater discharge, dumping, or illicit connections having reached municipal storm drains is necessary to ensure timely response by Permittees.

Provision C.5.c (Spill and Dumping Response, Complaint Response, and Frequency of Inspections) Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer." This Provision of the Permit requires the Permittees to establish and maintain a central point of contact including phone numbers for spill and complaint reporting. Reports from the public are an essential tool in discovering and investigating illicit discharge activities. Maintaining contact points will help ensure that there is effective reporting to assist with the discovery of prohibited discharges. Each Permittee must have a direct means for these reports of suspected polluted discharges to receive adequate documentation, tracking, and response through problem resolution.

Provision C.5.d (Control of Mobile Sources) requires each Permittee to develop and implement a program to reduce the discharge of pollutants from mobile businesses. The purpose of this section is to establish oversight and control of pollutants associated with mobile business sources to the MEP.

Provision C.5.e (Collection System Screening and MS4 Map Availability) Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water." This Provision of the Permit requires the Permittees to conduct follow up investigations and inspect portions of the MS4 for illicit discharges and connections. Permittees shall implement a program to actively seek and eliminate illicit connections and discharges during their routine collection system screening and during screening surveys at strategic check points. Additional wording has been added to this section to clarify and ensure that all appropriate municipal personnel are used in the program to observe and report these illicit discharges and connections when they are working the system.

This section also requires the Permittees to develop or obtain a map of their entire MS4 system and drainages within their jurisdictions and provide the map to the public for review. As part of the permit application process federal NPDES regulations 40 CFR 122.26(d)(1)(iii)(B)(1) and 40 CFR 122.26(d)(1)(iii)(B)(5) specify that dischargers must identify the location of any major outfall that discharges to waters of the United States, as well as the location of major structural controls for stormwater discharges. A major outfall is any outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than a circular pipe which is associated with a drainage area of more than 50 acres) or; for areas zoned for industrial activities, any pipe with a diameter of 12 inches or more or its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more). The permitting agency may not process a permit until the applicant has fully complied with the application requirements.[82] If, at the time of application, the information is unavailable, the Permit must require implementation of a program to meet the application requirements.[83] The requirement in this Provision of the Permit for

[82] 40 CFR 124.3 (applicable to state programs, see section 123.25).
[83] 40 CFR. 122.26(d)(1)(iv)(E).

Permittees to prepare maps of the MS4 system will help ensure that Permittees comply with federal NPDES permit application requirements that are more than 10 years old.

Provision C.5.f (Tracking and Case Follow-up) section of the Permit requires Permittees to track and monitor follow-up for all incidents and discharges reported to the complaint/spill response system that could pose a threat to water quality. This requirement is included so Permittees can demonstrate compliance with the ERP requirements of Section C.5.b and to ensure that illicit discharge reports receive adequate follow up through to resolution.

C.6. Construction Site Control

Legal Authority

The following legal authority applies to section C.6:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D) requires, "A description of a program to implement and maintain structural and non-structural best management practices to reduce pollutants in storm water runoff from construction sites to the municipal storm sewer system."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(1) requires, "A description of procedures for site planning which incorporate consideration of potential water quality impacts."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(2) requires, "A description of requirements for nonstructural and structural best management practices."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(3) requires, "A description of procedures for identifying priorities for inspecting sites and enforcing control measures which consider the nature of the construction activity, topography, and the characteristics of soils and receiving water quality."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(D)(4) requires, "A description of appropriate educational and training measures for construction site operators."

Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) provides that each Permittee must demonstrate that it can control, "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity."

Federal NPDES regulation 40 CFR 122.26(b)(14) provides that, "The following categories of facilities are considered to be engaging in 'industrial activity' for the purposes of this subsection: […] (x) Construction activity including cleaning, grading and excavation activities […]."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to, "control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute

to an excursion above any State water quality standard, including State narrative criteria for water quality."

Fact Sheet Findings in Support of Provision C.6.

C.6-1 Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters.

C.6-2 Excess sediment can cloud the water, reducing the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and grease. Permittees are on-site at local construction sites for grading and building permit inspections, and also have in many cases dedicated construction stormwater inspectors with training in verifying that effective BMPs are in place and maintained. Permittees also have effective tools available to achieve compliance with adequate erosion control, such as *stop work* orders and citations.

C.6-3 Mobilized sediment from construction sites can flow into receiving waters. According to the 2004 National Water Quality Inventory[84], States and Tribes report that sediment is one of the top 10 causes of impairment of assessed rivers and streams, next to pathogens, habitat alteration, organic enrichment or oxygen depletion, nutrients, metals, etc.. Sediment impairs 35,177 river and stream miles (14% of the impaired river and stream miles). Sources of sedimentation include agriculture, urban runoff, construction, and forestry. Sediment runoff rates from construction sites, however, are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forest lands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades.[85]

Specific Provision C.6 Requirements

Provision C.6.a. Legal Authority for Effective Site Management. Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(A) requires that each Permittee demonstrate that it can control "through ordinance, permit, contract, order or similar means, the contribution of pollutants to the municipal storm sewer by storm water discharges associated with industrial activity and the quality of storm water discharged from site of industrial activity." This section of the Permit requires each Permittee to have the

[84] http://www.epa.gov/owow/305b/2004report/2004_305Breport.pdf

[85] USEPA. December 2005. *Stormwater Phase II Final Rule Fact Sheet Series – Construction Site Runoff Control Minimum Control Measure*. EPA 833-F-00-008. Fact Sheet 2.6.

authority to require year-round, seasonally and phase appropriate effective erosion control, run-on and runoff control, sediment control, active treatment systems, good site management, and non stormwater management through all phases of site grading, building, and finishing of lots. All Permittees should already have this authority. Permittees shall certify adequacy of their respective legal authority in the 2010 Annual Report.

Inspectors should have the authority to take immediate enforcement actions when appropriate. Immediate enforcement will get the construction site's owner/operator to quickly implement corrections to violations, thereby minimizing and preventing threats to water quality. When inspectors are unable to take immediate enforcement actions, the threat to water quality continues until an enforcement incentive is issued to correct the violation. In its Phase II Compliance Assistance Guidance, USEPA says that, "Inspections give the MS4 operator an opportunity to provide additional guidance and education, issue warnings, or assess penalties."[86] To issue warnings and assess penalties during inspections, inspectors must have the legal authority to conduct enforcement.

Provision C.6.b. Enforcement Response Plan (ERP). This section requires each Permittee to develop and implement an escalating enforcement process that serves as reference for inspection staff to take consistent actions to achieve timely and effective corrective compliance from all public and private construction site owners/operators. Under this section, each Permittee develops its own unique ERP tailored for the specific jurisdiction; but all ERPs must make it a goal to correct all violations before the next rain event but no longer than 10 business days after the violations are discovered. In a few cases, such as slope inaccessibility, it may require longer than 10 days before crews can safely access the eroded area. The Permittees' tracking data need to provide a rationale for the longer compliance timeframe.

Water Board staff has noted deficiencies in the Permittees' enforcement procedures and implementation during inspections. The most common issues found were that enforcement was not firm and appropriate to correct the violation, and that repeat violations did not result in escalated enforcement procedures. USEPA supports enforcement of ordinances and permits at construction sites stating, "Effective inspection and enforcement requires […] penalties to deter infractions and intervention by the municipal authority to correct violations."[87] In addition, USEPA expects permits issued to municipalities to address "weak inspection and enforcement."[88] For these reasons, the enforcement requirements in this section have been established, while providing sufficient flexibility for each Permittee's unique stormwater program.

Provision C.6.c. Best Management Practices Categories. This section requires all Permittees to require all construction sites to have year-round seasonally appropriate effective Best Management Practices (BMPs) in the following six categories: (1)

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[86] USEPA. 2000. 833-R-00-002, Storm Water Phase II Compliance Assistance Guide, P.4-31
[87] USEPA. 1992. Guidance 833-8-92-002. Section 6.3.2.3.
[88] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48058.

erosion control, (2) run-on and runoff control, (3) sediment control, (4) active treatment systems, (5) good site management, and (6) non stormwater management. These BMP categories are listed in the State General NPDES Permit for Stormwater Discharges Associated with Construction Activities (General Construction Permit). The Water Board staff decided it was too prescriptive and inappropriate to require a specific set of BMPs that are to be applicable to all sites. Every site is different with regards to terrain, soil type, soil disturbance, and proximity to a waterbody. The General Construction Permit recognizes these different factors and requires site specific BMPs through the Storm Water Pollution Prevention Plan that addresses the six specified BMP categories. This Permit allows Permittees the flexibility to determine if the BMPs for each construction site are effective and appropriate. This Permit also allows the Permittees and the project proponents the necessary flexibility to make immediate decisions on appropriate, cutting-edge technology to prevent the discharge of construction pollutants into stormdrains, waterways, and right-of-ways. Appropriate BMPs for the different site conditions can be found in different handbooks and manuals. Therefore, this Permit is consistent with the General Construction Permit in its requirements for BMPs in the six specified categories.

Vegetation clearing, mass grading, lot leveling, and excavation expose soil to erosion processes and increase the potential for sediment mobilization, runoff and deposition in receiving waters. Construction sites without adequate BMP implementation result in sediment runoff rates that greatly exceed natural erosion rates of undisturbed lands, causing siltation and impairment of receiving waters. This can even occur in conjunction with unexpected rain events during the so-called *dry-season*. Although rare, significant rains can occur in the San Francisco Bay Region during the dry season. Therefore, Permittees should ensure that construction sites have materials on hand for rapid rain response during the dry season.

Normally, stormwater restrictions on grading should be implemented during the wet season from October 1st through April 30th. Section C.6.c.ii.(1).d of the Permit requires, "project proponents to minimize grading during the wet season and scheduling of grading with seasonal dry weather periods to the extent feasible." If grading does occur during the wet season, Permittees shall require project proponents to (1) implement additional BMPs as necessary, (2) keep supplies available for rapid response to storm events, and (3) minimize wet-season, exposed, and graded areas to the absolute minimum necessary.

Slope stabilization is necessary on all active and inactive slopes during rain events regardless of the season, except in areas implementing advanced treatment. Slope stabilization is also required on inactive slopes throughout the rainy season. These requirements are needed because unstabilized slopes at construction sites are significant sources of erosion and sediment discharges during rainstorms. "Steep slopes are the most highly erodible surface of a construction site, and require special attention."[89] USEPA emphasizes the importance of slope stabilization when it states, "slope length

[89] Schueler, T., and H. Holland. 2000. *Muddy Water In—Muddy Water Out*? The Practice of Watershed Protection. p. 6.

and steepness are key influences on both the volume and velocity of surface runoff. Long slopes deliver more runoff to the base of slopes and steep slopes increase runoff velocity; both conditions enhance the potential for erosion to occur."[90] In lieu of vegetation preservation or replanting, soil stabilization is the most effective measure in preventing erosion on slopes. Research has shown that effective soil stabilization can reduce sediment discharge concentrations up to six times, as compared to soils without stabilization.[91] Slope stabilization at construction sites for erosion control is already the consensus among the regulatory community and is found throughout construction BMP manuals and permits. For these reasons, Permittees must ensure that slope stabilization is implemented on sites, as appropriate.

It is also necessary that Permittees ensure that construction sites are revegetated as early as feasible. Implementation of revegetation reduces the threat of polluted stormwater discharges from construction sites. Construction sites should permanently stabilize disturbed soils with vegetation at the conclusion of each phase of construction.[92] A survey of grading and clearing programs found one-third of the programs without a time limit for permanent revegetation, "thereby increasing the chances for soil erosion to occur."[93] USEPA states "the establishment and maintenance of vegetation are the most important factors to minimizing erosion during development."[94]

To ensure the MEP standard and water quality standards are met, advanced treatment systems may be necessary at some construction sites. In requiring the implementation of advanced treatment for sediment at construction sites, Permittees should consider the site's threat to water quality. In evaluating the threat to water quality, the following factors shall be considered: (1) soil erosion potential; (2) the site's slopes; (3) project size and type; (4) sensitivity of receiving waterbodies; (5) proximity to receiving waterbodies; (6) non-stormwater discharges; and (7) any other relevant factors. Advanced treatment is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.[95] Advanced treatment consists of a three part treatment train of coagulation, sedimentation, and polishing filtration. Advanced treatment has been effectively implemented extensively in the other states and in the Central Valley Region of California.[96] In addition, Water Board's inspectors have observed advanced treatment being effectively implemented at both large sites greater than 100 acres, and at small, 5-acre sites. Advanced treatment is often necessary for Permittees to ensure that discharges from construction sites are not causing or contributing to a violation of water quality standards.

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[90] USEPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
[91] Schueler, T., and H. Holland. 2000. "Muddy Water In—Muddy Water Out?" *The Practice of Watershed Protection.* p. 5.
[92] Ibid.
[93] Ibid. p. 11.
[94] USEPA. 1990. *Sediment and Erosion Control: An Inventory of Current Practices*. p. II-1.
[95] SWCRB. September 2, 2009. *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities – Order No. 2009-0009-DWQ.*
[96] SWRCB. 2004. Conference on Advanced Treatment at Construction Sites.

Provision C.6.d. Plan Approval Process. This section of the Permit requires the Permittees to review project proponents' stormwater management plans for compliance with local regulations, policies, and procedures. USEPA states that it is often easier and more effective to incorporate stormwater quality controls during the site plan review process or earlier.[97] In the Phase I stormwater regulations, USEPA states that a primary control technique is good site planning.[98] USEPA goes on to say that the most efficient controls result when a comprehensive stormwater management system is in place.[99] To determine if a construction site is in compliance with construction and grading ordinances and permits, USEPA states that the "MS4 operator should review the site plans submitted by the construction site operator before ground is broken."[100] Site plan review aids in compliance and enforcement efforts since it alerts the "MS4 operator early in the process to the planned use or non-use of proper BMPs and provides a way to track new construction activities."[101]

Provision C.6.e. (Inspections) The Water Board allows flexibility on the exact legal authority language, ERP, and BMPs required on a site. This section of the Permit pulls together the accountability of the whole Provision through regular inspections, consistent enforcement, and meaningful tracking. These three elements will help ensure that effective construction pollutant controls are in place in order to minimize construction polluted runoff to the stormdrain and waterbodies.

Currently, Annual Reports show that some Permittees provide no information on its construction inspection and enforcement programs; some Permittees only provide information on pre rainy season inspections; another group of Permittees conduct inspections through December and provide just the date each site was inspected; yet another group of Permittees provides a very brief summary of their respective overall inspection program; and there is a small group of Permittees who report meaningful inspection and enforcement information. Inspections of construction sites by Water Board staff have noted deficiencies in stormwater inspections and enforcement. Therefore, this section clearly identifies the level of effort necessary by all Permittees to minimize construction pollutant runoff into stormdrains and ultimately, waterbodies.

This section requires monthly inspections during the wet season of all construction sites disturbing one or more acre of land and at all high priority sites as determined by the Permittee or the Water Board as significant threats to water quality. Inspections shall focus on the adequacy and effectiveness of the site specific BMPs implemented for the six BMP categories. Permittees shall implement its ERP and require timely corrections of all actual and potential problems observed. All violations must be corrected in a timely manner with the goal of correcting them before the next rain event but no longer

[97] USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 6.3.2.1.
[98] *Federal Register*. Vol. 55, No. 222, Friday, November 16, 1990. Rules and Regulations. p. 48034.
[99] Ibid.
[100] USEPA. 2000. *Storm Water Phase II Compliance Assistance Guide*. EPA 833-R-00-002. Section 4.6.2.4, pp. 4–30.
[101] Ibid. pp. 4–31.

than 10 business days after the violations are discovered. All inspections shall be recorded on a written or electronic inspection form, and also tracked in an electronic database or tabular format. The tracked information provides meaningful data for evaluating compliance. An example tabular format is included as Table 6 – Construction Inspection Data. Submittal of this Table is not required in each Annual Report but encouraged. Each Permittee will need to use the information in the electronic database or tabular format to compile its Annual Reports. The Executive Officer may require that the tracked information be submitted electronically or in a tabular format. When required, Permittees shall submit that data within 10-working days of the requirement. The recommended submittal format is in Table 6 – Construction Inspection Data.

Provision C.6.f. Staff Training. This section of the Permit requires Permittees to conduct annual staff trainings for municipal staff. These trainings have been found to be extremely effective means to educate inspectors and to inform them of any changes to local ordinances and state laws. Trainings provide valuable opportunity for Permittees to network and share strategies used for effective enforcement and management of erosion control practices.

Table 6 – Construction Inspection Data

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Run-on and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	9/30/08	Dry	0	Written Notice			x					Driveway not stabilized				
Panoramic Views	10/15/08	Dry	0.5										x			50' of driveway rocked.
Panoramic Views	11/15/08	Rain	3	Stop Work	x		x				x	Uncovered graded lots eroding; Sediment entering a stormdrain that didn't have adequate protection.				
Panoramic Views	11/15/08	Drizzling	0.25										x			Lots blanketed. Storm drains pumped. Street cleaned.
Panoramic Views	12/1/08	Dry	4	Verbal Warning					x			Porta potty next to stormdrain.	x			Porta potty moved away from stormdrain.
Panoramic Views	1/15/08	Rain	3.25	Written Warning	x					x		Fiber rolls need maintenance; Tire wash water flowing into street				
Panoramic Views	1/25/09	Dry	0										x			Fiber rolls replaced.

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Run-on and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	2/28/09	Rain	2.4	Stop Work	x		x				x	Slope erosion control failed. Fiber rolls at the bottom of the hill flattened. Sediment laden discharge skipping protected stormdrains and entering unprotected stormdrains.				
Panoramic Views	2/28/09	Rain	0.1											x		Fiber rolls replaced. Silt fences added. More stormdrains protected. Streets cleaned. Slope too soggy to access.
Panoramic Views	3/15/09	Dry	1	Citation with Fine					x		x	Paint brush washing not designated	x			Street and storm drains cleaned. Slopes blanketed.
Panoramic Views	4/1/09	Dry	0.5	Citation with Fine							x	Concrete washout overflowed; Evidence of illicit discharge				
Panoramic Views	4/15/09	Dry	0										x			Concrete washout replaced; Storm drain and line cleaned.

C.7. Public Information and Outreach

Legal Authority

The following legal authority applies to section C.7:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(A)(6) requires, "A description of a program to reduce to the maximum extent practicable, pollutants in discharges from municipal separate storm sewers associated with the application of pesticides, herbicides, and fertilizer which will include, as appropriate, controls such as educational activities, permits, certifications, and other measures for commercial applicators and distributors, and controls for application in public right-of-ways and at municipal facilities."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(5) requires , "a description of a program to promote, publicize, and facilitate public reporting of the presence of illicit discharges or water quality impacts associated with discharges from municipal separate storm sewers."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(6) requires, "A description of educational activities, public information activities, and other appropriate activities to facilitate the proper management and disposal of used oil and toxic materials."

Fact Sheet Finding in Support of Provision C.7.

C.7-1 An informed and knowledgeable community is critical to the success of a stormwater program since it helps ensure greater support for the program as the public gains a greater understanding of stormwater pollution issues.

C.7-2 An informed community also ensures greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

C.7-3 The public education programs should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children.102

[102] USEPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

C.7-4 Target audiences should include (1) government agencies and official to achieve better communication, consistency, collaboration, and coordination at the federal, state, and local levels and (2) K-12/Youth Groups.103

C.7-5 Citizen involvement events should make every effort to reach out and engage all economic and ethnic groups.[104]

Specific Provision C.7 Requirements

Provision C.7.a. Storm Drain Inlet Marking. Storm drain inlet marking is a long-established program of outreach to the public on the nature of the storm drain system, providing the information that the storm drain system connects directly to creeks and the Bay and does not receive treatment. Past public awareness surveys have demonstrated that this BMP has achieved significant impact in raising awareness in the general public and meets the MEP standard as a required action. Therefore, it is important to set a goal of ensuring that all municipally-maintained inlets are legible labeled with a no dumping message. If storm drain marking can be conducted as a volunteer activity, it has additional public involvement value.

Provision C.7.b. Advertising Campaigns. Use of various electronic and/or print media on trash/litter in waterways and pesticides. Advertising campaigns are long-established outreach management practices. Specifically, the Bay Area Management Agencies Association (BASMAA) already implements an advertising campaign on behalf of the Permittees. While the Permittees have been successful at reaching certain goals for its Public Information/Participation programs, it must continue to increase public awareness of specific stormwater issues. This Permit also requires a pre-campaign survey and a post-campaign survey. These two surveys will help identify and quantify the audiences' knowledge, trends, and attitudes and/or practices; and to measure the overall population awareness of the messages and behavioral changes.

Provision C.7.c. Media Relations. Public service media time is available and allows the Permittees to leverage expensive media purchases to achieve broader outreach goals.

Provision C.7.d. Stormwater Point of Contact. As the public has become more aware, citizens are more frequently calling their local jurisdictions to report spills and other polluting behavior impacting stormwater runoff and causing non-stormwater prohibited discharges. Permittees are required to have a centralized, easily accessible point of contact both for citizen reports and to coordinate reports of problems identified by Permittee staff, permitting follow-up and pollution cleanup or prevention. Often the follow-up, cleanup, and/or prevention provide the opportunity to educate the immediate neighborhood through established public outreach mechanisms such as distributing door hangers in the neighborhood describing the remedy for the problem discovered. Permittees already have existing published stormwater point of contacts.

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[103] State Water Board. 1994. Urban Runoff Technical Advisory Committee Report and Recommendations. Nonpoint Source Management Program.

[104] USEPA. 2000. Storm Water Phase II Compliance Assistance Guide. EPA 833-R-00-002.

Provision C.7.e. Public Outreach Events. Staffing tables or booths at fairs, street fairs or other community events are a long-established outreach mechanism employed by Permittees to reach large numbers of citizens with stormwater pollution prevention information in an efficient and convenient manner. These have been ongoing in the Region for several municipal stormwater permit cycles and are MEP outreach actions. Permittees shall continue with such outreach events utilizing appropriate outreach materials, such as printed materials, newsletter/journal articles, and videos. Permittees shall also utilize existing community outreach events such as the Bringing Back the Natives Garden Tour.

Provision C.7.f. Watershed Stewardship Collaborative Efforts. Watershed and Creek groups are comprised of active citizens, but they often need support from the local jurisdiction and certainly need to coordinate actions with Permittees such as flood districts and cities.

Provision C.7.g. Citizen Involvement Events. Citizen involvement and volunteer efforts both accomplish needed creek cleanups and restorations, and serve to raise awareness and provide outreach opportunities. These have been ongoing in the Region for several municipal stormwater permit cycles and are MEP outreach actions.

In previous municipal stormwater permits, Public Information/Participation encompassed both Citizen Involvement Events and Public Outreach Events. Citizen Involvement Events are important because they provide the community opportunities to actively practice being good stewards of our environment. Therefore, this Permit separates out the Public Outreach Events from the Citizen Involvement Events to ensure that citizens in all Bay Area communities are given the opportunity to be involved. In addition, the Permit allows Permittees to claim both Public Outreach and Citizen Involvement credits if the event contains significant elements of both. The combined specified number of events for Public Outreach and Citizen Involvement are very close to current performance standards and/or level of effort for respective Public Information/Participation Programs.

Provision C.7.h. School-Age Children Outreach. Outreach to school children has proven to be a particularly successful program with an enthusiastic audience who are efficient to reach. School children also take the message home to their parents, neighbors, and friends. In addition, they are the next generation of decision makers and consumers.

Provision C.7.i. Outreach to Municipal Officials. It is important for Permittee staff to periodically inform Municipal Officials of the permit requirements and also future planning and resource needs driven by the permit and stormwater regulations.

C.8. Water Quality Monitoring

Legal Authority

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii); CWC section 13377; Federal
NPDES regulations 40 CFR 122.26(d)(2)(iv)

Specific Legal Authority: Permittees must conduct a comprehensive monitoring program as required under Federal NPDES regulations 40 CFR 122.48, 40 CFR 122.44(i), 40 CFR 122.26.(d)(1)(iv)(D), and 40 CFR 122.26(d)(2)(ii)-(iv).

Fact Sheet Findings in Support of Provision C.8

C.8-1 In response to questions regarding the type of water quality-based effluent limitations that are most appropriate for NPDES stormwater permits, and because of the nature of stormwater discharges, USEPA established the following approach to stormwater monitoring:

Each storm water permit should include a coordinated and cost-effective monitoring program to gather necessary information to determine the extent to which the permit provides for attainment of applicable water quality standards and to determine the appropriate conditions or limitations for subsequent permits. Such a monitoring program may include ambient monitoring, receiving water assessment, discharge monitoring (as needed), or a combination of monitoring procedures designed to gather necessary information.[105]

According to USEPA, the benefits of stormwater runoff monitoring include, but are not limited to, the following:

- Providing a means for evaluating the environmental risk of stormwater discharges by identifying types and amounts of pollutants present;
- Determining the relative potential for stormwater discharges to contribute to water quality impacts or water quality standard violations;
- Identifying potential sources of pollutants; and
- Eliminating or controlling identified sources more specifically through permit conditions.[106]

C.8-2 Provision C.8 requires Permittees to conduct water quality monitoring, including monitoring of receiving waters, in accordance with 40 CFR 122.44(i) and 122.48. One purpose of water quality monitoring is to demonstrate the effectiveness of the Permittees' stormwater management

[105] USEPA. 1996. Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf
[106] USEPA. 1992. NPDES Storm Water Sampling Guidance Document. EPA/833-B-92-001.

actions pursuant to this Permit and, accordingly, demonstrate compliance with the conditions of the Permit. Other water quality monitoring objectives under this Permit include:

- Assess the chemical, physical, and biological impacts of urban runoff on receiving waters;
- Characterize stormwater discharges;
- Assess compliance with Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs) in impaired waterbodies;
- Assess progress toward reducing receiving water concentrations of impairing pollutants;
- Assess compliance with numeric and narrative water quality objectives and standards;
- Identify sources of pollutants;
- Assess stream channel function and condition, as related to urban stormwater discharges;
- Assess the overall health and evaluate long-term trends in receiving water quality; and
- Measure and improve the effectiveness of the Permittees' urban runoff control programs and the Permittees' implemented BMPs.

C.8-3 Monitoring programs are an essential element in the improvement of urban runoff management efforts. Data collected from monitoring programs can be assessed to determine the effectiveness of management programs and practices, which is vital for the success of the iterative approach, also called the "continuous improvement" approach, used to meet the MEP standard. When water quality data indicate that water quality standards or objectives are not being met, particular pollutants, sources, and drainage areas can be identified and targeted for urban runoff management efforts. The iterative process in Provision C.1, Water Quality Standards Exceedances, could potentially be triggered by monitoring results. Ultimately, the results of the monitoring program must be used to focus actions to reduce pollutant loadings to comply with applicable WLAs, and protect and enhance the beneficial uses of the receiving waters in the Permittees' jurisdictions and the San Francisco Bay.

C.8-4 Water quality monitoring requirements in previous permits were less detailed than the requirements in this Permit. Under previous permits, each program could design its own monitoring program, with few permit guidelines. A decision by the California Superior Court[107] regarding two of the programs' permits stated:

Federal law requires that all NPDES permits specify "[r]equired monitoring including type, intervals, and frequency sufficient to yield

[107] San Francisco Baykeeper vs. Regional Water Quality Control Board, San Francisco Bay Region, Consolidated Case No. 500527, filed Nov. 14, 2003.

data which are representative of the monitored activity." 40 C.F.R. § 122.48(b). Here, there is no monitoring program set forth in the Permit. Instead, an annual Monitoring Program Plan is to be prepared by the dischargers to set forth the monitoring program that will be used to demonstrate the effectiveness of the Stormwater Management Plan. This does not meet the regulatory requirements that a monitoring program be set forth including the types, intervals, and frequencies of the monitoring.

The water quality monitoring requirements in Provision C.8 comply with 40 CFR 122.44(i) and 122.48(b), and the Superior Court decision.

C.8-5 The Water Quality Monitoring Provision is intended to provide answers to five fundamental management questions, outlined below. Monitoring is intended to progress as iterative steps toward ensuring that the Permittees' can fully answer, through progressive monitoring actions, each of the five management questions:

- Are conditions in receiving waters protective, or likely to be protective, of beneficial uses?
- What is the extent and magnitude of the current or potential receiving water problems?
- What is the relative urban runoff contribution to the receiving water problem(s)?
- What are the sources of urban runoff that contribute to receiving water problem(s)?
- Are conditions in receiving waters getting better or worse?

C.8-6 On April 15, 1992, the Water Board adopted Resolution No. 92-043 directing the Executive Officer to implement the Regional Monitoring Program for San Francisco Bay. Subsequent to a public hearing and various meetings, Board staff requested major permit holders in the Region, under authority of CWC section 13267, to report on the water quality of the Estuary. These permit holders, including the Permittees, responded to this request by participating in a collaborative effort through the San Francisco Estuary Institute. This effort has come to be known as the San Francisco Estuary Regional Monitoring Program for Trace Substances (RMP). The RMP involves collection and analysis of data on pollutants and toxicity in water, sediment and biota of the Estuary. The Permittees are required to continue to report on the water quality of the Estuary, as presently required. Compliance with the requirement through participation in the RMP is considered to be adequate compliance.

C.8-7 The Surface Water Ambient Monitoring Program (SWAMP) is a statewide monitoring effort, administered by the State Water Board, designed to assess the conditions of surface waters throughout California. One purpose of SWAMP is to integrate existing water quality monitoring activities of the State Water Board and the Regional Water Quality Control Boards, and to coordinate with other monitoring programs. Provision C.8 contains a

framework, referred to as a regional monitoring collaborative, within which Permittees can elect to work cooperatively with SWAMP to maximize the value and utility of both the Permittees' and SWAMP's monitoring resources.

C.8-8 In 1998 BASMAA published *Support Document for Development of the Regional Stormwater Monitoring Strategy*,[108] a document describing a possible strategy for coordinating the monitoring activities of BASMAA member agencies. The document states:

> BASMAA's member agencies are connected not only by geography but also by an overlapping set of environmental issues and processes and a common regulatory structure. It is only natural that the evolution of their individual stormwater management programs has led toward increasing amounts of information sharing, cooperation, and coordination.

This same concept is found in the optional provision for Permittees to form a regional monitoring collaborative. Such a group is meant to provide efficiencies and economies of scale by performing certain tasks (e.g., planning, contracting, data quality assurance, data management and analysis, and reporting) at the regional level. Further benefits are expected from closer cooperation between this group, the Regional Monitoring Program, and SWAMP.

C.8-9 This Permit includes monitoring requirements to verify compliance with adopted TMDL WLAs and to provide data needed for TMDL development and/or implementation. This Permit incorporates the TMDLs' WLAs adopted by the Water Board as required under CWA section 303(d).

C.8-10 SB1070 (California Legislative year 2005/2006) found that there is no single place where the public can go to get a look at the health of local waterbodies. SB1070 also states that all information available to agencies shall be made readily available to the public via the Internet. This Permit requires water quality data to be submitted in a specified format and uploaded to a centralized Internet site so that the public has ready access to the data.

Specific Provision C.8 Requirements

Each of the components of the monitoring provision is necessary to meet the objectives and answer the questions listed in the findings above. Justifications for each monitoring component are discussed below.

Provision C.8.a. Compliance Options. Provision C.8.a. provides Permittees options for obtaining monitoring data through various organizational structures, including use of data obtained by other parties. This is intended to

[108] EcoAnalysis, Inc. & Michael Drennan Assoc., Inc., *Support Document for Development of the Regional Stormwater Monitoring Strategy*, prepared for Bay Area Stormwater Management Agencies Association, March 2, 1998.

- Promote cost savings through economies of scale and elimination of redundant monitoring by various entities;
- Promote consistency in monitoring methods and data quality;
- Simplify reporting; and
- Make data and reports readily publicly available.

In the past, each Stormwater Countywide Program has conducted water quality monitoring on behalf of its member Permittees, and some data were collected by wider collaboratives, such as the Regional Monitoring Program. In this Permit, all the Stormwater Countywide Programs are encouraged to work collaboratively to conduct all or most of the required monitoring and reporting on a region-wide basis. For each monitoring component that is conducted collaboratively, one report would be prepared on behalf of all contributing Permittees; separate reports would not be required from each Program. Cost savings could result also from reduced contract and oversight hours, fewer quality assurance/quality control samples, shared sampling labor costs, and laboratory efficiencies.

Provision C.8.b. San Francisco Estuary Receiving Water Monitoring. The San Francisco Estuary is the ultimate receiving water for most of the urban runoff in this region. For this reason and because of the high value of its beneficial uses, Provision C.8.b requires focused monitoring on the Estuary to continue. Since the mid-1990s, Permittees have caused this monitoring to be conducted by contributing financially and with technical expertise, to the San Francisco Estuary Regional Monitoring Program for Trace Substances. Provision C.8.b requires such monitoring to continue.

Provisions C.8.c. & C.8.e.ii. Status Monitoring and Long-Term Monitoring. Status Monitoring and Long-Term Monitoring serve as surrogates to monitoring the discharge from all major outfalls, of which the Permittees have many. By sampling the sediment and water column in urban creeks, the Permittees can determine where water quality problems are occurring in the creeks, then work to identify which outfalls and land uses are causing or contributing to the problem. In short, Status and Long-Term Monitoring are needed to identify water quality problems and assess the health of streams; they are the first step in identifying sources of pollutants and an important component in evaluating the effectiveness of an urban runoff management program.

Provisions C.8.c.i. and C.8.e.iii. Parameters and Methods
Status & Long-Term parameters and methods reflect current accepted practices, based on the knowledge and experience of personnel responsible for water quality monitoring, including state and Regional SWAMP managers, Permittee representatives, and citizen monitors. Many Status and Long-Term Monitoring parameters are consistent with parameters the Permittees have been monitoring to date. The following parameters are new for some of the Permittees:

- Biological Assessment—to provide site-specific information about the health and diversity of freshwater benthic communities within a specific reach of a creek, using standard procedures developed and/or used by the State Water

Resources Control Board Surface Water Ambient Monitoring Program.[109] It consists of collecting samples of benthic communities and conducting a taxonomic identification to measure community abundance and diversity, which is then compared to a reference creek to assess benthic community health. This monitoring can also provide information on cumulative pollutant exposure/impacts because pollutant impacts to the benthic community accumulate and occur over time.

- Chlorine—to detect a release of potable water or other chlorinated water sources, which are toxic to aquatic life.
- Nutrients—recent monitoring data indicate nutrients, which can increase algal growth and decrease dissolved oxygen concentrations, are present in significant concentrations in Bay area creeks.
- Toxicity and Pollutants in Bedded Sediment—to determine the presence of, and identify, chemicals and compounds that bind to sediment in a creek bed and are toxic to aquatic life.
- Pathogen Indicators—to detect pathogens in waterbodies that could be sources of impairment to recreational uses at or downstream of the sampling location.
- Stream Survey (stream walk and mapping)—to assess the overall physical health of the stream and to gain information potentially useful in interpreting monitoring results.

In consideration of economic impacts to Permittees, the minimum number of Status & Long-Term samples ("Minimum # Sample Sites" columns in Tables 8.1 and 8.3) reflects the Programs' populations, not waterbody size. Permittees must select exact sample locations that will yield adequate information on the status of their waterbodies; in some cases, additional sampling above the minimum might be necessary.

Provisions C.8.c.ii. and C.8.e.iii. Frequency

Status Monitoring continues to be an annual requirement for the Permittees, except for two much smaller Permittees, Fairfield-Suisun and Vallejo. In considering costs, the frequency of Status Monitoring is established at twice per Permit term for Fairfield-Suisun, and once per Permit term for Vallejo. It is common for Permit terms to be extended through a lengthy Permit reissuance process. Thus, these frequencies are considered the minimum; costs are minimized while data necessary for successful stormwater management are obtained.

Long-Term Monitoring is required every second year (biennially), rather than annually, in order to balance data needs and Permittee costs. To further reduce costs, the Fairfield-Suisun and Vallejo Permittees have no Long-Term Monitoring requirements.

Provisions C.8.c.iii. and C.8.e.ii. Locations

Status Monitoring is to be conducted on a rotating-watershed basis, in similar fashion to the Statewide SWAMP. Provision C.8.c.iii. identifies the major waterbodies, and Permittees are to select which of these waterbodies will be sampled during the Permit

[109] Ode, P.R. 2007. Standard Operating Procedures for Collecting Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California, California State Water Resources Control Board Surface Water Ambient Monitoring Program (SWAMP), as subsequently revised.

term. The exact sample locations within each waterbody are critical in terms of determining the monitoring program's effectiveness. If correctly sited, the stations are expected to be very useful in answering the monitoring program's management questions and meeting its goals. For this reason, Provision C.8.c.iii. requires sample locations to be based on surrounding land use, likelihood of urban runoff impacts, existing data gaps, and similar considerations. This will help maximize the utility of the sample locations, while also providing the Permittees with adequate flexibility to ultimately choose practical Status Monitoring locations.

Long-Term Monitoring is to be conducted at fixed stations, which are intended to be lower reaches of urban creeks. This monitoring is intended to help assess progress toward reducing receiving water concentrations of impairing pollutants, among other purposes. Provision C.8.e.ii. establishes the waterbodies on which to locate fixed stations, and suggests that fixed stations be co-located with SWAMP fixed stations so that Permittees can use SWAMP data to fulfill some of their monitoring requirements. However, Permittees may select alternate locations based on their knowledge of such factors as site access and stream characteristics and provided that similar data types, data quality, and data quantity are collected.

Provision C.8.d. Monitoring Projects. Monitoring Projects are necessary to meet several water quality monitoring objectives under this Permit, including characterize stormwater discharges; identify sources of pollutants; identify new or emerging pollutants; assess stream channel function and condition; and measure and improve the effectiveness of Stormwater Countywide Programs and implemented BMPs. In consideration of economic impacts to Permittees, the number of Monitoring Projects required reflects the Permittees' populations.

Provision C.8.d.i. Stressor/Source Identification
Minimizing sources of pollutants that could impair water quality is a central purpose of urban runoff management programs. Monitoring which enables the Permittees to identify sources of water quality problems aids the Permittees in focusing their management efforts and improving their programs. In turn, the Permittees' programs can abate identified sources, which will improve the quality of urban runoff discharges and receiving waters. This monitoring is needed to address the management question, "What are the sources to urban runoff that contribute to receiving water problems?"

When Status or Long-Term Monitoring results indicate an exceedance of a water quality objective, toxicity threshold, or other "trigger", Permittees must identify the source of the problem and take steps to reduce any pollutants discharged from or through their municipal storm sewer systems. This requirement conforms to the process, outlined in Provision C.1., of complying with the Discharge Prohibition and Receiving Water Limitations. If multiple "triggers" are identified through monitoring, Permittees must focus on the highest priority problems; a cap on the total number of source identification projects conducted within the Permit term is provided to cap Permittees' potential costs.

Provision C.8.d.ii. BMP Effectiveness Investigation
U.S. EPA's stated approach to NPDES stormwater permitting uses BMPs in first-round permits, and expanded or better-tailored BMPs in subsequent permits, where necessary, to provide for the attainment of water quality standards.[110] The purpose of this monitoring project is to investigate the effectiveness of one currently in-use BMP to determine how it might be improved. Permittees may choose the particular stormwater treatment or hydromodification control BMP to investigate. As with other monitoring requirements, Permittees may work collaboratively to conduct one investigation on a region-wide basis, or each stormwater countywide program may conduct an investigation.

Provision C.8.d.iii. Geomorphic Project
The physical integrity of a stream's bed, bank and riparian area is integral to the stream's capacity to withstand the impacts of discharged pollutants, including chemical pollutants, sediment, excess discharge volumes, increased discharge velocities, and increased temperatures. At present, various efforts are underway to improve geomorphic conditions in creeks, primarily through local watershed partnerships. In addition, local groups are undertaking *green stormwater projects* with the goal of minimizing the physical and chemical impacts of stormwater runoff on the receiving stream. Such efforts ultimately seek to improve the integrity of the waterbodies that receive urban stormwater runoff.

The purpose of the Geomorphic Project is to contribute to these ongoing efforts in each Stormwater Countywide Program area. Permittees may select the geomorphic project from three categories specified in the Permit.

C.8.e. Pollutants of Concern[111] Monitoring. Federal CWA section 303(d) TMDL requirements, as implemented under the CWC, require a monitoring plan designed to measure the effectiveness of the TMDL point and nonpoint source control measures and the progress the waterbody is making toward attaining water quality objectives. Such a plan necessarily includes collection of water quality data. Provision C.8.e. establishes a monitoring program to measure of the effectiveness of TMDL control measures in progressing toward WLAs. Locations, parameters, methods, protocols, and sampling frequencies for this monitoring are specified. A sediment delivery estimate/budget is also required to improve the Permittees' estimates of their loading estimates. In addition, a workplan is required for estimating loads and analyzing sources of emerging pollutants, which are likely to be present in urban runoff, in the next Permit term.

C.8.f. Citizen Monitoring and Participation. CWA section 101(e) and 40 CFR Part 25 broadly require public participation in all programs established pursuant to the CWA, to foster public awareness of environmental issues and decision-making processes. Provision C.8.f. is intended to do the following:

[110] USEPA. 1996. *Interim Permitting Approach for Water Quality-Based Effluent Limitations in Stormwater Permits*. Sept. 1, 1996. http://www.epa.gov/npdes/pubs/swpol.pdf
[111] See section C.9, C.11, C.12, and C.13 of this Fact Sheet for more information on Pollutants of Concern.

- Support current and future creek stewardship efforts by providing a framework for citizens and Permittees to share their collective knowledge of creek conditions; and
- Encourage Permittees to use and report data collected by creek groups and other third-parties when the data are of acceptable quality.

C.8.g. Reporting. CWC section 13267 provides authority for the Water Board to require technical water quality reports. Provision C.8.g. requires Permittees to submit electronic and comprehensive reports on their water quality monitoring activities to (1) determine compliance with monitoring requirements; (2) provide information useful in evaluating compliance with all Permit requirements; (3) enhance public awareness of the water quality in local streams and the Bay; and (4) standardize reporting to better facilitate analyses of the data, including for the CWA section 303(d) listing process.

C.9. – C.14. Pollutants of Concern including Total Maximum Daily Loads

Provisions C.9 through C.14 pertain to pollutants of concern, including those for which TMDLs are being developed or implemented.

Legal Authority

The following legal authority applies to provisions C.9 through C.14:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulation 40 CFR 122.44(d)(1) requires municipal stormwater permits to include any requirements necessary to, "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

Federal NPDES regulation 40 CFR 122.44(d)(1)(i) requires NPDES permits to include limitations to, "control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which are or may be discharged at a level which will cause, have reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

Basin Plan Requirements: Section 4.8 of the Region's Water Quality Control Plan (Basin Plan) requires that stormwater permits include requirements to prevent or reduce discharges of pollutants that cause or contribute to violations of water quality objectives. In the first phase, the Water Board requires implementation of technically and economically feasible control measures to reduce pollutants in stormwater to the MEP. If this first phase does not result in attainment of water quality objectives, the Water Board will consider permit conditions that might require implementation of additional control measures. For example, the control measures required as a result of TMDLs may go beyond the measures required in the first phase of the program.

General Strategy for Sediment-Bound Pollutants (Mercury, PCBs, legacy pesticides, PBDEs)

The control measures for mercury are intended to implement the urban runoff requirements stemming from TMDLs for this pollutant. The control measures required for PCBs are intended to implement those that are consistent with control measures in the PCBs TMDL implementation plan that has been approved by the Water Board and is pending approval by the State Board, the Office of Administrative Law, and U.S. EPA. The urban runoff management requirements in the PCBs TMDL implementation plan call for permit-term requirements based on an assessment of controls to reduce

PCBs to the MEP, and that is the intended approach of the required provisions for all pollutants of concern. Many of the control actions addressing PCBs and mercury will result in reductions of a host of sediment-bound pollutants, including legacy pesticides, mercury, PBDEs, and PCBs. The strategy for these pollutants is to use PCBs control guide decisions concerning where to focus effort, but implementation of the control efforts would taken into account the benefits for controlling other pollutants of concern. Further, because many of the control strategies addressing these pollutants of concern are relatively untested, the Water Board will implement control measures in the following modes:

1. Full-scale implementation throughout the region.
2. Focused implementation in areas where benefits are most likely to accrue.
3. Pilot-testing in a few specific locations.
4. Other: This may refer to experimental control measures, Research and Development, desktop analysis, laboratory studies, and/or literature review.

The logic of such categorization is that, as actions are tested and confidence is gained regarding level of experience and confidence in the control measure's effectiveness, the control measure may be implemented with a greater scope. For example, an untested control measure for which the effectiveness is uncertain may be implemented as a pilot project in a few locations during this permit term. If benefits result, and the action is deemed effective, it will be implemented in subsequent permit terms in a focused fashion in more locations or perhaps fully implemented throughout the Region, depending upon the nature of the measure. On the other hand there may be some control measures in which there is sufficient confidence, on the basis of prior experience, that the control action should be implemented in all applicable locations and/or situations. By conducting actions in this way and gathering information about effectiveness and cost, we will advance our understanding and be able to perform an updated assessment of the suite of actions that will constitute MEP for the following permit term. In fact, in additional to implementing control measures, gathering the necessary information about control measure effectiveness is a vital part of what needs to be accomplished by Permittees during this permit term. In the next permit term, control measures will be implemented on the basis of what we learn in this term, and we will, thus, achieve iterative refinement and improvement through time.

Background on Specific Provisions: Provisions C.9 through C.14 contain both technology-based requirements to control pollutants to the MEP and water quality based requirements to prevent or reduce discharges of pollutants that may cause or contribute to violations of water quality standards. Provisions C.9 and C.11 of the Permit incorporate requirements for the two TMDLs that have been fully approved and are effective for the Permittees. These TMDLs are for pesticide-related toxicity in urban creeks and mercury in San Francisco Bay. Additionally, Provision C.12 contains measures that address PCBs. The Regional Water Board has adopted a PCB TMDL, but it is still pending approval by State Board, the Office of Administrative Law, and U.S. EPA. This PCBs TMDL includes requirements that would be consistent with this

provision. Finally, Provision C.13 contains measures to implement the copper site-specific objective in San Francisco Bay.

Where a TMDL has been approved, NPDES permits must contain effluent limitations and conditions consistent with the requirements and assumptions in the TMDL.[112] Effluent limitations are generally expressed in numerical form. However, USEPA recommends that for NPDES-regulated municipal and small construction stormwater discharges, effluent limitations should be expressed as BMPs or other similar requirements rather than as numeric effluent limitations.[113] Consistent with USEPA's recommendation, this section implements WQBELs expressed as an iterative BMP approach capable of meeting the WLAs in accordance with the associated compliance schedule. The Permit's WQBELs include the numeric WLA as a performance standard and not as an effluent limitation. The WLA can be used to assess if additional BMPs are needed to achieve the TMDL Numeric Target in the waterbody.

[112] 40 CFR 122.44(d)(1)(vii)(B)
[113] USEPA, 2002. Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs. P. 4.

C.9. Pesticides Toxicity Control

Fact Sheet Findings in Support of Provision C.9.

C.9-1 This Permit fulfills the Basin Plan amendments the Water Board adopted that establish a Water Quality Containment Strategy and TMDL for diazinon and pesticide-related toxicity for Bay Area urban creeks on November 16, 2005, and approved by the State Water Board on November 15, 2006. The Water Quality Containment Strategy requires urban runoff management agencies to minimize their own pesticide use, conduct outreach to others, and lead monitoring efforts. Control measures implemented by urban runoff management agencies and other entities (except construction and industrial sites) shall reduce pesticides in urban runoff to the MEP.

C.9-2 **(Allocations):** The TMDL is allocated to all urban runoff, including urban runoff associated with MS4s, Caltrans facilities, and industrial, construction, and institutional sites. The allocations are expressed in terms of toxic units and diazinon concentrations.

Specific Provision C.9 Requirements

C.9 provisions fully implement the TMDL for Urban Creeks Pesticide Toxicity. All C.9 provisions are stated explicitly in the implementation plan for this TMDL. Permittees are encouraged to coordinate activities with the Urban Pesticide Pollution Prevention Project, the Urban Pesticide Committee, and other agencies and organizations. The Urban Pesticide Pollution Prevention (UP3) Project has been funded by a grant from the State Water Board and its goal is to prevent water pollution from urban pesticide use. The Urban Pesticides Committee serves as an information clearinghouse and as a forum for coordinating pesticide TMDL implementation.

The UP3 Project provides resources and information on integrated pest management (IPM) and tools to municipalities to support their efforts to reduce municipal pesticide use and to conduct outreach to their communities on less-toxic methods of pest control. In addition, it provides technical assistance to municipalities to encourage the U.S. Environmental Protection Agency and the California Department of Pesticide Regulation to prevent water quality problems from pesticides. It also maintains and manages the Urban Pesticides Committee, a statewide network of agencies, nonprofits, industry, and other stakeholders that are working to solve water quality problems from pesticides.

Specific tools provided by the UP3 Project that relate to permit requirements include:

- Guidance and resources to help agencies create contracts and bid documents for structural pest management services that help them meet their integrated pest management goals
- IPM policies and ordinances
- IPM training workshops and materials

- Outreach program design resources
- Resources for evaluating effectiveness

Provisions C.9.a through C.9.d are designed to insure that integrated pest management (IPM) is adopted and implemented as policy by all municipalities. IPM is a pest control strategy that uses an array of complementary methods: natural predators and parasites, pest-resistant varieties, cultural practices, biological controls, various physical techniques, and pesticides as a last resort. If implemented properly, it is an approach that can significantly reduce or eliminate the use of pesticides. The implementation of IPM will be assured through training of municipal employees and the requirement that municipalities only hire IPM-certified contractors.

Provision C.9.e requires that municipalities (through cooperation or participation with BASMAA) track and participate in pesticide regulatory processes like the USEPA pesticide evaluation and registration activities related to surface water quality, and the California Department of Pesticide Regulation (DPR) pesticide evaluation activities. The goal of these efforts is to encourage both the state and federal pesticide regulatory agencies to accommodate water quality concerns within the pesticide regulation or registration process. Through these efforts, it could be possible to prevent pesticide-related water quality problems from happening by affecting which products are brought to market.

Provision C.9.g is critical to the success of municipal efforts to control pesticide-related toxicity. Future permits must be based on an updated assessment of what is working and what is not. With every provision comes the responsibility to assess its effectiveness and report on these findings through the permit. The particulars of assessment will depend on the nature of the control measure.

Provision C.9.h directs the municipalities to conduct outreach to consumers at point of purchase and provide targeted information on proper pesticide use and disposal, potential adverse impacts on water quality, and less toxic methods of pest prevention and control. One way in which this can be accomplished is for the Permittees to participate in and provide resources for the "Our Water, Our World" program (www.ourwaterourworld.org) or a functionally equivalent pesticide use reduction outreach program. The "Our Water, Our World" program has developed a Web site with many resources, "to assist consumers in managing home and garden pests in a way that helps protect" the environment.

C.10. Trash Load Reduction

Legal Authority

The following legal authority applies to section C.10:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and Federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires, "shall be based on a description of a program, including a schedule, to detect and remove (or require the discharger to the municipal storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(2) requires, "a description of procedures to conduct on-going field screening activities during the life of the permit, including areas or locations that will be evaluated by such field screens."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(3) requires, "a description of procedures to be followed to investigate portions of the separate storm sewer system that, based on the results of the field screen, or other appropriate information, indicate a reasonable potential of containing illicit discharges or other sources of non-storm water."

Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B)(4) requires, "a description of procedures to prevent, contain, and respond to spills that may discharge into the municipal separate storm sewer."

San Francisco Bay Basin Plan, Chapter 4 – Implementation, Table 4-1 Prohibitions, Prohibition 7, which is consistent with the State Water Board's Enclosed Bays and Estuaries Policy, Resolution 95-84, prohibits the discharge of rubbish, refuse, bark, sawdust, or other solid wastes into surface waters or at any place where they would contact or where they would be eventually transported to surface waters, including flood plain areas. This prohibition was adopted by the Water Board in the 1975 Basin Plan, primarily to protect recreational uses such as boating.

Fact Sheet Findings in Support of Provision C.10

C.10-1 Trash and litter are a pervasive problem near and in creeks and in San Francisco Bay. Controlling trash is one of the priorities for this Permit reissuance not only because of the trash discharge prohibition, but also because trash and litter cause particularly major impacts on our enjoyment of creeks and the Bay. There are also significant impacts on aquatic life and habitat in those waters and eventually to the global ocean ecosystem, where plastic often floats, persists in the environment for hundreds of years, if not

forever, concentrates organic toxins, and is ingested by aquatic life. There are also physical impacts, as aquatic species can become entangled and ensnared and can ingest plastic that looks like prey, losing the ability to feed properly.

For the purposes of this provision, trash is defined to consist of litter and particles of litter. Man made litter is defined in California Government Code section 68055.1 (g): *Litter* means all improperly discarded waste material, including, but not limited to, convenience food, beverage, and other product packages or containers constructed of steel, aluminum, glass, paper, plastic, and other natural and synthetic materials, thrown or deposited on the lands and waters of the state, but not including the properly discarded waste of the primary processing of agriculture, mining, logging, sawmilling, or manufacturing.

C.10-2 Data collected by Water Board staff using the SWAMP Rapid Trash Assessment (RTA) Protocol,[114] over the 2003–2005 period,[115] suggest that the current approach to managing trash in waterbodies is not reducing the adverse impact on beneficial uses. The levels of trash in the waters of the San Francisco Bay Region are alarmingly high, considering the Basin Plan prohibits discharge of trash and that littering is illegal with potentially large fines. Even during dry weather conditions, a significant quantity of trash, particularly plastic, is making its way into waters and being transported downstream to San Francisco Bay and the Pacific Ocean. On the basis of 85 surveys conducted at 26 sites throughout the Bay Area, staff have found an average of 2.93 pieces of trash for every foot of stream, and all the trash was removed when it was surveyed, indicating high return rates of trash over the 2003–2005 study period. There did not appear to be one county within the Region with higher trash in waters—the highest wet weather deposition rates were found in western Contra Costa County, and the highest dry weather deposition was found in Sonoma County. Results of the trash in waterbodies assessment work by staff show that rather than adjacent neighborhoods polluting the sites at the bottom of the watershed, these areas, which tend to have lower property values, are subject to trash washing off with urban stormwater runoff cumulatively from the entire watershed.

C.10-3 A number of key conclusions can be made on the basis of the trash measurement in streams:

- Lower watershed sites have higher densities of trash.
- All watersheds studied in the San Francisco Bay Region have high levels of trash.
- There are trash source hotspots, usually associated with parks, schools, or poorly kept commercial facilities, near creek channels, that appear to contribute a significant portion of the trash deposition at lower watershed sites.

[114] SWAMP Rapid Trash Assessment Protocol, Version 8
[115] SWAMP S.F. Bay Region Trash Report, January 23, 2007

- Dry season deposition of trash, associated with wind and dry season runoff, contributes measurable levels of trash to downstream locations.
- The majority of trash is plastic at lower watershed sites where trash accumulates in the wet season. This suggests that urban runoff is a major source of floatable plastic found in the ocean and on beaches as marine debris.
- Parks that have more evident management of trash by city staff and local volunteers, including cleanup within the creek channel, have measurably less trash pieces and higher RTA scores.

C.10-4 The ubiquitous, unacceptable levels of trash in waters of the San Francisco Bay Region warrant a comprehensive and progressive program of education, warning, and enforcement, and certain areas warrant consideration of structural controls and treatment.

C.10-5 Trash in urban waterways of coastal areas can become *marine debris*, known to harm fish and wildlife and cause adverse economic impacts.[116] Trash is a regulated water pollutant that has many characteristics of concern to water quality. It accumulates in streams, rivers, bays, and ocean beaches throughout the San Francisco Bay Region, particularly in urban areas.

C.10-6 Trash adversely affects numerous beneficial uses of waters, particularly recreation and aquatic habitat. Not all litter and debris delivered to streams are of equal concern with regards to water quality. Besides the obvious negative aesthetic effects, most of the harm of trash in surface waters is imparted to wildlife in the form of entanglement or ingestion.[117,118] Some elements of trash exhibit significant threats to human health, such as discarded medical waste, human or pet waste, and broken glass.[119] Also, some household and industrial wastes can contain toxic batteries, pesticide containers, and fluorescent light bulbs that contain mercury. Large trash items such as discarded appliances can present physical barriers to natural stream flow, causing physical impacts such as bank erosion. From a management perspective, the persistent accumulation of trash in a waterbody is of particular concern, and signifies a priority for prevention of trash discharges. Also of concern are trash *hotspots* where illegal dumping, littering, and/or accumulation of trash occur.

C.10-7 The narrative water quality objectives applicable to trash are Floating Material (Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely

[116] Moore, S.L., and M.J. Allen. 2000. Distribution of anthropogenic and natural debris on the mainland shelf of the Southern California Bight. *Mar. Poll. Bull*. 40:83-88.
[117] Laist, D. W. and M. Liffmann. 2000. *Impacts of marine debris: research and management needs.* Issue papers of the International Marine Debris Conference, Aug. 6-11, 2000. Honolulu, HI, pp. 16–29.
[118] McCauley, S.J. and K.A. Bjorndahl. 1998. Conservation implications of dietary dilution from debris ingestion: sublethal effects in post-hatchling loggerhead sea turtles. *Conserv. Biol.* 13(4):925-929.
[119] Sheavly, S.B. 2004. *Marine Debris: an Overview of a Critical Issue for our Oceans*. 2004 International Coastal Cleanup Conference, San Juan, Puerto Rico. The Ocean Conservancy.

affect beneficial uses), Settleable Material (Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses), and Suspended Material (Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses).

C.10-8 The Water Board, at its February 11, 2009 hearing, adopted a resolution proposing that 26 waterbodies in the region be added to the 303(d) list for the pollutant trash. The adopted Resolution and supporting documents are contained in Attachment 10.1 – 303(d) Trash Resolution and Staff Report Feb 2009.

Specific Provision C.10 Requirements

Provision C.10. Permittees shall demonstrate compliance with Discharge Prohibition A.2 and trash-related Receiving Water Limitations through the timely implementation of control measures and other actions to reduce trash loads from municipal separate storm sewer systems (MS4s) by 40% by 2014, 70% by 2017, and 100% by 2022 as further specified below.

C.10.a.i. Short-Term Trash Load Reduction Plan
The Short-Term Trash Load Reduction Plan is intended to describe actions to incrementally reduce trash loads toward the 2014 requirement of a 40% reduction and eventual abatement of trash loads to receiving waters.

C.10.a.ii. Baseline Trash Load and **Trash Load Reduction Tracking Method**
In order to achieve the incremental trash load reductions in an accountable manner, the Permittees will propose Baseline Trash Loads and a Trash Load Reduction Tracking Method. The Tracking will account for additional trash load reducing actions and BMPs the Permittees implement. Permittees are also able to propose, with documentation, areas for exclusion from the Tracking Method accounting, by demonstrating that these areas already meet the Discharge Prohibition A.2 and have no trash loads.

C.10.a.iii. Minimum Full Trash Capture
Installation of full trash capture systems to prevent trash loads through the MS4 is MEP as demonstrated by the significant implementation of these systems occurring in the Los Angeles region. The minimum full trash capture installation requirements in this permit represent a moderate initial step toward employing this tool for trash load reduction.

C.10.b.i, ii. Trash Hot Spot Selection and Clean Up
Trash Hot Spots must be cleaned up as an interim measure until complete abatement of trash loads occurs. Eventually, with adequate source controls and trash loading abatement, trash hot spots will not occur in the receiving waters. In addition, Permittees will be credited for trash volume removed from hot spots in the trash load reduction tracking.

C.10.b.iii. Hot Spot Assessments
Trash Hot Spot assessments have been simplified and streamlined. Rather than counting individual trash items, which can vary in size from small plastic of glass particles to shopping carts, volume of material removed is measured, along with dominant types of trash removed. Photographs are recorded both before and after cleanup, to add to the record and verify cleanup.

C.10.c. Long Term Trash Load Reduction
Each Permittee will submit a Plan to achieve the incremental progress of 70% trash load reduction by 2017 during the following permit term, and the 100% reduction of trash loading by 2022.

C.10.d. Reporting
This sub-provision sets forth the reporting required in this provision, including the specific submittals and reports, and the annual reporting requirements.

Costs of Trash Control

Costs for either enhanced trash management measure implementation or installation and maintenance of trash capture devices are significant, but when spread over several years, and when viewed on a per-capita basis, are reasonable. Also, Trash capture devices have been installed by cities in California and in the Bay Region.

Trash and litter are costly to remove from our aquatic resource environments. Staff from the California Coastal Commission report that the Coastal Cleanup Day budget statewide: $200,000-250,000 for staff Coastal Commission staff, and much more from participating local agencies. The main component of this event is the 18,000 volunteer-hours which translates to $3,247,200 in labor, and so is equivalent to $3,250,000-3,500,000 per year to clean up 903,566 pounds of trash and recyclables at $3.60 to $3.90 per pound. This is one of the most cost-effective events because of volunteer labor and donations. The County of Los Angeles spends $20 million per year to sweep beaches for trash, according to Coastal Commission staff.

In Oakland, the Lake Merritt Institute is currently budgeted at $160,000 per year, with trash and litter removal from the Lake as a major task. The budget has increased from about $45,000 in 1996 to current levels. In the period of 1996-2005 the Lake Merritt Institute staff, utilizing significant volunteer resources, and accomplishing other education tasks, removed 410,859 pounds of trash from the Lake at cost of $951,725 at $2.3 per pound.

The City of Oakland reports that installation of two vortex and screen separators, titled by their brand name of CDS units, which cost, according to the table below, $821,000 for installations that treat tributary catchments of 192 acres before discharge to Lake Merritt at $4,276 per acre.

City of Oakland—CDS Unit Overview 9-07

Existing CDS unit location	Outfall number	Treatment area (acres)	Cost of implementation	Sizing	Maintenance requirements	Comments
Intersection of 27th and Valdez Streets	56*	71	$203,000 to contactor; plus ~$100,000 City costs	73 cfs peak flow; 36" stormdrain; Unit sizing: 18'6'6' box with 10'11"diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Required relocation of electrical conduit. Water main and gas line were also in the way; the box was adjusted to accommodate these conflicts.
Intersection of 22nd and Valley Streets	56*	121	$368,000 to contactor; plus ~$150,000 City costs	115 cfs peak flow; 54" stormdrain; Unit sizing: 18'8.5'6' box with 12'diam x 9'6" long cylinder	Visually inspect CDS Unit; remove trash and debris with Hydro Flusher bi-monthly	Installed in 2006. Installation costs were higher than anticipated. Sewer lines and PGE facilities were exposed that were not known before. Unit had to be modified and poured-in-place.

* The city is treating 192 acres or 72 percent of the 252 acres draining to outfall 56.

Mr. Morad Sedrak, the TMDL Implementation Program Manager, Bureau of Sanitation, Department of Public Works, City of Los Angeles, reports that the City plans to invest $72 million dollars for storm drain catch basin based capture device installation primarily, for a City of 4 million population, for a per-capita cost of $18 dollars. This effort is occurring over a span of over five years, for an annual per-capita cost of under $4.

Mr. Sedrak reports that O&M costs are not anticipated to increase, as the City of L.A. is already budgeted for 3 catch basin cleanings per year. He also states that catch basin inserts installed inside the catch basin in front of the lateral pipe, which have been certified by the Los Angeles Regional Water Board as total capture trash control devices, cost approximately $800 to $3,000 depending on the depth of the catch basin. The price quoted includes installation and the insert is made of Stainless Steel 316.

Furthermore, the price for catch basin opening screen covers, which are designed to retain trash at the street level for removal by sweepers, and also to open if there is a potential flooding blockage, ranges roughly from $800 to $4,500, depending on the opening size of the catch basin.

The City of Los Angeles has currently spent 27 million dollars on a retrofit program to install catch basin devices in approximately 30% of its area, with either inserts or screens

or both. Mr. Sedrak states that Los Angeles plans to spend $45 million over the next 3 years to retrofit the remaining catch basins within the City. The total number of catch basins within the City is approximately 52,000.

Here are some links to information about the Los Angeles trash control approach:

http://www.lastormwater.org/Siteorg/program/TMDLs/trashtmdl.htm

http://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdf)

http://www.lastorhttp://www.lastormwater.org/Siteorg/download/pdfs/general_info/Request-Certification-10-06.pdfmwater.org/Siteorg/program/poll_abate/cbscreens.htm)

http://www.lastormwater.org/Siteorg/program/poll_abate/cbinserts.htm

http://www.lastormwater.org/Siteorg/program/poll_abate/cbscreens.htm

Additional cost information on various trash capture devices are included in the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) BMP Trash Toolbox (July 2007). The Toolbox contains cost information for both trash capture devices and enhanced trash management measure implementation, covers a broad range of options and also discusses operation and maintenance costs. Catch basin screens are included with an earlier estimate by the City of Los Angeles of $44 million over 10 years to install devices in 34,000 inlets.

Litter booms are also discussed with an example from the City of Oakland. The Damon Slough litter boom or sea curtain cost $36,000 for purchase and installation, including slough side access improvements for maintenance and trash removal. Annual maintenance costs have been $77,000 for weekly maintenance, which includes use of a crane for floating trash removal.

The costs of the full trash capture device installation required in the Order is significantly less than the previous tentative orders requirements for trash capture, as set forth in the table below.

Trash Capture Cost Estimates – Final TO versus previous TOs

Trash Capture Device Requirement	Acres of Capture	Cost for Trash Capture Installation	Percent of Retail/Wholesale Commercial (ABAG 2005)	Per capita $, Population = 4,533,634
Final TO: Implemented in Year 4 – 30% of Retail/Wholesale Commercial	5527	**$ 27,635,000**	30%	$6.06
Previous TOs: Implement in Year 4, 5% of Urban/suburban land	0.05 X 529,712 = 26,485 (BASMAA) or ABAG 0.05 X 655,015 = 32,750	$132,425,000 or $163,750,000	5% of Urban/suburban land	$29 or $36

30**%** X 18,426 acres = 5527 acres X $5000/acre = **$27,635,000** for four counties for installation; maintenance will add an additional cost. The Permittees may work cooperatively to achieve this capture installation requirement, and there is the potential for Regional revenue development. The previous requirement was 5% of (.05 X 655,015) (529,712 by BASMAA's count) acres of urban land (from ABAG 2005 table) = 32,750 acres, ((26,486 according to BASMAA) X $5000 = $132,000,000).

C.11. Mercury Controls

Fact Sheet Findings in Support of Provision C.11

C.11-1 On August 9, 2006, the Water Board adopted a Basin Plan amendment including a revised TMDL for mercury in San Francisco Bay, two new water quality objectives, and an implementation plan to achieve the TMDL. The State Water Board has approved this Basin Plan amendment, and USEPA approval is pending. C.11-2 through C.11-6 are components of the Mercury TMDL implementation plan relevant to implementation through the municipal stormwater permit.

C.11-2 The 2003 load of mercury from urban runoff is 160 kg/yr, and the aggregate WLAs for urban runoff is 80 kg/yr and shall be implemented through the NPDES stormwater permits issued to urban runoff management agencies and Caltrans. The urban stormwater runoff allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of urban runoff management agencies (collectively, *source category*) including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

C.11-3 The allocations for this source category shall be achieved within 20 years, and, as a way to measure progress, an interim loading milestone of 120 kg/yr, halfway between the current load and the allocation, should be achieved within 10 years. If the interim loading milestone is not achieved, NPDES-permitted entities shall demonstrate reasonable and measurable progress toward achieving the 10-year loading milestone.

C.11-4 The NPDES permits for urban runoff management agencies shall require the implementation of BMPs and control measures designed to achieve the allocations or accomplish the load reductions derived from the allocations. In addition to controlling mercury loads, BMPs or control measures shall include actions to reduce mercury-related risks to humans and wildlife. Requirements in the permit issued or reissued and applicable for the term of the permit shall be based on an updated assessment of control measures intended to reduce pollutants in stormwater runoff to the MEP and remain consistent with the section of this chapter titled, *Surface Water Protection and Management—Point Source Control—Stormwater Discharges*.

C.11-5 The following additional requirements are or shall be incorporated into NPDES permits issued or reissued by the Water Board for urban runoff management agencies.

a. Evaluate and report on the spatial extent, magnitude, and cause of contamination for locations where elevated mercury concentrations exist;

b. Develop and implement a mercury source control program;

c. Develop and implement a monitoring system to quantify either mercury loads or loads reduced through treatment, source control, and other management efforts;

d. Monitor levels of methylmercury in discharges;

e. Conduct or cause to be conducted studies aimed at better understanding mercury fate, transport, and biological uptake in San Francisco Bay and tidal areas;

f. Develop an equitable allocation-sharing scheme in consultation with Caltrans (see below) to address Caltrans roadway and non-roadway facilities in the program area, and report the details to the Water Board;

g. Prepare an Annual Report that documents compliance with the above requirements and documents either mercury loads discharged, or loads reduced through ongoing pollution prevention and control activities; and

h. Demonstrate progress toward (a) the interim loading milestone, or (b) attainment of the allocations shown in Individual WLAs (see Table 4-w of the Basin Plan amendment), by using one of the following methods:

(1) Quantify the annual average mercury load reduced by implementing

i. Pollution prevention activities, and
ii. Source and treatment controls. The benefit of efforts to reduce mercury-related risk to wildlife and humans should also be quantified. The Water Board will recognize such efforts as progress toward achieving the interim milestone and the mercury-related water quality standards upon which the allocations and corresponding load reductions are based. Loads reduced as a result of actions implemented after 2001 (or earlier if actions taken are not reflected in the 2001 load estimate) may be used to estimate load reductions.

(2) Quantify the mercury load as a rolling 5-year annual average using data on flow and water column mercury concentrations.

(3) Quantitatively demonstrate that the mercury concentration of suspended sediment that best represents sediment discharged with urban runoff is below the suspended sediment target.

C.11-6 Urban runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to mercury loads to the Bay or is outside the jurisdiction or authority of an agency, the Water Board will consider a request from an urban runoff management agency that may include an allocation, load reduction, and/or other regulatory requirements for the source in question.

Specific Provision C.11 Requirements

The C.11 provisions implement the mercury TMDL and follow the general approach for sediment-bound pollutants discussed above where we seek to build our understanding and level of certainty concerning control actions by implementing actions in a phased approach. We then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective. Accordingly, there are some provisions that will be implemented throughout the Region, some that will be tested on a limited basis first before making the decision to expand region-wide in the next permit term. Some of the measures are companion measures for efforts targeting PCBs.

Provision C.11.a. Mercury is found in a wide variety of consumer products (e.g., fluorescent bulbs) that are subject to recycling requirements. These recycling efforts are already happening throughout the Region, and Provision C.11.a requires promotion, facilitation and/or participation in these region-wide recycling efforts to increase effectiveness and public participation.

Provision C.11.b. The remand resolution of the SF Bay Mercury TMDL made it clear that methyl mercury monitoring must be required of all NPDES Permittees. Methyl mercury is the most toxic form of mercury, and there is very little information, if any, regarding the concentrations of methyl mercury found in urban runoff. The purpose of the monitoring required through this provision is to obtain seasonal information and to assess the magnitude and spatial/temporal patterns of methylmercury concentrations in urban runoff.

Provisions C.11.c through Provision C.11.f relate to identical C.12 Provisions for PCBs. For each of these, sites for pilot studies will primarily be chosen on the basis of the potential for reducing PCB loads, but consideration will be given to mercury removal in the final design and implementation of the studies. For more information, see the fact sheet discussions for
Provisions C.12.c, d, e, and f and Provision C.2.g.

Provision C.11.g implements the TMDL requirement that Permittees measure mercury loads and loads reduced from program activities. There are three options for accomplishing this requirement: quantifying mercury loads reduced through implemented control measures, quantify mercury loading into the Bay from urban runoff, or demonstrating that the concentration of mercury on suspended sediment particles is below the sediment target of 0.2 ppm. It is likely that the first option will be chosen, and this will require development of an accounting system to establish what load reductions result from program activities. This will not be difficult for those measures that involve capture and measurement of mercury-containing sediment, but it will be more challenging for efforts that do not involve direct measurement.

Provision C.11.h is equivalent to Provision C.12.h for PCBs and is motivated by the same remaining technical uncertainties.

Provision C.11.i requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities.

Provision C.11.j requires an allocation sharing scheme to be developed in cooperation with Caltrans. The urban runoff TMDL allocation implicitly includes loads from Caltrans facilities.

C.12. PCBs Controls

The C.12 provisions are consistent with the regulatory approach and implementation plan of the San Francisco Bay PCBs TMDL adopted by the Water Board. They follow the general approach for sediment-bound pollutants discussed above where we seek to build our understanding and level of certainty concerning control actions by implementing actions in a phased approach. We then expand implementation of those actions that prove effective, and perhaps scale back or discontinue those that are not effective. Accordingly, there are some provisions that will be implemented throughout the region, some that will be tested on a limited basis first before making the decision to expand region-wide in the next permit term.

Fact Sheet Findings in Support of Provision C.12

C.12-2 On February 13, 2008, the Water Board adopted a Basin Plan amendment establishing a TMDL for PCBs in San Francisco Bay and an implementation plan to achieve the TMDL. Approval by the State Water Board and USEPA is pending. The following excerpts from the TMDL implementation plan are relevant to implementation of the municipal stormwater permit.

"Stormwater runoff wasteload allocations shall be achieved within 20 years and shall be implemented through the NPDES stormwater permits issued to stormwater runoff management agencies and the California Department of Transportation (Caltrans). The urban stormwater runoff wasteload allocations implicitly include all current and future permitted discharges, not otherwise addressed by another allocation, and unpermitted discharges within the geographic boundaries of stormwater runoff management agencies including, but not limited to, Caltrans roadway and non-roadway facilities and rights-of-way, atmospheric deposition, public facilities, properties proximate to stream banks, industrial facilities, and construction sites.

Requirements in each NPDES permit issued or reissued shall be based on an updated assessment of best management practices and control measures intended to reduce PCBs in urban stormwater runoff. Control measures implemented by stormwater runoff management agencies and other entities (except construction and industrial sites) shall reduce PCBs in stormwater runoff to the maximum extent practicable. Control measures for construction and industrial sites shall reduce discharges based on best available technology economically achievable. All permits shall remain consistent with Section 4.8 - Stormwater Discharges.

In the first five-year permit term, stormwater Permittees will be required to implement control measures on a pilot scale to determine their effectiveness and technical feasibility. In the second permit term, stormwater Permittees will be required to implement effective control measures, that will not cause significant adverse environmental impacts, in strategic locations, and to develop a plan to fully implement control measures that will result in

attainment of allocations, including an analysis of costs, efficiency of control measures and an identification of any significant environmental impacts. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations. If, as a consequence, allocations cannot be attained, the Water Board will take action to review and revise the allocations and these implementation requirements as part of adaptive implementation.

In addition, stormwater Permittees will be required to develop and implement a monitoring system to quantify PCBs urban stormwater runoff loads and the load reductions achieved through treatment, source control and other actions; support actions to reduce the health risks of people who consume PCBs-contaminated San Francisco Bay fish; and conduct or cause to be conducted monitoring, and studies to fill critical data needs identified in the adaptive implementation section.

Stormwater runoff management agencies have a responsibility to oversee various discharges within the agencies' geographic boundaries. However, if it is determined that a source is substantially contributing to PCBs loads to the Bay or is outside the jurisdiction or authority of an agency the Water Board will consider a request from an stormwater runoff management agency which may include an allocation, load reduction, and/or other regulatory requirements for the source in question."

C.12-3 **Some PCB congeners have dioxin-like properties.** Dioxins are persistent, bioaccumulative, toxic compounds that are produced from the combustion of organic materials in the presence of chlorine. Dioxins enter the air through fuel and waste emissions, including diesel and other motor vehicle exhaust fumes and trash incineration, and are carried in rain and contaminate soil. Dioxins bioaccumulate in fat, and most human exposure occurs through the consumption of animal fats, including those from fish. Therefore, the actions targeting PCBs will likely have the simultaneous benefit of addressing a portion of the dioxin impairment resulting from dioxin-like PCBs.

Specific Provision C.12 Requirements

Provision C.12.a. PCBs were used in a variety of electrical devices and equipment, some of which still can be found during industrial inspections. Provision C.12.a requires the stormwater management agencies to ensure that industrial inspectors can identify PCBs or PCB-containing equipment during their inspections and make sure appropriate agencies are notified if they are found. There is enough experience and/or background knowledge about the presence of such PCB-containing equipment that this measure should be implemented region-wide during this permit term.

Provision C.12.b. PCBs are used in a variety of building materials like caulks and adhesives. PCBs contained in such materials can be liberated and transported in runoff during and after demolition and renovation activities. At this point, it is not known how extensive this type of PCB contamination is in the region. Therefore, the expectation for

this permit term is that Permittees conduct pilot studies (Provision C.12.b) that includes evaluation of the presence of PCBs in such materials, sampling and analysis, and BMP development to prevent PCBs in these materials from being released into the environment during demolition and renovation. Conducting these pilot tests and reporting results will help determine if control measures for PCBs from these sources should be implemented in a more widespread fashion in the next permit term.

Provisions C.12.c and C.12.d form the core of PCB-related efforts for this permit term, and these efforts are crucial for the iterative development of effective control measures for PCBs and other sediment-bound pollutants in future permit terms. The overarching purpose of these two provisions is to conduct five comprehensive pilot studies in locations known to contain high levels of PCBs. The pilot studies will involve a combination of efforts including abatement of the on-land PCB contamination (Provision C.12.c) as well as exploration of sediment management practices (C.12.d) that can be implemented by municipalities to control migration of the PCBs away from the source of contamination. We expect that a suite of control measures will be applied in these five pilot regions to determine the optimum suite of measures for controlling PCB contamination and preventing its transport through the storm drain system. The lessons learned through these pilot efforts will inform the direction of future efforts targeting contaminated zones throughout the Region in subsequent permit terms.

Provision C.12.e. One promising management practice for addressing a wide range of sediment-bound contaminants, including PCBs is on-site treatment. Provision C.12.e requires selection of 10 locations for pilot studies spanning treatment types as described in the Provision. This effort can be conducted in conjunction with Provision C.12.d such that on-site treatment efforts conducted as part of C.12.d can be counted toward accomplishing C.12.e requirements.

Provision C.12.f. Another promising management practice is the diversion of certain flows to the sanitary sewers to be treated by the local POTWs. Provision C.12.f requires an evaluation of locations for diversion pilot studies and implementation of pilot studies at five pump stations. This effort can be conducted in conjunction with Provision C.12.d such that POTW diversion efforts conducted as part of C.12.d can be counted toward accomplishing C.12.f requirements. Also see discussion under Provision C.2.g.

Provision C.12.g requires, consistent with the approach taken in the PCBs TMDL, development of a monitoring system to quantify PCBs loads and loads reduced through source control, treatment and other management measures. This monitoring system will be used to determine progress toward meeting TMDL load allocations. This system should establish the baseline loading or loads reduced against which to compare future loading and load reductions.

Provision C.12.h. There are still uncertainties surrounding the magnitude and nature of PCBs reaching the Bay in urban runoff and the ultimate fate of such PCBs, including biological uptake. Provision C.12.h requires that Permittees ensure that fate and transport studies of PCBs in urban runoff are completed.

Provision C.12.i. requires actions that manage human health risk due to mercury and PCBs. These may include efforts to communicate the health risks of eating Bay fish and other efforts aimed at high risk-communities.

C.13. Copper Controls

Chronic and acute site-specific objectives (SSOs) for dissolved copper have been established in all segments of San Francisco Bay. The plan to implement the SSOs and ensure the achievement and ongoing maintenance of the SSOs in the entire Bay includes two types of actions for urban runoff management agencies. These actions from the SSO implementation are implemented through this permit as provisions to control urban runoff sources of copper as well as measures to resolve remaining technical uncertainties for copper fate and effects in the Bay.

The control measures for urban runoff target significant sources of copper identified in a report produced in 2004 for the Clean Estuary Partnership.[120] This report updated information on sources of copper in urban runoff, loading estimates and associated level of uncertainty, and summarized feasible control measures and priorities for further investigation. Accordingly, the permit provisions target major sources of copper including vehicle brake pads, architectural copper, copper pesticides, and industrial copper use.

Fact Sheet Findings in Support of Provision C.13.

C.13-1 Urban runoff is a conveyance mechanism by which copper reaches San Francisco Bay.

C.13-2 Copper has the reasonable potential to cause or contribute to exceedances of copper water quality standards in San Francisco Bay.

C.13-3 Site specific water quality objectives for dissolved copper have already been adopted for South San Francisco Bay will soon be adopted for the rest of the Bay.

C.13-4 The Permit requirements to control copper to the MEP are necessary to implement and support ongoing achievement of the site-specific water quality objectives.

Specific Provision C.13. Requirements

Provision C.13.a. Copper is used as an architectural feature in roofs, gutters and downspouts. When these roofs are cleaned with aggressive cleaning solutions, substantial amounts of copper can be liberated. The provision C.13.a for architectural copper involves a variety of strategies ranging from BMPs to prohibition against discharge of these cleaning wastes to the storm drain.

[120] TDC (TDC Environmental). 2004. *Copper Sources in Urban Runoff and Shoreline Activities*. Prepared for the Clean Estuary Partnership.

Provision C.13.b. Copper is commonly used as an algaecide in pools, spas, and fountains. The provision C.13.b prohibits discharge to the storm drain of copper-containing wastewater from such amenities.

Provision C.13.c. Vehicle brake pads are a large source of copper to the urban environment. There are cooperative efforts (e.g., the Brake Pad Partnership) evaluating the potential effects of brake wear debris on water quality. This cooperative effort could result in voluntary actions to reduce the amount of copper in automobile brake pads. However, this voluntary reduction is uncertain, and some aftermarket brake pads are possibly unaffected by the voluntary action. Moreover, the benefits of copper content reduction might be slowly realized because there is a great deal of wear debris already deposited on watersheds, and this wear debris will continue to be deposited as long as copper-containing brake pads are in use. Therefore, there might need to be additional measures addressing copper-containing wear debris on the part of urban stormwater management agencies. Provision C.13.c requires ongoing participation in the cooperative efforts of the Partnership.

Provision C.13.d Some industrial facilities likely use copper or have sources of copper (e.g., plating facilities, metal finishers, auto dismantlers). This control measure requires municipalities to include these facilities in their inspection program plans.

The most recent Staff Report[121] for the SSOs north of the Dumbarton Bridge also describes several areas of remaining technical uncertainty, and **Provision C.13.e** requires studies to address these uncertainties. Two of these areas are of particular concern, and urban runoff management agencies are required to conduct or cause to be conducted studies to help resolve these two uncertainties.

The first uncertainty concerns copper's tendency, even at low concentrations, to cause a variety of sublethal (not resulting in death, but in impaired function) effects. The studies documenting such effects have, so far, been conducted in the laboratory in experiments modeling freshwater systems, and many of them have not yet been published. A number of uncertainties need to be resolved before interpretation and extension to marine or estuarine systems can be attempted.[122]

The second uncertainty is that surface sediment samples have exhibited toxicity to test organisms at a number of sites throughout the Bay. Research has shown that sediment toxicity to bivalve embryos is caused by "elevated concentrations of divalent cations….with copper as the most probable cause of toxicity." Additional studies are needed to further examine whether water and sediment toxicity tests used in the RMP are accurate predictors of impacts on the Bay's aquatic and benthic communities.

[121] SFBRWQCB (San Francisco Bay Regional Water Quality Control Board). 2007. *Copper Site-Specific Objectives in San Francisco Bay: Proposed Basin Plan Amendment and Draft Staff Report.* June.
[122] Ibid.

C.14. Polybrominated Diphenyl Ethers (PBDE), Legacy Pesticides and Selenium

This section is predicated on the fact that legacy pesticides, PBDEs, and selenium are either known to impair or potentially impair Bay and tributary beneficial uses. Further, urban stormwater is a likely or potential cause or contributor to such impairment. The requirements for this permit term are primarily information gathering consistent with Provision C.1. Namely, this provision requires that Permittees gather information on a number of pollutants of concern (e.g., PBDEs, DDT, dieldrin, chlordane, selenium) for which TMDLs are planned or are in the early stages of development.

The goals of the provisions in this section are the following: One goal is to determine the concentrations and distribution of these pollutants and if urban runoff is a conveyance mechanism associated with their possible impairment of San Francisco Bay.

A second goal is to gather and provide information to allow calculation of PBDEs, legacy pesticides, and selenium loads to San Francisco Bay from urban runoff conveyance systems. A third goal is to identify control measures and/or management practices to eliminate or reduce discharges of PBDEs, legacy pesticides, or selenium conveyed by urban runoff conveyance systems. The Permittees are encouraged to work with the other municipal stormwater management agencies in the Bay Region to implement a plan to identify, assess, and manage controllable sources of these pollutants in urban runoff. The control actions initiated for PCBs will form the core of initial actions targeting sediment bound pollutants like these. It is very likely that some of these PCB control measures (see Provision C.12) warrant consideration for the control of sediment bound pollutants like PBDEs, legacy pesticides, and possibly others as well.

C.15. Exempted and Conditionally Exempted Discharges

Legal Authority

Broad Legal Authority: CWA section 402(p)(3)(B)(ii-iii), CWC section 1337, and Federal NPDES regulation 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Federal NPDES regulations 40 CFR 122.26(d)(2)(iv)(B) requires MS4 operators, "to detect and remove (or require the discharger to the municipal separate storm sewer to obtain a separate NPDES permit for) illicit discharges and improper disposal into the storm sewer."

Federal NPDES regulation 40 CFR 122.26(d)(2)(iv)(B)(1) provides that the Permittees shall prevent all types of illicit discharges into the MS4 except for certain non-stormwater discharges.

Fact Sheet Findings in Support of Provision C.15.

Prohibition A.1. effectively prohibits the discharge of non-stormwater discharges into the storm sewer system. However, we recognize that certain types of non-stormwater discharges may be exempted from this prohibition if they are unpolluted and do not violate water quality standards. Other types of non-stormwater discharges may be conditionally exempted from Prohibition A.1. if the discharger employs appropriate control measures and BMPs prior to discharge, and monitors and reports on the discharge.

Specific Provision C.15. Requirements

Provision C.15.a. Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are exempted from Discharge Prohibition A.1. if such discharges are unpolluted and do not violate water quality standards. If any exempted non-stormwater discharge is identified as a source of pollutants to receiving waters, the discharge shall be addressed as a conditionally exempted discharge and must meet the requirements of Provision C.15.b.

Provision C.15.b. Conditionally Exempted Non-Stormwater Discharges. This section of the Permit identifies the types of non-stormwater discharges that are conditionally exempted from Discharge Prohibition A.1. if they are identified by Permittees or the Executive Officer as not being sources of pollutants to receiving waters. To eliminate adverse impacts from such discharges, project proponents shall develop and implement appropriate pollutant control measures and BMPs, and where applicable, shall monitor and report on the discharges in accordance with the requirements specified in Provision C.15.b. The intent of Provision C.15.b.'s requirements is to facilitate Permittees in regulating these non-stormwater discharges to the storm drains since the Permittees have ultimate responsibility for what flows in those storm drains to receiving waters. For all planned discharges, the nature and characteristic of the discharge must be verified prior to the discharge so that effective

pollution control measures are implemented, if deemed necessary. Such preventative measures are cheaper by far than post-discharge cleanup efforts.

Provision C.15.b.i.(1). Pumped Groundwater from Non Drinking Water Aquifers. These aquifers tend to be shallower than drinking water aquifers and more subject to contamination. The wells must be purged prior to sample collection. Since wells are purged regularly, this section of the Permit requires twice a year monitoring of these aquifers. Pumped groundwater from non drinking water aquifers, which are owned and/or operated by Permittees who pump groundwater as drinking water, are conditionally exempted as long as the discharges meet the requirements in this section of the Permit.

Provision C.15.b.i.(2). Pumped Groundwater, Foundation Drains, and Water from Crawl Space Pumps and Footing Drains. This section of the Permit encourages these types of discharges to be directed to landscaped areas or bioretention units, when feasible. If the discharges cannot be directed to vegetated areas, it requires testing to determine if the discharge is uncontaminated. Uncontaminated discharges shall be treated, if necessary, to meet specified discharge limits for turbidity and pH.

Provision C.15.b.ii. Air Conditioning Condensate. Small air conditioning units are usually operated during the warm weather months. The condensate from these units are uncontaminated and unlikely to reach a storm drain or waters of the State because they tend to be low in volume and tend to evaporate or percolate readily. Therefore, condensate from small air conditioning units should be discharged to landscaped areas or the ground. Commercial and industrial air conditioning units tend to produce year-round continuous flows of condensate. It may be difficult to direct a continuous flow to a landscaped area large enough to accommodate the volume. While the condensate tends to be uncontaminated, it picks up contaminates on its way to the storm drain and/or waters of the State and can contribute to unnecessary dry weather flows. Therefore, discharges from new commercial and industrial air conditioning units should be discharged to landscaped areas, if they can accommodate the continuous volume, or to the sanitary sewer, with the local sanitary sewer agency's approval. If none of these options are feasible, air conditioning condensate can be directly discharged into the storm drain. If descaling or anti-algal agents are used to treat the air conditioning units, residues from these agents must be properly disposed of.

Provision C.15.b.iii. Planned, Unplanned, and Emergency Discharges of the Potable Water System.. Potable water discharges contribute pollution to water quality in receiving waters because they contain chlorine or chloramines, two very toxic chemicals to aquatic life. Potable water discharges can cause erosion and scouring of stream and creek banks, and sedimentation can result if effective BMPs are not implemented. Therefore, appropriate dechlorination and monitoring of chlorine residual, pH and turbidity, particularly for planned discharges of potable water, are crucial to prevent adverse impacts in the receiving waters.

This section of the Permit requires Permittees to notify Water Board staff at least one week in advance for planned discharges of potable water with a flowrate of 250,000 gpd or more or a total 500,000 gallons or more. These planned discharges must meet specified discharge benchmarks for chlorine residual, pH, and turbidity.

To address unplanned discharges of potable water such as non-routine water line breaks, leaks, overflows, fire hydrant shearing, and emergency flushing, this section of the Permit requires Permittees to implement administrative BMPs such as source control measures, managerial practices, operations and maintenance procedures or other measures to reduce or prevent potential pollutants from being discharged during these events. This Provision also contains specific notification and monitoring requirements to assess immediate and continued impacts to water quality when these events happen.

This section of the Permit acknowledges that in cases of emergency discharge, such as from firefighting and disasters, priority of efforts shall be directed toward life, property, and the environment, in that order. Therefore, Permittees are required to implement BMPs that do not interfere with immediate emergency response operations or impact public health and safety. Reporting requirements for such events shall be determined by Water Board staff on a case-by-case basis.

Provision C.15.b.iv. Individual Residential Car Washing. Soaps and automotive pollutants such as oil and metals can be discharged into storm drains and waterbodies from individual residential car washing activities. However, it is not feasible to prohibit individual residential car washing because it would require too much resources for the Permittees to regulate the prohibition. This section of the Permit requires Permittees to encourage residents to implement BMPs such as directing car washwaters to landscaped areas, using as little detergent as possible, and washing cars at commercial car washing facilities.

Provision C.15.b.v. Swimming Pool, Hot tub, Spa, and Fountain Water Discharges. These types of discharges can potentially contain high levels of chlorine and copper. Permittees shall prohibit the discharge of such waters that contain chlorine residual, copper algaecide, filter backwash, or other pollutants to the storm drains or to waterbodies. High flow rates into the storm drain or waterbody could cause erosion and scouring of the stream or creek banks. These types of discharges should be directed to landscaped areas large enough to accommodate the volume or to the sanitary sewer, with the local sanitary sewer's approval. If these discharge options are not feasible and the swimming pool, hot tub, spa, or fountain water discharges must enter the storm drain, they must be dechlorinated to non-detectable levels of chlorine and they must not contain copper algaecide. Flow rate should be regulated to minimize downstream erosion and scouring. We strongly encourage local sanitary sewer agencies to accept these types of non-stormwater discharges, especially for new and rebuilt ones where a connection could be achieved with marginal effort. This Provision also requires Permittees to coordinate with local sanitary agencies in these efforts.

Provision C.15.b.v.i. Irrigation Water, Landscape Irrigation, and Lawn or Garden Watering. Fertilizers and pesticides can be washed off of landscaping and discharged into storm drains and waterbodies. However, it is not feasible to prohibit excessive irrigation because it would require too much resource for the Permittees to regulate such a prohibition. It is also not feasible for individual Permittees to ban the use fertilizers and pesticides. This section of the Permit requires Permittees to promote and/or work with potable water purveyors to promote measures that minimize runoff and pollutant loading from excess irrigation, such as conservation programs, outreach regarding overwatering and less toxic options for pest control and landscape management, the use of drought tolerant and native vegetation, and to implement appropriate illicit discharge response and enforcement for ongoing, large-volume landscape irrigation runoff to the storm drains.

Provision C.15.b.vii. requires Permittees to identify and describe additional types and categories of discharges not listed in Provision C.15.b., that they propose to conditionally exempt from Prohibition A.1., in periodic submittals to the Executive Officer.

Provision C.15.b.viii. establishes a mechanism to authorize under the Permit non-stormwater discharges owned or operated by the Permittees.

Attachment J: Standard NPDES Stormwater Permit Provisions

The following legal authority applies to Attachment J:

Broad Legal Authority: CWA sections 402(p)(3)(B)(ii-iii), CWC section 13377, and federal NPDES regulations 40 CFR 122.26(d)(2)(i)(B, C, D, E, and F) and 40 CFR 122.26(d)(2)(iv).

Specific Legal Authority: Standard provisions, reporting requirements, and notifications are consistent to all NPDES permits and are generally found in federal NPDES regulation 40 CFR 122.41.

Attachment J includes Standard Provisions. These Standard Provisions ensure that NPDES stormwater permits are consistent and compatible with USEPA's federal regulations. Some Standard Provision sections specific to publicly owned sewage treatment works are not included in Attachment J.

Fact Sheet Attachment 6.1

Construction Inspection Data

Construction Inspection Data

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Runon and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	9/30/08	Dry	0	Written Notice			x					Driveway not stabilized				
Panoramic Views	10/15/08	Dry	0.5										x			50' of driveway rocked.
Panoramic Views	11/15/08	Rain	3	Stop Work	x		x				x	Uncovered graded lots eroding; Sediment entering a stormdrain that didn't have adequate protection.				
Panoramic Views	11/15/08	Drizzling	0.25										x			Lots blanketed. Storm drains pumped. Street cleaned.
Panoramic Views	12/1/08	Dry	4	Verbal Warning					x			Porta potty next to stormdrain.	x			Porta potty moved away from stormdrain.
Panoramic Views	1/15/08	Rain	3.25	Written Warning	x					x		Fiber rolls need maintenance; Tire wash water flowing into street				
Panoramic Views	1/25/09	Dry	0										x			Fiber rolls replaced.

Facility/Site Inspected	Inspection Date	Weather During Inspection	Inches of Rain Since Last Inspection	Enforcement Response Level	Problem(s) Observed							Specific Problem(s)	Resolution			Comments/ Rationale for Longer Compliance Time
					Erosion Control	Runon and Runoff Control	Sediment Control	Active Treatment System	Good Site Management	Non Stormwater Management	Illicit Discharge		Problems Fixed	Need More Time	Escalate Enforcement	
Panoramic Views	2/28/09	Rain	2.4	Stop Work	x		x				x	Slope erosion control failed. Fiber rolls at the bottom of the hill flattened. Sediment laden discharge skipping protected stormdrains and entering unprotected stormdrains.				
Panoramic Views	2/28/09	Rain	0.1											x		Fiber rolls replaced. Silt fences added. More stormdrains protected. Streets cleaned. Slope too soggy to access.
Panoramic Views	3/15/09	Dry	1	Citation with Fine					x		x	Paint brush washing not designated	x			Street and storm drains cleaned. Slopes blanketed.
Panoramic Views	4/1/09	Dry	0.5	Citation with Fine							x	Concrete washout overflowed; Evidence of illicit discharge				
Panoramic Views	4/15/09	Dry	0										x			Concrete washout replaced; Storm drain and line cleaned.

Fact Sheet Attachment 10.1

303(d) Trash Resolution and Staff Report February 2009

Available at
http://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2009/R2-2009-0008.pdf

ATTACHMENT A

Provision C.3.b.
Sample Reporting Table

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/08 to 06/09
City of Eden Annual Report FY 2008-09

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
Private Projects													
Nirvana Estates; Project #05-122; Property bounded by Paradise Lane, Serenity Drive, and Eternity Circle; Eden, CA	Heavenly Homes; Phase 1; Construction of 156 single-family homes and 45 townhomes with commercial shops and underground parking.	Runoff from site drains to Babbling Brook	25 acres site area, 21 acres disturbed	20 acres new	20 acres post-project	Application submitted 12/29/07, Application deemed complete 1/30/08, Project approved 7/16/08	Stenciled inlets, street sweeping, covered parking, car wash pad drains to sanitary sewer	Pervious pavement for all driveways, sidewalks, and commercial plaza	vegetated swales, detention basins,	Conditions of Approval require Homeowners Association to perform regular maintenance. Written record will be made available to City inspectors.	WEF Method	n/a	Contra Costa sizing charts used to design detention basin at Peace Park. Also contributed to in-stream projects in Babbling Brook
Barter Heaven; Project #05-345; Shoppers Lane & Bargain Avenue; 14578 Shoppers Lane, Eden, CA	Deals Galore Development Co.; Demolition of strip mall and parking lot and construction of 500-unit 5-story shopping mall with underground parking and limited outdoor parking.	Runoff from site drains to Bargain River	5 acres site area, 3 acres disturbed	1 acre new, 2 acres replaced	3.5 acres pre-project, 4.5 acres post-project	Application submitted 7/9/08, Application deemed complete 8/2/08, Project approved 12/12/08	Stenciled inlets, trash enclosures, underground parking, street sweeping	One-way aisles to minimize outdoor parking footprint; roof drains to planter boxes	tree wells with bioretention; planter boxes with bioretention	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	$ 250,000 paid to Renew Regional Project sponsored by Riverworks Foundation, 243 Water Way, Eden, CA 408-345-6789	Renew Project includes treatment and HM Controls

Provision C.3.b. Sample Reporting Table
Regulated Projects Approved During the Reporting Period 07/08 to 06/09
City of Eden Annual Report FY 2008-09

Project Name, Project Number, Location, Street Address,	Name of Developer, Project Phase No.,[1] Project Type & Description	Project Watershed[2]	Total Site Area, Total Area of Land Disturbed	Total New and/or Replaced Impervious Surface Area[3]	Total Pre- and Post-Project Impervious Surface Area[4]	Status of Project[5]	Source Control Measures	Site Design Measures	Treatment Systems Installed[6]	Operation & Maintenance Responsibility Mechanism	Hydraulic Sizing Criteria	Alternative Compliance Measures[7,8]	HM Controls[9,10]
New Beginnings; Project No. #05-456; Hope Street & Chance Road; 567 Hope Boulevard, Eden, CA	Fresh Start Corporation; Demolition of abandoned warehouse and construction of a 5-story building with 250 low-income rental housing units.	Runoff from site drains to Poor Man Creek	5 acres site area, 100,000 ft^2 disturbed	1 acre replaced	2 acres pre-project, 1 acre post-project	Application submitted 2/9/09, Application deemed complete 4/10/09; Project approved 6/30/09	Trash enclosures, underground parking, street sweeping, car wash pad drains to sanitary sewer	roof drains to landscaping	parking runoff flows to six bioretention units/gardens	Conditions of Approval require property owner (landlord) to perform regular maintenance. Written record will be made available to City inspectors.	BMP Handbook Method	n/a	n/a
Public Projects													
Gridlock Relief, Project No. #05-99, ABC Blvd between Main and Huett Streets, Eden, CA	City of Eden. Widening of ABC Blvd from 4 to 6 lanes	Runoff from site drains to Congestion River	6 acres site area, 3 acres disturbed	2 acres new, 1 acre replaced	4 acres pre-project, 6 acres post-project	Application submitted 7/9/06, Application deemed complete 10/6/08, Project approved 12/9/08, Construction scheduled to begin 7/10/09	none	ABC Blvd sloped to drain runoff into landscaped areas in median	Runoff leaving underdrain system of landscaped median is pumped to bioretention gardens along either side of ABC Blvd	Signed statement from City of Eden assuming post-construction responsibility for treatment BMP maintenance.	WEF Method	n/a	BAHM used to design and size stormwater treatment units so that increased runoff is detained.

Sample Reporting Table C.3.b. Footnotes

1. If a project is being constructed in Phases, use a separate row entry for each Phase.
2. State the watershed(s) that the Regulated Project drains to. Optional but recommended: Also state the downstream watershed(s).
3. State both the total new impervious surface area and the total replaced impervious surface area, as applicable.
4. For redevelopment projects state both the pre-project impervious surface area and the post-project impervious surface area.
5. State project application date; application deemed complete date; and final, major, staff-level discretionary review and approval date.
6. List stormwater treatment system(s) installed onsite or at a joint stormwater treatment system facility.
7. For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
8. For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
9. If HM control is not required, state why not.
10. If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

Instructions for Provision C.3.b. Sample Reporting Table

1. **Project Name, Number, Location, and Street Address** – Include the following information:
   - Name of the project
   - Number of the project (if applicable)
   - Location of the project with cross streets
   - Street address of the project (if available)

2. **Name of Developer, Project Phase Number, Project Type, and Project Description** – Include the following information:
   - Name of the developer
   - Project phase name and/or number (only if the project is being developed in phases) – each phase should have a separate row entry
   - Type of development (i.e., new and/or redevelopment)
   - Description of development (e.g., 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse)

3. **Project Watershed**
   - State the watershed(s) that the Project drains into
   - Optional but recommended: Also state the downstream watershed(s)

4. **Total Site Area and Total Area of Land Disturbed** – State the total site area and the total area of land disturbed.

5. **Total New and/or Replaced Impervious Surface Area**
   - State the total new impervious surface area
   - State the total replaced impervious surface area, as applicable

6. **Total Pre- and Post-Project Impervious Surface Area** – For redevelopment projects, state both the pre-project impervious surface area and the post-project impervious surface area.

7. **Status of Project –** Include the following information:
   - Project application submittal date
   - Project application deemed complete date
   - Final, major, staff-level discretionary review and approval date

8. **Source Control Measures** – List all source control measures that have been or will be included in the project.

9. **Site Design Measures –** List all site design measures that have been or will be included in the project.

10. **Treatment Systems Installed** – List all post-construction stormwater treatment system(s) installed onsite and/or at a joint stormwater treatment system facility.

11. **Operation and Maintenance Responsibility Mechanism –** List the legal mechanism(s) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.

12. **Hydraulic Sizing Criteria Used** – List the hydraulic sizing criteria used for the Project.

13. **Alternative Compliance Measures**
    - **Option 1: LID Treatment at an Offsite Location (Provision C.3.e.i.(1))** – On a separate page, give a discussion of the alternative compliance project including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
    - **Option 2: Payment of In-Lieu Fees (Provision C.3.e.i.(2))** – On a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii).

14. **HM Controls**
    - If HM control is not required, state why not
    - If HM control is required, state control method used (e.g., method to design and size device(s), method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basins, or in-stream control)

ATTACHMENT B

Provision C.3.g.
Alameda Permittees
Hydromodification Management Requirements

Alameda Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control*: Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[123] up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 6 of this Attachment.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate*: Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called *Qcp*[124]) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 6 of this Attachment.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[125]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User's Manual.[126] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with the requirements of this Attachment and Provision C.3.f.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[127] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the

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[123] Where referred to in this Order, the 2-year peak flow is determined using a flood frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[124] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[125] *The Bay Area Hydrology Model – A Tool for Analyzing Hydromodification Effects of Development Projects and Sizing Solutions*, Bicknell, J., D. Beyerlein, and A. Feng, September 26, 2006. Available at http://www.scvurppp-w2k.com/permit_c3_docs/Bicknell-Beyerlein-Feng_CASQA_Paper_9-26-06.pdf

[126] *The Bay Area Hydrology Model – A Tool for Analyzing Hydromodification Effects of Development Projects and Sizing Solutions*, Bicknell, J., D. Beyerlein, and A. Feng, September 26, 2006. Available at http://www.scvurppp-w2k.com/permit_c3_docs/Bicknell-Beyerlein-Feng_CASQA_Paper_9-26-06.pdf

[127] Such models include US EPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Surface Water Management Model (SWMM).

pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a-e above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[128] runoff to the maximum extent practicable. In addition, the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure that is not otherwise required by the Water Board or other regulatory agency. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

[128] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media and include bioretention units, bioswales, basins, planter boxes, tree wells, media filters, and green roofs.

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM Project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are in areas of HM applicability shown in the Alameda Permittees' HM Map.[129] (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

To assist in location and evaluation of project applicability, the Alameda Permittees' HM Map depicts a number of features including the following:

- Hardened channels and culverts at least 24 inches in diameter (green solid or dashed lines);
- Natural channels (red lines);
- Boundaries of major watersheds (light blue lines); and
- Surface streets and highways (gray or black lines).

These data are of varying age, precision and accuracy and are not intended for legal description or engineering design. Watersheds extending beyond the County boundaries are shown for illustration purposes only. Project proponents are responsible for verifying and describing actual conditions of site location and drainage.

5. Alameda Permittees' HM Map is color-coded as follows:

a. Solid pink areas – Solid pink designates hilly areas, where high slopes (greater than 25 percent) occur. The HM Standard and all associated requirements apply in areas shown in solid pink on the map. In this area, the HM Standard does *not* apply if a project proponent demonstrates that all project runoff will flow through enclosed storm drains, existing concrete culverts, or fully hardened (with bed and banks continuously concrete-lined) channels to the tidal area shown in light gray.

b. Purple/red hatched areas – These are upstream of areas where hydromodification impacts are of concern because of factors such as bank instability, sensitive habitat, or restoration projects. The HM Standard and all associated requirements apply in areas

[129] The watercourses potentially susceptible to hydromodification impacts are identified based on an assessment approach developed by Balance Hydrologics (2003).

shown in purple/red (printer-dependant) hatch marking on the map. Projects in these areas may be subject to additional agency reviews related to hydrologic, habitat or other watershed-specific concerns.

c. **Solid white areas** – Solid white designates the land area between the hills and the tidal zone. This area may be susceptible to hydromodification unless the site is connected to storm drains that discharge to the tidal area. The HM Standard and all associated requirements apply to projects in solid white areas *unless* a project proponent demonstrates that all project runoff will flow through fully hardened channels.[130] Short segments of engineered earthen channels (length less than 10 times the maximum width of trapezoidal cross-section) can be considered resistant to erosion if located downstream of a concrete channel of similar or greater length and comparable cross-sectional dimensions. Plans to restore a hardened channel may affect the HM Standard applicability in this area.

d. **Solid gray areas** – Solid gray designates areas where streams or channels are tidally influenced or primarily depositional near their outfall in San Francisco Bay. The HM Standard does not apply to projects in this area. Plans to restore a hardened channel may affect the HM Standard applicability in this area.

e. **Dark gray, *Eastern County* area** – Dark gray designates the portion of eastern Alameda County that lies outside the discharge area of this NPDES permit. This area is in the Central Valley Regional Water Quality Control Board's jurisdiction.

6. Potential Exceptions to Alameda Permittees' HM Map Designations

The Program may choose to prepare a User Guide[131] to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.[132] After the Program has collated its methods into a User Guide format, received approval of the User Guide from the Executive Officer,[133] and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional HM controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

[130] In this paragraph, *fully hardened channels* include enclosed storm drains, existing concrete culverts, or channels whose bed and banks are continuously concrete-lined to the tidal area shown in light gray on the map.
[131] The User Guide may be offered under a different title.
[132] The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.
[133] The User Guide shall not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

ATTACHMENT C

Provision C.3.g.
Contra Costa Permittees
Hydromodification Management Requirements

Contra Costa Permittees Hydromodification Management Requirements

1. Demonstrating Compliance with the Hydromodification Management (HM) Standard

Contra Costa Permittees shall ensure that project proponents shall demonstrate compliance with the HM Standard by demonstrating that any one of the following four options is met:

a. *No increase in impervious area.* The project proponent may compare the project design to the pre-project condition and show that the project will not increase impervious area and also will not facilitate the efficiency of drainage collection and conveyance.

b. *Implementation of hydrograph modification IMPs.* The project proponent may select and size IMPs to manage hydrograph modification impacts, using the design procedure, criteria, and sizing factors specified in the Contra Costa Clean Water Program's *Stormwater C.3 Guidebook*. The use of flow-through planters shall be limited to upper-story plazas, adjacent to building foundations, on slopes where infiltration could impair geotechnical stability, or in similar situations where geotechnical issues prevent use of IMPs that allow infiltration to native soils. Limited soil infiltration capacity in itself does not make use of other IMPs infeasible.

c. *Estimated post-project runoff durations and peak flows do not exceed pre-project durations and peak flows.* The project proponent may use a continuous simulation hydrologic computer model such as USEPA's Hydrograph Simulation Program—Fortran (HSPF) to simulate pre-project and post-project runoff, including the effect of proposed IMPs, detention basins, or other stormwater management facilities. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, using limitations and instructions provided in the Program's *Stormwater C.3 Guidebook*, and shall show that the following criteria are met:

i. For flow rates from 10 percent of the pre-project 2-year runoff event (0.1Q2) to the pre-project 10-year runoff event (Q10), the post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than 10 percent over more than 10 percent of the length of the flow duration curve.

ii. For flow rates from 0.5Q2 to Q2, the post-project *peak flows* shall not exceed pre-project peak flows. For flow rates from Q2 to Q10, post-project peak flows may exceed pre-project flows by up to 10 percent for a 1-year frequency interval. For example, post-project flows could exceed pre-project flows by up to 10 percent for the interval from Q9 to Q10 or from Q5.5 to Q6.5, but not from Q8 to Q10.

d. *Projected increases in runoff peaks and durations will not accelerate erosion of receiving stream reaches.* The project proponent may show that, because of the specific characteristics of the stream receiving runoff from the project site, or because of proposed stream restoration projects, or both, there is little likelihood that the cumulative impacts from new development could increase the net rate of stream erosion to the extent that beneficial uses would be significantly impacted. To use this option, the project proponent shall evaluate the receiving stream to determine the relative risk of erosion impacts and take the appropriate actions as described below and in Table A-1. Projects 20 acres or larger in total area shall not use the medium risk methodology in *(d)ii* below.

i. ***Low Risk.*** In a report or letter report, signed by an engineer or qualified environmental professional, the project proponent shall show that all downstream channels between the project site and the Bay/Delta fall into one of the following *low-risk* categories.

(1) Enclosed pipes.

(2) Channels with continuous hardened beds and banks engineered to withstand erosive forces and composed of concrete, engineered riprap, sackcrete, gabions, mats, and such. This category excludes channels where hardened beds and banks are not engineered continuous installations (i.e., have been installed in response to localized bank failure or erosion).

(3) Channels subject to tidal action.

(4) Channels shown to be aggrading (i.e., consistently subject to accumulation of sediments over decades) and to have no indications of erosion on the channel banks.

ii. ***Medium Risk.*** Medium risk channels are those where the boundary shear stress could exceed critical shear stress as a result of hydrograph modification but where either the sensitivity of the boundary shear stress to flow is low (e.g., an oversized channel with high width to depth ratios) or where the resistance of the channel materials is relatively high (e.g., cobble or boulder beds and vegetated banks). In *medium-risk* channels, accelerated erosion due to increased watershed imperviousness is not likely but is possible, and the uncertainties can be more easily and effectively addressed by mitigation than by additional study.

In a preliminary report, the project proponent's engineer or qualified environmental professional shall apply the Program's *Basic Geomorphic Assessment*[134] methods and criteria to show each downstream reach between the project site and the Bay/Delta is either at *low-risk* or *medium-risk* of accelerated erosion due to watershed development. In a following, detailed report, a qualified stream geomorphologist[135] shall use the Program's Basic Geomorphic Assessment methods and criteria, available information, and current field data to evaluate each *medium-risk* reach. For *each medium-risk* reach, the detailed report shall show one of the following:

[134] Contra Costa Clean Water Program *Hydrograph Modification Management Plan*, May 15, 2005, Attachment 4, pp. 6-13. This method must be made available in the Program's *Stormwater C.3 Guidebook.*

[135] Typically, detailed studies will be conducted by a stream geomorphologist retained by the lead agency (or, on the lead agency's request, another public agency such as the Contra Costa County Flood Control and Water Conservation District) and paid for by the project proponent.

(1) A detailed analysis, using the Program's criteria, showing the particular reach may be reclassified as *low-risk.*

(2) A detailed analysis, using the Program's criteria, confirming the *medium-risk* classification, and:

(a) A preliminary plan for a mitigation project for that reach to stabilize stream beds or banks, improve natural stream functions, and/or improve habitat values, and

(b) A commitment to implement the mitigation project timely in connection with the proposed development project (including milestones, schedule, cost estimates, and funding), and

(c) An opinion and supporting analysis by one or more qualified environmental professionals that the expected environmental benefits of the mitigation project substantially outweigh the potential impacts of an increase in runoff from the development project, and

(d) Communication, in the form of letters or meeting notes, indicating consensus among staff representatives of regulatory agencies having jurisdiction that the mitigation project is feasible and desirable. In the case of the Regional Water Board, this must be a letter, signed by the Executive Officer or designee, specifically referencing this requirement. (This is a preliminary indication of feasibility required as part of the development project's Stormwater Control Plan. All applicable permits must be obtained before the mitigation project can be implemented.)

iii. ***High Risk.*** High-risk channels are those where the sensitivity of boundary shear stress to flow is high (e.g., incised or entrenched channels, channels with low width-to-depth ratios, and narrow channels with levees) or where channel resistance is low (e.g., channels with fine-grained, erodible beds and banks, or with little bed or bank vegetation). In a *high-risk* channel, it is presumed that increases in runoff flows will accelerate bed and bank erosion.

To implement this option (i.e., to allow increased runoff peaks and durations to a high-risk channel), the project proponent must perform a comprehensive analysis to determine the design objectives for channel restoration and must propose a comprehensive program of in-stream measures to improve channel functions while accommodating increased flows. Specific requirements are developed case-by-case in consultation with regulatory agencies having jurisdiction. The analysis will typically involve watershed-scale continuous hydrologic modeling (including calibration with stream gauge data where possible) of pre-project and post-project runoff flows, sediment transport modeling, collection and/or analysis of field data to characterize channel morphology including analysis of bed and bank materials and bank vegetation, selection and design of in-stream structures, and project environmental permitting.

2. IMP Model Calibration and Validation

The Program shall monitor flow from Hydrograph Modification Integrated Management Practices (IMPs) to determine the accuracy of its model inputs and assumptions. Monitoring

shall be conducted with the aim of evaluating flow control effectiveness of the IMPs. The Program shall implement monitoring where feasible at future new development projects to gain insight into actual versus predicted rates and durations of flow from IMP overflows and underdrains.

At a minimum, Permittees shall monitor five locations for a minimum of two rainy seasons. If two rainy seasons are not sufficient to collect enough data to determine the accuracy of model inputs and assumptions, monitoring shall continue until such time as adequate data are collected.

Permittees shall conduct the IMP monitoring as described in the IMP Model Calibration and Validation Plan in Section 5 of this Attachment. Monitoring results shall be submitted to the Executive Officer by June 15 of each year following collection of monitoring data. If the first year's data indicate IMPs are not effectively controlling flows as modeled in the HMP, the Executive Officer may require the Program to make adjustments to the IMP sizing factors or design, or otherwise take appropriate corrective action. The Permittees shall submit an IMP Monitoring Report by August 30 of the second year[136] of monitoring. The IMP Monitoring Report shall contain, at a minimum, all the data, graphic output from model runs, and a listing of all model outputs to be adjusted, with full explanation for each. Board staff will review the IMP Monitoring Report and require the Program to make any appropriate changes to the model within a 3-month time frame.

3. Stormwater C.3 Guidebook and IMP Design Criteria

The Current Contra Costa Clean Water Program C.3 Guidebook, 4th Edition (September 2008) shall be implemented until the expiration of this permit (November 2014). Any significant changes in the designs of the IMPs, their sizing factors or manner of implementation shall be approved by the Water Board.

4. IMP Model Calibration and Validation Plan Objective

Monitoring shall be conducted with the aim of evaluating flow control effectiveness of the IMPs. The IMPs were redesigned in 2008 to meet a low flow criterion of 0.2Q2, not 0.1Q2, which is current HMP standard for Contra Costa County. The Program shall implement monitoring at future new development projects at a minimum of five locations and for a minimum of two rainy seasons to gain insight into actual versus predicted rates and durations of flow from IMP overflows and underdrains. If two rainy seasons are not sufficient to collect enough data to determine the accuracy of model inputs and assumptions, monitoring shall continue until such time as adequate data are collected.

a. The Dischargers Shall Identify and Establish Monitoring Sites – Program staff shall work with municipal Co-Permittees to identify potential monitoring sites on development projects that implement IMPs. Proposed sites shall be identified during review of planning and zoning applications so that monitoring stations can be designed and constructed as part of the development project. Monitoring shall begin after the development project is complete and the site is in use.

Criteria for appropriate sites include**,** but are not limited to**,** the following:

[136] If the monitoring extends beyond 2 years, an IMP Monitoring Report shall be submitted by August 30 annually until model calibration and validation is complete.

- To ensure applicability of results, the development project and IMPs should be typical of development sites and types of IMPs foreseen throughout the County. In particular, at least one each of the infiltration planter, flow-through planter, and *dry* swale shall be selected for monitoring.
- The area tributary to the IMP should be clearly defined, should contain and direct runoff at all rainfall intensities to the IMP. Two monitoring locations shall contain tributary areas that are a mix of pervious and impervious areas to test the pervious area simplifying assumptions used in the HMP, Table 14, Attachment 2, page 49. If no such locations are constructed by the monitoring period, modeling of mixed (pervious and impervious) tributary areas can substitute for direct monitoring of this type of location.
- The site shall be easily accessible at all times of day and night to allow inspection and maintenance of measurement equipment.
- Hourly rain gauge data representative of the site's location shall be available.

b. Documentation of Monitoring Sites – The Dischargers shall record and report (i.e., document) pertinent information for each monitoring site. Documentation of each monitoring site shall include the following:

- Amount of tributary area;
- Condition of roof or paving;
- Grading and drainage to the IMP, including calculated time of concentration.
- Locations and elevations of inlets and outlets;
- As-built measurements of the IMP including depth of soil and gravel layers, height of underdrain pipe above the IMP floor or native soil;
- Detailed specifications of soil and gravel layers and of filter fabric and other appurtenances; and
- Condition of IMP surface soils and vegetation.

c. Design, Construction, and Operation of Monitoring Sites – The Dischargers shall ensure that IMPs selected for monitoring are equipped with a manhole, vault, or other means to install and access equipment for monitoring flows from IMP overflows and underdrains.

Development of suitable methods for monitoring the entire range of flows may require experiment. The Program and Water Board are interested in the timing and duration of very low flows from underdrains, as well as higher flows from IMP overflows. The Dischargers shall ensure that equipment is configured to measure the entire range of flows and to avoid potential clogging of orifices used to measure low flows.

The Dischargers shall ensure that construction of IMPs is inspected carefully to ensure that IMPs are installed as designed and to avoid potential operational problems. For example, gravel used for underdrain layers should be washed free of fines, and filter fabric should be installed without breaks.

The Dischargers shall ensure that, following construction, artificial flows are applied to the IMP to verify the IMP and monitoring equipment are operating correctly and to resolve any operational problems prior to measuring flows from actual rain storms.

The Dischargers shall ensure that monitoring equipment is properly maintained. Maintenance of monitoring equipment will require, initially, inspections during and after storms that produce runoff. The inspection and maintenance schedule may be adjusted as additional experience is gained.

d. Data to be Obtained – The Dischargers shall collect the following data for each IMP, during the monitoring period:

- Hourly rainfall and more frequent rainfall data where available;
- Hourly IMP outflow and 15-minute outflow for all time periods in which sub-hourly rainfall data are available;
- Hourly IMP inflow (if possible) and more frequent inflow (if possible) when sub-hourly rainfall data are available; and
- Notes and observations.

e. Evaluation of Data – The principal use of the monitoring data shall be a comparison of predicted to actual flows. The Dischargers shall ensure that the HSPF model is set up as it was to prepare the curves in Attachment 2 of the HMP, with appropriate adjustments for the drainage area of the IMP to be monitored and for the actual sizing and configuration of the IMP. Hourly rainfall data from observed storms shall be input to the model, and the resulting hourly predicted output recorded. Where sub-hourly rainfall data are available, the model shall be run with, and output recorded for, 15-minute time steps.

The Dischargers shall compare predicted hourly outflows to the actual hourly outflows. As more data are gathered, the Dischargers may examine aggregated data to characterize deviations from predicted performance at various storm intensities and durations.

Because high-intensity storms are rare, it will take many years to obtain a suitable number of events to evaluate IMP performance under overflow conditions. Underdrain flows will occur more frequently, but possibly only a few times a year, depending on rainfall and IMP characteristics (e.g., extent to which the IMP is oversized, and actual, rather than predicted, permeability of native soils). However, evaluating a range of rainfall events that do *not* produce underflow will help demonstrate the effectiveness of the IMP.

5. Record Keeping and Reporting

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A list and thorough technical explanation of any changes in design criteria for HM Controls, including IMPs. Permittees shall submit this list and explanation annually with the Annual Report.

6. The current Contra Costa Clean Water Program C.3 Guidebook, 4th Edition (C.3 Guidebook) (September 2008) design approach and IMPs shall be used to comply with Provision C.3.g flow requirements until this permit expires and is reissued, pending model verification studies as described below. The IMPs shall be an implementation option as the flow control implementation for development projects up to a footprint of 30 acres

By April 1, 2014, the Contra Costa Clean Water Program shall submit a proposal containing one or a combination of the following three options (a.-c.) for implementation after the expiration and reissuance of this permit:

a. Present model verification monitoring results demonstrating that the IMPs are sufficiently overdesigned and perform to meet the 0.1Q2 low flow design criteria; or

b. Present study results of Contra Costa County streams geology and other factors that support the low flow design criteria of 0.2Q2 as the limiting HMP design low flow; or

c. Propose redesigns of the IMPs to meet the low flow design criteria of 0.1Q2 to be implemented during the next permit term.

ATTACHMENT D

Provision C.3.g.
Fairfield-Suisun Permittees
Hydromodification Management Requirements

Fairfield-Suisun Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control*: Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 20 percent of the pre-project 2-year peak flow[137] up to the pre-project 10-year peak flow.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate:* Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called Qcp[138]) shall be no greater than 20 percent of the pre-project 2-year peak flow.

d. *Standard HM modeling:* On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[139]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the most current BAHM User Manual.[140] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this Attachment and Provision C.3.g.

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[137] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[138] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[139] See www.bayareahydrologymodel.org , Resources

[140] *The Bay Area Hydrology Model User Manual*is available at http://www.bayareahydrologymodel.org/downloads.html.

e. *Alternate HM modeling and design:* The project proponent may use a continuous simulation hydrologic computer model[141] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a–c above are met.

f. *Sizing Charts:* The Program developed design procedures, criteria, and sizing factors for infiltration basins and bioretention units, based on a low flow rate that exceeds the allowable low flow rate. After the Program has modified its sizing factors[142] to the allowable criteria, received approval of the modified sizing factors from the Executive Officer,[143] and informed the public through such mechanism as an electronic mailing list, project proponents may meet the HM Standard by using the Program's design procedures, criteria, and sizing factors for infiltration basins and/or bioretention units.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[144] runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d. treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls*: A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability*: In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

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[141] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[142] Current sizing factors and design criteria are shown in Appendix D of the FSURMP HMP.

[143] The modified sizing factors will not introduce a new concept but rather make an existing compliance mechanism more stringent; therefore, Executive Officer approval is appropriate.

[144] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, tree wells, media, filters, and green roofs.

d. *Financial contribution to an alternative HM project*: The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects discharge into the upstream reaches of Laurel or Ledgewood Creeks, as delineated in the Fairfield-Suisun Permittees' HM Maps (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf.). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

ATTACHMENT E

Provision C.3.g.
San Mateo Permittees
Hydromodification Management Requirements

San Mateo Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[145] up to the pre-project 10-year peak flow.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate:* Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called Qcp[146]) shall be no greater than 10 percent of the pre-project 2-year peak flow.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[147]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the

[145] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17 B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[146] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[147] See www.bayareahydrologymodel.org , Resources

most current BAHM User Manual.[148] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with the requirements of Provision C.3.g.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[149] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a.–c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a regional HM control within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[150] runoff to the maximum extent practicable. In addition, , if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project proponent shall provide for or contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM controls:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional HM control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project*: The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment shall be contributed to an alternative HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or

[148] The Bay Area Hydrology Model User Manualis available at http://www.bayareahydrologymodel.org/downloads.html

[149] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[150] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, tree wells, media filters, and green roofs.

in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality, or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of startup, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are in the HM control areas shown in the San Mateo Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf). Plans to restore a creek reach may reintroduce the applicability of HM requirements; in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

The HM Standard and all associated requirements apply in areas that are shown in green on the map and noted in the map's key as *areas subject to HMP*. The other areas are exempt from the HM Standard because they drain to hardened channels or low gradient channels (a characteristic applicable to San Mateo County's particular shoreline properties), or are in highly developed areas. Plans to restore a hardened channel may affect areas of applicability.

Areas shown in the San Mateo Permittees' HM Map may be modified as follows:

b. **Street Boundary Interpretation** – Streets are used to mark the boundary between areas where the HM Standard must be met and exempt areas. Parcels on the boundary street are considered within the area exempted from the hydromodification requirements. Nonetheless, there might be cases where the drainage from a particular parcel(s) on the boundary street drains westward into the hydromodification required area and, as such, any applicable project on such a parcel(s) would be subject to the hydromodification requirements.

c. **Hardened Channel/Drainage to Exempt Area –** If drainage leaving a proposed project subject to the HM Standard is determined to flow only through a hardened channel and/or enclosed pipe along its entire length before directly discharging into a waterway in the exempt area or into tidal waters, the project would be exempted from the HM Standard and its associated requirements. The project proponent must demonstrate, in a statement signed by an engineer or qualified environmental professional, that this condition is met.

d. **Boundary Re-Opener –** If the municipal regional permit or future permit reissuances or amendments modify the types of projects subject to the hydromodification requirements, the appropriate location for an HMP boundary or boundaries will be reevaluated at the same time.

ATTACHMENT F

Provision C.3.g.
Santa Clara Permittees
Hydromodification Management Requirements

Santa Clara Permittees Hydromodification Management Requirements

1. On-site and Regional Hydromodification Management (HM) Control Design Criteria

a. *Range of flows to control:* Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10 percent of the pre-project 2-year peak flow[151] up to the pre-project 10-year peak flow, except where the lower endpoint of this range is modified as described in Section 5 of this Attachment.

b. *Goodness of fit criteria*: The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent over more than 10 percent of the length of the curve corresponding to the range of flows to control.

c. *Allowable low flow rate*: Flow control structures may be designed to discharge stormwater at a very low rate that does not threaten to erode the receiving waterbody. This flow rate (also called *Qcp*[152]) shall be no greater than 10 percent of the pre-project 2-year peak flow unless a modified value is substantiated by analysis of actual channel resistance in accordance with an approved User Guide as described in Section 5 of this Attachment.

d. *Standard HM modeling*: On-site and regional HM controls designed using the Bay Area Hydrology Model (BAHM[153]) and site-specific input data shall be considered to meet the HM Standard. Such use must be consistent with directions and options set forth in the

[151] Where referred to in this Order, the 2-year peak flow is determined using a flood flow frequency analysis procedure based on USGS Bulletin 17B to obtain the peak flow statistically expected to occur at a 2-year recurrence interval. In this analysis, the appropriate record of hourly rainfall data (e.g., 35–50 years of data) is run through a continuous simulation hydrologic model, the annual peak flows are identified, rank ordered, and the 2-year peak flow is estimated. Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers' Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[152] Qcp is the allowable low flow discharge from a flow control structure on a project site. It is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

[153] See www.bayareahydrologymodel.org , Resources.

most current BAHM User Manual.[154] Permittees shall demonstrate to the satisfaction of the Executive Officer that any modifications of the BAHM made are consistent with this attachment and Provision C.3.g.

e. *Alternate HM modeling and design*: The project proponent may use a continuous simulation hydrologic computer model[155] to simulate pre-project and post-project runoff and to design HM controls. To use this method, the project proponent shall compare the pre-project and post-project model output for a rainfall record of at least 30 years, and shall show that all applicable performance criteria in 1.a. – c. above are met.

2. Impracticability Provision

Where conditions (e.g., extreme space limitations) prevent a project from meeting the HM Standard for a reasonable cost, *and* where the project's runoff cannot be directed to a Regional HM control[156] within a reasonable time frame, *and* where an in-stream measure is not practicable, the project shall use (1) site design for hydrologic source control, *and* (2) stormwater treatment measures that collectively minimize, slow, and detain[157] runoff to the maximum extent practicable. In addition, if the cost of providing site design for hydrologic source control and treatment measures to the maximum extent practicable does not exceed 2% of the project cost (as defined in "2.a." below), the project shall contribute financially to an alternative HM project as set forth below:

a. *Reasonable cost*: To show that the HM Standard cannot be met at a reasonable cost, the project proponent must demonstrate that the total cost to comply with both the HM Standard and the Provision C.3.d treatment requirement exceeds 2 percent of the project construction cost, excluding land costs. Costs of HM and treatment control measures shall not include land costs, soil disposal fees, hauling, contaminated soil testing, mitigation, disposal, or other normal site enhancement costs such as landscaping or grading that are required for other development purposes.

b. *Regional HM control:* A regional HM control shall be considered available if there is a planned location for the regional HM control and if an appropriate funding mechanism for a regional control is in place by the time of project construction.

c. *In-stream measures practicability:* In-stream measures shall be considered practicable when an in-stream measure for the project's watershed is planned and an appropriate funding mechanism for an in-stream measure is in place by the time of project construction.

d. *Financial contribution to an alternative HM project:* The difference between 2 percent of the project construction costs and the cost of the treatment measures at the site (both costs as described in Section 2.a of this Attachment) shall be contributed to an alternative

[154] *The Bay Area Hydrology Model User Manual* is available at http://www.bayareahydrologymodel.org/downloads.html.

[155] Such models include USEPA's Hydrologic Simulation Program—Fortran (HSPF), U.S. Army Corps of Engineers Hydrologic Engineering Center-Hydrologic Modeling System (HEC-HMS), and USEPA's Storm Water Management Model (SWMM).

[156] *Regional HM controls* are flow duration control structures that collect stormwater runoff discharge from multiple projects (each of which should incorporate hydrologic source control measures as well) and are designed such that the HM Standard is met for all the projects at the point where the regional control measure discharges.

[157] Stormwater treatment measures that detain runoff are generally those that filter runoff through soil or other media, and include bioretention units, bioswales, basins, planter boxes, sand filters, and green roofs.

HM project, such as a stormwater treatment retrofit, HM retrofit, regional HM control, or in-stream measure. Preference shall be given to projects discharging, in this order, to the same tributary, mainstem, watershed, then in the same municipality or county.

3. Record Keeping

Permittees shall collect and retain the following information for all projects subject to HM requirements:

a. Site plans identifying impervious areas, surface flow directions for the entire site, and location(s) of HM measures;

b. For projects using standard sizing charts, a summary of sizing calculations used;

c. For projects using the BAHM, a listing of model inputs;

d. For projects using custom modeling, a summary of the modeling calculations with corresponding graph showing curve matching (existing, post-project, and post-project with HM controls curves);

e. For projects using the Impracticability Provision, a listing of all applicable costs and a brief description of the alternative HM project (name, location, date of start up, entity responsible for maintenance); and

f. A listing, summary, and date of modifications made to the BAHM, including technical rationale. Permittees shall submit this list and explanation annually with the Annual Report. This may be prepared at the Countywide Program level and submitted on behalf of participating Permittees.

4. HM Control Areas

Applicable projects shall be required to meet the HM Standard when such projects are located in areas of HM applicability as described below and shown in the Santa Clara Permittees' HM Map (available at http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/muni/mrp/Final%20TO%20HM%20Maps.pdf).

a. Purple areas: These areas represent catchments that drain to hardened channels that extend continuously to the Bay or to tidally influenced sections of creeks. The HM Standard and associated requirements do not apply to projects in the areas designated in purple on the map.

Plans to restore a creek reach may reintroduce the applicability of HM requirements, unless the creek restoration project is designed to accommodate the potential hydromodification impacts of future development; if this is not the case, in these instances, Permittees may add, but shall not delete, areas of applicability accordingly.

b. Red areas: These areas represent catchments and subwatersheds that are greater than or equal to 65% impervious, based on existing imperviousness data sources. The HM Standard and associated requirements do not apply to projects in the areas designated in red on the map.

c. Pink areas: These are areas that are under review by the Permittees for accuracy of the imperviousness data. The HM Standard and associated requirements apply to projects in areas designated as pink on the map until such time as a Permittee presents new data that indicate that the actual level of imperviousness of a particular area is greater than or equal

to 65% impervious. Any new data will be submitted to the Water Board in one coordinated submittal within one year of permit adoption.

d. Green area: These areas represent catchments and subwatersheds that are less than 65% impervious and are not under review by the Permittees. The HM Standard and associated requirements apply to projects in areas designated as green on the map.

5. Potential Exceptions to Map Designations

The Program may choose to prepare a User Guide[158] to be used for evaluating individual receiving waterbodies using detailed methods to assess channel stability and watercourse critical flow. This User Guide would reiterate and collate established stream stability assessment methods that have been presented in the Program's HMP.[159] After the Program has collated its methods into User Guide format, received approval of the User Guide from the Executive Officer,[160] and informed the public through such process as an electronic mailing list, the Permittees may use the User Guide to guide preparation of technical reports for the following: implementing the HM Standard using in-stream or regional controls; determining whether certain projects are discharging to a watercourse that is less susceptible (from point of discharge to the Bay) to hydromodification (e.g., would have a lower potential for erosion than set forth in these requirements); and/or determining if a watercourse has a higher critical flow and project(s) discharging to it are eligible for an alternative Qcp for the purpose of designing on-site or regional measures to control flows draining to these channels (i.e., the actual threshold of erosion-causing critical flow is higher than 10 percent of the 2-year pre-project flow). In no case shall the design value of Qcp exceed 50 percent of the 2-year pre-project flow.

[158] The User Guide may be offered under a different title.
[159] The Program's HMP has undergone Water Board staff review and been subject to public notice and comment.
[160] The User Guide will not introduce a new concept, but rather reformat existing methods; therefore, Executive Officer approval is appropriate.

ATTACHMENT G

Provision C.3.h.
Sample Reporting Table

Table C.3.h. – Operation and Maintenance of Stormwater Treatment Systems
City of Eden Annual Report FY 2008-09

Facility/Site Inspected and Responsible Party for Maintenance	Date of Inspection	Type of Inspection (annual, follow-up, etc.)	Type of Treatment System or HM Control Inspected	Inspection Findings or Results	Enforcement Action Taken (Warning, NOV, administrative citation, etc.)	Comments
ABC Company 123 Alphabet Road San Jose	12/06/08	annual	offsite bioretention unit	proper operation	none	Unit is operating properly and is well maintained.
DEF site 234 Blossom Drive Santa Clara	12/17/08	annual	onsite media filter	ineffective filter media	verbal warning	Media filter is clogged and needs to be replaced.
	12/19/08	follow-up	onsite media filter	proper operation	none	New media filter in place and unit is operating properly.
	1/19/09	follow-up	onsite media filter	proper operation	none	Unit is operating properly.
GHI Hotel 1001 Grand Blvd 227 Touring Parkway	12/21/08	annual	onsite swales	proper operation	notice of violation	Bioretention unit #2 is badly eroded because of flow channelization. Stormwater is flowing over the eroded areas, bypassing treatment and running off into parking area.
			onsite bioretention unit #1	proper operation		
			onsite bioretention unit #2	eroded areas due to flow channelization		
	12/27/08	follow-up	onsite bioretention unit #2	proper operation	none	Entire bioretention unit #2 has been replanted and re-graded. Raining heavily but no overflow observed.
Rolling Hills Estates Homeowners' Association 543 Rolling Hill Drive Pleasanton	01/17/09	annual	onsite pond	sediment and debris accumulation	notice of violation	Pond needs sediment removal and check dam needs debris removal.
	01/24/09	follow-up	onsite pond	sediment and debris accumulation	administrative citation $1000	Pond still a mess. Administrative citation requires maintenance within a week.
	01/31/09	follow-up	onsite pond	proper maintenance	none	Pond maintenance completed.
	02/18/09	spot inspection	onsite pond	proper operation and maintenance	none	Proper operation and maintenance.

ATTACHMENT H

Provision C.8.
Status and Long-Term Monitoring
Follow-up Analysis and Actions

Status and Long-Term Monitoring Follow-up Analysis and Actions for Biological Assessment, Bedded Sediment Toxicity, and Bedded Sediment Pollutants

When results from Biological Assessment, Bedded Sediment Toxicity, and/or Bedded Sediment Pollutants monitoring indicate impacts at a monitoring location, Permittees shall evaluate the extent and cause(s) of impacts to determine the potential role of urban runoff as indicated in Table H-1.

Table H-1. Sediment Triad Approach to Determining Follow-Up Actions

Chemistry Results[161]	Toxicity Results[162]	Bioassessment Results[163]	Action
No chemicals exceed Threshold Effect Concentrations (TEC), mean Probable Effects Concentrations (PEC) quotient < 0.5 and pyrethroids < 1.0 Toxicity Unit (TU)[164]	No Toxicity	No indications of alterations	No action necessary
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	Toxicity	No indications of alterations	(1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources causing toxicity; initiate no later than the second fiscal year following the sampling event.

[161] TEC and PEC are found in MacDonald, D.D., G.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-based Sediment Quality Guidelines for Freshwater Ecosystems. *Archives of Environ. Contamination and Toxicology* 39(1):20–31.

[162] Toxicity is exhibited when *Hyallela* survival statistically different than and < 20 percent of control.

[163] Alterations are exhibited if metrics indicate substantially degraded community.

[164] Toxicity Units (TU) are calculated as follows: TU = Actual concentration (organic carbon normalized) ÷ Reported *H. azteca* LC_{50} concentration (organic concentration normalized). Weston, D.P., R.W. Holmes, J. You, and M.J. Lydy, 2005. Aquatic Toxicity Due to Residential Use of Pyrethroid Insecticides. *Environ. Science and Technology* 39(24):9778–9784.

Chemistry Results[161]	Toxicity Results[162]	Bioassessment Results[163]	Action
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	No Toxicity	Indications of alterations	Identify the most probable cause(s) of the alterations in biological community. Where impacts are under Permittee's control, take management actions to minimize the impacts causing physical habitat disturbance; initiate no later than the second fiscal year following the sampling event.
No chemicals exceed TECs, mean PEC quotient < 0.5 and pyrethroids< 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to minimize impacts; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	Indications of alterations	(1) Identify cause of impacts. (2) Where impacts are under Permittee's control, take management actions to minimize the impacts caused by urban runoff; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	No indications of alterations	(1) Take confirmatory sample for toxicity. (2) If toxicity repeated, attempt to identify cause and spatial extent. (3) Where impacts are under Permittee's control, take management actions to minimize upstream sources; initiate no later than the second fiscal year following the sampling event.
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	No Toxicity	No Indications of alterations	If PEC exceedance is Hg or PCBs, address under TMDLs
3 or more chemicals exceed PECs, the mean PEC quotient is > 0.5, or pyrethroids > 1.0 TU	Toxicity	Indications of alterations	(1) Identify cause(s) of impacts and spatial extent. (2) Where impacts are under Permittee's control, take management actions to address impacts.

ATTACHMENT I

Provision C.8.
Standard Monitoring Provisions

All monitoring activities shall meet the following requirements:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. [40 CFR 122.41(j)(1)]
2. Permittees shall retain records of all monitoring information, including all calibration and maintenance of monitoring instrumentation, and copies of all reports required by this Order for a period of at least five (5) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Water Board or USEPA at any time and shall be extended during the course of any unresolved litigation regarding this discharge. [40 CFR 122.41(j)(2), CWC section 13383(a)]
3. Records of monitoring information shall include [40 CFR 122.41(j)(3)]:
   a. The date, exact place, and time of sampling or measurements;
   b. The individual(s) who performed the sampling or measurements;
   c. The date(s) analyses were performed;
   d. The individual(s) who performed the analyses;
   e. The analytical techniques or methods used; and,
   f. The results of such analyses.
4. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this Order shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than two years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than four years, or both. [40 CFR 122.41(j)(5)]
5. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in the monitoring Provisions. [40 CFR 122.41(l)(4)(iii)]
6. All chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services or a laboratory approved by the Executive Officer.
7. For priority toxic pollutants that are identified in the California Toxics Rule (CTR) (65 Fed. Reg. 31682), the Permittees shall instruct its laboratories to establish calibration standards that are equivalent to or lower than the Minimum Levels (MLs) published in Appendix 4 of the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP). If a Permittee can demonstrate that a particular ML is not attainable, in accordance with procedures set forth in 40 CFR 136, the lowest quantifiable concentration of the lowest calibration standard analyzed by a specific analytical procedure (assuming that all the method specified sample weights, volumes, and processing steps have been followed) may be used instead of the ML listed in Appendix 4 of the SIP. The Permittee must submit documentation from the laboratory to the Water Board for approval prior to raising the ML for any priority toxic pollutant.
8. The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-

compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both. [40 CFR 122.41(k)(2)]

9. If the discharger monitors any pollutant more frequently than required by the Permit, unless otherwise specified in the Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the reports requested by the Water Board. [40 CFR 122.41(l)(4)(ii)]

ATTACHMENT J

Minimum Trash Capture Area
and
Minimum Number of Trash Hot Spots

Table 10.1 Minimum Trash Capture Area and Trash Hot Spots for Population Based Permittees

Data Source: http://quake.abag.ca.gov/mitigation/pickdbh2.html and Association of Bay Area Governments, 2005 ABAG Land Use Existing Land Use in 2005: Report and Data for Bay Area Counties

	Population	Retail / Wholesale Commercial Acres	**Minimum Trash Capture Catchment Area (Acres)**[165]	# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Alameda County						
San Leandro	73,402	721	**216**	2	7	4
Oakland	420,183	759	**228**	14	8	8
Dublin	46,934	377	**113**	1	3	**3**
Emeryville	9,727	69	**21**	1	1	1
Albany	16,877	95	**28**	1	1	1
Berkeley	106,697	183	**55**	3	1	3
Alameda County Unincorporated.	140,825	375	**112**	4	3	4
Alameda	75,823	402	**121**	2	4	**4**
Fremont	213,512	698	**209**	7	6	7
Hayward	149,205	726	**218**	4	7	**7**
Livermore	83,604	423	**127**	2	4	**4**
Newark	43,872	314	**94**	1	3	**3**
Piedmont	11,100	1	**0.3**	1	1	1
Pleasanton	69,388	366	**110**	2	3	**3**
Union City	73,402	183	**55**	2	1	2

[165] 30% of Retail / Wholesale Commercial Acres
[166] If the hot spot # based on % commercial area is more than twice that based on population, the minimum hot spot # is double the population based #.

	Population	Retail / Wholesale Commercial Acres		**Minimum Trash Capture Catchment Area (Acres)**[165]		# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
San Mateo County								
San Mateo County Unincorporated.	65,844	71		**21**		2	1	2
Atherton	7,475	0		**0**		1	1	1
Belmont	26,078	58		**17**		1	1	1
Brisbane	3,861	16		**5**		1	1	1
Burlingame	28,867	123		**37**		1	1	1
Colma	1,613	106		**32**		1	1	1
Portola Valley	4,639	9		**3**		1	1	1
Daly City	106,361	242		**73**		3	2	3
East Palo Alto	32,897	59		**18**		1	1	1
Foster City	30,308	67		**20**		1	1	1
Half Moon Bay	13,046	49		**15**		1	1	1
Hillsborough	11,272	0		**0**		1	1	1
Menlo Park	31,490	83		**25**		1	1	1
Millbrae	21,387	68		**20**		1	1	1
Pacifica	39,616	100		**30**		1	1	1
Redwood City	77,269	309		**93**		2	3	**3**
San Bruno	43,444	137		**41**		1	1	1
San Carlos	28,857	129		**39**		1	1	1
San Mateo	95,776	275		**82**		3	2	3
South San Francisco	63,744	195		**58**		2	1	2
Woodside	5,625	9		**3**		1	1	1

	Population	Retail / Wholesale Commercial Acres		**Minimum Trash Capture Catchment Area (Acres)**[165]		# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Contra Costa County								
Contra Costa County Unincorporated.	173,573	524		**157**		5	5	5
Concord	123,776	1016		**305**		4	10	8
Walnut Creek	65,306	329		**99**		2	3	**3**
Clayton	10,784	21		**6**		1	1	1
Danville	42,629	134		**40**		1	1	1
El Cerrito	23,320	105		**32**		1	1	1
Hercules	24,324	37		**11**		1	1	1
Lafayette	23,962	68		**20**		1	1	1
Martinez	36,144	142		**43**		1	1	1
Moraga	16,138	108		**32**		1	1	1
Orinda	17,542	24		**7**		1	1	1
Pinole	19,193	140		**42**		1	1	1
Pittsburg	63,652	520		**156**		2	5	4
Pleasant Hill	33,377	219		**66**		1	2	**2**
Richmond	103,577	391		**117**		3	3	3
San Pablo	31,190	131		**39**		1	1	1
San Ramon	59,002	274		**82**		1	2	**2**

	Population	Retail / Wholesale Commercial Acres		**Minimum Trash Capture Catchment Area (Acres)**[165]		# of Trash Hot Spots per 30K Population	# of Trash Hot Spots per 100 Retail / Wholesale Commercial Acres	**Minimum # of Trash Hot Spots**[166]
Santa Clara County								
Santa Clara County Unincorporated	99,122	270		**81**		3	3	3
Cupertino	55,551	213		**64**		2	2	2
Los Altos	28,291	65		**20**		1	1	1
Los Altos Hills	8,837	0		**0**		1	1	1
Los Gatos	30,296	163		**49**		1	1	1
Milpitas	69,419	457		**137**		2	4	**4**
Monte Sereno	3,579	0		**0**		1	1	1
Mountain View	73,932	375		**112**		2	3	**3**
Santa Clara	115,503	560		**168**		3	5	**5**
Saratoga	31,592	41		**12**		1	1	1
San Jose	989,496	2983		**895**		32	29	32
Sunnyvale	137,538	548		**164**		3	5	**5**
Palo Alto	63,367	282		**84**		2	2	2
Solano County								
Vallejo	120,416	559		**168**		4	5	**5**
Fairfield	106,142	486		**146**		3	4	**4**
Suisun	28,031	75		**22**		1	1	1
Totals	4,930,339	19057		**5718**		165	184	349

Table 10-2. Non-Population Based Permittee Trash Hot Spot and Trash Capture Assignments

Non population based Permittee	Number of Trash Hot Spots	Trash Capture Requirement
Santa Clara Valley Water District	12	4 trash booms or 8 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda County Flood Control Agency	9	3 trash booms or 6 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Alameda Co. Zone 7 Flood Control Agency	3	1 trash boom or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Contra Costa County Flood Control Agency	6	2 trash booms or 4 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
San Mateo County Flood Control District	2	1 trash booms or 2 outfall capture devices (minimum 2 ft. diameter outfall) or equivalent measures
Vallejo Sanitation and Flood District	1	1 trash boom or 2 outfall capture devices or equivalent measures (minimum 2 ft. diameter outfall)

ATTACHMENT K

Standard NPDES Stormwater Permit Provisions

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN FRANCISCO BAY REGION

Standard Provisions and Reporting Requirements for NPDES Stormwater Discharge Permits

February 2009

A. GENERAL PROVISIONS

1. Neither the treatment nor the discharge of pollutants shall create a pollution, contamination, or nuisance as defined by Section 13050 of the California Water Code.

2. All discharges authorized by this Order shall be consistent with the terms and conditions of this Order.

3. Duty to Comply

a. If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Clean Water Act, or amendments thereto, for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation upon such pollutant in a Board adopted Order, discharger must comply with the new standard or prohibition. The Board will revise or modify the Order in accordance with such toxic effluent standard or prohibition and so notify the discharger.

b. If more stringent applicable water quality standards are approved pursuant to Section 303 of the Clean Water Act, or amendments thereto, the discharger must comply with the new standard. The Board will revise and modify this Order in accordance with such more stringent standards.

c. The filing of a request by the discharger for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR 122.41(f)]

4. Duty to Mitigate

The discharger shall take all reasonable steps to minimize or prevent any discharge in violation of this order and permit which has a reasonable likelihood of adversely affecting public health or the environment, including such accelerated or additional monitoring as requested by the Board or Executive Officer to determine the nature and impact of the violation. [40 CFR 122.41(d)]

5. Pursuant to U.S. Environmental Protection Agency regulations the discharger must notify the Water Board as soon as it knows or has reason to believe (1) that they have begun or expect to begin, use or manufacture of a pollutant not reported in the permit application,

or (2) a discharge of toxic pollutants not limited by this permit has occurred, or will occur, in concentrations that exceed the limits specified in 40 CFR 122.42(a).

6. The discharge of any radiological, chemical, or biological warfare agent waste is prohibited.

7. All facilities used for transport, treatment, or disposal of wastes shall be adequately protected against overflow or washout as the result of a 100-year frequency flood.

8. Collection, treatment, storage and disposal systems shall be operated in a manner that precludes public contact with wastewater, except where excluding the public is inappropriate, warning signs shall be posted.

9. Property Rights

This Order and Permit does not convey any property rights of any sort or any exclusive privileges. The requirements prescribed herein do not authorize the commission of any act causing injury to the property of another, nor protect the discharger from liabilities under federal, state or local laws, nor create a vested right for the discharge to continue the waste discharge or guarantee the discharger a capacity right in the receiving water. [40 CFR 122.41(g)]

10. Inspection and Entry

The Board or its authorized representatives shall be allowed:

a. Entry upon premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of the order and permit;

b. Access to and copy at, reasonable times, any records that must be kept under the conditions of the order and permit;

c. To inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, or operations regulated or required under the order and permit; and

d. To photograph, sample, and monitor, at reasonable times for the purpose of assuring compliance with the order and permit or as otherwise authorized by the Clean Water Act, any substances or parameters at any locations. [40 CFR 122.41(i)]

11. Permit Actions

This Order and Permit may be modified, revoked and reissued, or terminated in accordance with applicable State and/or Federal regulations. Cause for taking such action includes, but is not limited to any of the following:

a. Violation of any term or condition contained in the Order and Permit;

b. Obtaining the Order and Permit by misrepresentation, or by failure to disclose fully all relevant facts;

c. Endangerment to public health or environment that can only be regulated to acceptable levels by order and permit modification or termination; and

d. Any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

12. Duty to Provide Information

The discharger shall furnish, within a reasonable time, any information the Board may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit. The discharger shall also furnish to the Board, upon request, copies of records required to be kept by its permit. [40 CFR 122.41(h)]

13. Availability

A copy of this permit shall be maintained at the discharge facility and be available at all times to operating personnel.

14. Continuation of Expired Permit

This permit continues in force and effect until a new permit is issued or the Board rescinds the permit. Only those dischargers authorized to discharge under the expiring permit are covered by the continued permit.

B. GENERAL REPORTING REQUIREMENTS

1. Signatory Requirements

a. All reports required by the order and permit and other information requested by the Board or USEPA Region 9 shall be signed by a principal executive officer or ranking elected official of the discharger, or by a duly authorized representative of that person. [40 CFR 122.22(b)]

b. Certification

All reports signed by a duly authorized representative under Provision E.1.a. shall contain the following certification:
"I certify under penalty of law that this document and all attachments are prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. [40 CFR 122.22(d)]

2. Should the discharger discover that it failed to submit any relevant facts or that it submitted incorrect information in any report, it shall promptly submit the missing or correct information. [40 CFR 122.41(l)(8)]

3. False Reporting

Any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall be subject to enforcement procedures as identified in Section F of these Provisions.

4. Transfers

a. This permit is not transferable to any person except after notice to the Board. The Board may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

b. Transfer of control or ownership of a waste discharge facility under an National Pollutant Discharge Elimination System permit must be preceded by a notice to the Board at least 30 days in advance of the proposed transfer date. The notice must include a written agreement between the existing discharger and proposed discharger containing specific dates for transfer of responsibility, coverage, and liability between them. Whether an order and permit may be transferred without modification or revocation and reissuance is at the discretion of the Board. If order and permit modification or revocation and reissuance is necessary, transfer may be delayed 180 days after the Board's receipt of a complete application for waste discharge requirements and an NPDES permit.

5. Compliance Reporting

a. Planned Changes

The discharger shall file with the Board a report of waste discharge at least 120 days before making any material change or proposed change in the character, location or volume of the discharge.

b. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final compliance dates contained in any compliance schedule shall be submitted within 10 working days following each scheduled date unless otherwise specified within this order and permit. If reporting noncompliance, the report shall include a description of the reason for failure to comply, a description and schedule of tasks necessary to achieve compliance and an estimated date for achieving full compliance. A final report shall be submitted within 10 working days of achieving full compliance, documenting full compliance

c. Non-compliance Reporting (Twenty-four hour reporting:)

i. The discharger shall report any noncompliance that may endanger health or the environment. All pertinent information shall be provided orally within 24 hours from the time the discharger becomes aware of the circumstances. A written submission shall also be provided within five working days of the time the discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times and, if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

C. ENFORCEMENT

1. The provision contained in this enforcement section shall not act as a limitation on the statutory or regulatory authority of the Board.

2. Any violation of the permit constitutes violation of the California Water Code and regulations adopted hereunder and the provisions of the Clean Water Act, and is the basis for enforcement action, permit termination, permit revocation and reissuance, denial of an application for permit reissuance; or a combination thereof.
3. The Board may impose administrative civil liability, may refer a discharger to the State Attorney General to seek civil monetary penalties, may seek injunctive relief or take other appropriate enforcement action as provided in the California Water Code or federal law for violation of Board orders.
4. It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this order and permit.
5. A discharger seeking to establish the occurrence of any upset (See Definitions, G. 24) has the burden of proof. A discharger who wishes to establish the affirmative defense of any upset in an action brought for noncompliance shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:
   a. an upset occurred and that the Permittee can identify the cause(s) or the upset;
   b. the permitted facility was being properly operated at the time of the upset;
   c. the discharger submitted notice of the upset as required in paragraph E.6.d.; and
   d. the discharger complied with any remedial measures required under A.4.

   No determination made before an action for noncompliance, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.
   In any enforcement proceeding, the discharger seeking to establish the occurrence of any upset has the burden of proof. [40 CFR 122.41(n)]

D. DEFINITIONS

1. DDT and Derivatives shall mean the sum of the p,p' and o,p' isomers of DDT, DDD (TDE), and DDE.
2. Duly authorized representative is one whose:
   a. Authorization is made in writing by a principal executive officer or ranking elected official;
   b. Authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as general manager in a partnership, manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
   c. Written authorization is submitted to the USEPA Region 9. If an authorization becomes no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements above must be submitted to the Board and USEPA Region 9 prior to

or together with any reports, information, or applications to be signed by an authorized representative.

3. Hazardous substance means any substance designated under 40 CFR 116 pursuant to Section 311 of the Clean Water Act.

4. HCH shall mean the sum of the alpha, beta, gama (Lindane), and delta isomers of hexachlorocyclohexane.

5. Overflow is defined as the intentional or unintentional spilling or forcing out of untreated or partially treated wastes from a transport system (e.g. through manholes, at pump stations, and at collection points) upstream from the plant headworks or from any treatment plant facilities.

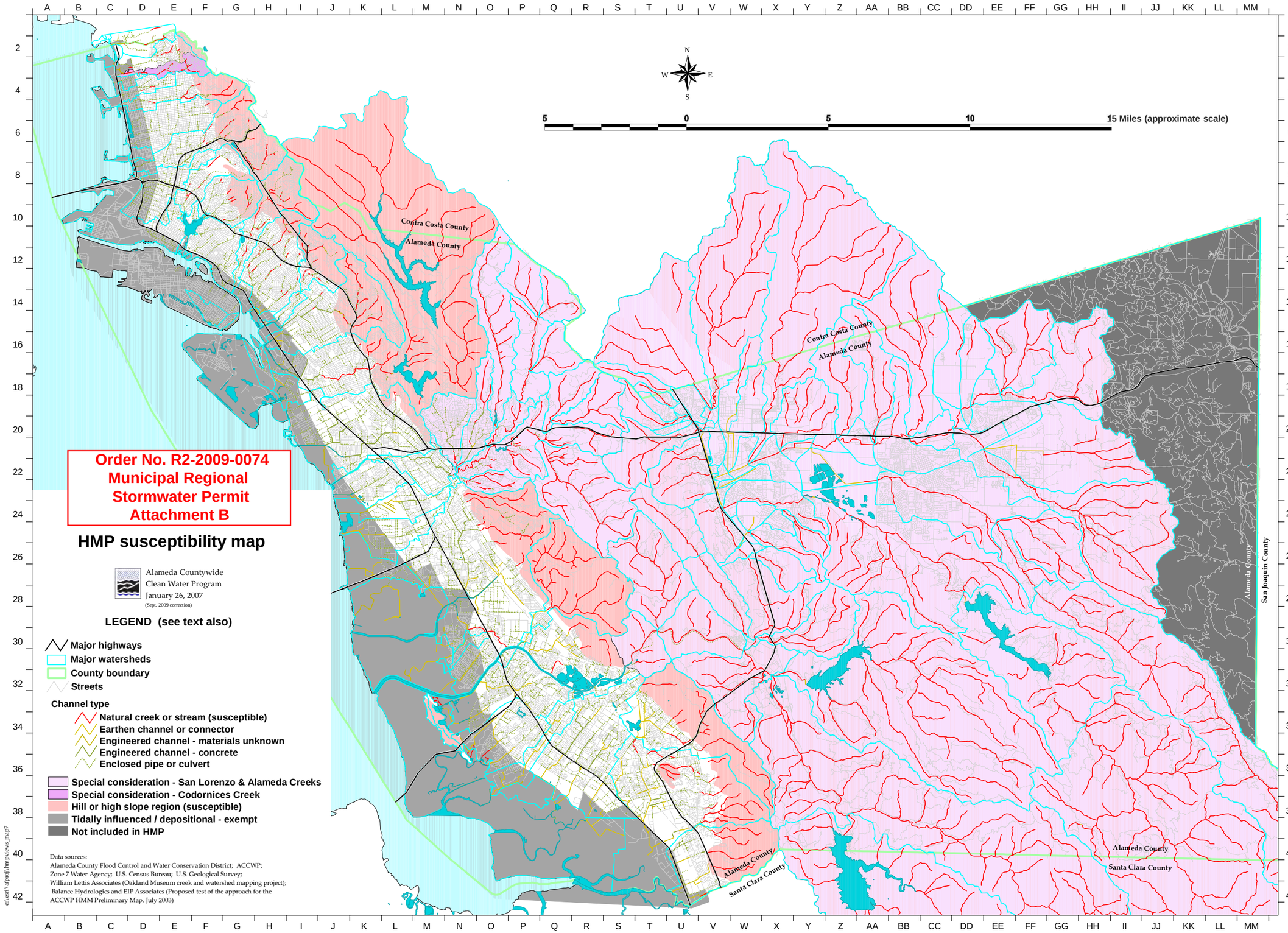
6. Priority pollutants are those constituents referred to in 40 CFR S122, Appendix D and listed in the USEPA NPDES Application Form 2C, (dated 6/80) Items V-3 through V-9.

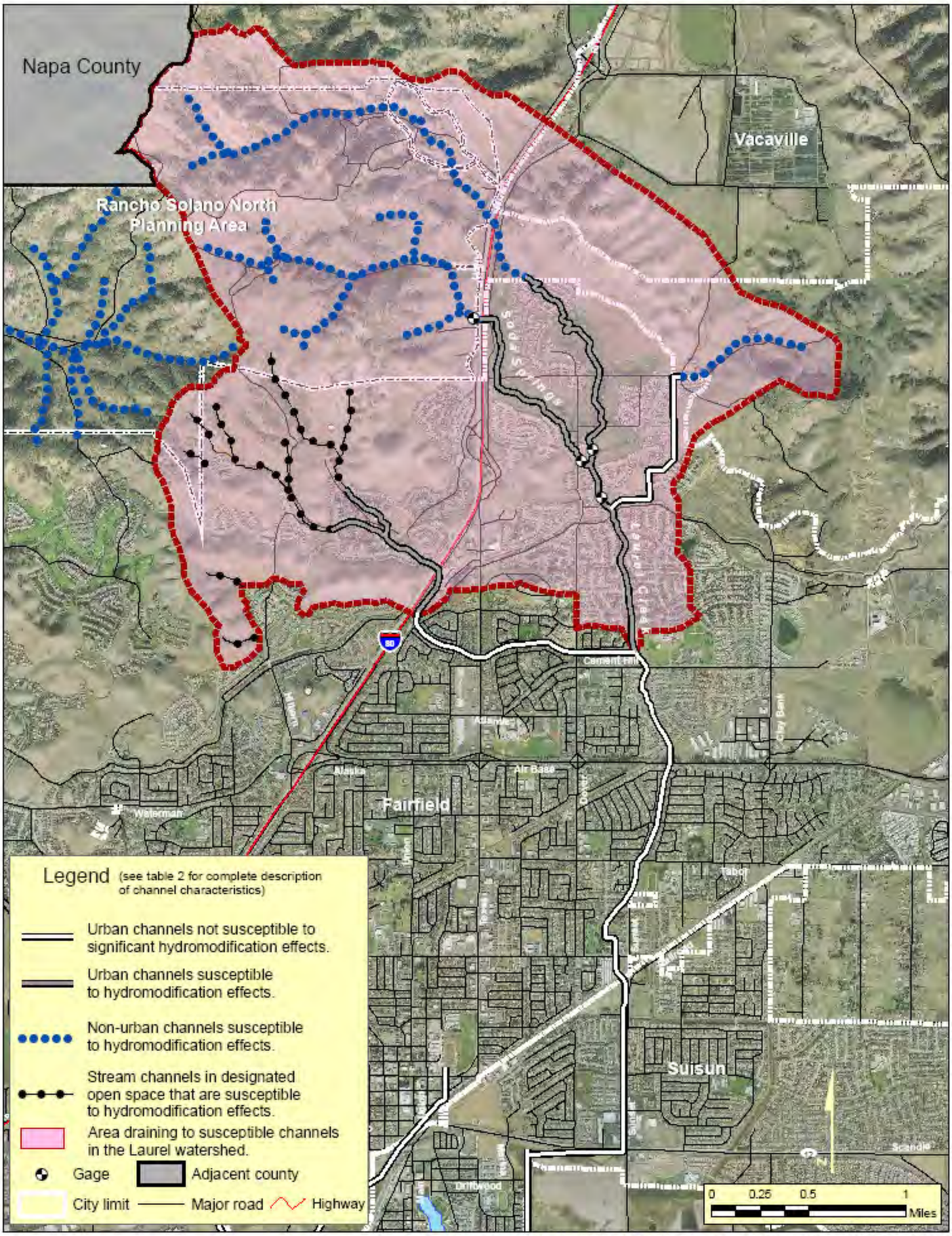
7. Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

8. Toxic pollutant means any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act or under 40 CFR S401.15.

9. Total Identifiable Chlorinated hydrocarbons (TICH) shall be measured by summing the individual concentrations of DDT, DDD, DDE, aldrin, BHC, chlordane, endrin, heptachlor, lindane, dieldrin, PCBs and other identifiable chlorinated hydrocarbons.

10. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in this order and permit. The requirements of this order and permit are applicable to the entire volume of water, and the material therein, which is disposed of to surface and ground waters of the State of California.


Order No. R2-2009-0074
Municipal Regional
Stormwater Permit
Attachment B
HMP susceptibility map
Alameda Countywide
Clean Water Program
January 26, 2007
(Sept. 2009 correction)
LEGEND (see text also)
Major highways
Major watersheds
County boundary
Streets
Channel type
Natural creek or stream (susceptible)
Earthen channel or connector
Engineered channel - materials unknown
Engineered channel - concrete
Enclosed pipe or culvert
Special consideration - San Lorenzo & Alameda Creeks
Special consideration - Codornices Creek
Hill or high slope region (susceptible)
Tidally influenced / depositional - exempt
Not included in HMP
Data sources:
Alameda County Flood Control and Water Conservation District; ACCWP;
Zone 7 Water Agency; U.S. Census Bureau; U.S. Geological Survey;
William Lettis Associates (Oakland Museum creek and watershed mapping project);
Balance Hydrologics and EIP Associates (Proposed test of the approach for the
ACCWP HMM Preliminary Map, July 2003)
c:\esri\afproj\hmpviews_map7
N
W
E
S
5
0
5
10
15 Miles (approximate scale)
Contra Costa County
Alameda County
Contra Costa County
Alameda County
Alameda County
San Joaquin County
Alameda County
Santa Clara County
Alameda County
Santa Clara County



Source: Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas (north of Cement Hill Road, for example).

Balance Hydrologics, Inc.

Figure 2. Map showing HMP channel Classification for the Laurel Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map). Hydromodification controls are not required for projects that drain directly to non-susceptible urban channels.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure2_edits.mxd

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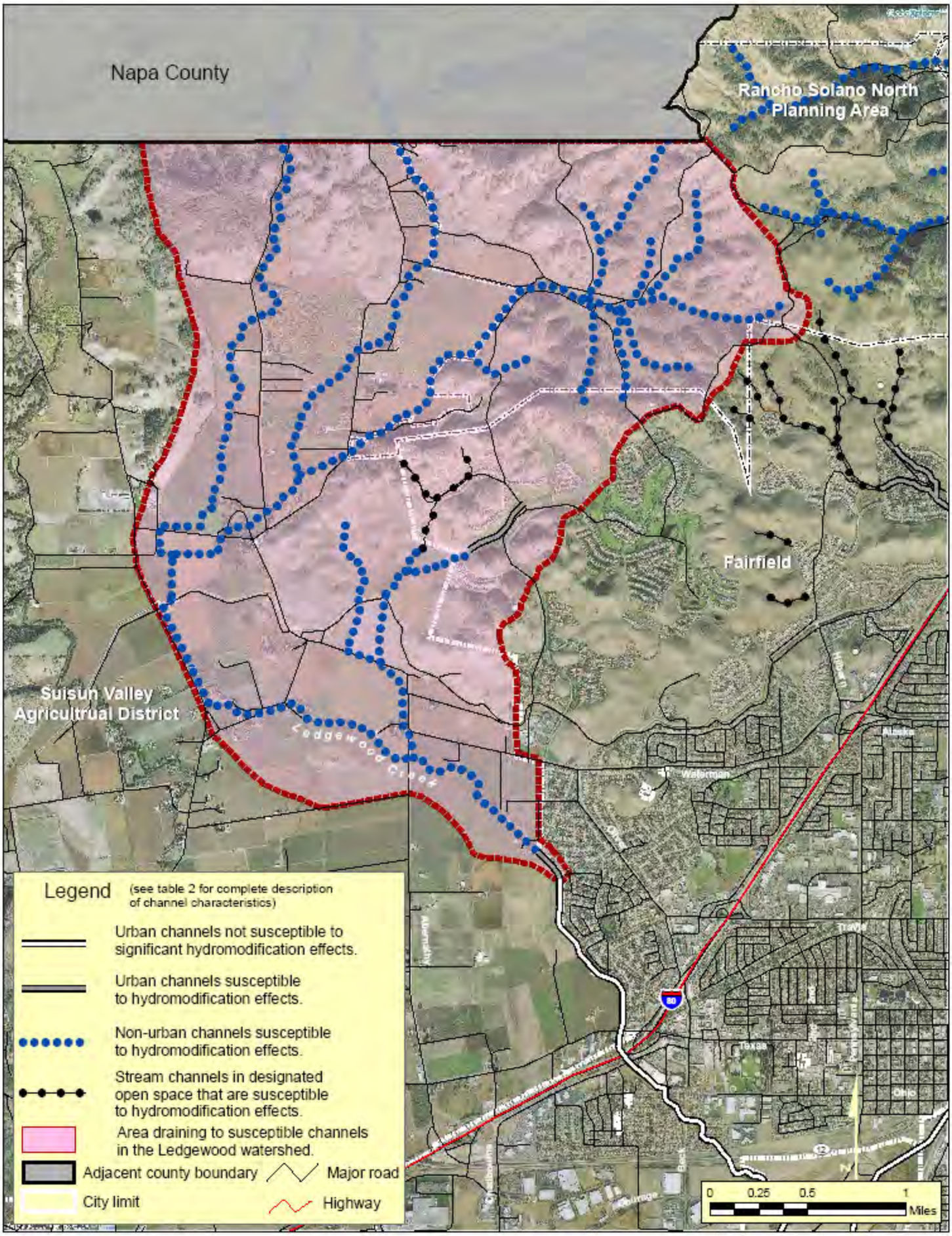

Basemap data provided by Fairfield-Suisun Sewer District. Note that the roads layer does not include the most recently urbanized areas, as shown in the aerial photo.

Balance Hydrologics, Inc.

Figure 3. Map showing HMP channel Classification for the Ledgewood Creek watershed. The mid- to upper reaches include all channels within the watershed that are susceptible to hydromodification effects (dotted and gray-shaded channels on this map), however areas outside the City of Fairfield are not included in this permit unless annexed by the city. The non-developed areas within the current city limits are designated open space in relatively steep terrain, and are unlikely to be converted to urban areas however the HMP still applies in these areas.

W:\Projects\204126 Fairfield HMP\204003\204126_Figure3_edits.mxd

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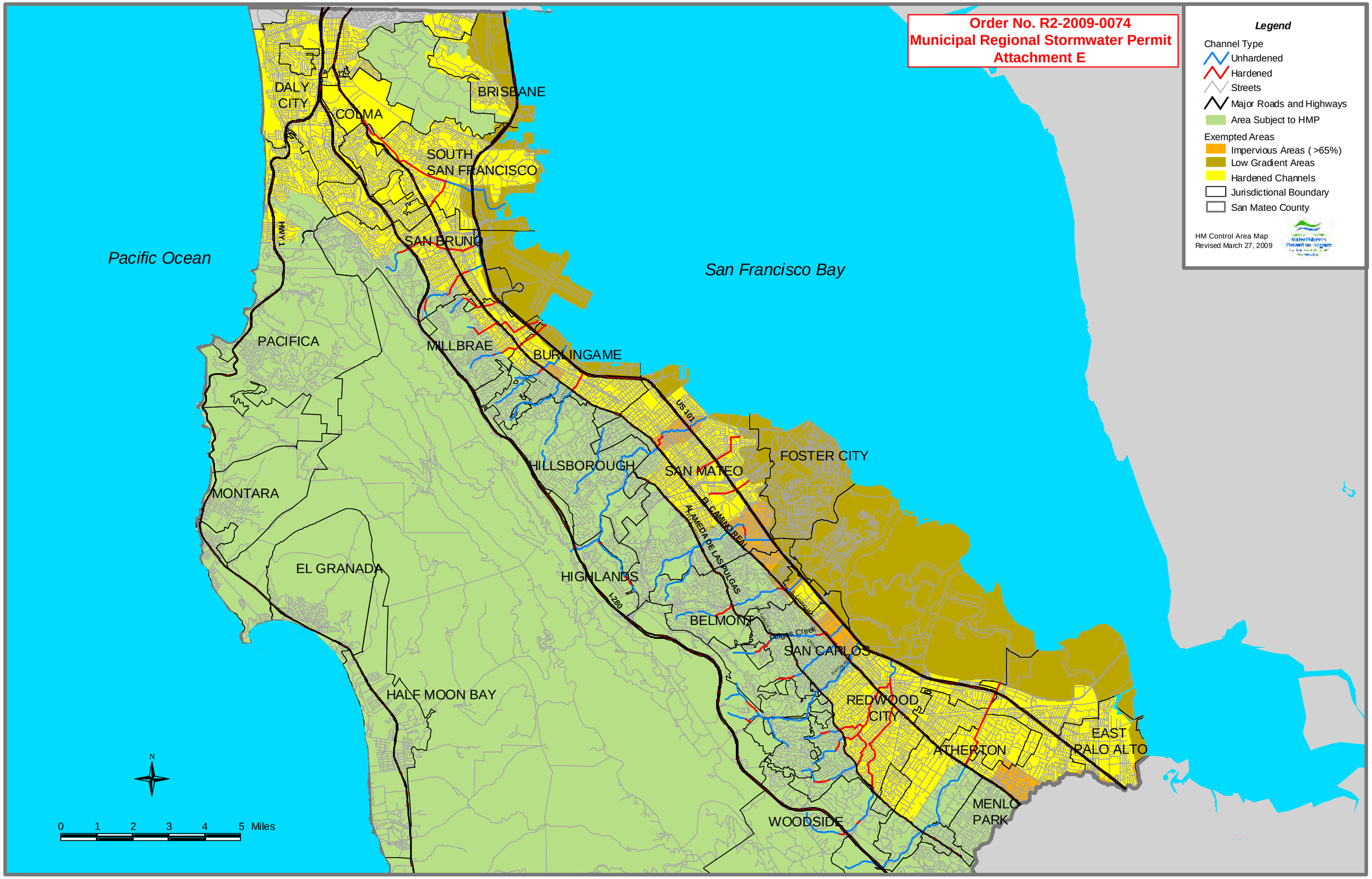
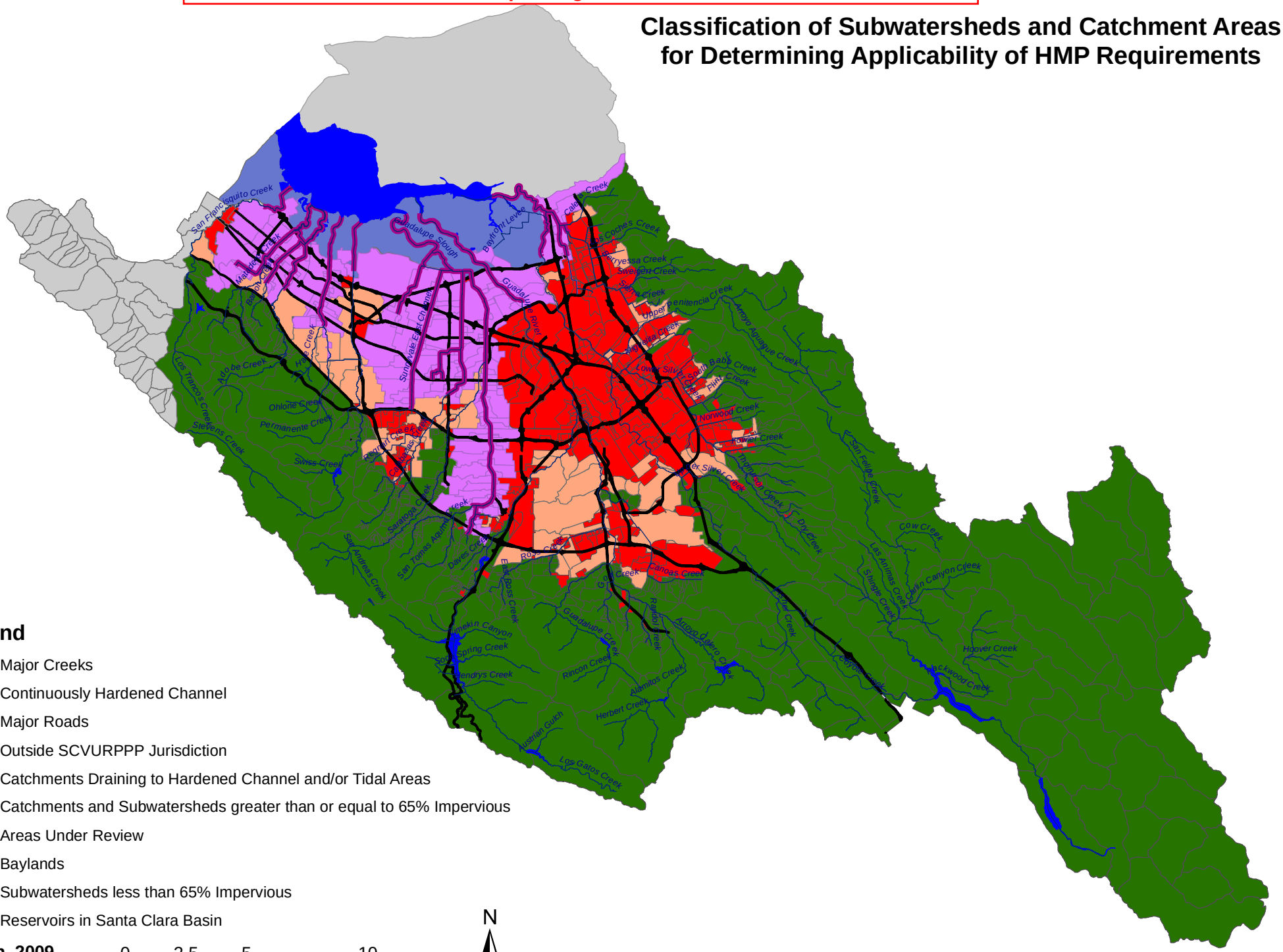

Order No. R2-2009-0074
Municipal Regional Stormwater Permit
Attachment E
Legend
Channel Type
Unhardened
Hardened
Streets
Major Roads and Highways
Area Subject to HMP
Exempted Areas
Impervious Areas (>65%)
Low Gradient Areas
Hardened Channels
Jurisdictional Boundary
San Mateo County
HM Control Area Map
Revised March 27, 2009
Pacific Ocean
San Francisco Bay
DALY CITY
COLMA
BRISBANE
SOUTH SAN FRANCISCO
SAN BRUNO
PACIFICA
MILLBRAE
BURLINGAME
HILLSBOROUGH
SAN MATEO
FOSTER CITY
MONTARA
EL GRANADA
HIGHLANDS
BELMONT
SAN CARLOS
HALF MOON BAY
REDWOOD CITY
ATHERTON
EAST PALO ALTO
MENLO PARK
WOODSIDE
HWY 1
US 101
I-280
EL CAMINO REAL
ALAMEDA DE LAS PULGAS
Pulgas Creek
N
0 1 2 3 4 5 Miles

Order No. R2-2009-0074, Municipal Regional Stormwater Permit, Attachment F

Classification of Subwatersheds and Catchment Areas for Determining Applicability of HMP Requirements



Legend

- Major Creeks
- Continuously Hardened Channel
- Major Roads
- Outside SCVURPPP Jurisdiction
- Catchments Draining to Hardened Channel and/or Tidal Areas
- Catchments and Subwatersheds greater than or equal to 65% Impervious
- Areas Under Review
- Baylands
- Subwatersheds less than 65% Impervious
- Reservoirs in Santa Clara Basin

March, 2009
SCVURPPP

0 2.5 5 10 Miles

N

This map contains: 1) a revision to the November 2007 version to correct a mapping error; and 2) two revisions to Areas Under Review in Palo Alto and North Santa Clara County to reflect updated impervious surface data, consistent with the HM applicability criteria set forth in Attachment F, Section 4 of the MRP

APPENDIX 13A-3

SCVURPPP C.3 AND OTHER PROGRAM DOCUMENTS

Santa Clara Valley
Urban Runoff
Pollution Prevention Program
Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

Memorandum

TO: **Site Design Work Group, C3PO Ad Hoc Task Group and Management Committee**

FROM: **Wendy Edde, Program Staff**

DATE: **May 16, 2003** **PROJECT:** **SC42.36**

SUBJECT: **Santa Clara Basin Model Development Principles**

The recently completed Development Policies Comparison Project began in response to a Regional Water Quality Control Board annual review of the Urban Runoff Program. To complete this analysis objectively, Program staff together with the Santa Clara Basin Watershed Management Initiative's Land Use Subgroup (LUS) developed a multi-section Policy, Code, and Ordinance worksheet based upon the 1998 Center for Watershed Protection's manual "Better Site Design: A Handbook for Changing Development Rules In Your Community," (Silver Spring, MD, 1998). The handbook includes model site planning/development principles and a Code and Ordinance comparison worksheet to assist municipalities to compare their development policies against the model development principles. The LUS made modifications to the basic model site planning and development principles and used these to modify the associated worksheet. The modifications involved tailoring the principles and worksheet to the Santa Clara Basin (for example, adding campus developments) and to cover the areas that the Program and WMI were interested in: erosion and sediment controls; imperviousness reduction and post-construction BMPs; drainage design; other stormwater pollution controls; natural resources; and policies to promote alternative transportation.

Attached are the Santa Clara Basin Model Development Principles developed with the LUS that formed the basis of the Development Policies Comparison Project's Policy, Code, and Ordinance Worksheet. These principles may be used by municipal staff as another tool for updating their development policies, codes, and guidance materials to provide ideas for those wishing to provide more detailed language/guidelines for additional water quality and beneficial use protection. With slight modifications, the language can be reworked to form specific goals, policies, implementation measures and/or other guidance to the level each Co-permittee determines is most appropriate.

699 Town & Country Village • Sunnyvale, CA 94086 • tel: (408) 720-8833 • fax: (408) 720-8812
1410 Jackson Street • Oakland, CA 94612 • tel: (510) 832-2852 • fax: (510) 832-2856
1-800-794-2482

Santa Clara Basin Model Development Principles
April 2003

I. Requirements to Implement Erosion and Sediment Controls During Construction

1. Specify comprehensive erosion and sediment control policies, including more stringent control policies for developments in sensitive areas (near riparian areas, hillside developments) to protect natural resources. Specify more stringent erosion and sediment control policies for, or discourage altogether, wet season construction.
2. Incorporate erosion control policies for off-road vehicle and trail use.
3. Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection. Minimize removal of vegetation and trees, and minimize earth movement.
4. Implement erosion and sediment controls prior to the start of and as part of grading and clearing.
5. Require adequate training of contractors, engineers, and designers in erosion and sediment controls. Reference specific technical manual(s) for guidance (e.g., Regional Board's Field Guide, ABAG's Erosion and Sediment Control Manual).
6. Require appropriate sites to meet NPDES General Permit conditions prior to obtaining municipal approvals.
7. Allow for flexibility in the erosion and sediment control plans to allow for updates in response to ever-changing field conditions.
8. Allow adequate authority and funding for routine municipal site inspections.
9. Incorporate enforcement measures, such as performance bonds, to ensure compliance with erosion and sediment control regulations/policies.

II. Policies to Limit the Overall and Directly-Connected Imperviousness of a Site and for Incorporating Post-Construction BMPs Into Development Projects

A. New Residential and Commercial Campus/Institutional Subdivisions.

10. Incorporate cluster development zoning policies with criteria to support water quality protection: (a) significant impervious surface reduction from reduced roadway network compared to conventional zoning, (b) minimum site size; minimum open space requirement of approximately 50% of total site. (c) consolidation of open space, such that at least 75% is in a contiguous unit for habitat value; (d) maintenance of approximately half of the open space in undisturbed, natural vegetated areas (i.e., wetlands, meadows), with the other half as a community green space (e.g.

playgrounds, constructed stormwater basins, turf grass); (e) formation of private legal entity to maintain open space in perpetuity (e.g. homeowners' association); and (f) dedication of open space to a public open space district.

11. Ensure that site designs require a definition of the development envelope, including the identification of protected areas, such as existing trees, steep slopes, erosive soils, riparian areas, or wetlands; setbacks, easements, and important site features.
12. Allow for a minimization of lot sizes, setbacks, and frontage distances to allow for open space and to protect sensitive areas.
13. Minimize impervious surface in recreational open space by using permeable pavement and other BMPs.
14. Advocate reliable methods for management of open space (e.g., community associations, and land trust or local government management via conservation easements). Address management decisions including maintenance, liability, and emergency vehicle access issues for open space areas. Clearly specify how community open space will be managed and designate a sustainable legal entity responsible for managing both natural and recreational open space.
15. Protect native vegetation, including heritage trees. Promote tree canopy coverage.

B. Residential Subdivision Site Design.

16. Advocate open space development that incorporates smaller lot sizes to minimize total impervious area, reduce total construction costs, conserve natural areas, provide community recreational space, and promote watershed protection.
17. Relax side yard setbacks and allow narrower frontages to reduce total road length in the community and overall site imperviousness. Relax front setback requirements to minimize driveway lengths and reduce overall lot imperviousness.
18. Promote more flexible design standards for residential subdivision sidewalks. Where practical, consider locating sidewalks on only one side of the street and providing common walkways linking pedestrian areas.
19. Reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.
20. Implement maximum impervious surface coverage limits.

C. Commercial/Industrial/Campus/Institutional Site Design.

21. Cover maintenance yard, service, cafeteria use, and disposal areas.
22. Policies should promote inclusion of turf playfields/courtyards as appropriate that will also serve as infiltration areas. Play areas or impervious areas should slope to turf playfields/courtyards. Promote multi-use area or playgrounds that to double as overflow parking for large events. Use removable bollard for access to overflow areas.

23. Promote use of benign roof materials.

24. Promote reduced building footprint, including multi-stories that incorporate parking areas within the structure.

25. Industrial areas should include an inlet with sump for spills; covered storage.

D. Streets.

26. Promote neo-traditional design, or headwaters street designs. Design residential streets for the minimum required pavement width needed to support travel lanes; on-street parking; and emergency, maintenance, and service vehicle access. These widths should be based on traffic volume.

27. Reduce the total length of residential streets by examining alternative street layouts to determine the best option for increasing the number of homes per unit length and for reducing vehicle trip miles.

28. Minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Consider alternative turnarounds.

29. Promote safe, integrated bikeways and pathways.

30. Promote native street trees.

E. Parking.

31. The required parking ratio governing a particular land use or activity should be enforced as both a maximum and a minimum in order to curb excess parking space construction. Existing parking ratios should be reviewed for conformance taking into account local and national experience to see if lower ratios are warranted and feasible.

32. Parking codes should be revised to lower parking requirements where mass transit is available or enforceable shared parking arrangements are made.

33. Reduce the overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas. Promote use of hybrid parking lot/parking groves in parking lots, and/or landscaped parking reserves.

34. Provide meaningful incentives to encourage structured and shared parking to make it more economically viable.

35. Wherever possible, provide stormwater treatment for parking lot runoff using bioretention areas, filter strips, and/or other practices that can be integrated into required landscaping areas and traffic islands. Promote use of vegetated swales, biofilters, infiltration islands. Promote pervious overflow in parking stalls, and notched curbs to direct runoff to swales, infiltration areas.

III. Requirements for Drainage Design

36. Promote limiting runoff to pre-development levels and/or finding solutions to flooding and local drainage problems in the development vicinity (e.g., detention/retention). Drainage policies, standard specifications and details for drainage should allow for infiltration of storm water and breakup of directly-connected impervious areas before sending water to the storm drain system.
37. Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas and avoid routing rooftop runoff to the roadway and the stormwater conveyance system.
38. Drainage master plans should incorporate protection of streams from hydrologic impacts from development. Avoid altering natural drainage systems, so that flooding and water quality degradation do not result.
39. CEQA checklists should be modified, as necessary, to address stormwater and hydrologic impacts.
40. Wherever possible, residential street right-of-way widths should reflect the minimum required to accommodate the travel-way, the sidewalk, and vegetated open channels. Utilities and storm drains should be located within the pavement section of the right-of-way wherever feasible.
41. Where density, topography, soils, and slope permit, vegetated open channels should be used in the street right-of-way to convey and treat stormwater runoff.

IV. Other Policies Intended to Reduce Stormwater Pollution

42. Reduce the use of herbicides and pesticides on city-owned properties to the extent possible.
43. Prohibit litter, oil, pesticides/herbicides, or other illicit discharges or connections to the storm drain system. Control pollutants to the storm drain systems by any user.
44. Incorporate policies to reduce wastes from commercial, industrial sites, and municipal maintenance activities. Ensure proper use, storage, and disposal of toxic chemicals.
45. Include policies to promote public information and participation in all areas of storm water management, and for watershed protection.
46. Require general pollution prevention controls at construction sites.
47. Obtain appropriate legal authority for inspections, monitoring activities needed to ensure compliance and obtain adequate enforcement authority.
48. Policies and funding to help city implement Storm Water Management Plan.

VI. Wetlands and Riparian Protection and Restoration, and Open Space Policies

49. Distinguish between and preserve natural open space and urban (park, recreation) open space. A fixed portion of any community open space should be managed as protected natural open space in a consolidated manner.
50. Create a variable width, naturally vegetated buffer system along all perennial streams that also encompasses critical environmental features such as the 100-year floodplain, steep slopes and freshwater wetlands.
51. The riparian stream buffer should be preserved or restored with native vegetation that can be maintained throughout the delineation, plan review, construction, and occupancy stages of development.
52. Conserve trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native plants. Wherever practical, manage community open space, street rights-of-way, parking lot islands, and other landscaped areas to promote natural vegetation.
53. Incentives and flexibility in the form of density compensation, buffer averaging, property tax reduction, stormwater credits, and by-right open space development should be encouraged to promote conservation of stream buffers, forests, meadows, and other areas of environmental value. In addition, off-site mitigation consistent with locally adopted watershed plans should be encouraged.
54. New stormwater outfalls should not discharge unmanaged stormwater into jurisdictional wetlands, sole-source aquifers, or sensitive areas.

VI. Policies to Limit Auto Use and Promote Alternative Modes of Transportation

55. Promote regional and local linking of mass transit opportunities to allow for easy, convenient connections.
56. Reduce the amount or length of vehicle trips necessary. Promote street design to minimize trip length. Promote telecommuting. Promote delivery services.
57. Promote employment and industrial areas in areas with more truck routes, better access to air, truck, rail, and water freight routes.
58. Participate in Regional Transportation Planning Process, and develop local policies to support the regional transportation planning efforts. Examine and reduce overall social, economic, energy and environmental effects of transportation decisions in the transportation plan.
59. Promote mixed land use development and strong regional centers with strong pedestrian amenities, to ease congestion and increase mass transit use. Arrange mass transit together with higher density land uses. Promote parking limitations, pedestrian amenities, and land use considerations in areas with compact, densely developed

urban areas near mass transit. Advocate increased density near transit and activity centers.

60. Promote well-connected network of streets/pathways to benefit transit, pedestrian, and bike travel. Promote more compact urban form and land use patterns, and increased availability for transit, safe biking and walking. Promote connection of urban centers with several corridors and access points that allow for auto, transit, bike, and pedestrian movement.

61. Minimize the impact of travel on rural and environmental land uses by promoting greenbelts.

VII. Policies to Promote Regional/Watershed-Based Planning and Zoning

62. Local jurisdictions should work with multiple jurisdictions that share their watershed and on a regional level to: (1) identify the watersheds shared by participating jurisdictions; (2) identify, assess, and prioritize the natural, social, and other resources into the watershed, (3) prioritize areas for growth, protection and conservation based on prioritized resources, and (4) develop plans and regulations to guide growth and protect resources.

63. Adopt a watershed-based or ecosystem-based planning approach to land use planning and policy decisions. Articulate the basic strategy in the General Plan. The General Plan should look at development projects in the context of the entire watershed. Link land use planning with transportation planning to maintain livability, protect the watershed.

64. Begin to pursue basic watershed-based planning strategy in collaboration with neighboring local governments located in the watershed.

65. Promote watershed-based zoning, such as overlay districts, performance zoning, incentive zoning, imperviousness overlay zoning, and/or planned unit development zoning to introduce flexibility into the zoning structure.

66. Update CEQA checklist to consider site impacts in terms of an overall watershed plan (once available).

67. Consolidate open space planning within the watershed. Plan early with other watershed communities where and when open space development is desired and needed.

68. Have a mechanism to prepare a specific area plan in conjunction with flood control planning, to address in part the need to incorporate urban drainage.

References Cited:

Bay Area Stormwater Management Agencies Association, *Start at the Source, Design Guidance Manual for Stormwater Quality Protection*, 1999 Edition, Tom Richman and Associates, Forbes Press, 1999.

Center for Watershed Protection, *Better Site Design: A Handbook for Changing Development Rules In Your Community,* August 1998.

Metro: Regional Transportation Plan, "2040 Concepts for Growth: transportation element," <http://www.metro-region.org/transpo/growthlink/transgrowthlink.html> Portland Oregon, 1997 Metro, last updated December 15, 1999.

Pacific Municipal Consultants, *Catalog of General Plan and Development Related Policies (Phase 2) for the Santa Clara Valley Urban Runoff Pollution Prevention Program,* October 1998.

C.3 STORMWATER HANDBOOK

GUIDANCE FOR IMPLEMENTING STORMWATER REQUIREMENTS FOR NEW AND REDEVELOPMENT PROJECTS

May 2004

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

CREDITS

This document was prepared by the Santa Clara Valley Urban Runoff Pollution Prevention Program (Program) for use by the Program Co-permittees, other local agencies, and the land development community. The Program expresses its appreciation to all those who contributed to this document.

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This Handbook will be updated periodically. Go to the SCVURPPP website to obtain the most recent update: www.scvurppp.org

C.3 Stormwater Handbook

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Campbell • Cupertino • Los Altos • Los Altos Hills • Los Gatos • Milpitas • Monte Sereno • Mountain View • Palo Alto
San Jose • Santa Clara • Saratoga • Sunnyvale • Santa Clara County • Santa Clara Valley Water District

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Acronyms and Abbreviations

ASCE	American Society of Civil Engineers
BMPs	Best Management Practices
CA	California
CalTrans	California Department of Transportation
CASQA	California of Stormwater Quality Association
CDS	Continuous Deflective Separation
CWA	Clean Water Act
DEH	California Department of Environmental Health
EPA	United States Environmental Protection Agency
MCTT	Multi-Chambered Treatment Train
O&M	Operation and Maintenance
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
Program	Santa Clara Valley Urban Runoff Pollution Prevention Program
RCRA	Resource Conservation and Recovery Act
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SCVWD	Santa Clara Valley Water District
TP	Total Phosphorus
TPH	Total Petroleum Hydrocarbons
URQM	Urban Runoff Quality Management *(WEF Manual of Practice No. 23 and ASCE Manual of Practice No. 87, 1998)*
WEF	Water Environment Federation

I INTRODUCTION & GUIDE TO USING THIS HANDBOOK

I.1. INTRODUCTION

The goal of this Handbook is to assist project proponents and Co-permittee staff to ensure that they meet the stormwater requirements of Permit Provision C.3 for new development and redevelopment projects.

During urban development, two important changes occur. First, vegetated pervious ground cover is converted to impervious surfaces such as paved streets, driveways, rooftops, and parking lots. Vegetated soil can both absorb rainwater and remove pollutants, providing a very effective natural purification process. Impervious surfaces can neither absorb water nor remove pollutants and the natural purification characteristics of the land are lost. The increased flows and volumes of stormwater discharged from new impervious surfaces can impact beneficial uses of aquatic ecosystems.

Secondly, urban development can create new pollution sources and increase levels of existing sources such as car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc. As rain becomes runoff, it collects pollutants while passing over impervious surfaces. The runoff typically enters a storm drain system that rapidly conveys it, untreated, to a lake, creek, river, bay, or ocean.

Because of these two changes, the runoff leaving a newly developed or significantly redeveloped urban area may be considerably greater in volume, velocity and/or pollutant load than pre-development runoff from the same area. A comprehensive approach to stormwater management includes: a) site design measures to minimize impervious area, reduce direct connections between impervious areas and the storm drain system, and mimic natural systems; b) pollutant source control; c) stormwater treatment measures; and d) flow controls where needed This approach can effectively reduce runoff and the discharge of pollutants into stormwater and receiving waters.

This Handbook will be updated periodically. Go to the SCVURPPP website to obtain the most recent update: www.scvurppp.org

Background on SCVURPPP

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP or Program) is an association of thirteen (13) cities and towns in the Santa Clara Valley, together with Santa Clara County and the Santa Clara Valley Water District.[1] Program participants, referred to as Co-permittees, share a common permit to discharge stormwater from their storm drain systems to South San Francisco Bay. The Program incorporates regulatory, monitoring and outreach measures aimed at reducing pollutants in stormwater runoff and improving the water quality of the streams of the Santa Clara Valley and South San Francisco Bay. The Program's Management Committee, consisting of one designated representative from each Co-permittee, is the official decision making body.

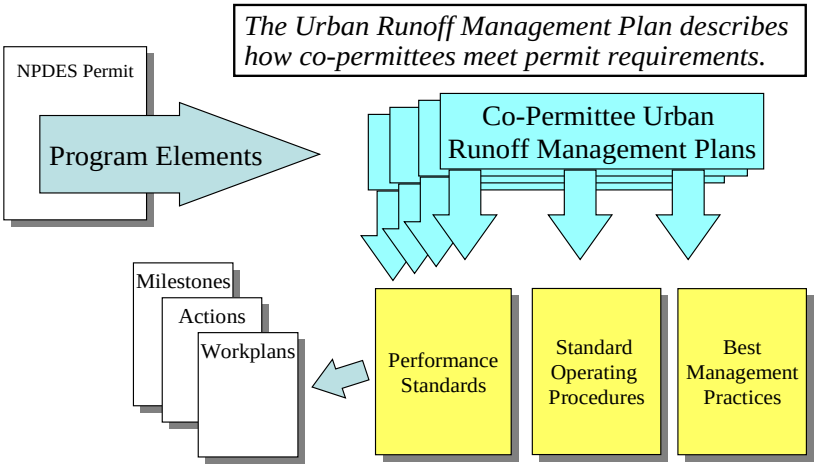
See Glossary of Terms at the end of this Handbook for definitions.

The Co-permittees formed SCVURPPP in response to the Federal Clean Water Act (CWA) and the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan). The CWA requires municipalities to control discharges from storm drains to reduce pollutants in stormwater to the maximum extent practicable (MEP). The Basin Plan requires regulated agencies to submit plans for identifying and evaluating stormwater pollutant sources, pollutant loading and control measures for South San Francisco Bay. As SCVURPPP, the Co-permittees applied for an area-wide National Pollutant Discharge Elimination System (NPDES) municipal stormwater permit. The California Regional Water Quality Control Board, San Francisco Bay Region (Regional Board) issued the Program its first NPDES permit in 1990 (the first in the nation), and reissued the permit in 1995 and again in 2001.

The NPDES permit allows each Co-permittee to discharge stormwater to South San Francisco Bay under one common permit. As part of the NPDES permit requirements, the Program produces and regularly updates an Urban Runoff Management Plan (URMP) that presents the Program's strategy to implement the NPDES permit. Within the URMP, the Planning Procedures Performance Standard defines the level of implementation that the Co-permittees in the Program must attain in order to demonstrate that their land use planning, development plan review, and project approval processes control stormwater quality impacts to the maximum extent practicable. The Program submits annual reports describing progress towards meeting the URMP and annual work plans detailing the course of action the Co-permittees will follow in the coming year. The Program submits all reports required by the Permit to the Regional Board.

[1] The Co-permittees include: Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Milpitas, Monte Sereno, Mountain View, Palo Alto, San Jose, Santa Clara, Saratoga, Sunnyvale, Santa Clara County, Santa Clara Valley Water District

Santa Clara Valley Urban Runoff Pollution Prevention Program Implementation



Background on Provision C.3

The Program's NPDES permit is comprised of many elements that address the reduction of adverse impacts of stormwater pollutants and increases in peak runoff rate on water quality and beneficial uses. Provision C.3 of the NPDES permit specifically addresses the control of the stormwater impacts associated with new development and redevelopment projects (see Appendix A).

On October 17, 2001, the Board amended the permit's Provision C.3, enhancing the Program's existing requirements for new development and significant redevelopment. It requires a level of implementation of best management practices (BMPs), including treatment measures that reflect the regulatory standard of maximum extent practicable. Requirements were added to more effectively incorporate source control measures, site design principles, and structural stormwater treatment controls in new development and redevelopment projects to reduce water quality impacts of stormwater runoff for the life of these projects. These requirements apply to both private development projects and municipal capital improvement projects.

On July 20, 2005, the Board adopted another permit amendment pertaining to Provision C.3 applicability and requirements for controlling runoff flow and volume from new development and redevelopment projects. Other changes made the Santa Clara permit more consistent with other Bay Area NPDES permits, and clarified which smaller projects must meet Provision C.3 requirements.

Planning Procedures Performance Standards (PPPS)

The Program revised the model Planning Procedures Performance Standard to incorporate the Provision C.3 requirements (see Appendix B). The Performance Standard defines the level of implementation that the Co-permittees must attain to demonstrate that their land use planning, development plan review and

approval processes control stormwater impacts to the maximum extent practicable. The Co-permittees incorporated the Planning Procedures Performance Standard into their individual URMPs.

Design standards and requirements for stormwater quality and quantity addressed in Provision C.3 include the following:

- Numeric design standards for sizing stormwater treatment controls;
- Limits on increases in peak, volume and duration of stormwater discharges from new or redevelopment sites that may increase erosion in creeks;
- Requirements for operation and maintenance of stormwater treatment controls;
- Requirements for site design and source control measures;
- Definition of a minimum project size, based on the amount of impervious surface created and/or replaced, for which the design standards, control measures, peak flow limitations, and maintenance requirements apply;
- Requirements for changes to General Plans and environmental review processes to provide authority to implement the requirements;
- Reporting requirements; and
- Schedule for implementation.

Co-permittees implement some components of Provision C.3 individually while other components are implemented jointly through SCVURPPP.

I.2 PURPOSE OF HANDBOOK AND GUIDE TO ITS USE

Implementation of Permit Provision C.3 requires that each Co-permittee modify its development project planning and review and approval process to mitigate the potential impacts of new projects and redevelopment projects on stormwater quality and quantity. This Handbook is designed to assist project proponents and Co-permittee staff to efficiently and effectively make these modifications.

This Handbook is the compilation of the various tools and work products that SCVURPPP Program Staff and Co-permittees have developed to facilitate the implementation of Provision C.3. Handbook materials are also provided on the SCVURPPP website: www.scvurppp.org.

Format of Handbook

This Handbook is organized into seven (7) Chapters, each one focusing on a topic specific to meeting the Provision C.3 stormwater requirements. Pertinent attachments are included at the end of each Chapter. The Technical Appendix includes supporting documents, including permit and regulations language, for each topic.

Contents of Handbook

Chapter I – Introduction. This Chapter provides background on SCVURPPP and its NPDES permit Provision C.3, along with a description of the Handbook contents.

Chapter II – Summary of Major Changes to the Development Project Review Process. To incorporate the new requirements of the NPDES permit's Provision C.3, Co-permittees must modify their development review process. Although each municipality has unique procedures for reviewing projects, the Program has developed flow charts and tables that may be useful to help determine when C.3 provisions apply to specific projects, define how Provision C.3 requirements will influence the necessary steps in the project review process, and identify changes to the project that may be necessary to incorporate Provision C.3-related measures. This Chapter also describes how to address Provision C.3 requirements during the California Environmental Quality Act (CEQA) initial study process.

Chapter III – Selecting Stormwater BMPs and Treatment Controls. Chapter III is divided into five (5) subsections pertaining to site design measures, source control measures, stormwater treatment Best Management Practices (BMPs), vector control issues, and pesticide reduction measures.

Site Design Measures. Co-permittees are required to recommend site design measures that minimize land disturbance, impervious surface area, and changes in the volume, flow, rate, timing and duration of runoff on all projects. Recommended site design concepts for the Santa Clara Valley and model conditions of approval are provided.

Source Control Measures. Guidance on incorporating requirements for source controls and the model source control measures list are provided.

Stormwater Treatment Measures. Applicable projects must incorporate stormwater treatment BMPs designed with the capability of treating a specified volume or rate of flow. This subsection guides and assists the Co-permittees and project proponents in the selection of appropriate stormwater treatment BMPs and infiltration measures. A selection matrix for treatment controls is included.

Vector Control Issues. Proper BMP selection, design and maintenance are discussed in relation to reducing habitat for mosquito production.

Pesticide Reduction Measures. Co-permittees are required to discourage the use of pesticides at new and redevelopment sites and to report on the types of pesticide reduction measures employed. To help educate applicants, the Program has developed model conditions of approval and a fact sheet on landscape maintenance techniques for pest reduction.

Chapter IV – Treatment Control Sizing Criteria. Guidance is provided to help Co-permittees and project proponents meet stormwater treatment hydraulic sizing criteria based on local rainfall data. Worksheets are provided that guide the calculation of stormwater storage requirements for volume-based BMP controls

and flow requirements for flow-based BMP controls. Example applications are included.

Chapter V – Peak Flow and Volume Control Measures (Hydromodification Management Plan Guidance). Some projects may be subject to the NPDES permit's Provision C.3.f, which limits increases in runoff peak flow, duration and volume where such increases may cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses. The Program developed a Hydromodification Management Plan (HMP) that delineates areas where such increases will be detrimental to channel health and water quality and proposes means of managing such situations to maintain the pre-project discharge rates and durations after development. This chapter describes the key provisions of the HMP and provides guidance on meeting the requirements for applicable projects.

Chapter VI – Operation and Maintenance. Co-permittees must develop and implement a program that verifies the proper operation and maintenance of the stormwater treatment BMPs required of projects over the life of the project. Items covered include inspection program elements, vector control issues, and twenty-two (22) BMP Fact Sheets.

Chapter VII – Data Management and Reporting. This Chapter provides information on data that need to be collected to show compliance with the NPDES permit. This Chapter includes a data collection form and Planning Procedures Performance Standard reporting tables for use by Co-permittees. Data collected include the name, type, site area and area of new impervious surfaces for each project subject to the requirements of Provision C.3; the stormwater treatment BMPs used; the numeric sizing criteria employed; the site design and source control measures used; the types of pesticide reduction measures used and the percentage of applicable projects for which they were required.

Technical Appendices. Supporting documents and technical documentation are included in the separately bound Technical Appendix. Additional supporting materials are available electronically on SCVURPPP's website at: www.scvurppp.org.

ATTACHMENT I-1

New Stormwater Requirements
What Developers, Builders and Project Applicants
Need to Know

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Stormwater Pollution Control Requirements

What Developers, Builders and Project Applicants Need to Know

It's Federal Law

Urban stormwater runoff is a significant source of pollution to the nation's waters. In 1987 Congress began to address this problem by requiring municipalities with storm drain systems to obtain National Pollutant Discharge Elimination System (NPDES) permits. This resulted in local requirements for control of runoff from development projects.

The Countywide Urban Runoff Program

In the Santa Clara Valley, development projects must comply with the NPDES permit issued to the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) by the Regional Water Quality Control Board and its amendments. SCVURPPP is an association of 13 cities in Santa Clara Valley, Santa Clara County, and the Santa Clara Valley Water District that share these permit requirements.

Summary of Requirements

Local agencies are required to address protection of stormwater quality during development review. The following requirements apply to ***all projects regardless of size***, as appropriate:

- Construction-phase best management practices (BMPs).
- Post-construction site design measures to maximize infiltration in pervious areas.
- Post-construction source control measures to help keep pollutants out of stormwater.

The requirements listed below apply to certain projects ***based on project size and/or location***:

- Post-construction stormwater treatment measures are required for most projects with 10,000 square feet or more of impervious surface.
- Post-construction stormwater quantity (flow peak, volume and duration) controls are required for projects in certain locations with 1 acre or more of impervious surface, in accordance with SCVURPPP's Hydromodification Management Plan (HMP).

Site Design for Water Quality

Some of the many ways to reduce water quality impacts through site design include:

- Reduce impervious surface area;
- Drain rooftop downspouts to lawns or other landscaping; and
- Use landscaping as a storm drainage and treatment feature for paved surfaces.

Parking lot runoff drains to a detention basin in Palo Alto.

What is Source Control?

Source control is all about keeping potential pollutants away from stormwater. Some source control measures include:

- Roofs over trash enclosures and loading docks;
- Sanitary sewer drains in covered parking structures and vehicle washing areas; and
- Indoor wash racks for mats and equipment.

What's Required During Construction?

Many contractors are familiar with BMPs that are required at project sites, including:

- Prepare and implement sediment and erosion control plans;
- Control exposed soil by stabilizing slopes; and
- Control sediment in runoff using sand bag barriers or straw wattles.

Projects that disturb one acre or more of land are subject to an NPDES General Construction Activity Permit and must submit a Notice of Intent to the State Water Resources Control Board.

Stormwater Treatment Measures

Stormwater treatment measures are facilities designed to remove pollutants from stormwater before it reaches the storm drain system, creeks and the Bay. Examples include:

- Vegetated swales,
- Detention basins, and
- Detention and infiltration areas in landscaping.

Treatment measures must be hydraulically sized to treat a specified amount of runoff. And they need ongoing maintenance to continue working properly. During development review, applicants must identify and record the responsible party and funding mechanism for long-term maintenance and assure access to the treatment system to verify maintenance.

Stormwater Quantity Controls

Creek beds and banks can become damaged when the rate and volume of runoff increase, as often occurs when land is developed. In the past, these increases in runoff have caused excessive erosion, sedimentation, and destruction of habitat. To help prevent this, SCVURPPP has prepared a Hydromodification Management Plan (HMP), which identifies areas susceptible to development-induced erosion. In these areas, projects that create one acre or more of impervious surface are required to retain, detain or infiltrate runoff to match pre-project flows and durations. In some cases, projects may be allowed to meet the HMP requirements by helping fund in-stream or regional solutions.

Turf block fire access road, Santa Clara

Projects that May Be Exempt[1]

- One single family home that includes appropriate stormwater control measures.
- Sidewalks, bicycle lanes, trails, bridge accessories, guardrails, and landscape features that are part of street, road, highway, and freeway projects under the Dischargers' jurisdiction. These are not exempt in commercial, industrial, or residential developments.
- Interior remodels and routine maintenance or repair, and any other reconstruction work within a public street or road right-of-way are excluded.

Resources on the Web

The following resources provide useful information for selecting and incorporating stormwater controls in development projects.

C.3 Stormwater Handbook, SCVURPPP, 2004.
http://www.eoainc.com/c3_handbook_final_may2004/

Developments Protecting Water Quality: A Guidebook of Site Design Examples, SCVURPPP, 2004. http://www.scvurppp-w2k.com/permit_c3_docs/SCVURPPP_Site_Design_Manual.pdf

Hydromodification Management Plan – Final Report, SCVURPPP, April 2005.
http://www.eoainc.com/hmp_final_draft

Stormwater BMP Handbook – New Development and Redevelopment, California Stormwater Quality Association, 2003.
http://www.cabmphandbooks.org/Development.asp

Contacts for More Information:

- Your local stormwater program – links available at: http://www.scvurppp-w2k.com/Copermittee.htm
- SCVURPPP, at (408) 720-8833, or http://www.scvurppp.org
- San Francisco Bay Regional Water Quality Control Board at (510) 622-2300. Ask for staff responsible for Santa Clara Valley stormwater program.

SCVURPPP would like to thank the Alameda Countywide Clean Water Program and the Regional Water Quality Control Board for development of the original design and content of this document.

[1] See permit Provision C.3 for details of Group 1 and 2 definitions and exemptions.

II SUMMARY OF MAJOR CHANGES TO DEVELOPMENT PROJECT REVIEW

II.1 INTRODUCTION

The goal of this Chapter is to describe recommended changes to internal processes of SCVURPPP Co-permittees as they administer Provision C.3 requirements.

The comprehensive requirements of Provision C.3 impact the entire municipal development review process from the initial conceptual planning stages, to engineering design review, and on through building permit approvals. This Chapter describes recommended changes to the internal processes of SCVURPPP agencies as they administer Provision C.3 requirements. To ensure successful implementation, each Co-permittee must understand and integrate these requirements into its development review process. The goal of this integration is for every employee at each step of the process to perform the necessary tasks that will minimize the negative impacts of new development and redevelopment on water quality. As a result, property owners and developers, builders and contractors will be guided to plan and build developments that provide stormwater treatment for pollutants and reduce the amount of stormwater runoff.

Provision C.3 Requirements

Several subchapters of Provision C.3 impact the development review process, most notably Provisions C.3.b, and C.3.j, and C.3.m. Under Provision C.3.b, Co-permittees modified their project review processes to incorporate the requirements of Provision C.3. Provision C.3.j addresses site design and review. Under Provision C.3.m, Co-permittees are required "to evaluate water quality effects and to identify appropriate mitigation measures" when conducting CEQA and other environmental reviews of proposed projects.

II.2 MAJOR CHANGES TO THE DEVELOPMENT REVIEW PROCESS

Although each Co-permittee's review process is slightly different, Attachments II-1 and II-2 provide a general overview depicting how the Provision C.3 requirements fits into the development review process. Attachment II-1 summarizes the typical steps involved in development project review (Column 1) and indicates at which points in the review process a planner, engineer or other appropriate municipal employee should implement the various stormwater requirements (Columns 2 and 3). Column 3 focuses on the additional

requirements from the October 2001 Provision C.3 amendment. Attachment II-2 provides a flow chart depicting how the Provision C.3 requirements can be incorporated into a typical municipal review process. [Co-permittees may substitute their own tailored flow charts at this location.]

II.3 DETERMINING THE APPLICABILITY OF PROVISION C.3 TO NEW PROJECTS AND REDEVELOPMENT PROJECTS

In general, the amount of impervious surface created or replaced as part of a development project determines whether it falls under the requirements of Provision C.3 and the extent of the Provision C.3 requirements. However, there are certain requirements that apply to all projects. Types of projects and requirements are described below.

Minimum Requirements for All Projects

All projects must consider the incorporation of appropriate site design and source control measures to minimize the impact of the project on water quality, regardless of project size, amount of impervious surface area being created or replaced, or timing of the application. To meet this standard, Co-permittees should recommend the inclusion of appropriate site design and source control measures for all projects. For more information on site design and source control measures, see Chapter III.

Projects that disturb 1 acre or more of land during construction also need coverage under the Construction General Permit (see page II-4 and Attachment II-6).

Requirements for C.3. Applicable Projects

Applicable projects consist of all new public and private projects that create ten-thousand (10,000) square feet or more of impervious surface collectively over the entire project site, including roof area, streets and sidewalks. Also, significant redevelopment projects that result in the addition or replacement of impervious surface area that totals 10,000 square feet or more qualify for C.3. coverage. If more than fifty percent (50%) of the existing impervious surface area is replaced or added, the entire project is subject to the requirements of Provision C.3. If less than fifty percent (50%) of the existing impervious surface area is replaced or added, only that affected portion of the project needs to meet C.3. requirements. Excluded from this category are interior remodels and routine maintenance or repair, including roof or exterior surface replacement and repaving. (See exemptions in Table II-1.)

Applicable projects are required to implement appropriate source controls (including pesticide control measures), site design <u>and</u> stormwater treatment measures to reduce the discharge of stormwater pollutants to the maximum extent practicable. Treatment measures must be designed to treat a certain volume or flow rate as specified in Provision C.3.d. (see Chapter IV).

Additional requirements must be met by large projects (formerly known as "Group 1 projects") that create one (1) acre (43,560 square feet) or more of impervious surface. These large projects must control increases in runoff peak flow, volume, and duration caused by the project if these increases have the potential to cause erosion or other adverse impacts to receiving streams. These requirements for "hydromodification management" are described in Chapter V.

Attachment II-3 provides a flow chart for determining whether a project must meet the full requirements of Provision C.3. Attachments II-4 and II-5 provide checklists for Co-permittees and Project applicants, respectively, to determine compliance with Provision C.3 requirements.

Projects Exempt from Provision C.3 Requirements

A projects may be exempt from Provision C.3. requirements if 1) the project's impervious surface is below the threshold of 10,000 s.f.; 2) the project is in an exempted land use category; or 3) the project application was deemed complete by the Co-permittee's planning department prior to a certain date. Projects that create or replace less than 10,000 square feet of impervious surface are exempt from stormwater treatment and stormwater quantity controls (i.e., hydromodification management).

Table II-1 provides a description of the land uses that are exempt from Provision C.3 requirements. These projects are still required to incorporate source controls and site design measures where feasible.

Table II-1
Project Land Uses Exempt from Provision C.3

Land Use Category	Exempted Land Use
Single family residential	Construction of one single-family home that is not part of a larger common plan of development, with the incorporation of appropriate pollutant source control and design measures, and using landscaping to appropriately treat runoff from roof and house-associated impervious surfaces (e.g., runoff from roofs, patios, driveways, sidewalks, and similar surfaces).
Street, road, highway, and freeway projects that are under the Dischargers' jurisdiction	Sidewalks, bicycle lanes, trails, bridge accessories, guardrails, and landscape features that are part of a street, road, highway or freeway project. Note, these are not exempt when part of commercial, industrial or residential developments.
Significant redevelopment projects	Interior remodels and routine maintenance or repair, such as roof or exterior surface replacement, pavement resurfacing, repaving and road pavement structural section rehabilitation within the existing footprint, and any other reconstruction work within a public street or road right-of-way where both sides of that right-of-way are developed.

Project applications submitted and deemed complete prior to certain C.3. implementation start dates for different project sizes and land use categories (as shown in Table II-2) do not have to comply with Provision C.3. requirements. However, these projects are still required to incorporate source controls and site design measures where feasible.

Table II-2
Projects Exempt from Provision C.3 Based on Date Application is Deemed Complete

Project Category	Exempt if Application Deemed Complete Prior to:
One acre or more of impervious surfaces	October 15, 2003
Under one acre and equal to or greater than 10,000 square feet of impervious surface AND have one of the following land use categories with a high potential to generate pollutants: • Gas stations; • Auto wrecking yards; • Loading docks and surface parking lots containing 10,000 square feet or more of impervious surface area; • Vehicle or equipment maintenance areas (including washing and repair), outdoor handling or storage of waste or hazardous material, outdoor manufacturing area(s), outdoor food handling or processing, outdoor animal care, outdoor horticultural activities, and various other industrial and commercial uses where potential pollutant loading cannot be satisfactorily mitigated by post-construction source control and site design practices.	October 20, 2005
Under one acre and equal to or greater than 10,000 square feet of impervious surface, and NOT in one of the above land use categories	August 15, 2006 October 20, 2005 for some cities[1]

Construction General Permit

All projects disturbing one (1) acre or more of land during construction need to obtain coverage under the State's "General Permit for Storm Water Discharges Associated with Construction Activity", in addition to meeting local construction requirements. Attachment II-6 provides information to developers and contractors on the Construction General Permit, including descriptions of guidance for complying with the General Permit.

[1] Some cities, including Sunnyvale, began implementing Provision C.3. on all projects with 10,000 square feet or more of impervious surface beginning October 20, 2005.

II.4 MODIFICATIONS TO SITE DESIGN STANDARDS

NPDES Permit Provision C.3.j. requires that Co-permittees review their development standards—policies, codes, ordinances, and guidelines—and adopt and implement changes to comply with Provision C.3.. Co-Permittees submitted a summary of their reviews and implemented changes on September 15, 2004 (see "Site Design Standards and Guidance Review" at www.scvurppp.org). For more information on site design and source control measures, including model conditions of approval, see Chapter III.

II.5 IMPROVING THE ENVIRONMENTAL REVIEW PROCESS FOR WATER QUALITY PROTECTION

A work group of Co-permittees and other interested parties, led by the City of San Jose, conducted an evaluation of ways to modify the environmental review process to comply with the NPDES permit's Provision C.3.m. The consensus of the work group was that the Statewide CEQA Guidelines checklist (CEQA checklist) questions are sufficient to comply with the NPDES permit. When Provision C.3.m sample environmental review questions were compared to the CEQA checklist, the CEQA checklist questions were sufficiently general enough to encompass the issues identified in the permit's sample questions. Program attention focused on revising local guidance documents rather than changing the statewide developed CEQA checklist. A table titled *Guidance for Co-permittees' Review/Modification of CEQA Procedures and Local CEQA Guidance* providing recommendations on how to improve guidance on the use of the CEQA checklist can be found in Attachment II-7. The table lists the corresponding CEQA Guidelines checklist questions (column 1), and recommends possible action for Co-permittees to take to change CEQA review procedures and local CEQA guidance (column 3). An associated outreach piece to assist those conducting the initial study review is also provided in Attachment II-7.

II.6 DATA TRACKING

In addition to changing an agency's development review process, Provision C.3 requirements necessitate changes in the data collection and reporting process. Chapter VII addresses data collection and management. The flow chart in Attachment II-2 shows the types and timing of data to be collected during the development review process. (See the information in the boxes on the right-hand-side of the chart.)

II.7 REFERENCES

CEQA Guidelines Checklist: California Code of Regulations, Title 14, Chapter 3, Guidelines for Implementation of the California Environmental Quality Act, Chapter 15, Appendix G.

ATTACHMENT II-1

Implementation of Provision C.3 Summary of Major Changes to the Development Project Review Process

Attachment II-1: SCVURPPP Implementation of Provision C.3.
Summary of Major Changes to the Development Project Review Process

Project Review Process Activity (Private Project)	Previous Stormwater-Related Requirements	Additional Stormwater-Related Requirements Per Provision C.3.	Tools or Model Documents to Assist Implementation	Provision C.3 Handbook Reference
Pre-submittal Meeting/ Conceptual Review (if needed)	• Provide applicant information on development policies and requirements for stormwater controls and BMPs. • Provide applicant information on what is required for design review.	• Provide information on new requirements for stormwater controls and BMPs, including pesticide reduction measures. • Check size of project and extent of redevelopment and determine applicability of C.3. requirements (C.3.c.i.).	• Fact sheets on new requirements (C.3. , HMP and local) • BASMAA "Using Site Design Techniques to Meet Development Standards for Stormwater Quality," CDM, May 2003 (available at www.scvurppp.org) . • BASMAA Start at the Source,1999 (available at www.scvurppp.org) • Pesticide reduction conditions of approval fact sheets • Provision C.3 data collection form (if needed for calculations)	• Attachment I-1 - New Stormwater Requirements: What Developers, Builders and Project Applicants Need to Know • Section II.3, Attachment II-3. C.3 Applicability Flow Chart • Attachment III-5 Selection Matrix for Stormwater Quality Measures • Attachment III-4 List of Treatment Control Vendors • Attachment III-1 Model Conditions of Approval for Stormwater Quality • Vector Control Guidance (Chapter III, Appendix E) • Section III-6; Attachment III-5 (pesticide reduction education materials) • Attachment VII-2 Provision C.3. Data Form • Attachment V-1 – Hydromodification Management Plan: What Developers, Builders and Project Applicants Need to Know

Attachment II-1: SCVURPPP Implementation of Provision C.3.
Summary of Major Changes to the Development Project Review Process

Project Review Process Activity (Private Project)	Previous Stormwater-Related Requirements	Additional Stormwater-Related Requirements Per Provision C.3.	Tools or Model Documents to Assist Implementation	Provision C.3 Handbook Reference
Plan Submittal	• Check application for completeness regarding existing and proposed impervious surfaces and stormwater facilities. • Provide applicant information on what is required for design review.	• Check size of project and extent of re-development and determine applicability of C.3. requirements (C.3.c.i.). • Require and log information related to project size, area of land disturbance, and amount of impervious surface (C.3.n.i.).	• Outreach to developers re: new requirements • Provision C.3 data collection form	• Attachment II-4 Checklist for Project Proponents • Section II.3, Attachment II-3. C.3 Applicability Flow Chart • Attachment VII-2 Provision C.3. Data Form
CEQA Assessment (may be concurrent with Plan Submittal)	• Analyze possible stormwater quality and quantity impacts and propose appropriate mitigation measures.	• Evaluate additional questions related to water quality impacts (C.3.m.) and propose mitigation measures consistent C.3	• Guidance on initial study checklist	• Chapter II-5 • Attachment II-7
Design Review/Plan Check	• Check that all required control measures are included in plans. • Ensure that any necessary O&M agreements are prepared.	• Check use of appropriate site design, source controls, and treatment controls (C.3.b., c., j., k.). • Evaluate design criteria and determine whether BMPs are sized properly (C.3.d.). • Evaluate design of flow controls per HMP requirements (C.3.f.) • Evaluate use of infiltration devices, if any, and groundwater protection measures (C.3.i.). • Log information on site design and treatment measures used, sizing criteria used, and O&M responsibility mechanism (C.3.n.ii.). • Document alternative certification of design criteria (if utilized) (C.3.h.).	• SCVURPPP C.3 Handbook • SCVURPPP C.3 Handbook • Provision C.3 data collection form • List of professionals qualified to do certification; stormwater control measures data collection form	• Chapter III • Chapter IV • Chapters III and V • Attachment VII-2 Provision C.3. Data Form

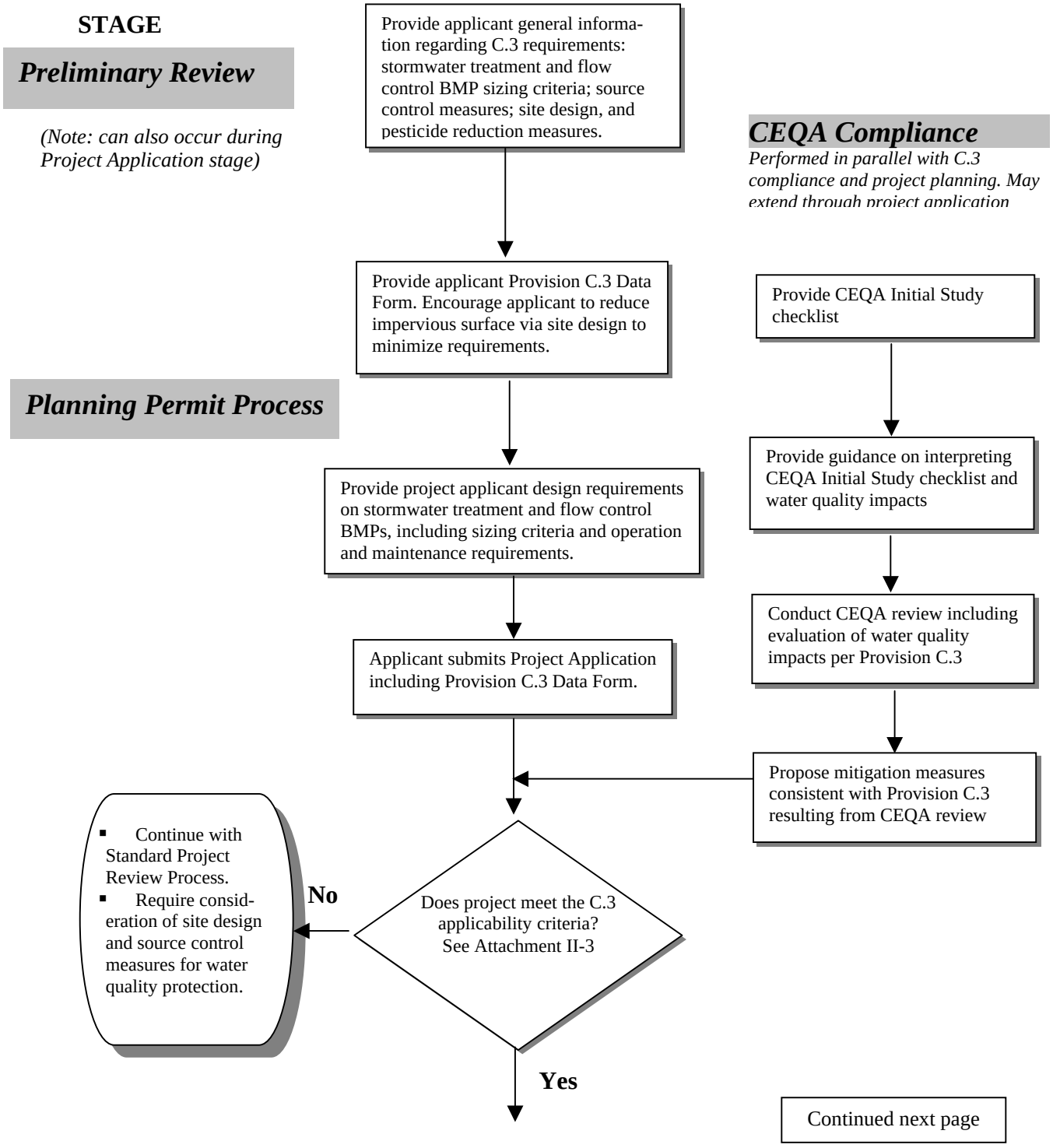
Attachment II-1: SCVURPPP Implementation of Provision C.3.
Summary of Major Changes to the Development Project Review Process

Project Review Process Activity (Private Project)	Previous Stormwater-Related Requirements	Additional Stormwater-Related Requirements Per Provision C.3.	Tools or Model Documents to Assist Implementation	Provision C.3 Handbook Reference
Conditions of Approval	• Impose stormwater related conditions on project for permit approval.	• Impose additional conditions of approval related to site design/landscape requirements, source controls, treatment controls, flow controls, pesticide control measures, and O&M requirements. (C.3. e., f., g., i., j., k.). • Log types of pesticide reduction measures required in COAs (C.3.n.iii.).	• Standard set of stormwater conditions, developed from SCVURPPP C.3 Handbook, Planning Procedures Performance Standard, HMP, and other sources. • Provision C.3 data collection form (includes these measures)	• Attachment III-1 Model Conditions of Approval for Stormwater Quality; • Chapter V (HMP) • Attachment VII-2 Provision C.3. Data Form
Permit Issuance/ Project Approval	• Ensure all stormwater conditions and CEQA mitigations are included in project. • Ensure necessary maintenance agreements have been signed. • Check NOI, SWPPP and/or grading plan if needed.	• Check that additional O&M documentation is complete (C.3.e.ii.). • Check final impervious surface area.	• Provision C.3 data collection form or separate form • Model O&M documents on SCVURPPP website	• Chapter VI • Attachment VII-2 Provision C.3. Data Form
Post-construction Operation and Maintenance	• Require ongoing maintenance of post-construction controls	• Conduct O&M Verification Program (c.3.e.) • Log information on inspections	• SCVURPPP Field Data Collection and Reporting Forms	• Chapter VI • Attachment VI-3—Maintenance Fact Sheets

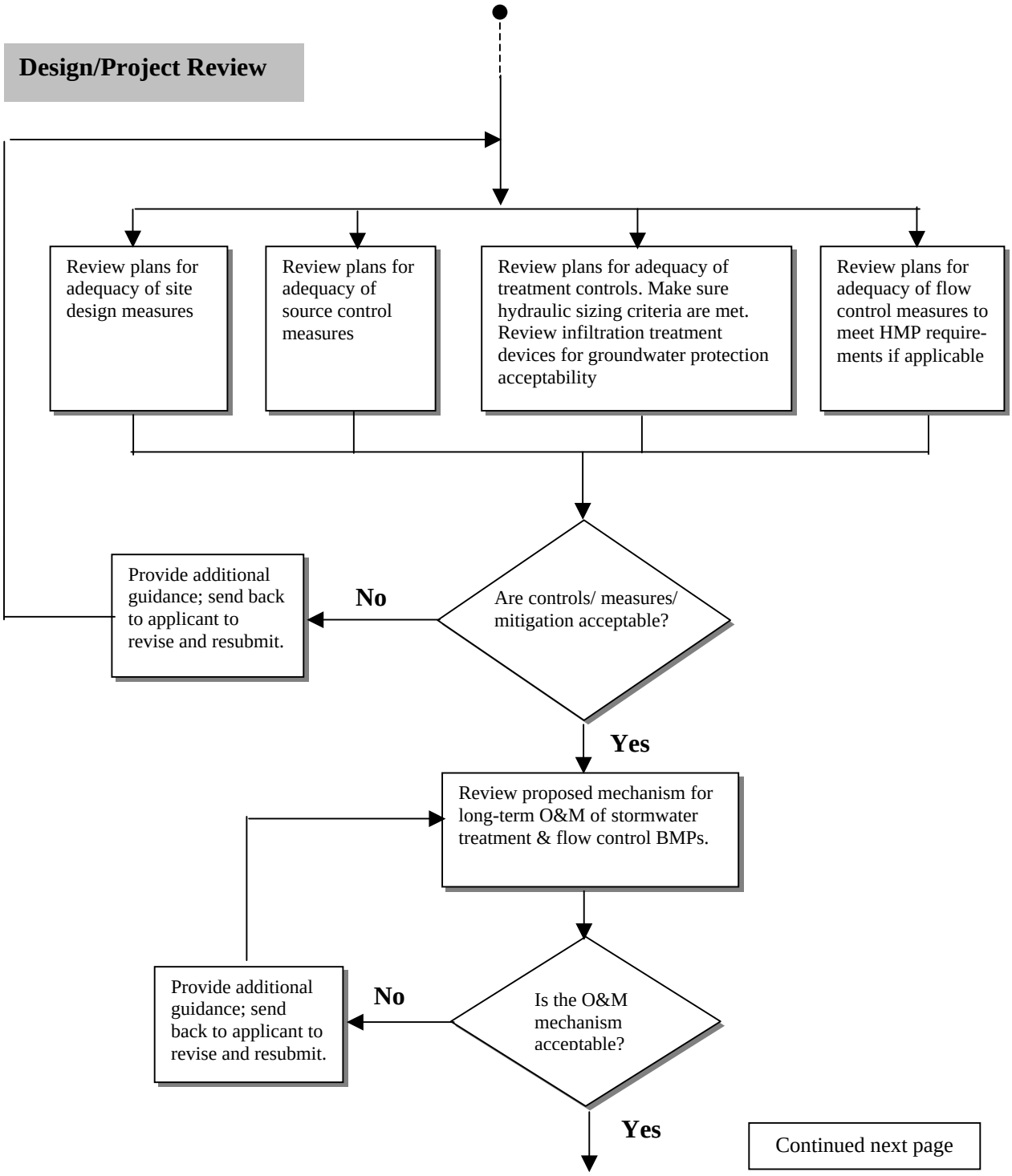
ATTACHMENT II-2

Incorporating Provision C.3 Requirements Into the Development Review Process Flow Chart

SCVURPPP Typical Development Review Process Incorporating Provision C.3 Stormwater Requirements



SCVURPPP Typical Development Review Process Incorporating Provision C.3 Requirements (continued)



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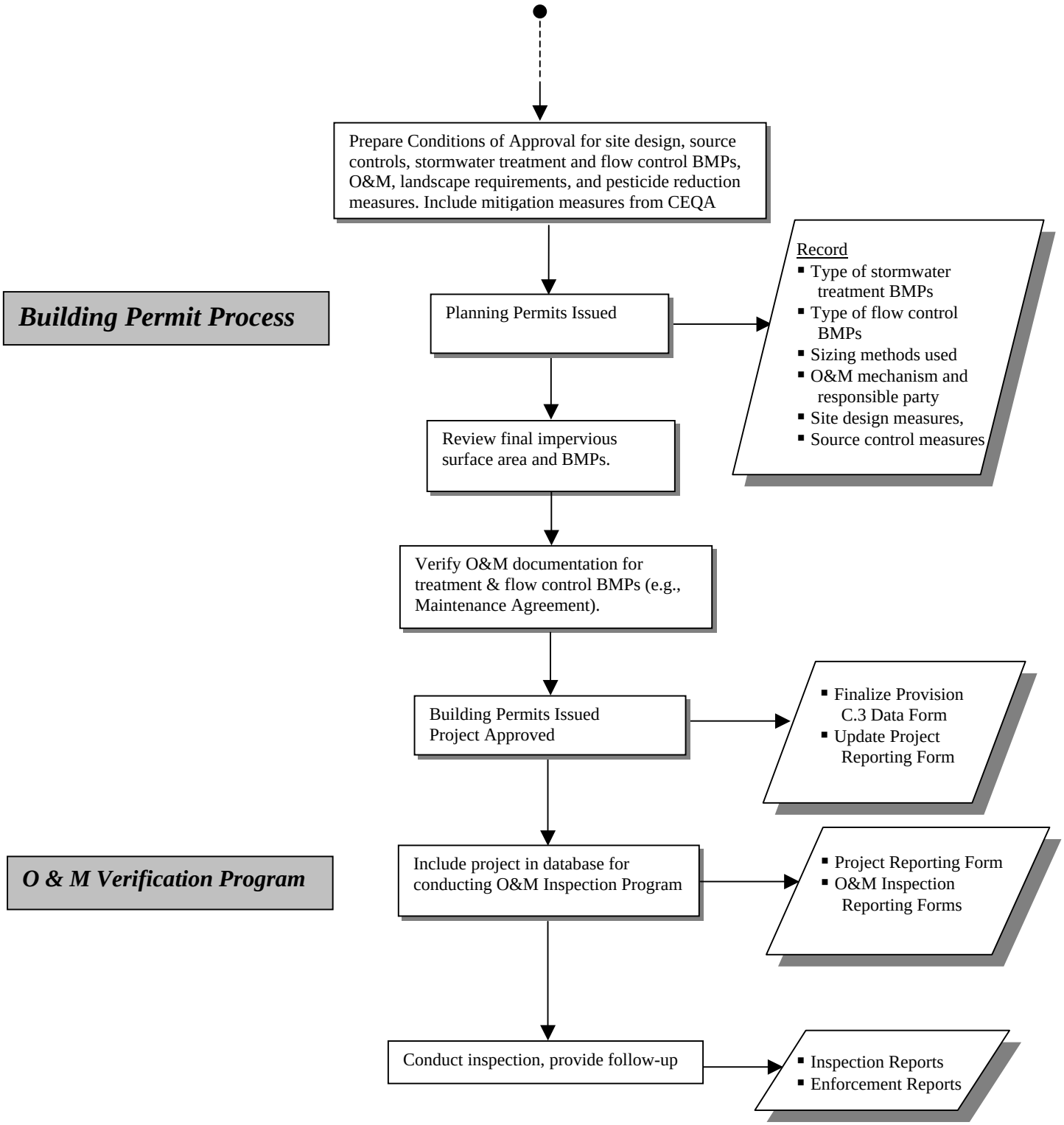
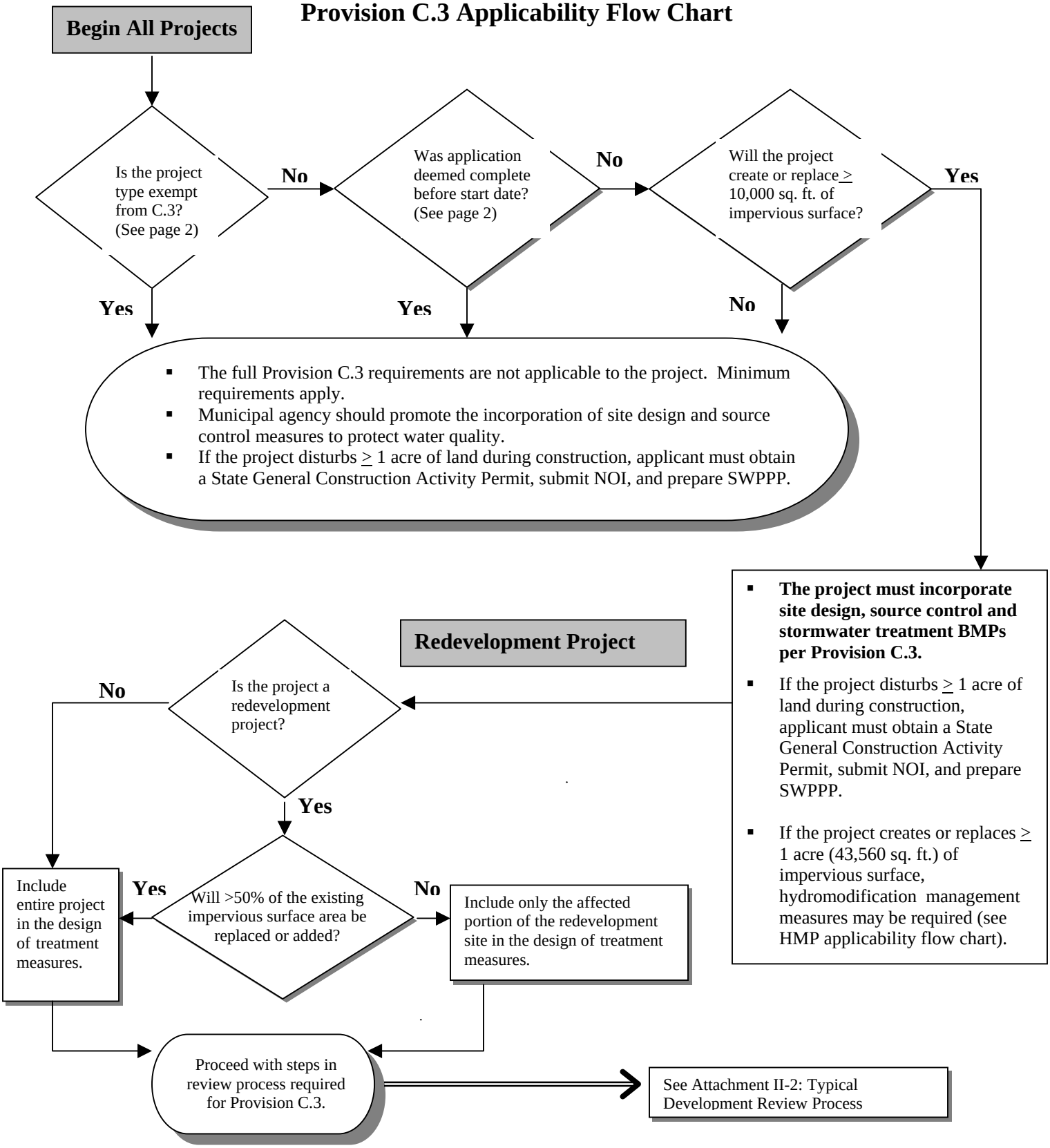
SCVURPPP Typical Development Review Process Incorporating Provision C.3 Requirements (continued)



ATTACHMENT II-3

SCVURPPP
Provision C.3 Applicability Flow Chart

SCVURPPP Permit
Provision C.3 Applicability Flow Chart



Provision C.3. Applicability Flow Chart
(continued)

Projects Exempt from Provision C.3

Land Use Category	Exempted Land Use
Single family residential	Construction of one single-family home that is not part of a larger common plan of development, with the incorporation of appropriate pollutant source control and design measures, and using landscaping to appropriately treat runoff from roof and house-associated impervious surfaces (e.g., runoff from roofs, patios, driveways, sidewalks, and similar surfaces).
Street, road, highway, and freeway projects that are under the Dischargers' jurisdiction	Sidewalks, bicycle lanes, trails, bridge accessories, guardrails, and landscape features that are part of a street, road, highway or freeway project. Note, these are not exempt when part of commercial, industrial or residential developments.
Significant redevelopment projects	Interior remodels and routine maintenance or repair, such as roof or exterior surface replacement, pavement resurfacing, repaving and road pavement structural section rehabilitation within the existing footprint, and any other reconstruction work within a public street or road right-of-way where both sides of that right-of-way are developed.

Projects Exempt from C.3 if Application is Deemed Complete Before Start Date

Project Size and Land Use Subject to Provision C.3.	Start Date
One acre or more of impervious surfaces	October 15, 2003
Under one acre and equal to or greater than 10,000 square feet of impervious surface AND Land use category is one of the following: • Gas station; • Auto wrecking yard; • Loading dock and surface parking lot containing 10,000 square feet or more of impervious surface area; • Vehicle or equipment maintenance areas (including washing and repair), outdoor handling or storage of waste or hazardous material, outdoor manufacturing area(s), outdoor food handling or processing, outdoor animal care, outdoor horticultural activities, and various other industrial and commercial uses where potential pollutant loading cannot be satisfactorily mitigated by post-construction source control and site design practices.	October 20, 2005
Under one acre and equal to or greater than 10,000 square feet of impervious surface	August 15, 2006 October 20, 2005 for some cities.[1]

[1] Some cities, including Sunnyvale, began implementing Provision C.3. on all projects with 10,000 square feet or more of impervious surface beginning October 20, 2005.

ATTACHMENT II-4

Stormwater Requirements Checklist
For Municipal Staff

Stormwater Requirements Checklist

for Municipal Staff Ensuring Project Compliance with Provision C.3 Requirements

Question	Yes	No	Not Applicable	Additional Guidance (C.3. Handbook Reference)
A. All Projects				
1. Has the municipality recommended that project proponent incorporates site design techniques to reduce the impact of the project on creeks and water bodies?				**Chapter III.2**
2. Has the municipality recommended that project proponent incorporates source control techniques to reduce the impact of the project on creeks and water bodies?				**Chapter III.3**
3. Has the municipality provided the project proponent with information and guidance materials on site design guidelines, building permit requirements and BMPs for storm water pollution prevention early in the application process?				**Chapter III**
4. Has the municipality required the project proponent to demonstrate coverage under the State's General Permit for Storm Water Discharges Associated with Construction Activity if project disturbs a land area of 1 acre or more?				**Chapter II** **Attachment II-3**
5. Has the municipality ensured the project proponent prepare and implement an effective erosion and /or sediment control plan or similar document prior to the start of the wet season (as defined by local ordinance) if the project has the potential for significant erosion or planned construction during the wet season?				**Chapter II** **Attachment II-6**
6. Has the municipality ensured that the contractor complies with stormwater quality control requirements during construction and maintenance activities for public projects?				**Chapter II** **Attachment II-6** **Chapter VI**
7. Is project subject to Provision C.3 requirements? If not…DO NOT CONTINUE				**Chapter II.3** **Attachment II-3**
B. Provision C.3 Applicable Projects				
1. Has the municipality included conditions of approval for this project to ensure that pollutant discharges are reduced by incorporation of treatment measures and other appropriate source control and site design measures?				**Chapter III**
2. Has the municipality included conditions of approval for this project to ensure that increases in runoff flows, duration, and volume are managed per the requirements of the HMP?				**Chapter III** **Chapter V**

Stormwater Requirements Checklist

for Municipal Staff Ensuring Project Compliance with Provision C.3 Requirements

Question	Yes	No	Not Applicable	Additional Guidance (C.3. Handbook Reference)
3. Has the municipality required that treatment BMPs be sized per the hydraulic design criteria in Provision C.3?				**Chapter IV**
4. Has the municipality completed a C.3 Data Form for the project?				**Chapter VII**
5. Does the municipality have a legally enforceable agreement or mechanism that assigns responsibility for the maintenance of post-construction treatment BMPs at this project?				**Chapter VI**
6. Has the municipality included Conditions of Approval that require pesticide reduction measuresfor the project?				**Chapter III.6** **Attachment III-1**
7. Are source control BMPs being implemented at this project to protect groundwater quality?				**Chapter III**
8. Has the municipality ensured that the design of any infiltration devices onsite at this project follows the SCVURPPP and SCVWD guidelines?				**Chapter III** **Chapter VI**
C. Water Quality Review Process/CEQA				
1. Did the municipality evaluate water quality effects and identify appropriate mitigation measures required by Provision C.3 when they conduct environmental review of projects in their jurisdictions?				**Chapter II.5**

ATTACHMENT II-5

Stormwater Requirements Checklist
For Project Proponents

Stormwater Requirements Checklist

for Project Proponents to Facilitate Project Compliance with Provision C.3. Requirements

Question	Yes	No	Not Applicable	Additional Guidance (C.3. Handbook Reference)
A. All Projects				
1. Have you considered and incorporated, as appropriate, site design techniques to reduce the impact of the project on creeks and water bodies?				**Chapter III.2**
2. Have you considered and incorporated, as appropriate, pollutant source control techniques to reduce the impact of the project on creeks and water bodies?				**Chapter III.3**
3. Have you collected and reviewed information on the municipality's preferred site design guidelines, building permit requirements and Best Management Practices (BMPs) for storm water pollution prevention during the conceptual design and application process?				**Chapter III**
4. If your project will disturb a land area of 1 acre or more during construction, have you obtained coverage under the State's General Permit for Storm Water Discharges Associated with Construction Activity?				**Chapter II** **Attachment II-3**
5. If your project has the potential for significant erosion or if you plan construction during the wet season (as defined by local ordinance), have you prepared an effective erosion and/or sediment control plan or similar document and do you plan to implement it prior to the start of the wet season?				**Chapter II** **Attachment II-6**
6. Have you prepared and do you plan to implement a Stormwater Pollution Protection Plan (SWPPP) that includes BMPs to protect stormwater quality during construction?				**Chapter II** **Attachment II-6** **Chapter VI**
7. Is your project subject to Provision C.3 requirements? If no DO NOT CONTINUE. If yes, proceed to B, next page.				**Chapter II.3** **Attachment II-3**

Stormwater Requirements Checklist

for Project Proponents to Facilitate Project Compliance with Provision C.3. Requirements

Question	Yes	No	Not Applicable	Additional Guidance (C.3. Handbook Reference)
B. Provision C.3 Applicable Projects				
1. Have you received and incorporated the municipality's conditions of approval for this project to ensure that pollutant discharges are reduced by incorporation of treatment measures and other appropriate source control and site design measures?				**Chapter III**
2. Have you received and incorporated the municipality's conditions of approval for this project to ensure that increases in stormwater runoff flows, duration, and volume are managed per the requirements of the Hydromodification Management Plan (HMP) and designed the project to meet the requirements of the HMP?				**Chapter III** **Chapter V**
3. Have you sized the necessary stormwater treatment BMPs to incorporate the hydraulic sizing design in Provision C.3?				**Chapter IV**
4. Have you assisted the municipality to complete a C.3 Data Form for the project?				**Chapter VII**
5. Have you considered pest-resistant landscaping and design features, minimization of impervious surfaces, and incorporation of stormwater detention and retention techniques in the design, landscaping, and/or environmental reviews of this project?				**Chapter III**
6. Are pollution prevention and source control BMPs being implemented at this project to protect groundwater quality?				**Chapter III**
7. Have you designed all on-site infiltration devices to meet SCVURPPP and SCVWD guidelines so that they do not cause or contribute to the degradation of groundwater quality objectives?				**Chapter III.4**
8. Have you entered into a legally enforceable agreement or mechanism that assigns the property responsibility for the maintenance of post-construction treatment BMPs over the life of the project and completed an O & M agreement with the municipality?				**Chapter VI**
C. Water Quality Review Process/CEQA				
1. In preparing the environmental review (e.g., CEQA initial study checklist) for the project, did you consider the water quality effects of your project and identify and implement appropriate mitigation measures required by Provision C.3?				**Chapter II.5**

ATTACHMENT II-6

Construction Erosion and Sediments Control – Resources for Developers, Builders, and Project Proponents

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Construction Erosion and Sediment Controls

Resources for Developers, Builders and Project Proponents

Urban stormwater runoff is a significant source of pollution to the nation's waters, including our creeks and the San Francisco Bay. In 1987, Congress began to address this problem by requiring municipalities with storm drain systems to obtain National Pollutant Discharge Elimination System (NPDES) permits. This, along with State requirements, has resulted in local requirements for the control of runoff from development projects.

The following is a list of resources available for developers, builders, and other project applicants with information on best practices for managing erosion and sediment at construction sites. Most of these items listed below are available through the Association of Bay Area Governments at http://store.abag.ca.gov/construction.asp or by contacting the San Francisco Estuary Project at (510) 622-2419.

Erosion and Sediment Control Field Manual–(Revised 2002) $30

- This manual was developed by the San Francisco Bay Regional Water Quality Control Board (SFRWQCB) and provides descriptions and schematic drawings of best management practices (BMPs) for construction site planning and management, erosion and sediment control, pollution prevention and sampling guidelines. The new General Construction Permit Phase II regulations, the State Board sampling and monitoring guidelines, and long-term BMP maintenance information are included.

Guidelines for Construction Projects–(Revised 2003) $12

- This booklet, compiled by SFRWQCB, includes information pertaining to the statewide National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activities, a guide to the State Water Resources Control Board, detailed instructions on preparing a Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI) to comply with the SWPPP, 404 Permit and 401 Water Quality Certification requirements, and Waste Discharge Requirements.

Video: "Hold on to Your Dirt" (English or Spanish)–(Revised 2002) $15

- This 20-minute video illustrates installation and maintenance of some of the most commonly used BMPs used for grading projects and for stabilizing disturbed land areas. Filmed locally, the video also includes footage of environmental impacts caused by uncontrolled erosion from construction projects.

Video: "Keep it Clean" (English or Spanish)–(Revised 2002) $15

- This video shows the measures to use after mass grading and site stabilization. BMPs in the video are designed to prevent water pollution from construction-related activities (e.g.; painting, stucco, concrete washout facilities, saw-cutting). The video also discusses State sampling modifications. The English version is also available on CD.

CD Training Kit: Simple Tools - Construction Site Planning and Management for Water Quality Protection $58

- This CD ROM is a complete training kit for Construction Site Planning and Management for Compliance with Phase I and II NPDES requirements. The CD also contains electronic versions of the 1999 editions of the *Erosion and Sediment Control Field Manual* and the *Guidelines for Construction Projects* listed above.

A Primer on Stream & River Protection for the Regulator and Program Manager Technical Reference Circular W.D. 02- #1 (May 2003)

- This technical reference document by Ann Riley provides technical assistance for the typical permit applicant to address property managers' concerns for stream channel stability while addressing the water quality concerns of the SFRWQCB. It is used to improve the quality and speed of permit applications for projects affecting streams and includes color photos, sketches, diagrams, and graphs. The primer describes the methods of effectively addressing stream bank stability and flooding issues. This document is available for download free of charge at the SFRWQCB website: http://www.swrcb.ca.gov/rwqcb2/Agenda/04-16-03/Stream%20Protection%20Circular.pdf

Stormwater Best Management Practices Handbook – Construction

- This is one of a series of handbooks developed by California Association of Stormwater Quality Agencies (CASQA) and provides guidance for selecting and implementing BMPs to reduce the discharge of pollutants from construction sites. This document is available for download free of charge at the following website: http://www.cabmphandbooks.com/Construction.asp.

State Water Resources Control Board Website

- This website contains several materials useful for preventing stormwater pollution from construction sites, including information on the General Construction Activity Permits. Information includes frequently asked questions, a checklist to assist with preparation of the storm water pollution prevention plan, and contact information for staff available to answer any additional questions. The website is located at: http://www.swrcb.ca.gov/stormwtr/construction.html.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

ATTACHMENT II-7

CEQA Guidance Related to Provision C.3 Stormwater Requirements

- Table: CEQA Initial Study Guidance for Project Applicants
- Additional Resources for Environmental Review Process
- Table: Guidance for Co-Permittee Review/Modification of CEQA Procedures and Local CEQA Guidance

SCVURPPP Guidance for Project Applicants in Addressing Stormwater Quality Concerns During CEQA Review

The following table provides supplemental guidance to project applicants in completing the initial study checklist to address urban runoff water considerations during project environmental review.

CEQA Guidelines Question	Additional Issues to Address Stormwater Quality Concerns within the CEQA Initial Study Checklist
CHECKLIST CHAPTER IV: BIOLOGICAL RESOURCES	
IV.b) Will the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	The evaluation of a project's effect on sensitive natural communities should encompass aquatic and wetland habitats. Consider "aquatic and wetland habitat" as examples of sensitive habitat.
CHECKLIST CHAPTER VIII: HYDROLOGY AND WATER QUALITY	
VIII.a) Will the project violate any water quality standards or waste discharge requirements?	The evaluation of a project's compliance with water quality standards should consider the project's potential effect on water bodies on the Section 303(d) list[1], as well as the potential for conflict with applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses.
VIII.d) Will the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	The evaluation of a project's effect on drainage patterns should refer to the final approved SCVURPPP Hydromodification Management Plan (HMP), where applicable, to assess the significance of altering existing drainage patterns and to develop any mitigation measures. The evaluation of hydromodification effects should also consider any potential for streambed or bank erosion downstream from the project.
VIII.e) Will the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	The evaluation of a project's potential to create or contribute runoff should consider whether the project meets the NPDES permit's Group 1 or Group 2 criteria. The response to this question will indicate how Provision C.3 requirements will be met. Applicants must address Provision C.3 requirements in environmental documents for projects that meet Group 1 or Group 2 criteria.
VIII.f) Would the project otherwise substantially degrade water quality?	The evaluation of a project's potential to degrade water quality should consider whether a project has the potential to result in a significant impact to surface water quality, marine, fresh, or wetland waters, or to groundwater quality. As with every category of environmental impact, effects must be considered both during and after construction. The evaluation of water quality impacts should include a description of how the project will comply with the requirements of SCVURPPP's NPDES permit and the State's Construction General Permit. The description should also include a statement that the project should avoid creation of mosquito larval sources that would subsequently require chemical treatment to protect human and animal health.

[1] Available at: http://www.swrcb.ca.gov/rwqcb2/tmdlmain.htm

Additional Potential Water Quality Impacts

Additionally, the San Francisco Regional Board staff has expressed the concern that the following potential water quality impacts not be overlooked during CEQA review:

- Seasonal creeks;
- Stream crossing impacts;
- Turbidity limitation for discharged water;
- Whether increased runoff from increasing impervious surface will impact water ecology (along with storm drain capacity and flood control);
- Hydrograph modification;
- Endangered species;
- Off-site impacts to channels; and
- Appropriateness of runoff mitigation.

Additional Resources for the Environmental Review Process

Staff planners, engineers and consultants responsible for environmental reviews may find the following references useful for evaluating water quality impacts.

1. San Francisco Bay Regional Water Quality Control Board, 1995 Basin Plan and Amendments: (http://www.swrcb.ca.gov/rwqcb2/basinplan.htm).
2. Bay Area Stormwater Management Agencies Association, Start at the Source, 1999: (http://www.scvurppp.org).
3. California BMP Handbooks (New Development and Redevelopment, Construction Maintenance): (http://www.cabmphandbooks.com/).
4. Santa Clara Valley Urban Runoff Management Program, NPDES Permit Order No. 01-024 and NPDES Permit Order No. 01-119: (Appendix A and http://www.scvurppp-w2k.com/NPDES_Permit.htm)
5. 303 (d) Impaired Water Body List and TMDLs: (http://www.swrcb.ca.gov/rwqcb2/tmdlmain.htm)
6. San Jose Council Policy on Post-Construction Urban Runoff Management: (www.ci.san-jose.ca.us/planning/sjplan/counter/stormwater/pol_stormwater.pdf)
7. Santa Clara Valley Water District, Soils Data Mapping, 2003. (CDs have been provided to Co-permittees).
8. Santa Clara Valley Water District, Results of the Water Resources Collaborative that provides guidance on Water District review of projects near streams (under development): (http://www.valleywater.org/index.htm).

Guidance for Co-permittees' Review/Modification of CEQA Procedures and Local CEQA Guidance

CEQA Guidelines Question	Corresponding C.3.m Example Question(s)	Recommended Action
CHECKLIST CHAPTER IV: BIOLOGICAL RESOURCES		
IV.b) Will the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	x. Will the project impact aquatic, wetland, or riparian habitat?	The evaluation of a project's effect on sensitive natural communities should encompass aquatic and wetland habitats. Co-permittees may revise any local CEQA guidance to identify "aquatic and wetland habitat" as examples of sensitive habitat. It is also recommended that Co-permittees evaluate, as an adverse impact, changes to sensitive habitats that favor the development of mosquitoes and other biting flies that may pose a threat to public health.
CHECKLIST CHAPTER VI: GEOLOGY AND SOILS		
VI.b) Will the project result in <u>substantial</u> soil erosion or the loss of topsoil?	v. Will the proposed project result in <u>increased</u> erosion in its watershed?	No change is recommended in Co-permittees' procedures for responding to Checklist question VI.b. The issue raised by the C.3.m example question is addressed under Checklist question VIII.d.
CHECKLIST CHAPTER VIII: HYDROLOGY AND WATER QUALITY		
VIII.a) Will the project violate any water quality standards or waste discharge requirements?	vi. Is the project tributary to an already impaired water body, as listed on the Clean Water Act Section 303(d) list? If so, will it result in an increase in any pollutant for which the water body is already impaired? ix. Will the proposed project cause or contribute to an exceedance of applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses?	The evaluation of a project's compliance with water quality standards should consider the project's potential effect on water bodies on the Section 303(d) list, as well as the potential for conflict with applicable surface or groundwater receiving water quality objectives or degradation of beneficial uses. Co-permittees may revise any local CEQA guidance to specify that these water quality standards be considered.
VIII.d) Will the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	iv. Will the proposed project create a significant adverse environmental impact to drainage patterns due to changes in runoff flow rates or volumes? v. Will the proposed project result in increased erosion in its watershed?	The evaluation of a project's effect on drainage patterns should refer to the final approved SCVURPPP Hydromodification Management Plan (HMP), where applicable, to assess the significance of altering existing drainage patterns and to develop any mitigation measures. The evaluation of hydromodification effects should also consider any potential for streambed or bank erosion downstream from the project. Co-permittees may revise any local CEQA guidance to include these instructions regarding the evaluation of hydromodification effects.

Guidance for Co-permittees' Review/Modification of CEQA Procedures and Local CEQA Guidance

CEQA Guidelines Question	Corresponding C.3.m Example Question(s)	Recommended Action
VIII.e) Will the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	iii. Will the proposed project result in increased impervious surfaces and associated increased runoff?	The evaluation of a project's potential to create or contribute runoff should consider whether the project meets the NPDES permit's Group 1 or Group 2 criteria. The response to this question will indicate how Provision C.3 requirements will be met. Co-permittees should advise applicants of the need to address Provision C.3 requirements in environmental documents for projects that meet Group 1 or Group 2 criteria.
VIII.f) Would the project otherwise substantially degrade water quality?	i. Would the proposed project result in an increase in pollutant discharges to receiving waters? Consider water quality parameters such as temperature, dissolved oxygen, turbidity and other typical stormwater pollutants (e.g., heavy metals, pathogens, petroleum derivatives, synthetic organics, sediment, nutrients, oxygen-demanding substances, and trash). ii. Would the proposed project result in significant alteration of receiving water quality during or following construction? vii. Would the proposed project have a potentially significant environmental impact on surface water quality, to marine, fresh, or wetland waters? viii. Would the proposed project have a potentially significant adverse impact on ground water quality?	The evaluation of a project's potential to degrade water quality should consider whether a project has the potential to result in a significant impact to surface water quality, marine, fresh, or wetland waters, or to groundwater quality. As with every category of environmental impact, effects must be considered both during and after construction. The evaluation of water quality impacts should include a description of how the project will comply with the requirements of SCVURPPP's NPDES permit and the State's Construction General Permit. The description should also include a statement that the project should avoid creation of mosquito larval sources that would subsequently require chemical treatment to protect human and animal health. Co-permittees may include these instructions in any local CEQA guidance.

III SELECTING SITE DESIGN, SOURCE CONTROL AND STORMWATER TREATMENT BMPS

III.1 INTRODUCTION

New and redevelopment projects can comply with the NPDES Permit Provision C.3 to reduce the adverse impacts of stormwater pollutants and increases in peak runoff rate by implementing a variety of stormwater BMPs (Best Management Practices, see Glossary for definition). The purpose of this Chapter is threefold:

The goal of this Chapter is to provide information on selecting appropriate permanent site design, source control, and stormwater treatment Best Management Practices (BMPs) for new and redevelopment projects.

a) Define the various site design, pollutant source control and stormwater treatment[1] BMPs, present the factors that impact their performance and compare their relative success at treating different constituents;

b) Describe the permit requirements for BMP use; and,

c) Provide guidance on selecting BMPs best suited for a specific project

Model conditions of approval, BMP selection matrices and other guidance are provided to assist municipal staff and project proponents in choosing the most appropriate site design, source control and/or stormwater treatment BMPs for new and redevelopment projects. Pesticide reduction and vector control issues are also discussed in this Chapter.

The BMPs are organized under the categories of site design, source control, and stormwater treatment BMPs. For the purposes of this Handbook, the following general definitions apply.

Definitions →

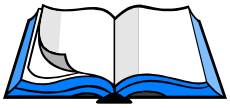
- **Site Design Measures**: Site planning approaches aimed at either preventing or reducing adverse impacts of stormwater pollutants and increases in peak runoff rate, volume, and duration on water quality and beneficial uses. Site design measures use techniques such as protection of natural resources and/or reduction of impervious surfaces when planning the layout of a development or redevelopment project.

→

- **Source Control Measures**: Structural controls or operational practices designed to prevent or limit pollution generation from a source (e.g., chemical storage area, industrial processing, vehicle washing and/or

[1] The NPDES permit uses the terms stormwater treatment BMP and pollutant removal treatment system interchangeably.

maintenance area, etc.) so that pollutants do not contact stormwater. In this Handbook, source control refers to controlling sources of pollutants, not sources of flow (hydrologic source control). Hydrologic source control is covered under site design measures.



- **Stormwater Treatment BMPs**: Landscape or structural systems designed to treat or remove pollutants in stormwater or to reduce the amount or rate of stormwater. Treatment controls include detention basins, water quality wetlands, vegetated swales, bioretention, filters, and solid separators.

← *Definitions*

III.2 SITE DESIGN MEASURES

Definition and Purpose

Site design measures for water quality protection integrate basic stormwater management and hydrological concepts into site planning to create development projects that mitigate their impact on stormwater quality. The five (5) main site design principles that promote water quality protection include[2]:

(a) Define and locate the development envelope in order to protect sensitive areas and minimize changes to the natural topography;

(b) Minimize impervious surface areas;

(c) Maximize permeability by preserving open space and using permeable pavement surfaces where feasible;

(d) Maximize the choices for mobility by planning for alternative modes of transportation other than automobiles; and,

(e) Use drainage as a design element.

Tools To Promote Incorporation of Site Design Measures

Standard Conditions of Approval. A compilation of model standard conditions of approval for site design measures, together with source control and treatment control conditions of approval can be found in Attachment III-1. Although defined as conditions of approval, Co-permittees can adapt and use these in various ways, including as mitigation principles, in 60-day letters, or as initial guidelines. (Some Co-Permittees have included source control BMPs in their municipal codes. In such cases, the Model Conditions of Approval have been replaced by Co-permittees own documents).

Selection Matrix. Project proponents and municipal staff can use the selection matrix found in Attachment III-2 to help narrow the menu of potential site designs and other controls for their specific site characteristics.

Regional and Statewide Resources. Program staff together with the Santa Clara Basin Watershed Management Initiative's Land Use Subgroup developed a number of model site design development principles (Appendix C) for protecting

[2] For further details, see Chapter 4 of BASMAA's *Start at the Source* (1999), available electronically at www.scvurppp.org.

watershed health in the Santa Clara Basin. These principles provide ideas for those wishing to have more detailed guidelines for water quality and beneficial use protection. With slight modifications, the language can be reworked to form specific goals, policies, implementation measures and/or other guidance as useful and appropriate.

Co-permittees and project proponents are also highly encouraged to use the Bay Area Stormwater Management Agencies Association's (BASMAA's) "*Start at the Source"* (1999) and the California BMP Handbooks as good overviews of better site design concepts. The Selection Matrix in Attachment III-2 also references specific pages from BASMAA *Start at the Source* (1999) and the California BMP Handbooks. They can be accessed electronically at www.scurppp.org and www.cabmphandbooks.com, respectively.

BASMAA's *Start at the Source Tools* handbook (2000) is useful resource for municipalities looking for example language to use when updating their General Plans and other development policies. Each Co-permittee has received a copy of this handbook. For additional copies contact the Program at (408)-720-8811.

Optimize Site Designs to Help Meet C.3 Requirements and Minimize Treatment System BMPs

Applicants can minimize the size of required treatment system BMPs by optimizing their site design to reduce the amount of impervious surface area through using the following techniques:

- **Cluster buildings** on portions of the site to reduce the need for impervious driveways and walkways and to protect natural areas;
- **Reduce the building footprint** by creating multistory buildings or locating portions of the building underground; and,
- **Minimize pavement** by minimizing street and driveway widths in low-traffic volume residential areas.

III.3 SOURCE CONTROL MEASURES

Definition and Purpose

Source control measures are post-development BMPs that prevent pollutant generation, discharge and runoff by controlling it at its source or, at a minimum, limiting pollutant exposure to stormwater. Typically, a source control measure involves a cover, berm, drain connection to the sanitary sewer system or some other structural design element that prevents a pollutant from becoming a direct discharge to stormwater. Source control measures can also include operational BMPs, such as routine pavement sweeping, using a wet vactor to collect soapy washwater, or instituting a practice to immediately safely drain fluids from leaking vehicles. Both structural and operational source control BMPs can prevent pollutants from entering stormwater runoff.

Additional Site Design Resources

The following resources are available to assist project designers to optimize site designs:

- BASMAA, *Using Site Design Techniques to Meet Development Standards for Stormwater Quality* (May 2003), illustrates how various site planning concepts such as those found in the BASMAA Start at the Source manual can be used to help minimize the treatment requirements of Provision C.3. Both are available for download at www.scvurppp.org.
- SCVURPPP, *Developments Protecting Water Quality – A Guidebook of Site Design Examples.* In April 2004, the Program completed a guidebook illustrating numerous examples of developments located throughout Santa Clara Valley that have incorporated water-quality friendly site designs. This guidebook is designed to be used by both Co-permittees and project proponents to generate ideas for new projects and to recognize the opportunities for using site design techniques and certain source controls to minimize the impacts of development on water quality. The guidebook will be available on the SCVURPPP website at www.scvurppp.org by July 2004.
- SCVURPP, "Summary of Fall 2003 SCVURPP/SCBWMI LUS Site Design Dialogue Results." This table summarizes underlying potential conflicts to implementing site design BMPs and provides suggestions on potential solutions to such hurdles. The table may be found in Appendix C and will be available on the SCVURPPP website at www.scvurppp.org by July 2004.

Model Source Control Measures

Source control measures can be imposed as either up-front submittal or checklist requirements, conditions of approval, CEQA mitigation measures or plan check comments, and so on depending on the particular planning process used by the municipality.

As described under the Standard Conditions of Approval, a model list of source control measures was developed by the Program and can be found in Attachment III-1, *Model Conditions of Approval for Meeting C.3 Requirements*. The list arranges source control measures by their associated pollutant source, (e.g., refuse areas, parking lots, and vehicle/equipment cleaning). Under each pollutant source, several source control alternatives are given. For example, the following structural BMPs are given for refuse areas: 1) enclosed and covered areas for dumpsters and recycling containers, and 2) drains beneath dumpsters shall be connected to a grease interceptor prior to discharging to the sanitary sewer. Co-permittees are encouraged to use the list as a menu, selecting appropriate measures to apply to specific projects. Project proponents are encouraged to use the list proactively, as guidelines. As long as the intent of the measure is preserved, Co-permittees do not have to use the exact wording of the model source control measure.

III.4 STORMWATER TREATMENT BMPs

Definition and Purpose

Stormwater treatment BMPs are structural or landscaped facilities that remove pollutants from stormwater. Stormwater treatments BMPs are required for non-exempt Group 1 and Group 2 (after April 15, 2005) projects. The major types of treatment facilities are bio-retention, vegetated swales, filters, detention basins (dry ponds) water quality wetlands, and solid separators. Permit Provision C.3 (and thus this Handbook) focus on permanent, post-construction treatment systems rather than those treatment controls placed temporarily during the construction process (e.g., temporary detention basins and other treatment measures designed to remove sediment from stormwater at construction grading sites).

Definitions

Volume-based Versus Flow-based BMPs. The two (2) basic treatment removal techniques are volume-based and flow-based BMPs. Volume-based BMPs detain stormwater for a certain period and treat primarily through settling and infiltration. Flow-based BMPs treat pollutants from a moving stream of water through filtration, infiltration, and/or biological processes. The selection matrix in Attachment III-2 indicates whether specific BMPs are volume-based, flow-based or a combination of the two. The type of control is important for determining the method to be used to size the BMP (see Chapter IV for more information on the hydraulic sizing of treatment controls). Specific definitions for several treatment BMPs are provided in Table III.1, below.

Selecting Stormwater Treatment BMPs.

In general, the goal for meeting stormwater requirements on a development site is to reduce urban runoff pollution from new development and redevelopment as much as possible through site design and source control measures in order to reduce the amount of runoff needing treatment. This approach minimizes but does not necessarily eliminate the need to implement stormwater treatment BMPs. In essence, implementation of stormwater treatment BMPs is a last line of defense that has negative attributes such as their expense, the use of "developable" space on an applicant's project, and the need for adequate maintenance over the life of the project to remain effective. (See Chapter VI for detailed information about long-term maintenance requirements.)

If, after applying site design and source control measures described in previous subsections, a proposed project exceeds the minimum threshold of one (1) acre (43,560 square feet) or eventually the Group 2 minimum threshold of 10,000 s.f.[3] of impervious area, a project applicant will need to select the most appropriate treatment measure(s) for effectively removing pollutants. The decision to select a particular stormwater treatment BMP and a municipality's review of the proposed selection should be based on the following factors:

- Land use activity;

[3] Co-permittees may propose an alternative Group 2 minimum threshold. See your Management Committee representative for updates.

- Expected pollutants of concern;
- BMPs effective at removing those pollutants and for source control;
- Site constraints (drainage area, slope, soils, topography, etc.);
- Capital cost; and,
- Ease of maintenance and maintenance cost.

Additional factors that impact the selection of a specific type of stormwater treatment BMP are vector concerns and groundwater quality concerns related to infiltration devices. These additional factors are closely related to design issues described in the next Chapter (Chapter IV) and operation and maintenance issues described in Chapter VI.

Table III.1
Stormwater Treatment Controls/Best Management Practice (BMP) Descriptions and Categories for Infiltration Measure Guidelines

Stormwater Treatment BMP[1]	Definition[2]
Category A: BMPs defined as Infiltration Devices.[3]	
Dry well	Structure placed in an excavation or boring, or excavation filled with open-graded rock, that is designed to collect stormwater and infiltrate into the subsurface soil.
Infiltration basin	Shallow impoundment that is designed to infiltrate stormwater into the subsurface soil.
Infiltration and exfiltration trench	Long narrow trench filled with permeable material (e.g., gravel), which may contain perforated pipe (exfiltration), designed to store runoff and infiltrate through the bottom and sides into the subsurface soil. Includes french drain.
Unlined Retention Basin	A basin without an outlet that is designed for storing runoff and infiltrating stormwater into the subsurface soils. Basin is not designed to drain runoff into any stormwater conveyance system.
Unlined or open-bottomed vault or box below grade	Below grade structure designed to receive runoff from conveyance systems and store stormwater. Storage structure allows infiltration of stormwater into subsurface soil. Includes bubble ups and permeable pavement with underground storage.
Category B: BMPs not defined as Infiltration Devices because they treat stormwater prior to infiltration into the subsurface. This category includes all landscape measures that utilize infiltration through surface soils.	
Bioretention	System designed to filter pollutants from runoff using a combination of vegetated buffer strip, sand bed, ponding area, organic layer, planting soil and plants.
Constructed wetland	Constructed detention basins that have a permanent pool of water throughout the year and capacity for temporary additional storage of runoff that is released via an outlet structure. They differ from wet ponds in that they are typically shallower and have greater vegetation coverage.
Lined retention pond/irrigation system	System designed to capture runoff in a holding pond with impervious bottom and subsequently use the captured volume for irrigation of landscape with natural pervious areas.
Permeable pavement	Permeable hardscape or paved surface that allows surface runoff to infiltrate into surface soil (e.g., turf block, brick, natural stone, cobbles, gravel, etc.).

Table III.1 (Continued)

Stormwater Treatment Controls/Best Management Practice (BMP) Descriptions and Categories for Infiltration Measure Guidelines

Stormwater Treatment BMP	Definition
Vegetated filter or buffer strip	Linear strips of vegetated surfaces that are designed to treat sheet runoff flow from adjacent surfaces.
Vegetated swale Bio swale	Open, shallow channels with vegetation covering side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points.
Wet pond	Constructed detention basins that have a permanent pool of water throughout the year and capacity for temporary additional storage of runoff that is released via an outlet structure. They differ from constructed wetlands in that they typically have a greater average depth and less vegetation.
Category C: BMPs that discharge treated stormwater directly to the storm drain system.	
Devices w/ impermeable liner and underdrain/ outfall to storm drain	Structures that transport or store stormwater (e.g., lined drainage sumps, catch basins, conveyance systems) and discharge to the stormwater conveyance system, with an impervious bottom or liner that prevents infiltration into subsurface soil.
Extended detention basin	Constructed basins with drainage outlets that are designed to detain runoff from a water quality design storm for some minimum time (e.g., 72 hours) to allow settling of sediment and pollutants.
Hydrodynamic Separator	Flow-through structures with a settling or separation unit that removes sediments and other pollutants.
Media filtration device	Two-chambered systems that include a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media.
Planter Box, Contained or Flow-Through	Structures that are built on either impervious (contained) or pervious surfaces (flow-through) designed to intercept rainfall and slowly drain it through filter media and out of planter.
Green Roof Roof garden	Vegetated roof systems that retain and filter stormwater prior to drainage off building rooftops.
Underground Detention System, Wet Vault	System that consists of underground detention tank, vault or pipes that are designed to fill with stormwater during large storm events and slowly release it back into stormwater conveyance systems over a number of hours.
Water quality inlet	Systems that contain one or more chambers that promote sedimentation of coarse materials and separation of undissolved oil and grease from stormwater.

[1] This is not an inclusive list.

[2] The definitions were obtained from the following sources: (1) Stormwater Best Management Practice Handbook: Municipal, CASQA 2003; (2) Stormwater Management Manual, City of Portland Environmental Services, 2002; (3) Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County, Attachment 4: Final Draft Well Standard, Santa Clara Valley Water District, 2003.

[3] A storm water infiltration device is any structure that is designed to infiltrate storm water into the subsurface and, as designed, bypasses the natural groundwater protection afforded by surface soil. The definition of storm water infiltration device does not include any type of septic system or other waste water disposal system, any infiltration of water other than storm water, District percolation ponds, lined sumps and basins, or any naturally-occurring body of surface water.

Attachment III-4 provides a list of manufactured stormwater control vendors.

Select Stormwater Treatment BMPs to Remove Pollutant of Concern. The stormwater treatment BMPs chosen should remove the primary pollutants of concern generated by the proposed project's land uses. Table III.2 lists pollutant sources categorized by land use and lists the typical pollutants generated by the land use activity.

Table III.2
Pollutants Generated by Land Use Activity

Project Pollutant Sources	Pollutants of Concern
Lawns, Landscaping, and Parks	Sediment (coarse and fine) Nutrients (dissolved and particulate) Pesticides, pathogens, trash & debris
Parking Lots and Driveways	Sediment (fine) Metals (dissolved and particulate) TPH, Trash
Arterials and Highways	Sediment (coarse and fine) Metals (dissolved and particulate) TPH, PAHs, Trash & Debris
Food-Related Commercial	Pathogens, Oil & Grease, Trash
Animal-Related Commercial (e.g., dog grooming, horse stables)	Pathogens
Auto-related Commercial	Metals (dissolved and particulate) TPH, PAHs, Surfactants
Industrial	Sediment (coarse and fine) Metals (dissolved and particulate) TPH, PAHs, PCBs, pH, Surfactants
Agriculture	Sediment (coarse and fine) Nutrients (dissolved and particulate) Pesticides

Source: GeoSyntec Consultants, 2002

After determining the pollutants of concern for the proposed project, the applicant can choose an appropriate removal process and the pollutant removal treatment system(s). Table III.3 lists major pollutants of concern and indicates what process removes the pollutant in its various forms (e.g., course versus fine sediments). The table also groups treatment controls by the removal process employed.

Table III.3
Pollutant Removal Processes

Pollutant	Form	Removal Process	Treatment Control
Sediment: Trash and Debris	Coarse	Gravity Settling Filtration Hydro-Dynamic Settling	Wet Pond Extended Detention Pond Wetlands Wet Vault/Tank Bioswale, Vegetated Swale Filter Strip Hydrodynamic Separators Catch Basin Inserts
Sediment: including pollutants associated w/ fine sediment – metals, TPH, TP	Fine	Gravity Settling Filtration Coagulation/Precipitation	Wet Pond Wetlands Sand Filter Media Filter Infiltration Bioretention Polymer Treatment Electrocoagulation
Metals	Dissolved	Absorption/Adsorption Ion Exchange Biological Uptake	Wetlands Media Filter Infiltration Bioretention
Ammonia/nitrate	Dissolved	Nitrification/Denitrification Biological Uptake	Bioretention Wetlands Wetponds Biofilters
Phosphate	Dissolved	Precipitation Biological Uptake	Amended Sand Filter Media Filter
Pathogens	Suspended	Disinfection	Ozonation
Oil and Grease	Emulsified	Absorption/Adsorption	Bioretention Wetlands Media Filtration
Surfactants	Dissolved	Absorption/Adsorption	Bioretention Infiltration
Pesticides	Dissolved	Absorption/Adsorption	Bioretention Infiltration Media Filter

Source: GeoSyntec Consultants, 2002.

Effectiveness. A comparative summary of the effectiveness of various treatment BMP types at removing common pollutants based on these sources is located in Table III-4. The following resources provide detail on the removal effectiveness of various treatment BMPs:

- *National Pollutant Removal Performance Database for Stormwater Treatment Practices*, June 2000, Center for Watershed Protection (http://www.cwp.org).BMP National Stormwater Database, American Society of Civil Engineers (ASCE) (http://www.bmpdatabase.org/)
- CSUS Office of Water Programs: Storm Water Monitoring (http://www.stormwater.water-programs.com)

Table III.4
Treatment Control Performance

BMP Performance

BMP Type	BMP	Constituent/Performance										
		Coarse Sed.	Fine Sed	NO3	TN	TP	Pb (T)	Zn (T)	Cu (T)	Pathogens	Oil and Grease	Trash and Debris
Detention Basins	Wetpond	●	●	⊙	■	■	●	●	■	■	NR	●
	Extended Wetpond	●	●	■	■	●	●	●	●	■	NR	●
	Extended Drypond	●	■	⊙	■	⊙	■	■	■	⊙	NR	●
Water Quality Wetlands	Shallow Wetland	●	●	■	⊙	■	■	●	■	●	NR	●
	Extended Detention Wetland	●	●	■	⊙	■	■	●	■	●	NR	●

● Good ■ Fair ○ Poor
NR – Not recommended for treating this parameter without pretreatment due to high probability of system impairment.

Source: GeoSyntec Consultants, 2002.

Table III.4 (Continued)

Treatment Control Performance

BMP Performance

BMP Type	BMP	Constituent/Performance										
		Coarse Sed.	Fine Sed	NO3	TN	TP	Pb (T)	Zn (T)	Cu (T)	Pathogens	Oil and Grease	Trash and Debris
Biofilters (horizontal)	Bioswale	●	■	⊙	■	■	●	■	■	⊙	■	■
	Filter Strip	●	■	⊙	■	■	●	■	■	⊙	■	■
Filters (vertical)	Sand Filter	●	●	⊙	■	■	●	●	■	■	●	●
	Media Filter	●	●	⊙	■	■	●	●	●	■	■	NR
	Bioretention	●	●	⊙	●	●	●	●	●	⊙	●	NR
Solids Separator	Rotational Flow	●	■	⊙	■	■	■	■	■	⊙	●*	●
	Multi-Chamber	■	⊙	⊙	■	⊙	■	■	⊙	⊙	■	●
Inserts	Catch Basin Insert**	●	■	⊙	■	■	■	■	■	⊙	●*	●

● Good ■ Fair ⊙ Poor
NR – Not recommended for treating this parameter without pretreatment due to high probability of system impairment.
*Assumes that sorbent is placed in sedimentation chamber

** The San Francisco Regional Board staff does not recommend the use of this BMP as it feels that it is ineffective.

Source: GeoSyntec Consultants, 2002.

Select Treatment BMPs To Fit Site Constraints. The slope, size of the drainage area, soils, and other site constraints affect the choice of treatment BMPs. Good landscape and site design will use these constraints as treatment opportunities. Selection of the best treatment BMP option will become self evident as the overall site is designed. The following examples demonstrate how stormwater treatment systems can fit a site and in many cases provide other enhancements.

Retention/Detention Basin. Either naturally occurring or the result of grading, landscapes with a slight concave slope (see picture above) have the ability to hold water and may be a good location for a retention/detention basin. This technique is more valuable in permeable soils but with proper outlets or underdrains this option can also be used in areas with heavy clay soils.

Grassy Swales. For large expanses of pavement such as parking lots (see picture above), use grass or vegetation lined swales (channels) as low maintenance linear biofilters.

Multiple Small Basins. Small vegetated retention basins (bioretention areas) may be installed in the parkway planting strip, along shoulders of streets, in parking lot planters, and at roof downspouts to support infiltration and treatment in a landscape. Use small basins to create opportunities for storage.

Extended Detention Basins. Detention basins are appropriate landscape elements for developments greater than ten acres and, when properly designed, can simultaneously serve as flood control basins, parks, playing fields, tennis courts, open space and overflow parking lots. Incorporate extended detention basins into landscape design to reduce the volume and velocity of runoff from the site, as well as to treat runoff.

Wet Ponds. Wet ponds are most cost effective in a development or project with a drainage area greater than ten (10) acres, but can be suitable with a drainage area greater than two (2) acres. Incorporate wet ponds into landscape design to enhance the drainage functions and aesthetic quality of the site. Combine wet ponds with recreational areas and surround by a fringe wetland to increase stormwater treatment potential.

Capital Cost Considerations. In general, capital costs are influenced by the type and size of the treatment BMP, whether it is located above or below ground and the land cost. Small, aboveground types of BMPs, like grassy swales, are less expensive than underground sand filters or infiltration trenches and large detention basins are less expensive than large wetlands, which involve specific plant types. Capital costs must be weighed against such factors as the treatment BMPs effectiveness at pollutant removal, maintenance costs, the likelihood that the treatment system will be maintained, and the potential for mosquito breeding. For additional information on comparative costs for various treatment control types, please see Attachment III-2 and the summary tables in Appendix D. These tables are based on studies done by the EPA and Caltrans on projects outside of the San Francisco Bay Area. Currently, capital cost data for the San Francisco Bay Area are limited.

Special Concerns With the Use of Infiltration Measures

Groundwater Quality Concerns. BMPs that allow rain and runoff to infiltrate into the soil help to reduce the amount of runoff from a development site and in some areas provide groundwater recharge. Infiltration measures that allow runoff to be filtered through surface soils, such as those incorporated into landscaping are encouraged where feasible. These include: vegetated swales and filter strips, bioretention, microdetention in landscaping, and pervious paving on surface soils.

Nonetheless, in some situations infiltration treatment systems can pose a risk of contaminating groundwater. Before approving their use, municipalities need to work with applicants to determine if the appropriate conditions exist for employing infiltration methods. Protecting groundwater quality is a major concern in the Santa Clara basin, where groundwater provides approximately half of the drinking water supply for 1.7 million residents. The Santa Clara Valley Water District strictly regulates the siting and construction of deep infiltration devices such as stormwater drainage wells.[4]

[4] SCVWD, 1993. "Stormwater Infiltration Devices", Supplement to "Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County", Attachment 4, Santa Clara Valley Water District Final Draft Well Standard.

Figure III-1 (page III-21) shows groundwater depths throughout Santa Clara Valley.

In general, the risks associated with infiltration can be managed by:

- Selecting stormwater treatment measures and other BMPs that are appropriate for the land use and location of the development site;
- Designing landscape drainage features so that they promote infiltration of runoff, but do not inject runoff or provide a direct conduit such that runoff bypasses the natural processes of filtering and transformation that occur in surface or near surface soils; and
- Taking steps to prevent the illegal discharge of wastes to drainage systems, including pollution prevention and source control BMPs.

Selection and Design of Infiltration Measures. In general, do not select infiltration measures for areas where any of the following conditions exist.

- Area is in proximity to or accepting runoff from locations used for chemical use or storage, washing, or waste disposal activities or is located where this may occur in the future;
- Surface and or subsurface soil of the area is contaminated (groundwater remediation site);
- Area has been recently disturbed and not stabilized or landscaped and therefore may have a high sediment load in the runoff; or,
- Soil does not permit infiltration measures to drain standing water within seventy-two (72) hours.

If the site is free of these general site conditions, municipalities must also confirm that the necessary design considerations have been met before approving the proposed infiltration measure. General design considerations for stormwater infiltration measures include:

- Infiltrate through surface or near surface soils;
- Incorporate underdrains to convey infiltrated stormwater to the storm drain if needed;
- Provide stormwater pretreatment (i.e. sediment removal) if needed; and
- Prevent illegal discharge into infiltration areas through education, signage (such as “No Dumping” stencils), and source controls.

Infiltration “devices” are measures designed to infiltrate stormwater into the subsurface and, as designed, bypass the natural groundwater protection afforded by surface soil. If infiltration devices are being considered for a site, applicants should know that special guidelines must be met for the following devices (definitions are in Table III.1).

- Dry wells;
- Infiltration basins;
- Infiltration and exfiltration trenches (includes french drains);
- Unlined retention basins (i.e., basins with no outlets); and

- Unlined or open-bottomed vaults or boxes installed below grade (includes bubble ups and permeable pavement with underground storage).
-

For additional guidelines on locating infiltration devices, please see Attachment III-3.

Ease of Inspection and Maintenance. Infiltration measures that disperse runoff over landscaped areas, or through permeable surfaces are the easiest types to inspect and maintain. In addition, these minimize the risks of illegal disposal because the surface is visible and the infiltration rate per unit area is relatively low. Below ground treatment units are more difficult and expensive to maintain because of access constraints. For more information on maintenance responsibilities, see Vector Control Considerations for Treatment Controls, next, and Chapter VI of this Handbook.

III.5 VECTOR CONTROL CONSIDERATIONS FOR STORMWATER CONTROLS

The Santa Clara Vector Control District (SCC VCD) has the responsibility for providing enforcement of mosquito control measures when public health is threatened. It is concerned with the spread of insects and other nuisance pests that could result from poorly designed and/or maintained structures, especially those containing standing water. Detention basins, water quality wetlands and infiltration basins are examples of stormwater treatment control structures that may offer prime breeding habitats for mosquitoes and other nuisance pests if not properly designed and maintained. Stagnant water associated with storm water treatment can provide habitat for the aquatic stages of mosquitoes. Santa Clara and other California vector control districts are particularly concerned that the expanding number of treatment controls may result in increased mosquito habitat at the same time as the potential arrival of West Nile Virus. SCVURPPP is working with the SCC VCD to develop favorable treatment control design standards.

Using Site Design to Minimize Mosquito Vector Control Concerns

Proper site design offers an excellent opportunity to minimize stormwater impacts and mosquito threats by minimizing the treatment controls needed, and by designing and placing those that are needed properly to reduce potential vector impacts.

Based on available literature and current BMP implementation strategies nationwide, the following general principles for proper site designs should be considered.

- **Preserve natural drainage**. This reduces the amount of stormwater runoff and provides for natural on-site runoff control. This can reduce the number of structural BMP measures required.
- **Improve designs of permanent pools**. Reduce mosquito habitat: increase circulation and provide deeper water depths. Stock permanently flooded

systems with mosquito fish to foster biological predation on mosquito larvae.

- **Select stormwater management measures based on site-specific conditions**. Designs that take into account site conditions tend to improve drainage and limit the occurrence of stagnant water.
- **Attend to ponds that temporarily impound water**. Facilities that pond water for an extended period (e.g., dry ponds, and man-made wetlands) should drain water completely within seventy-two (72) hours of a storm event. Avoid placement of dry ponds and underground structures in areas where they are likely to remain wet (i.e., high water tables). Principal outlets should have positive drainage. [5]
- **Properly design storm sewer systems**. The sheltered environment in-side storm drains can promote mosquito breeding. Design and construct pipes for a rate of flow that flushes the system of sediment and prevents water backing up in the pipe. Construct storm drains so that the invert out is at the same elevation as the interior bottom to prevent standing water.
- **Properly maintain controls.** Any circumstances that restrict the flow of water from a system as designed should be corrected. Debris or silt build-up obstructing an outfall structure should be removed. Under-drains and filtration media should be inspected periodically and cleaned out or replaced as needed.

Addressing Vector Control Considerations in Stormwater Treatment BMPs. While addressing stormwater quality via proper site design planning is the best method for minimizing long-term maintenance requirements and vector concerns, some projects still require stormwater treatment systems due to the size of the project. In such cases, project proponents should consider the following standards when selecting and designing these systems for their site. Municipalities should review proposed stormwater treatment BMPs designs with vector control in mind.

Proper BMP Designs to Reduce or Eliminate Mosquito Production. The Santa Clara County Vector Control District has identified several stormwater BMP maintenance objectives to reduce or eliminate mosquito production. These include the following:

- Minimize stagnant water (i.e., maintain constant exchange of water in systems);
- Minimize surface area (i.e., deeper water habitat is preferable);
- Keep wetland edges simple (e.g., steep banks with deep water);
- Prevent mosquito access to underground systems that may have standing water. Use siphons and sealed access to prevent mosquito access.

[5] "In Santa Clara County, there is not mosquito that will complete development in under seven days, even during the warmest conditions. Once the mosquito reaches the pupal stage, it can complete development without water as long as the soil remains damp. Therefore, a realistic limit on the duration of standing water is five days, even allowing for a considerable margin of error." Daniel Strickman, DEH-SC, May 3, 2004.

- Include mosquito net covering sand media filter pump sumps;
- Include aluminum "smoke proof" cover for any vault sedimentation basins;
- Use grouted rock energy dissipaters instead of loose rock; and
- Construct sites so that there is access to the water's surface. Any underground site that might create mosquito habitat in stagnant water should have easy access for direct inspection and insecticidal treatment.

Vector-control personnel throughout the United States have found that aquatic habitats that last only three (3) to five (5) days generally do not allow for complete development of mosquito larvae[6]. In addition, cold temperatures that often occur during the rainy season suppress mosquito production. In the Santa Clara Valley, with the exception of certain BMPs designed to hold permanent water (e.g. detention or wet ponds), all BMPs should drain completely within seventy-two (72) hours to effectively suppress vector production. Access for routine maintenance and vector control is also imperative in BMP design.

Improper BMP Design and Maintenance Can Lead to Additional Mosquito Production. Improper BMP selection, design, and maintenance contribute to mosquito production. Stormwater BMPs (and their associated structures and/or components) that may create a suitable habitat for mosquito production include:[7]

- Any BMP that clogs, improperly drains and/or collects debris;
- Catch basins and settling basins that are exposed;
- Effluent pipes with small diameter discharge orifices prone to clogging;
- Loose riprap;
- Pumps or motors designed to automatically drain water from structures;
- Retention ponds, continuous deflective separation (CDS) units, Delaware sand filters, multi-chambered treatment trains (MCTT), wet basins and other BMPs that maintain a pool of standing water;
- Sumps, catch basins and settling basins that are covered or located below ground;
- Sumps, catch basins, spreader troughs or other BMPs that do not drain completely; and,
- Underground detention systems, sumps or other BMPs that are unsealed or have openings.

Additional Resources For Guidance On Vector Controls

See Appendix E for additional vector control guidance. Additionally, the Program's website at www.scvurppp.org contains the following materials regarding mosquitoes and factors contributing to mosquito production within BMPs:

- *The Dark Side of Stormwater Runoff Management: Disease Vectors Associated with Structural BMPs;*

[6] Metzger et al., 2003.
[7] This list may not be totally inclusive of all stormwater BMPs that provide potential habitats for mosquitoes.

- *Stormwater Treatment Devices as Potential Breeding Grounds for Disease Carriers;*
- *Disease Vectors Associated with Stormwater Treatment Devices in California;*
- *The Downside of Stormwater Runoff Management: Disease Vectors & Structural BMPs in Southern California.*

III.6 PESTICIDE REDUCTION MEASURES

The SCVURPPP NPDES permit requires Co-permittees to discourage pesticide use at new development sites (Provision C.9.d.ii.) and requires reporting of these efforts when new developments meet the minimum area threshold for Provision C.3 (see Chapter II for details on the minimum area threshold). Pesticide reduction measures influence new development's landscape and structural design features, as well as the maintenance practices of the site's future owners. Ideally, an appropriately designed landscape reduces the potential for pesticides to run off the landscape; reduces or eliminates the amount of pesticides and other chemicals necessary to ensure healthy plants; and decreases the need for landscape maintenance by minimizing pest infestations and by creating low maintenance environments. Educational materials encourage property owners and their maintenance employees/contractors to consider maintenance techniques, such as integrated pest management, that stress less toxic pest control products and alternatives to chemical controls.

Pesticide Reduction Measures. When used as part of the development project review process, these measures can take the form of:

1. Conditions of approval to a proposed project's landscaping and building plans; and,
2. Fact sheets or other educational materials that are distributed to builders.

The Program developed model conditions of approval for landscaping plans, (Attachment III-1). The Program also created a fact sheet titled *Landscape Maintenance Techniques for Pest Reduction (*Attachment III-5). Other education fact sheets are also available on problem pesticides, integrated pest management (IPM), and controls for specific pests from the regional "Our Water Our World" (OWOW) store partnership outreach program. For additional outreach in both English and Spanish, see the OWOW IPM Fact Sheets on the Watershed Watch Site at http://www.watershedwatch.net/index_ipm.htm. (Click on "Got Bugs?" from the main page.)

Co-permittees are encouraged to add conditions of approval related to pesticide reduction (see Attachment III-1) during their review of landscape plans and to widely distribute the education fact sheets, perhaps as an attachment to planning application packets or grading and building permit forms. Due to site-specific constraints and concerns, there is no preferred or model list of pest-resistant plants, but municipal staff who review landscape plans may want to suggest the

IPM Fact Sheets

Ants	Aphids
Cockroaches	Fleas
Lawn	Weeds
Pests	Problem Pesticides
Pesticides & Water Quality	Use and Disposal of Pesticides
Roses	Snails and Slugs
Spiders	Yellow Jackets
Mosquitoes	Healthy Gardens

most hardy and appropriate plants for landscaping a particular site based on consultation with staff arborists, landscape plan experts, and IPM specialists. Ultimately, municipal staff is not required to enforce the implementation of pesticide reduction measures at new development or redevelopment projects during the post construction phase. However, the Co-permittees are required to keep track of the educational tools that they have provided regarding pest reduction measures. (See Chapter II and Attachment II-2 for recommendations on when to collect such data, and Chapter VII for the C.3 Data Form that can be used to collect such data.)

III.7 REFERENCES

SCVURPPP, June 1999. Technical Memorandum to Municipal Planning Department Personnel, from Dan Cloak and Wendy Edde, SCVURPPP, "Additional Considerations for Incorporating BASMAA's *Start at the Source* Techniques in Development Projects."

BASMAA, 1999. *Start at the Source: Design Guidance Manual for Stormwater Quality Protection*, Forbes Custom Publishing, NY.

California Regional Water Quality Control Board, San Francisco Bay Region, 1995. *Water Quality Control Plan for the San Francisco Bay Basin*,

SCVWD, 1993. "Stormwater Infiltration Devices", Supplement to "Standards for the Construction and Destruction of Wells and Other Deep Excavations in Santa Clara County", Attachment 4, Santa Clara Valley Water District Final Draft Well Standard.

California Regional Water Quality Control Board, San Francisco Bay Region, 2001. Order No. 01-119, NPDES Permit No. CAS029718, Amendment Revising Provision C.3. of Order No. 01-024, October 17, 2001.

GeoSyntec Consultants, "Design Session I – Treatment Control BMPs," APWA Stormwater Workshop 2002 – Current Issues for New and Redevelopment, Lisa Austin, November 14, 2002.

Larry Walker Associates, Inc. *Final Report Investigation of Structural Control Measures for New Development*, Prepared for Sacramento Stormwater Management Program, November 1999.

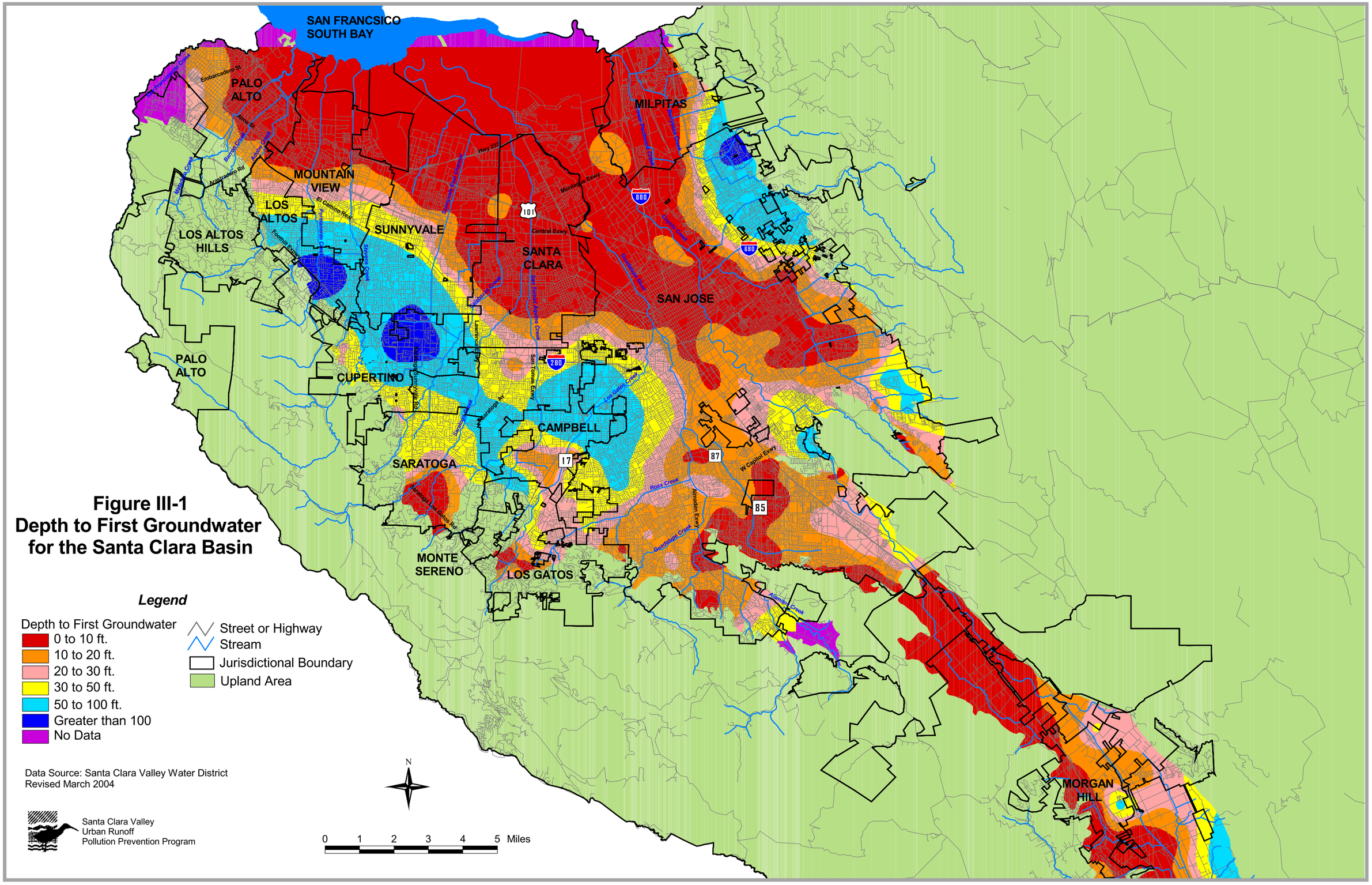


Figure III-1
Depth to First Groundwater for the Santa Clara Basin

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

ATTACHMENT III-1

Santa Clara Valley Urban Runoff Pollution Prevention Program Model Conditions of Approval for Stormwater Quality

[Co-permittees May Replace with own documents]

Santa Clara Valley Urban Runoff Pollution Prevention Program
MODEL CONDITIONS OF APPROVAL FOR STORMWATER QUALITY

INTRODUCTION

The following list contains measures to control sources of storm water pollutants associated with the post-construction phase of new development and redevelopment projects. Each identified source of pollutants may have one or more appropriate control measures. The model list is intended to be a menu of measures from which Co-permittees may select appropriate measures to apply to specific projects. Co-permittees do not have to use the exact wording of a site design or source control measure as long as the intent of the measure (i.e., to keep pollutants out of storm water, groundwater, creeks and the Bay) is preserved. Phrases in brackets represent alternative or optional wording.

SITE DESIGN

General

1. The project will incorporate site design measures for reducing water quality impacts of the project, in compliance with the [City/Town's] NPDES stormwater permit Provision C.3. requirements. Guidance on approved site design measures is available from the [Public Works/Planning Department]. Final approval for site design measures must be obtained from the [Planning/Community Development/Public Works Department].

Minimize Land Disturbance

1. Significant natural features and resources on site such as undisturbed forest area, setbacks, easements, trees, steep slopes, erosive soils, wetlands or riparian areas shall be identified within the area to be developed and protected during construction and during future use of the site.
2. Site layout shall conform to natural landforms on-site. Buildings shall be located to utilize natural drainage systems as much as possible and avoid unnecessary disturbance of vegetation and soils. Development on unstable or easily erodible soils shall be avoided due to their greater erosion potential.

Minimize Impervious Surfaces

1. Directly connected impervious surfaces shall be minimized. Runoff from impervious areas shall be channeled to pervious areas (e.g., park strips, vegetated planters) where possible prior to discharge to the storm drain.
2. Site permeability shall be maximized by clustering buildings, reducing building footprints, minimizing impervious surfaces, and paving with permeable materials where feasible.
3. The project shall cluster structures and incorporate smaller lot sizes where feasible to reduce overall impervious surface coverage and provide more undisturbed open space, for protection of water resources.

Preserve Open Space

1. The amount of open space on the site shall be maximized and the open space area maintained in a natural manner.
2. Undisturbed natural areas such as forested conservation areas and stream buffers shall be utilized to treat and control stormwater runoff from other areas of the site with proper design.

Reduce Effects of Hydromodification

1. The project shall utilize infiltration measures to reduce stormwater discharge to the greatest extent feasible.
2. The applicant shall minimize increases in stormwater flow and volume resulting from the development project to protect creeks and waterways from flooding and erosion impacts.

Street Design

1. Where density, topography, soils, slope and safety issues permit, vegetated open channels or other landscape measures shall be used in the street right of way to convey and treat stormwater runoff from roadways.
2. Sidewalks shall be sloped to drain to adjacent vegetated park strips.

Parking Lots

1. Where feasible, parking lots and other impervious areas shall be designed to drain stormwater runoff to vegetated drainage swales, filter strips, and/or other treatment devices that can be integrated into required landscaping areas and traffic islands prior to discharge into storm drain systems.
2. The amount of impervious area associated with parking lots shall be minimized by providing compact car spaces, reducing stall dimensions, incorporating efficient parking lanes, and using permeable pavement in overflow parking areas where feasible.
3. Curb cuts (one every 10 feet), tire stops, or other means shall be provided to protect landscaped areas and allow maximum flow of stormwater into landscaped areas.
4. The use of permeable paving for parking and driveway surfaces is encouraged, to reduce runoff from the site. Such paving should meet fire department requirements and be structurally appropriate for the location.

Landscaping as a Stormwater Drainage/Treatment Feature

1. Projects shall be designed to direct stormwater runoff into landscaping or natural vegetation where feasible.
2. Large landscaped areas shall be designed to collect and infiltrate stormwater where feasible. Overflow drains shall be placed so that landscaped areas can store runoff and drain at capacity. Such collection areas shall be designed and maintained to meet vector control requirements.
3. Where possible, runoff from impervious areas such as rooftops, roadways and parking lots shall be directed to pervious areas, open channels or vegetated areas prior to discharge to the storm drain system.

Riparian Areas

1. Naturally vegetated buffers shall be delineated and preserved along perennial streams, rivers, lakes and wetlands.

SOURCE CONTROLS

Structural Control Measures

A. Illegal Dumping to Storm Drain Inlets and Waterways

1) On-site storm drain inlets shall be clearly marked with the words "No Dumping! Flows to Bay," or equivalent, using methods approved by the [Co-permittee].

2) It is unlawful to discharge any wastewater into storm drains, gutters, creeks, or the San Francisco Bay. Unlawful discharges to storm drains include, but are not limited to, discharges from toilets; sinks; industrial processes; cooling systems; boilers; fabric cleaning; equipment cleaning; or vehicle cleaning.

3) It is unlawful to cause hazardous domestic waste materials to be deposited in such a manner or location as to constitute a threatened discharge into storm drains, gutters, creeks or San Francisco Bay.

B. Interior Floor Drains

1) Interior floor drains shall be plumbed to the sanitary sewer system and shall not be connected to storm drains.

C. Parking Lots

1) Interior level parking garage floor drains shall be connected to [a water treatment device approved by the (Co-permittee) prior to discharging to] the sanitary sewer system. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

D. Pesticide/Fertilizer Application

1) Landscaping shall be designed to minimize irrigation and runoff, promote surface infiltration where appropriate, and minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.

2) Structures shall be designed to discourage the occurrence and entry of pests into buildings, thus minimizing the need for pesticides. For example, dumpster areas should be located away from occupied buildings, and building foundation vents shall be covered with screens.

3) Additional requirements are covered in the "Model Conditions of Approval for Pest Resistant Landscaping" (August 19, 2002).

E. Pool, Spa, and Fountain Discharges

1) Pool (including swimming pools, hot tubs, spas and fountains) discharge drains shall not be connected directly to the storm drain or sanitary sewer system. [Exception: Public pool discharge drains must be connected to the sanitary sewer system, per County Department of Environmental Health requirements.]

2) When draining is necessary, a hose or other temporary system shall be directed into a sanitary sewer clean out. The clean out shall be installed in a readily accessible area [example: within 10 feet of the pool]. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

F. Food Service Equipment Cleaning

1) Food service facilities (including restaurants and grocery stores) shall have a sink or other area for cleaning floor mats, containers, and equipment, that is connected to a grease interceptor prior to discharging to the sanitary sewer system. The cleaning area shall be large enough to clean the largest mat or piece of equipment to be cleaned. The cleaning area shall be indoors or in a covered area outdoors; both areas must be plumbed to the sanitary sewer.

G. Refuse Areas

1) New buildings [such as food service facilities and/or multi-family residential complexes or subdivisions] shall provide a covered or enclosed area for dumpsters and recycling containers. The area shall be designed to prevent water run-on to the area and runoff from the area.

2) Areas around trash enclosures, recycling areas, and/or food compactor enclosures shall not discharge to the storm drain system. Any drains installed in or beneath dumpsters, compactors, and tallow bin areas serving food service facilities shall be connected [to a grease removal device prior to discharging] to the sanitary sewer. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

H. Outdoor Process Activities/Equipment[1]

1) Process activities shall be performed either indoors or outdoors under cover. If performed outdoors, the area shall be designed to prevent run-on to and runoff from the site.

2) Process equipment areas shall drain to the sanitary sewer system. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

I. Outdoor Equipment/Materials Storage

1) All outdoor equipment and materials storage areas shall be covered [and bermed], or shall be designed to limit the potential for runoff to contact pollutants [or a storm drain inlet valves shall be provided on exterior drains in the area].

2) Storage areas containing non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners or vaults. . The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

3) All hazardous materials and wastes, as defined [or regulated] by [cite ordinance or regulation], on the site must be used and stored in compliance with the [Co-permittee's] Hazardous Materials Ordinance and Hazardous Materials Management Plan for the site approved by the [Co-permittee department].

J. Vehicle/Equipment Cleaning

1) Wastewater from vehicle and equipment washing operations shall not be discharged to the storm drain system. [Optional, e.g. for car dealerships: If water only (without soap or other cleaning agent) is used for rinsing of vehicle exterior surfaces for appearance purposes, the runoff may be discharged to the storm drain system.]

[1] Examples of businesses that may have outdoor process activities and equipment include machine shops and auto repair shops, and industries that have pretreatment facilities.

2) Commercial/industrial facilities having vehicle/equipment cleaning needs [and new residential complexes of 25 units or greater] shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. Vehicle/equipment washing areas shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

3) Commercial car wash facilities shall be designed and operated such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer [or a wastewater reclamation system shall be installed]. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

K. Vehicle/Equipment Repair and Maintenance

1) Vehicle/equipment repair and maintenance shall be performed in a designated area indoors, or if such services must be performed outdoors, in an area designed to prevent the run-on and runoff of stormwater.

2) Secondary containment shall be provided for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.

3) Vehicle service facilities shall not contain floor drains unless the floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer, for which an industrial waste discharge permit has been obtained. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

4) Tanks, containers or sinks used for parts cleaning or rinsing shall not be connected to the storm drain system. Tanks, containers or sinks used for such purposes may only be connected to the sanitary sewer system if allowed by an industrial waste discharge permit. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

L. Fuel Dispensing Areas

1) Fueling areas[2] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.

2) Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area, as defined below[1].] The canopy [or cover] shall not drain onto the fueling area.

[2] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

M. Loading Docks

1) Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

2) Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.

3) Door skirts between the trailers and the building shall be installed to prevent exposure of loading activities to rain.

N. Fire Sprinkler Test Water

1) Sanitary sewer connections shall be provided to drain fire sprinkler test water.

O. Miscellaneous Drain or Wash Water

1) Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.

2) [Air compressor or air conditioner] condensate drain lines may not discharge to the storm drain system.

3) Roof drains shall discharge and drain away from the building foundation to an unpaved area wherever possible.

4) Roof top equipment shall drain to the sanitary sewer. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

Operational BMPs

A. Paved Sidewalks and Parking Lots

2) Sidewalks and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris resulting from pressure washing shall be trapped and collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and shall not be discharged to a storm drain. The applicant shall contact the local permitting authority and/or sanitary district with jurisdiction for specific connection and discharge requirements.

B. Private Streets

1) Owner of private streets and storm drains shall prepare and implement a plan for street sweeping of paved private roads and cleaning of all storm drain inlets.

C. Vehicle/Equipment Repair and Maintenance

5) No person shall dispose of, nor permit the disposal, directly or indirectly, of vehicle fluids, hazardous materials, or rinsewater from parts cleaning operations into storm drains.

6) No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any

spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.

7) No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

D. Fueling Areas

The property owner shall dry sweep the fueling area routinely.

PESTICIDE REDUCTION

If a landscaping plan is required as part of a development project application, the plan shall meet the following conditions related to reduction of pesticide use on the project site:

1. Landscaping shall be designed with efficient irrigation to reduce runoff, promote surface infiltration, and minimize the use of fertilizers and pesticides that can contribute to water pollution.
2. Where feasible, landscaping shall be designed and operated to treat stormwater runoff by incorporating elements that collect, detain, and infiltrate runoff. (Attachment A, "Examples of Landscaping Element for Stormwater Treatment" shall be used as a reference.) In areas that provide detention of water, plants that are tolerant of saturated soil conditions and prolonged exposure to water shall be specified.
3. Plant materials selected shall be appropriate to site specific characteristics such as soil type, topography, climate, amount and timing of sunlight, prevailing winds, rainfall, air movement, patterns of land use, ecological consistency and plant interactions to ensure successful establishment.
4. Existing native trees, shrubs, and ground cover shall be retained and incorporated into the landscape plan to the maximum extent possible.
5. Proper maintenance of landscaping, with minimal pesticide use, shall be the responsibility of the property owner. ("Fact Sheet on Landscape Maintenance Techniques for Pest Reduction" may be used as an example education piece for property owners.)

REFERENCES

Site Design

Atlanta Regional Commission, *Georgia Stormwater Management Manual Volume 2 (Technical Handbook)*, August 2001

City of Palo Alto, Municipal Code Title 18.12.050 Site Development Regulations.

City of Portland Environmental Services, *Stormwater Management Manual*, September 2002.

City of San Bruno Community and Economic Development Department, *San Bruno Redevelopment Project Area Plan Draft Environmental Impact Report*, prepared by Environmental Science Associates, March 1999.

City of Sunnyvale, *Industrial Pretreatment/Urban Runoff Program*, August 1998.

San Mateo Countywide Stormwater Pollution Prevention Program New Development Subcommittee, *Model Development Policies*, May 2001.

Washington State Department of Ecology, *Stormwater Management Manual for Western Washington*, August 2001.

Source Control

BASMAA "Start at the Source Tools Handbook" (June 2000);

Alameda Countywide Clean Water Program (ACCWP) Model Conditions of Approval (1999);

City of Palo Alto Municipal Code Chapter 16.09, and revisions to Chapter 16.09 approved July 22, 2002;

City of San Jose standard conditions (need reference);

City of Cupertino, Guidance for Selecting BMPs for Development Projects;

Example source control measures provided by Regional Board staff in Provision C.3.k. of the SCVURPPP NPDES Permit (October 2001).

Pesticide Reduction

Alameda Countywide Clean Water Program, Model Conditions of Approval, 1999.

City of Concord, North Carolina, *Unified Development Ordinance*, "Article 7, Landscaping and Buffering Standards" http://www.ci.concord.nc.us/planning/zoning/acrobats/Article%207.pdf,

IPM Access, Integrated Pest Management Information Service, www.efn.org/~ipmpa, *IPM Based Landscape Design.*

IPM Access, Integrated Pest Management Information Service, www.efn.org/~ipmpa, *Fundamentals of a Low Maintenance, Integrated Pest Management Approach to Landscape Design.*

King County Local Hazardous Waste Management Program, *Tri-County Integrated Pest and Vegetation Management: Guidelines.*

ATTACHMENT III-1A

LANDSCAPING ELEMENTS FOR STORMWATER TREATMENT

Landscaped areas in development sites present valuable opportunities to treat and store runoff. Through a variety of strategies, the volume of runoff and concentration of pollutants found in the runoff from development sites can be minimized, resulting in improved quality of waters discharged into local creeks and the Bay.

A particular concern with landscaped areas is the use of pesticide products for landscape maintenance. Alternative design and maintenance techniques can reduce the potential for pesticides to run off the landscape; reduce the amount of chemicals necessary to ensure healthy plants or eliminate the need for pesticide usage; and decrease the need for landscape maintenance by minimizing pest infestations and creating low maintenance environments. Using these techniques decreases the amount of pesticides entering receiving waters.

The planning and design phases of development present ideal opportunities for inclusion of stormwater treatment into landscape design. It is important to make such considerations early in the development process to ensure effective incorporation and plan for maintenance measures. Described below are suggestions for various stages in the development process. These methods are enumerated in more detail in BASMAA's Start at the Source Design Guidance Manual for Stormwater Quality Protection (1999).

PLANNING

Identify sensitive areas to be protected and preserved during construction, such as existing trees, steep slopes, erosive soils, riparian areas or wetlands when planning for site development (Start at the Source, p. 28).

DESIGN

Utilize drainage as a design element in site plan development. Whenever possible, natural drainage systems should guide the pattern of development and influence site layout of pathways, parks and open areas, and building structures. Integrating naturally occurring drainage systems into site design will yield aesthetic and functional benefits (Start at the Source, p. 32). Suggested methods include:

A. Maximizing Permeability

1. Minimizing Directly Connected Impervious Surface Area

   Impervious surfaces that are directly connected to the stormwater conveyance system do not take advantage of the potential benefits offered by the infiltration of runoff and filtration of pollutants by plant and soil materials. Direct runoff from pathways to landscaped areas. (Start at the Source, p. 29)

2. Permeable Pavement

   When development requires the installment of hard, flat surfaces, porous pavement may be utilized instead of impervious surfaces. Permeable pavement minimizes runoff by allowing the infiltration of water through a load bearing surface where it is stored in an underground

reservoir. The materials listed below may be used as porous pavement. (*Start at the Source*, p. 47)

a. Pervious concrete
b. Porous asphalt
c. Turf block
d. Brick
e. Natural stone
f. Concrete unit paver
g. Crushed aggregate (gravel)
h. Cobbles
i. Wood mulch (for light pedestrian use)

B. Utilizing Treatment Opportunities (Start at the Source, p. 70-73)

1. Landscape Grading

   Landscapes that have a slight concave slope have the ability to hold water. This technique is more valuable in permeable soils but can be used as retention/detention basins with proper outlets or underdrains in heavy clay soils.

2. Grass Swales

   Grass or vegetation lined swales (channels) can be used as low maintenance linear biofilters along the perimeters of large expanses of pavement. (e.g., parking lots)

3. Multiple Small Basins

   Small vegetated retention basins (bioretention areas) can to used to create opportunities for storage, infiltration, and treatment in a landscape. Small basins may be installed in the parkway planting strip, along shoulders of streets, under wood decks, in parking lot planters, and at roof downspouts.

4. Extended Detention Basins

   Extended detention basins can be incorporated into landscape design to reduce the volume and velocity of runoff from the site. Detention basins are appropriate landscape elements for developments greater than ten acres and can simultaneously serve as flood control basins, parks, playing fields, tennis courts, open space and overflow parking lots.

5. Wet Ponds

   Permanent pools of water that detain and treat stormwater runoff, wet ponds can be incorporated into landscape design to enhance the drainage functions and aesthetic quality of the site. Wet ponds are often surrounded by a fringe wetland to increase stormwater treatment potential and can also be combined with recreational areas (usually appropriate for storm water drainage in a development or project with a drainage area greater than 2 acres but more cost effective for drainage areas greater than 10 acres).

6. Increase the Treatment Potential of the Landscape

   The beneficial stormwater detention and treatment elements of a landscape can be optimized by:

   a. Planting deeply rooted plants that help build soil porosity;

   b. Allowing exposed leaf surface to collect rainwater before it filters into the soil in order to increase overall detention potential; and

   c. Selecting plants appropriate for the site climate, exposure, and amount of watering or inundation by water.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

C.3. Stormwater Handbook

ATTACHMENT III-2

Santa Clara Valley Urban Runoff Pollution Prevention Program
Selection Matrix for Stormwater Quality Measures

SITE DESIGN MEASURE SELECTION MATRIX

	Reference		Design Objective						Application					NRCS Hydrologic Soil Group				Effectiveness	Constraints		Costs		Type		Philosophy			
Site Design Measures	**BASMAA's Start at the Source (1999)**	**CA BMP Handbook (2003)**	**Infiltration**	**Retention**	**Slow Runoff**	**Minimize Impervious Surface Area**	**Contain Pollutants**	**Collect and Convey**	**Residential**	**Commercial**	**Industrial,RGO**	**Parking Lot**	**Other**	**A (Gravel/ Sand)**	**B (Loam)**	**C (Silt Loam)**	**D (Clay Loam, Sandy Clay, Clay)**		**Suitable for Slopes?**	**Locations to Avoid**	**Construction**	**Maintenance**	**Flow-through Treatment**	**Volume-based Treatment**	**Zero Discharge**	**Self-Treating**	**Runoff Reduction**	**Notes**
Permeable Pavement Materials																												
Pervious Concrete	47-48; 101	SD-20	✓	✓	✓	✓	✓		✓	✓		✓	(1)	✓	✓	✓	P	H	≤ 5%	Gas stations, truck stops, high HC areas, high traffic areas.	1.5 X conventional concrete (2)	1-2% construction costs/year		✓			✓	(1) Low traffic volume bikeways, streets, travel lanes, parking stalls, residential driveways, patios. (2) Cost can be offset by not having to install curb and gutter drainage system.
Porous Asphalt	48-49; 102-103	SD-20	✓	✓	✓	✓	✓		✓	✓		✓	(3)	✓	✓	✓	P	H	≤ 5%	Gas stations, truck stops, high HC areas, high traffic areas.	1.5 X conventional concrete (2)	1-2% construction costs/year		✓			✓	(2) Cost can be offset by not having to install curb and gutter drainage system. (3) Low traffic volume parking lots, travel lanes, parking stalls.
Turf Block	50; 104	SD-20	✓	✓	✓	✓	✓		✓	✓		✓	(4)	✓	✓	✓	P	H	≤ 5%	All day parking, heavy use, areas with turning movements.	$4-6/sq. ft, installed.	Comparable to lawn.		✓		✓	✓	(4) Low flow traffic/infrequent parking: res. driveways, overflow parking areas, outer 1/3 comm/retail developments; emergency access roads, utility roads, street shoulders, swales.
Brick, Natural Stone, Concrete Unit Pavers on Sand	50-52; 104-107	SD-20	✓	✓	✓	✓	✓		✓	✓			(5)	✓	✓	✓	P	M	≤ 5%	High erosive areas.	$6-10/sq. ft. brick; $10-25/sq. ft. stone; $9-15/sq.ft concrete unit paver	Easy to repair. Occasional weed suppression.		✓			✓	(5) Driveways, walkways, patios, plazas, parking stalls.
Crushed Aggregate (gravel)	52; 108	SD-20	✓	✓	✓	✓	✓		✓	✓		✓	(6)	✓	✓	✓	✓	H		ADA-compliant accessible paths of travel. High erosive areas. High trafffic volume/speed areas.	$1-$3/sq. ft.	Easy to repair. Occasional weed suppression.		✓			✓	(6) Driveways, walkways, patios, public sidewalks, plazas, low volume streets, low-use parking stalls.
Cobbles Set in Soils	53; 109	SD-20	✓	✓	✓	✓	✓		✓	✓			(7)	✓	✓	✓	✓	M		Walkway surfaces.	Variable on material.	Easy to repair. Occasional weed suppression.		✓			✓	(7) Garden areas, parkway planter strips, median islands, under trees.
Streets																												
Narrow Access Street (urban & rural)	54-57; 111-114		P	P	✓	✓			✓	✓				✓	✓	✓	✓	H	Not for hillside sites with high fire risks	>500-750 ADT; >15-25 mph; long cul-de-sac streets.	Design. Less cost for materials.	Standard + Landscaping.	NA	NA			✓	Properties on tree-lined narrower streets command higher values typically.
Street Swale Systems	57-58; 115-116		✓		✓				✓	✓			arterial streets, concave medians	✓	✓	✓	P	H	✓		Design. Less cost for materials.	Standard + Landscaping and sediment removal.	✓				✓	
Dual Drainage System	58-59; 117		✓		✓		✓		✓	✓			arterial streets, concave medians	✓	✓	✓	✓	H	✓	Industrial areas/ potential spills.	More expensive; multiple elements	More expensive; multiple elements	✓				✓	
Concave Median	59; 118		✓	✓					✓	✓	✓	✓	where would have convex medians	✓	✓	✓	P	H	✓		Similar to convex planted medians.	Similar to convex planted medians	✓	✓	✓	✓	✓	
Cul-de-sacs, landscaped	60; 119		P	P		✓			✓	✓			Institutional, cul-de-sac streets	✓	✓	✓	P	H	✓		Cost to extend storm drain the length of the cul-de-sac; landscaping.	Similar to planted medians	✓	✓	✓	✓	✓	
Parking Lots																												
Hybrid Parking Lot/Parking Grove/ Overflow Parking	61-63; 121-124					✓			✓	✓		✓	Parking groves best for MFR or offices, or hotels.	✓	✓	✓	✓	M,L,M	≤ 5%	High groundwater or lack of deep permeable soils may limit applicability. Parking groves not recommended for high turnover lots (res., retail. areas).	Variable dependent on materials selected.	✓		✓		(8)	✓	(8) Overflow parking may be used as part of a self-treating area
Porous Pavement Recharge Bed	63; 125		✓		✓							✓	Underneath parking lots where land values are high	✓	✓	✓	✓	H	✓	Areas with poor soil infiltration rates; high groundwater table, depth to bedrock; areas of high or heavy traffic.	Expensive, requires extensive engineering	Yes, 2 times/year		✓	✓		✓	
Driveways																												

SITE DESIGN MEASURE SELECTION MATRIX

	Reference		Design Objective						Application					NRCS Hydrologic Soil Group				Effectiveness	Constraints		Costs		Type		Philosophy			
Site Design Measures	**BASMAA's Start at the Source (1999)**	**CA BMP Handbook (2003)**	**Infiltration**	**Retention**	**Slow Runoff**	**Minimize Impervious Surface Area**	**Contain Pollutants**	**Collect and Convey**	**Residential**	**Commercial**	**Industrial,RGO**	**Parking Lot**	**Other**	**A (Gravel/ Sand)**	**B (Loam)**	**C (Silt Loam)**	**D (Clay Loam, Sandy Clay, Clay)**		**Suitable for Slopes?**	**Locations to Avoid**	**Construction**	**Maintenance**	**Flow-through Treatment**	**Volume-based Treatment**	**Zero Discharge**	**Self-Treating**	**Runoff Reduction**	**Notes**
Driveways sloped to landscaping	64; 127				✓		✓		✓	✓	✓			✓	✓	✓	P	H	Cross slope must be >longitudinal slope	Areas where suitably-sized adjacent landscaped area is not available.	Same as conventional	Same as conventional	✓					Ensure driveway edge 3 inches above vegetated area.
Crushed Aggregate Driveways	64; 128				✓				✓				Light use driveways	✓	✓	✓	✓	H	< 5%	Multi-use driveways/play areas.	$1-$3/sq.ft.	Weed control, replenishment of aggregate.		✓			✓	
Unit Pavers on Sand/ Temp. Parking	65-66; 129; 132		✓						✓	✓				✓	✓	✓	P	M	< 5%	Expansive soils without special subgrade preparation. Highly erosive areas require more maintenance.	$9-15/sq. ft installation	Easy to repair.		✓			✓	
Paving Only Under Wheels	65; 130					✓			✓					✓	✓	✓	✓	H	✓	Curving driveways	Reduced construction costs	✓		✓		✓	✓	
Flared Driveways	66; 131					✓			✓				Multi-car garages	✓	✓	✓	✓	H	✓	Areas requiring multilane width along entire length	Reduced materials costs	Same		✓			✓	
Temporary Parking	66; 132					✓			✓				Guest Parking; Areas where infrequent parking or loading access is required.	✓	✓	✓	✓	H	Flat to gentle	High use areas	Higher initial than asphalt/ concrete	✓		✓			✓	Design to support vehicle loads
Roof Runoff																												
Dry-well	67; 134	SD-11	✓	✓			✓		✓	✓	✓			✓	✓		No	H	≤ 40%	Within 10 ft. bldg.	Relatively inexpensive	Relatively inexpensive		✓	✓	✓	✓	
Cistern or Rain Barrels	67-68; 135	SD-11		✓	✓		✓		✓	✓	✓			✓	✓	✓	✓	M	✓		Low	Regular monitoring/cleaning.	✓	✓	✓	✓	✓	Design to be vector, child-proof
Foundation Planting	68; 136	SD-11	✓		✓				✓	✓	✓		Buildings that do not use gutters	✓	✓	✓	P	H	✓	Bldgs with gutter system.	Low	Regular gardening	✓	✓			✓	Can use underdrains for soils
Pop-up Drainage Emitter	68; 137	SD-11	✓		✓				✓	✓	✓			✓	✓	✓	P	H		Must be at least 10 ft. away from the bldg.	$12-$20 each plus pipe	Standard	✓				✓	
Green Roofs (vegetation on roof)		SD-21	✓	✓	✓	✓	✓		✓	✓	✓			✓	✓	✓	✓	H	✓	Redevelopment of buildings not structurally designed to handle the weight.	Similar to high end slate/tile	Irrigate/mow roughly once/year. 40 yr warranty on membrane		✓		✓	✓	Reduces urban heat island effect, cooling costs, noise.
Blue Roofs (water storage on roof)		SD-21			✓				✓	✓	✓			✓	✓	✓	✓	H	✓	Redevelopment of buildings not structurally designed to handle the weight.				✓				

Sources:
BASMAA, Start at the Source, 1999.
BASMAA, Using Site Design Techniques to Meet Development Standards for Stormwater Quality--A Companion Document to Start at the Source, May 2003
California Stormwater Quality Association, Stormwater Best Management Practice Handbook--New Development and Redevelopment, 2003.
SCVURPPP Program Staff, professional judgment, February 2004.

Notes:

H	High
M	Medium
L	Low
P	Potential
✓	Yes

STORMWATER TREATMENT CONTROL SELECTION MATRIX

	Reference		Targeted Constituents Removal Effectiveness							Application					NRCS Hydrologic Soil Group				Applicability			Costs		Type		
Treatment Control Measures	**BASMAA's Start at the Source (1999)**	**CA BMP Handbook (2003)**	**Sediment**	**Nutrients**	**Trash**	**Metals**	**Bacteria**	**Oil and Grease**	**Organics**	**Residential**	**Commercial**	**Industrial, RGO**	**Parking Lots**	**Other**	**A (Gravel/ Sand)**	**B (Loam)**	**C (Silt Loam)**	**D (Clay Loam, Sandy Clay, Clay)**	**Goundwater Level a Concern?**	**Locations to Avoid**	**Potential for Mosquito/Vector Concerns**	**Construction**	**Maintenance**	**Flow-through Treatment**	**Volume-based Treatment**	**Notes**
Infiltration																										
Infiltration Trench		TC-10	H	H	H	H	H	H	H	✓	✓	No	✓		✓	✓	P	P	✓	Slopes>15% (1). Fill sites; Where spills may occur.	✓ if clogged	$5 per ft3 new; $50/ft3 retrofit.	20% of construction cost		✓	(1) Risk of groundwater contamination in very coarse soils
Infiltration Basin		TC-11	H	H	H	H	H	H	H	✓	✓	No			✓	✓	P	P	✓	Slopes> 15% (2). Fill sites; Where spills may occur.	✓ if clogged	$2/ft./0.25 ac basing; $18/ft3 for 0.34 ac.ft.	5-10% of construction		✓	(2) Risk of groundwater contamination in very coarse soils
Retention/Irrigation		TC-12	H	H	H	H	H	H	H		✓			(3)	✓	✓	✓	✓	✓	<100 ft. from wells, septic systems, natural wetlands; <12 inches soil; Areas without open space (4).	✓	Not Available	High (inspections, mechanical equipment, power)		✓	(3) Recreational and greenbelt areas. (4) Best for areas with infrequent rainfall. Design Philosophy: Zero Discharge.
Detention and Settling																										
Constructed Wetland		TC-21	H	M	H	H	H	H	H	✓				(5)	No	✓	✓	✓		Steep unstable slopes	✓	$57,100/1 ac-ft facility; $1.47 mil/100 ac-ft facility,	3-5% of construction cost	✓	✓	(5) Where high nutrient load potential problem (e.g. golf courses).
Extended Detention (dry) Ponds	71; 142-143	TC-22	M	L	H	M	M	M	M	✓			✓	(6)	P (7)	✓	✓	✓	✓	Tight spaces. Areas without hydraulic head.	✓	$41,600/ 1 ac-ft pond; $239,000/10 ac-ft pond	3-5% of construction cost		✓	(6) Minimum 5 acre site (7) w/design modification Note: Design Philosophy: Zero Discharge, Self-treating; Runoff reduction
Wet Ponds	71; 144-145	TC-20	H	M	H	H	H	H	H	✓	✓			(8)	✓	✓	✓	✓		Steep unstable slopes	✓	$45,700/ac-ft facility; $1.17 mil/ 100ac-ft facility	3-5% of construction cost		✓	(8) Not in arid regions. Note: Design Philosophy: Zero Discharge, self-treating; runoff reduction
Manufactured Wetland		MP-20	✓	✓	✓	✓	✓	✓	✓	✓	✓				No	✓	✓	✓			✓	Variable	Variable	✓	✓	
Biofiltration																										
Vegetated Swales	71; 139-141	TC-30	M	L	L	M	L	M	M	✓	✓		✓		✓	✓	✓	✓		Slopes > 6%. Steep topography. Heavily gopher-populated areas. Certain industrial.	✓	$0.50/sq.ft. total	$0.75/linear foot per year. $2,700/ 2 ha drainage area.	✓	✓	Design Philosophy: Self-treating; Runoff reduction
Vegetated Buffer Strip		TC-31	H	L	M	H	L	H	M	✓	✓		✓	(9)	✓	✓	✓	✓		Slopes >15%. Tight spaces Certain industrial.	✓	$.30/sq ft. seed; $.70/sq ft. sod.	$350/ac/yr.	✓		(9) Roads, highways, roof downspouts, small parking lots, pervious surfaces.
Bioretention		TC-32	H	M	H	H	H	H	H	✓	✓	✓	✓	(10)	✓	✓	✓	P	✓	Slopes > 20%. Unstable soil stratum	✓	$3-$4/sq ft. Res; $10-$40/sq.ft. Other; $6,500/area retrofitted.	Comparable to typical landscaping.		✓	(10) Institutional. Design Philosophy: Zero-Discharge; Self-treating; Runoff reduction

Filtration

STORMWATER TREATMENT CONTROL SELECTION MATRIX

	Reference		Targeted Constituents Removal Effectiveness							Application					NRCS Hydrologic Soil Group				Applicability			Costs		Type		
Treatment Control Measures	**BASMAA's Start at the Source (1999)**	**CA BMP Handbook (2003)**	**Sediment**	**Nutrients**	**Trash**	**Metals**	**Bacteria**	**Oil and Grease**	**Organics**	**Residential**	**Commercial**	**Industrial, RGO**	**Parking Lots**	**Other**	**A (Gravel/ Sand)**	**B (Loam)**	**C (Silt Loam)**	**D (Clay Loam, Sandy Clay, Clay)**	**Goundwater Level a Concern?**	**Locations to Avoid**	**Potential for Mosquito/Vector Concerns**	**Construction**	**Maintenance**	**Flow-through Treatment**	**Volume-based Treatment**	**Notes**
Media Filter		TC-40	H	L	H	H	M	H	H	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ (11)	Unstable soils lead to clogs. large sites>25 acres; < 4 feet head.	✓	Variable $18,500 (1997 $) to $240,000	5% of construction	✓		(11) Can design to prevent contact with groundwater.
Manufactured Media Filter		MP-40	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Per design	Unstable soils lead to clogs	✓	Variable	Variable	✓		
Flow Through Separation																										
Water Quality Inlet		TC-50	L	L	M	L	L	M	L		✓	✓	✓		✓	✓	✓	✓	Per design	Unvegetated areas	✓	>2,000-$3,000	$125,000-$150,000/vactor truck	✓		Should be used only when no other BMP is feasible.
Manufactured Wet Vault		MP-50	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	Per design		✓	Variable	Variable. (12)	✓		(12) Subsurface control maintenance costs<surface (landscaping); manufactured< public domain (confined space)
Manufactured Vortex Separator		MP-51	M	L	✓	L		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	Per design		✓	Variable	Variable	✓		
Manufactured Drain Inserts		MP-52	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	Per design	Large areas; Areas with Trash/Leaves.	✓	<$100-$2,000/ insert	High frequency, high costs	✓		Use only in retrofit situations or pretreatment of other BMPs.
Other																										
Multiple Systems		TC-60	H	L	H	H	M	H	H	P	P	P	P	P	P	P	P	P	See individual	Tight land areas	✓	Variable	Sum of individuals	P	P	

Sources:
BASMAA, Start at the Source, 1999.
BASMAA, Using Site Design Techniques to Meet Development Standards for Stormwater Quality--A Companion Document to Start at the Source, May 2003
California Stormwater Quality Association, Stormwater Best Management Practice Handbook--New Development and Redevelopment, 2003.
SCVURPPP Program Staff, professional judgment, February 2004.

Notes:

H	High
M	Medium
L	Low
P	Potential
✓	Yes

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

C.3. Stormwater Handbook

ATTACHMENT III-3

SCVURPPP Guidelines for Infiltration Devices

Attachment III-3

SCVURPPP Guidelines for Infiltration Devices (Rev. Draft 9-11-03)[1]

Siting / Design Parameter	Land Use Category I: Single Lot Residential	Land Use Category II: Residential Subdivision, Commercial, and Transportation
Groundwater separation (default)	>10 feet	>30 feet
Drainage Area	<5,000 sq. ft	<10,000 sq. ft.
Land use activities (occurring in drainage area to infiltration device)	Residential activities only.	No high risk land uses, including industrial, automotive repair shops, car washes, fleet storage areas, nurseries, landfills, and agricultural uses; No hazardous materials, chemical storage, or waste disposal.
Level of vehicular traffic	Not Applicable	<25,000 ADT main roads; <15,000 ADT minor roads
Setbacks[2] – horizontal distance to:		
➢ Drinking water wells (active wells and abandoned wells that are not properly decommissioned)	>500 feet	>600 feet
➢ Septic systems	>100 feet	>100 feet
➢ Underground storage tanks with hazardous materials	>500 feet	>500 feet
Hillside stability	Slopes > 7% - recommend geotechnical stability analysis	Slopes > 7% - recommend geotechnical stability analysis
Pretreatment	None required[3]	Sediment removal required

[1] An infiltration device is defined as any structure that is designed to infiltrate storm water into the subsurface, and as designed, bypasses the natural groundwater protection afforded by surface or near surface soil. Infiltration devices that do not meet the design criteria described herein are recommended to be reviewed by the Santa Clara Valley Water District.
[2] Additional design guidelines will include guidance on setbacks to other stormwater infiltration devices and to horizontal conduits.
[3] Sediment removal is recommended at most sites for ease of maintenance and effective operation of the device.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

ATTACHMENT III-4

Stormwater Treatment BMP Maintenance Companies
Manufactured Stormwater Control Vendors

Attachment III-4

Stormwater Treatment BMP Maintenance Companies Contacted In The Santa Clara Basin[1]

Company Name	Contact	Phone
Storm Water Inspection & Maintenance Services (SWIMS)	Ric Campos	925-516-8966
Drainage Protection Systems (DPS)	Ryan Bradford	800-579-8819
Revel Environmental Manufacturing (REM)	Charlie Fleischmann	888-526-4736

[1] Disclaimer. This list is provided as an information resource only. The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). Inclusion on the list should not be construed to be an endorsement by SCVURPPP. SCVURPPP does not guarantee that this list is all conclusive of vendors serving the Santa Clara Valley. Vendors not included on this list who would like their contact information included in future updates or materials may contact Jill Bicknell at (408) 720-8811 or jcbicknell@eoainc.com.

List of Manufactured Stormwater Control Vendors

Company Name[2]	Vendor Information/Company Information	Product descriptions
Remedial Solutions, Inc/ AquaShield http://www.aquashieldinc.com	Andy Gersen Matzke Company Longview, WA 98632 206-595-2203 2626 Greenway Ave. Andy@isomedia.com	The Aqua-Guard™ Catch Basin Insert works to remove gross contaminants, oil and sediment at the source. The Aqua-Filter™ Stormwater Filtration System is an in-line stormwater filtration system capable of gross contaminant removal, and the removal of fine sediments, water-borne hydrocarbons, heavy metals (i.e. zinc) and nutrients such as phosphorous and nitrogen.
Bay Saver, Inc. California Concrete and Pipe (CA Vendors for Bay Saver) http://www.baysaver.com	Paul McWhorter 2960 South Hwy. 99 Stockton, CA 95215 800-314-7473 paul.mcwhorter@oldcastleprecast.com	BaySaver stormwater treatment systems are structural best management practice offering pollutant removal.
Continuous Deflective Separation Technologies, Inc .http://www.cdstech.com/	Gary Lippner 4813 El Camino Ave. Suite C Carmichael, CA 95608 916-486-1736 p 916-481-6836 f glippner@cdstech.com	Continuous Deflection Separation units CDS units remove sediments, gross debris, floatables, neutrally buoyant debris and remove free oil and grease.
United Stormwater, Inc http://www.unitedstormwater.com		The DrainPac is a catchment and filtration system. The retrofit design is designed to contain contaminants and debris prior to discharge into storm drain systems.
Ero-Con	Tom Schneider Dallas, TX 800-891-0473	Filters
KriStar Enterprises, Inc http://www.kristar.com	Sue Lillo 800-579-8819	A device installed in a new or existing oil/water separator tank that acts as a polishing filter for petroleum hydrocarbons.

[2] Disclaimer. This list is provided as an information resource only. The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP). Inclusion on the list should not be construed to be an endorsement by SCVURPPP. SCVURPPP does not guarantee that this list is all conclusive of vendors serving the Santa Clara Valley. Vendors not included on this list who would like their contact information included in future updates or materials may contact Jill Bicknell at (408) 720-8811 or jcbicknell@eoainc.com.

Company Name[2]	Vendor Information/Company Information	Product descriptions
Altech Technology Systems, Inc http://www.altech-group.com	Mr. Alex R. Keen, President 12 Banigan Drive Toronto, Ontario M4H 1E9 Phone: (416) 467-5555 Fax: (416) 467-9824 Email: ats@altech-group.com	
Jensen Precast http://www.jensenprecast.com	Jeff Friedman (916) 992-8317 Toll Free: (800) 843-9569	
Kistner Concrete Products http://www.kistner.com/	Mike Kistner 716-434-6157	Environment 21, LLC develops technology for the Stormwater Treatment market and provides Technical Support to an international network of Precast Concrete Manufacturers of "Structural Stormwater Treatment Systems". Proprietary technology includes sedimentation hydraulics, sediment re-suspension hydraulics, and design storm flow hydraulics.
Rinker Materials www.hydroconduit.com	Gary Fortney 385 Tower Road Napa, CA 94558 707-255-3035 x 224 707-975-7522 mobile gfortney@rinker.com	Wet Vaults
Stormwater Management Inc http://www.stormwatermgt.com/	William Harris Jr. (Sr. Regional Manager) Neil Erickson (Nor. Cal Regional Mngr) California, Hawaii, Nevada 877.446.7250 (p) 909.790.5289 (f) 909.499.7298 © willh@stormwaterinc.com neile@stormwaterinc.com	StormFilter is a Best Management Practice (BMP) filtration system for removing a variety of pollutants. The StormFilter cartridges are filled with an array of media, selected to treat the specific pollutant loadings at each site.

Company Name[2]	Vendor Information/Company Information	Product descriptions
Abtech Industries, Inc	Robert AbTech Industries 4110 North Scottsdale Road, Suite 235 Scottsdale, Arizona 85251 480-874-4000 800-545-8999 Fax: 480-970-1665	The Ultra-Urban Filter® BMP Filter is designed to capture oil and grease, trash and sediment from stormwater runoff before it enters the storm drain system.
Vortechnics Inc	John Stiver, Regional Sales Manager John Rackers 650-323-6110 Phone: 916-984-6085 Fax: 916-984-6086 E-mail: jstiver@vortechnics.com Email: jrackers@contech-cpi.com	The Vortechs System is a reinforced concrete vaulted structure with a swirl chamber, baffle wall and flow control wall. Designed to slow the water down, and give pollutants an opportunity to settle out in the swirl chamber or rise to the surface, all without washout during the peak events. Designed for 80% TSS removal on a net annual basis of extremely fine particles, realistic to typical urban roadway runoff.The VortSentry System is a product designed on the same principals as the Vortechs System, except in a small footprint manhole type configuration.
Invisible Structures, Inc	Andy Gersen Matzke Company 2626 Greenway Ave. Longview, WA 98632 206-595-2203 Andy@isomedia.com	
Bay Area Concretes, Inc	Mike Price P.O. Box 599 Madera, CA 510-651-6020	Porous Pavers
Westcon Pavers www.westconpavers.com	Elaine Hart 1821 Mayes Road SE Olympia, WA 866-816-2111	Porous Pavers
Pavestone, Co. www.pavestone.com	Mark Ketchum 27600 Country Road 90 Winters, CA 95694 530-795-4400 p 530-517-1242 m 530-795-4441 f mark.ketchum@pavestone.com	Porous Pavers

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

C.3. Stormwater Handbook

ATTACHMENT III-5

Landscape Maintenance Techniques For Pest Reduction

PROPERTY MAINTENANCE FACT SHEET

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

Landscape Maintenance Techniques for Pest Reduction

Who should use this Fact Sheet?

- Development Project Applicants
- City/County Planners
- Landscape Maintenance Personnel
- Landscape Architects
- Homeowners

Why is it Important to Reduce Pesticide Usage?

When it rains, pesticides used in maintaining landscapes and gardens are washed off the plants and soils they are used to protect. This stormwater runs off the landscape and flows to the nearest storm drain, which ultimately carries the water to a local creek or the San Francisco Bay without treatment. Pesticides carried with stormwater into creeks and the Bay may be harmful to fish and other organisms that live there. Minimizing use of pesticides in landscape maintenance helps protect water quality, aquatic life, and human health.

What is Integrated Pest Management?

Integrated Pest Management (IPM) is a decision-making process for managing pests that uses monitoring to determine pest-caused injury levels and determine the best methods for their control. IPM uses a combination of :

- biological controls (e.g., natural enemies or predators);
- physical or mechanical controls (e.g., hand labor or mowing);
- cultural controls (e.g., mulching, discing, or alternative plant type selection); and
- reduced risk chemical controls (e.g., soaps or oils)

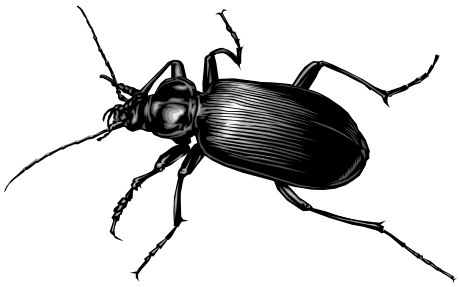
in order to minimize pesticide usage. The IPM method uses the least hazardous pesticides only as a last resort for controlling pests.

How Can Landscape Design and Maintenance Techniques Reduce Pesticide Usage?

Pesticides are often used in maintaining landscapes. The amount of pesticides entering our creeks and Bay can be decreased by using alternative design and maintenance techniques that:

- Reduce the potential for the pesticides to run off the landscape;
- Reduce the amount of chemicals necessary to ensure healthy plants or eliminate the need for pesticide usage at all; or,
- Decrease the need for landscape maintenance by designing landscapes that minimize pest infestation and create low maintenance environments.

Refer to the back of this fact sheet for more design and maintenance tips.



Pest Reducing Landscape Design Techniques

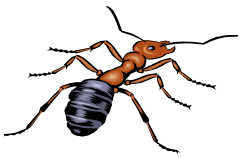
- Design the landscape for efficient irrigation and drainage.
- Design the landscape to conform to natural drainage patterns.
- Retain existing native, pest-resistant trees, shrubs and plants.
- Select pest-resistant plants adapted to your specific area. Consider site-specific characteristics such as the soil, topography, climate, amount and timing of sunlight, prevailing winds, rainfall, air movement, patterns of land use, ecological consistency and plant interactions.
- Prevent the need for routine pruning by selecting plants based on their size and shape when mature.
- Situate plants to facilitate maintenance. Install mowing strips, tree wells and pathway edging to reduce problems associated with maintaining the interface between different elements of the design.
- Plant at the right time of year.

Pest Reducing Landscape Maintenance Techniques

- Employ nonchemical Integrated Pest Management methods (biological, physical and cultural controls) before using chemicals to treat a pest problem.
- If pesticides are necessary, use the least toxic pesticide available. Avoid use of organophosphates such as diazinon and chlorpyrifos (Dursban) as well as copper-based pesticides.
- Do not over apply pesticide. Spray only where the infestation exists. Follow the manufacturer's instructions for mixing and applying materials.
- Properly sweep up spilled fertilizers or pesticides. Do not wash away or bury such spills.
- Properly dispose of chemical wastes by recycling, reusing, or disposing of as hazardous waste. Do not dispose of debris into or near channels or other waterways or leave it where it may contact runoff.
- Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging undegraded pesticides into runoff. With the exception of pre-emergent pesticides, avoid application if rain is expected.
- Maintain healthy soils by incorporating organic matter, making regular pH adjustments, and appropriately fertilizing.
- Do not overwater.
- Minimize irrigation overspray.
- Prune to increase air circulation but do not overprune.
- Apply 2-4 inches of mulch or geotextiles to exposed soils to prevent weed growth.
- Mow lawns and turf high and leave clippings in place.
- Replace problem plants with locally-adapted, pest resistant plants.
- Remove, rake up and dispose of diseased plant parts.

ADDITIONAL RESOURCES

IPM Access, www.efn.org/~ipmpa, *IPM Based Landscape Design.*



Bio-Integral Resource Center (BIRC) (510) 524-2567 www.birc.org

Central Contra Costa County Sanitary District *Our Water Our World* IPM Fact Sheets www.centralsan.org

San Francisco Department of the Environment www.sfenvironment.com

IPM Information: www.watershedwatch.net

University of California Cooperative Extension Master Gardeners: www.mastergardeners.org

University of California IPM (800) 994-8849 www.ipm.ucdavis.edu

- Natural Enemies Handbook: The Illustrated Guide to Biological Pest Control
- The UC Guide to Solving Garden and Landscape Problems: An Interactive CD- ROM
- Pests of Landscape Trees and Shrubs

IV STORMWATER TREATMENT CONTROL SIZING CRITERIA

IV.1 INTRODUCTION

The goal of this Chapter is to provide guidance on appropriately sizing stormwater treatment BMPs to meet the requirements of Provision C.3.

The sizing of the stormwater treatment BMPs selected as described in Chapter III must meet criteria identified in the NPDES permit's Provision C.3.d. This chapter explains the hydraulic sizing criteria that are required by the permit. Worksheets and sizing curves to assist municipal staff and project designers in sizing various treatment systems are provided.

Volume-Based Versus Flow-Based Versus Combination BMPs

The two (2) basic stormwater treatment removal processes are volume-based and flow-based BMPs. Volume-based BMPs detain stormwater for a certain period and treat primarily through settling and infiltration. Flow-based BMPs treat pollutants from a moving stream of water through filtration, infiltration, and/or biological processes. This section does not address the sizing of a treatment system that will be used for both volume and flow control, as may be required by the Program's Hydromodification Management Plan (HMP). The design of dual-purpose systems will be addressed in the completed HMP report and added to Chapter V of this Handbook at a future date.

Appendix F describes the development of numeric sizing criteria for stormwater treatment systems for conditions in the Santa Clara Basin, as required in the Program's NPDES Permit Provision C.3.d. It applies the different criteria to several examples for a comparison of the results. The Program acknowledges the assistance of GeoSyntec Consultants, for the technical analyses and report (GeoSyntec Consultants, 2003) that form the basis of this section.

IV.2 HYDRAULIC SIZING CRITERIA

The following are the hydraulic sizing criteria required by Provision C.3.d. The name assigned to each criterion is consistent with the nomenclature used in the 2003 California Best Management Practice (BMP) Manual for New Development and Redevelopment (CASQA, 2003) and is given in bold in the parentheses following each criterion.

C.3.d.i. Volume Hydraulic Design Basis: Volume-based treatment BMPs are designed to treat a volume of runoff, which is detained for a certain period of time to effect settling of solids and associated pollutants. Examples of volume-

based controls include wet ponds, detention basins, constructed wetlands, and bioretention systems (see Attachment III-2 for additional examples). Treatment BMPs[1] whose primary mode of action depends on volume capacity, such as detention/retention units or infiltration structures shall be designed to treat storm water runoff equal to:

- The maximum stormwater quality capture volume for the area, based on historical rainfall records, determined using the formula and volume capture coefficients set forth in *Urban Runoff Quality Management, WEF Manual of Practice No. 23 and ASCE Manual of Practice No. 87, (199*8), pages 175-178 **(URQM Approach);** or
- The volume of annual runoff required to achieve eighty percent (80%) or more capture, determined in accordance with the methodology set forth in Appendix D of the *California Stormwater Best Management Practices Handbook*, (1993) using local rainfall data. **(CA Stormwater BMP Handbook Volume Approach)**.

C.3.d.ii. Flow Hydraulic Design Basis: Flow-based treatment BMPs treat water on a continuous flow basis. Examples include vegetated swales, media filters, hydrodynamic separators and screened systems.[2] Treatment BMPs whose primary mode of action depends on flow capacity, such as swales, sand filters, or wetlands, shall be sized to treat:

- Ten percent (10%) of the 50-year peak flow rate **(Factored Flood Flow Approach)**; or,
- The flow of runoff produced by a rain event equal to or at least two (2) times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths **(CA Stormwater BMP Handbook Flow Approach);** or,
- The flow of runoff from a rain event equal to at least 0.2 inches per hour intensity **(Uniform Intensity Approach)**.

IV.3 RECOMMENDATIONS

Stormwater treatment BMPs designed using any of the sizing methods specified in Permit Provision C.3.d., when properly applied, will be in compliance with the NPDES permit's requirements. However, the various sizing methods have advantages and disadvantages to their use, and local agencies may wish to specify a preference for particular methods in order to standardize development project submittals. Therefore, Table IV.1 presents a summary of the advantages and disadvantages of the methods. The recommended sizing methods are also discussed following this summary.

[1] For the purpose of this section, a stormwater best management practice (BMP) is the same as a stormwater treatment measure, device, or control.
[2] For clarification, flow-based treatment BMPs differ from flow control BMPs, which are used to limit the volume and rate of discharge from a development site, such as may be required by the Program's HMP (see Chapter V).

Table IV.1 -- Advantages and Disadvantages of Alternative Sizing Methods

Volume Based Methods		
	Advantages	**Disadvantages**
1) Urban Runoff Quality Management (URQM) Method	Based on modeling and regression analysis using long-term rainfall records in six cities including San Francisco. Takes into account drain time. Easy to apply.	Does not simulate performance under local rainfall patterns, but estimates volume based on average storm event size. Does not consider soil type or slope.
2) CA Stormwater BMP Handbook Volume Method (adapted for Santa Clara Valley using SWMM Model)	More comprehensive method. Takes into account drain time, slope, and soil types. Based on continuous simulation of detention storage, outflow, and bypass using local long-term rainfall records.	More complex method of the two candidate methods. Curves are provided that should cover most applications.
Flow Based Methods		
	Advantages	**Disadvantages**
1) Factored Flood Flow Approach (10% of 50-year rainfall intensity)	Intensity-duration-frequency curves are very familiar to most engineers. Takes into account local rainfall conditions.	Not based on achieving any given level of treatment of small storms. Sensitive to time of concentration estimate, which could make it more difficult for development review agency.
2) CA Stormwater BMP Handbook Flow Approach (2 times 85th percentile rainfall intensity)	Takes into account local rainfall conditions.	Some question regarding appropriateness of factor of 2.
3) Uniform Intensity Approach (0.2 inches/hr)	Simplest of methods.	Does not take into account local rainfall patterns and statistics.

<u>For volume-based controls, the adapted CA Stormwater BMP Handbook Volume Method is recommended</u> because it takes into account rainfall characteristics, percent imperviousness, drainage time, soil infiltration conditions, and slope. All of these factors can be relatively easily determined for a site, and the design curves provided in this report (Attachment IV-1) should be sufficient for sizing basins and other volume-based controls. In addition, the method simulates the operation of a basin under realistic conditions, and it is reasonable to assume that

basins designed using this method will achieve the desired percent capture specified in permit Provision C.3.d. Lastly, this method explicitly incorporates a drain time that allows an appropriate level of treatment while avoiding vector control concerns.

For flow based controls, the CA Stormwater BMP Handbook Flow Method is recommended, using the values estimated for each of the rain gages. This method is based on local rainfall data and achieving treatment of small storms consistent with the permit requirements.

Attachment IV-1 contains worksheets and sizing curves to assist municipal staff and development project proponents in sizing various treatment systems using all five (5) of the alternative sizing methods. Attachment IV-2 contains worksheets completed for an example of a single-family residential project in Santa Clara Valley.

Several figures and tables are provided in Attachment IV-1 to assist in selecting and designing BMPs.

Figure 1: Mean Annual Precipitation Depths and Soil Texture for the Santa Clara Basin
Figures 2 and 3: Unit Basin Volumes
Figure 4: Rain Intensity-Frequency-Duration Curves

IV.4. REFERENCES

California Stormwater Quality Association, 2003. Stormwater Best Management Practice Handbook, New Development and Redevelopment, January.

Camp Dresser & McKee, 2003. Using Site Design Techniques to Meet Development Standards for Stormwater Quality. Prepared for the Bay Area Stormwater Management Agencies Association. May.

GeoSyntec Consultants, 2003. Sizing Criteria for Stormwater Treatment. Draft Report. Prepared for the Santa Clara Valley Urban Runoff Pollution Prevention Program and the Santa Clara Valley Water District.

Water Environment Federation (WEF) Manual of Practice No. FD-20 / American Society of Civil Engineers (ASCE) Manual and Report of Engineering Practice No. 77, 1992. Design and Construction of Urban Stormwater Management Systems.

Water Environment Federation (WEF) Manual of Practice No. 23 / American Society of Civil Engineers (ASCE) Manual and Report of Engineering Practice No. 87, 1998. Urban Runoff Quality Management.

ATTACHMENT IV-1

Sizing Criteria Worksheets

TABLES

Table 1 – Examples Of Volume-Based And Flow-Based Controls
Table 2 – Precipitation Data for Four Reference Gages
Table 3a – Estimated Runoff Coefficients for Various Surfaces During Small Storms (CDM, 2003)
Table 3b – Estimated Composite Runoff Coefficients for Small Storms by Land Use (WEF/ASCE, 2003)

FIGURES

Figure 1 – Mean Annual Precipitation Depths and Soil Texture for the Santa Clara Basin
Figure 2 – Unit Basin Volumes for 80% Capture, Assumed slope = 1%
Figure 3 – Unit Basin Volumes for 80% Capture, Assumed slope = 15%
Figure 4 – Rain Intensity-Frequency-Duration Curves

Attachment IV-1
Sizing Criteria Worksheets

These worksheets are designed to assist municipal staff and development project proponents in sizing stormwater treatment controls. Figures used in the computations can be found at the back of these worksheets.

I. Type of Treatment Measure Proposed for Project

1. Does the treatment measure (or part of a series of measures) operate based on the volume of water treated (i.e., detains an amount of runoff for a certain amount of time to allow solids and pollutants to settle to the bottom)? (See Table 1 for examples.)

___ Yes ____ No

If Yes, continue to Section II.—Sizing for Volume-Based Treatment Controls on page 2.
If No, continue to next question.

2. Does the treatment measure (or part of a series of measures) operate based on continuous flow of runoff through the device? (See Table 1 for examples.)

___ Yes ____ No

If Yes, continue to Section III.—Sizing for Flow-Based Treatment Controls on page 8.

Table 1: Examples Of Volume-Based And Flow-Based Controls

Volume-based Controls	Flow-based Controls
Extended detention (dry) ponds	Vegetated swales
Wet ponds	Vegetated buffer strips
Infiltration trench	Media filters
Infiltration basin	Hydrodynamic separators
Bioretention areas	Wet vaults
Constructed wetlands	Other proprietary treatment devices

Attachment IV-1

Sizing for Volume-Based Treatment Controls

II. Sizing for Volume-Based Treatment Controls

The SCVURPPP Permit Provision C.3.d allows two methods for sizing volume-based controls—the Urban Runoff Quality Management method (URQM Method) or the California Stormwater Best Management Practice[1] (BMP) Handbook Volume Method. Steps for applying these methods are presented in Sections A and B below.

Section A.— Sizing Volume-Based Treatment Controls based on the Urban Runoff Quality Management[1], Approach (URQM Approach)

The equations used in this method are:

$$P_o=(a*C_w)*P_6$$

$$C_w=0.858i^3-0.78i^2+0.774i+0.04$$

Where:

P_o = maximized detention storage volume (inches over the drainage area to the BMP)
a = regression constant (unitless)
C_w = watershed runoff coefficient (unitless)[2]
P_6 = mean storm event precipitation depth (inches);
i = watershed impervious ratio (range: 0-1)

Step 1. Determine the drainage area for the BMP, A = _____ acres

Step 2. Determine the watershed impervious ratio, "*i*", which is the amount of impervious area in the drainage area to the BMP divided by the drainage area, or the percent of impervious area in the drainage area divided by 100.

a. Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP = _____ acres

b. Calculate the watershed impervious ratio, *i*:

i = amount of impervious area (acres)/drainage area for the BMP (acres)

i = (**Step 2.a.**)/(**Step 1**) = _____ (range: 0-1)

Percent impervious area= *i*/100 = _____%

[1] For the purpose of this worksheet, a stormwater best management practice, or BMP, is the same as a stormwater treatment measure or device.

[2] For the purpose of this worksheet, the watershed runoff coefficient is notated as "C_w" to avoid confusion with the runoff coefficient "C" used in the Rational Method.

Attachment IV-1

Sizing for Volume-Based Treatment Controls

Section A.— URQM Approach (continued)

Step 3. Determine the watershed runoff coefficient, "C_w", using the following equation:

$C_w = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$, using "*i*" from **Step 2.b.**

C_w = _____

Step 4. Find the mean annual precipitation at the site (MAP_{site}). To do so, estimate where the site is on Figure 1and estimate the mean annual precipitation in inches from the rain line (isopleth) nearest to the project site.[3],

Mean annual precipitation at the site, MAP_{site} = _____

(Each line on the figure, called a rainfall isopleth, indicates locations where the same amount of rainfall falls on average each year (e.g., the isopleth marked 14 indicates that areas crossed by this line average 14 inches of rainfall per year). If the project location is between two lines, estimate the mean annual rainfall depending on the location of the site.)

Step 5. Identify the reference rain gage closest to the project site from the following list.

Table 2: Precipitation Data for Four Reference Gages

Gages	Mean Annual Precipitation (MAP_{gage}) (in)	Mean Storm Event Precipitation $(P_6)_{gage}$ (in)
San Jose Airport	13.9	0.512
Palo Alto	13.7	0.522
Gilroy	18.2	0.684
Morgan Hill	19.5	0.760

Select the MAP_{gage} and the mean storm precipitation $(P_6)_{gage}$ for the reference gage, and use them to determine $(P_6)_{site}$ for the project site in Step 6.

MAP_{gage} = _____

$(P_6)_{gage}$ = _____

[3] Check with the local municipality to determine if more detailed maps are available for locating the site and estimating MAP.

Attachment IV-1
Sizing for Volume-Based Treatment Controls

Section A.— URQM Approach (continued)

Step 6. Calculate the mean storm event precipitation depth at the project site, called $(P6)_{site}$. Multiply the mean storm event precipitation depth for the rain gage chosen by a correction factor, which is the ratio of the mean annual precipitation at the site (MAP_{site}) to the mean annual precipitation at the rain gage (MAP_{gage}).

$$(P_6)_{site} = (P_6)_{gage} * (MAP_{site}) / (MAP_{gage}).$$

$(P_6)_{site}$ = Mean Event Precipitation $(P_6)_{gage}$ (Step5) $*$ (MAP_{site}) (Step4) / (MAP_{gage})(Step5).

$P_{6\ site}$ = _____ inches

Step 7 Find "*a*", the regression constant (unitless) [4]:

a = 1.963 for a 48-hour drain time
a = 1.582 for a 24-hour drain time *a* = _____
a = 1.312 for a 12-hour drain time

Recommendation: Use a 48-hour drain time for detention basins and 24-hour drain time for pervious paving.

Step 8 Determine the maximized detention storage volume P_o:

$$P_o = (a*C_w) * P_6$$

P_o = (**Step 7** * **Step 3**) * (**Step 6**)

P_o = _____ inches

Step 9 Determine the volume of the runoff to be treated from the drainage area to the BMP (i.e., the BMP design volume):

Design volume = P_o * A = (**Step 8**) * (**Step 1**) * 1 foot/12 inches

Design Volume = _____ acre-feet

[4] *WEF Manual of Practice No. 23 and the ASCE Manual of Practice No. 87 (1998), pages 175-178.*

Attachment IV-1

Sizing for Volume-Based Treatment Controls

Section B — Sizing Volume-Based Treatment Controls based on the Adapted California Stormwater BMP Handbook Approach

The equation that will be used to size the BMP is:

BMP Volume = (Correction Factor) X (Unit Storage) X (Drainage Area to the BMP)

Step 1. Determine the drainage area for the BMP, A = _____ acres

Step 2. Determine the watershed impervious ratio, "*i*", which is the amount of impervious area in the drainage area to the BMP divided by the drainage area, or the percent of impervious area in the drainage area divided by 100.

a) Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP = _____ acres

b) Calculate the watershed impervious ratio, *i*:

i = amount of impervious area (acres)/drainage area for the BMP (acres)

i = (**Step 2.a.**)/(**Step 1**) = _____ (range: 0-1)

Percent impervious area= i/100 = _____%

Step 3. Determine from Figure 1 the mean annual precipitation (MAP_{site}) at the project site location: (see Section II. Step 4 for more explanation.)

MAP_{site} = _____inches

Step 4 Identify the reference rain gage closest to the project site from the following list and record the MAP_{gage}:

MAP_{gage} = _____inches

Reference Rain Gages	**Mean Annual Precipitation (MAP_{gage}) (in)**
San Jose Airport	13.9
Palo Alto	13.7
Gilroy	18.2
Morgan Hill	19.5

Attachment IV-1

Sizing for Volume-Based Treatment Controls

Section B —Adapted California Stormwater BMP Handbook Approach (continued)

Step 5 Determine the rain gage correction factor for the precipitation at the site using the information from **Step 3** and **Step 4**.

Correction Factor = MAP_{site} (**Step 3**)/MAP_{gage} (**Step 4**)

Correction Factor = _____

Step 6. Identify representative soil type for the BMP drainage area.

a) Identify from Figure 1, the soil type that is representative of the pervious portion of the project shown here in order of increasing infiltration capability:

____ Clay ____ Sandy Clay ____ Clay Loam

____ Silt Loam ____ Loam

b) Does the site planning allow for protection of natural areas and associated vegetation and soils so that the soils outside the building footprint are not graded/compacted? ____

If your answer is no, and the soil will be compacted during site preparation and grading, the soil's infiltration ability will be decreased. Modify your answer to a soil with a lower infiltration rate (e.g., Silt Loam to Clay Loam or Clay).

Modified soil type: _____

7. Determine the average slope for the drainage area for the BMP: _____%

8. Determine the unit basin storage volume from sizing curves.

a) Slope ≤ 1%,

Use the figure entitled "Unit Basin Volume for 80% Capture, 1% Slope" corresponding to the nearest rain gage: Figure 2-A, B, C, or D for San Jose, Palo Alto, Gilroy and Morgan Hill, respectively. Find the percent imperviousness of the drainage area (see answer to **Step 2**, above) on the x-axis. From there, find the line corresponding to the soil type (from **Step 6**), and obtain the unit basin storage on the y-axis.

Unit Basin Storage $(UBS)_{1\%}$ =_____(inches)

b) Slope ≥ 15%

*Use the figure entitled "Unit Basin Volume for 80% Capture, 15% Slope" corresponding to the nearest rain gage: Figure 3-A, B, C, or D for San Jose, Palo Alto, Gilroy and Morgan Hill, respectively. Find the percent imperviousness of the drainage area (see answer to **Step 2**, above) on the x-axis. From there, find the line corresponding to the soil type (from **Step 6**), and obtain the unit basin storage on the y-axis.*

Unit Basin Storage $UBS_{15\%}$ =_____(inches)

Attachment IV-1

Sizing for Volume-Based Treatment Controls

Section B —Adapted California Stormwater BMP Handbook Approach (continued)

c) Slope > 1% and < 15%

*Find the unit basin volumes for 1% and 15% using the techniques in **Steps 8a** and **8b** and interpolate by appling a slope correction factor per the following formula:*

$UBS_{x=}$ Unit Basin Storage of intermediate slope, x

$UBS_x = UBS_{1\%} + (UBS_{15\%} - UBS_1)*(x-1) / (15\% - 1\%)$
$= (\textbf{Step 8a}) + (\textbf{Step 8b} - \textbf{Step 8a}) * (x-1)/15\%-1\%)$

Unit Basin Storage volume = _____(inches)
(corrected for slope of site)

9. Size the BMP, using the following equation:

BMP Volume = Rain Gage Correction Factor * Unit Basin Storage Volume * Drainage Area

BMP Volume = (**Step 5**) * (**Step 8** unit storage) * (**Step 1** Drainage area) * 1 foot/12 in.

BMP Volume = _____ acre-feet

III. Sizing for Flow-based Treatment Controls

The SCVURPPP permit allows three methods for sizing flow-based treatment measures—the Factored Flood Flow Method (10% of the 50-year peak flow rate); the California BMP Handbook Method (the flow produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity); or the Uniform Intensity Method (the flow produced by a rain event equal to at least 0.2 inches/hour intensity). Tables 3a and 3b are utilized in each of the three methods.

Table 3a – Estimated Runoff Coefficients for Various Surfaces During Small Storms (CDM, 2003)

Surface	Runoff Coefficient (C Factor)
Concrete	0.80
Asphalt	0.70
Pervious Concrete	0.60
Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone (without grout)	0.25
Turf Block	0.15
Brick (without grout)	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10
Roofs (from WEF/ASCE, 1992)	0.75

Notes: The above C-factors were estimated by selecting the lower range of the best available C-factor for each paving surface. These C-factors are only appropriate for small storm treatment BMP design, and should not be used for flood control sizing. Where available, locally developed small storm C-factors for various surfaces should be used.

Table 3b – Estimated Composite Runoff Coefficients for Small Storms by Land Use (WEF/ASCE, 2003)

Description of Area		Runoff Coefficient (C Factor)
Business:	Neighborhood	0.50
	Downtown	0.70
Residential:	Single Family	0.30
	Multi-unit, detached	0.40
	Apartment	0.50
	Multi-unit, attached	0.60
Industrial:	Light	0.50
	Heavy	0.60
Parks, cemeteries		0.10
Playgrounds		0.20
Unimproved		0.10

Notes: The above C-factors were estimated by selecting the lower range of the runoff coefficients listed for various land uses in WEF/ASCE, 1992. Where available, locally developed small storm C-factors for various land uses should be applied.

Section A — Sizing Flow-Based Treatment Controls based on the Factored Flood Flow Approach

This method uses the Rational Method equation to determine the design flow, using a design intensity that is 10 % of the intensity for the 50-year return period found on the local intensity-duration-frequency (IDF) curve:

Q=CIA

Where:

Q is the design flow in cubic feet per second (cfs),
C is the drainage area runoff coefficient,
I is the design intensity (in/hr), and
A is the drainage area for the BMP (acres)

Step 1. Determine the drainage area for the BMP, A = _____ acres

Step 2 Determine the runoff coefficient, C = _____

It is more accurate to compute an area-weighted "C-factor" based on the surfaces in the drainage area (Table 3a), if possible, than to assume a composite "C-factor" such as those in Table 3b, especially for small drainage areas.

Step 3 Find the time of concentration (t_c) for the site (i.e. the travel time from the most remote portion of the BMP drainage area to the BMP). (Check with local agency's Engineering Department for standard or accepted methods of computing t_c).

t_c = Time of overland flow + time in drainage pipe: _____hrs

Step 4 Using the time of concentration as the duration, use Figure 4 to determine the intensity for the 50-year storm (IDF curve) (in/hr). _____

intensity for the 50-year storm = _____in/hr

Step 5 The design intensity (I) will be 10% of the intensity obtained from the IDF curve (intensity for the 50-year storm).

I = (**Step 4** * 0.10) = = _____in/hr

Step 6 Determine the design flow (Q) using the Rational Method equation:

Q = C*I*A
*Q = **(Step 2)*(Step 5) * (Step 1)***
Q = _____ acres-in/hr

Design Flow, Q = _____ *cfs*[5]

[5] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) * (43,560 s.f/acre) * (1ft/12 in) * (1hr/3600 sec) ≈ 1 ft^3/ sec or cfs.

Attachment IV-1

Sizing for Flow-Based Treatment Controls

Section B—Sizing Flow-Based Treatment Controls based on the California Stormwater BMP Handbook Flow Approach

This method uses the Rational Method equation to determine the design flow, using a design intensity that is 10 % of the intensity for the 50-year return period found on the local intensity-duration-frequency (IDF) curve:

$$Q=CIA$$

Where:
Q = the design flow in cubic feet per second (cfs),
C = the drainage area runoff coefficient,
I = the design intensity (in/hr), and
A = the drainage area for the BMP (acres)

Step 1. Determine the drainage area for the BMP, A = _____ acres

Step 2 Determine the runoff coefficient, C = _____

It is more accurate to compute an area-weighted "C-factor" based on the surfaces in the drainage area (Table 3a), if possible, than to assume a composite "C-factor" such as those in Table 3b, especially for small drainage areas.

Step 3. Determine from Figure 1 the mean annual precipitation (MAP_{site}) at the project site location: (see Section II. Step 4 for more explanation.)

MAP_{site} = _____inches

Step 4 Identify the reference rain gage closest to the project site from the following list and record the MAP_{gage}:

MAP_{gage} = _____inches

Reference Rain Gages	**Mean Annual Precipitation (MAP_{gage}) (in)**
San Jose Airport	13.9
Palo Alto	13.7
Gilroy	18.2
Morgan Hill	19.5

Step 5 Determine the rain gage correction factor for the precipitation at the site using the information from **Step 3** and **Step 4**.

Correction Factor = MAP_{site} /MAP_{gage} = (**Step 3**)/(**Step 4**)

Correction Factor = _____

Attachment IV-1
Sizing for Flow-Based Treatment Controls

Section B—California Stormwater BMP Handbook Flow Approach (continued)

Step 6 Select the design intensity, I, for the reference gage closest to the site from the following list:

I, Design Rainfall Intensity = _____ in/hour

Gages	85th Percentile Hourly Rainfall Intensity (in/hr)	Design Rainfall Intensity (I) (in/hr)
San Jose Airport	0.087	0.17
Palo Alto	0.096	0.19
Gilroy	0.11	0.21
Morgan Hill	0.12	0.24

The design intensity is twice the 85th percentile Hourly Rainfall Intensity.

7. Determine the corrected design rainfall intensity (I) for the site:

   Design intensity (site) = Correction factor * Design rainfall intensity for closest rain gage

   Design intensity (site) = (**Step 5**) * (**Step 6**) = _____

9. Determine the design flow (Q) using the Rational Method equation:

$$Q = C*I*A$$

Q = (**Step 2**) * (**Step 7**) * (**Step 1**)

Q = _____ acres-in

Q = _____cfs[6]

[6] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) * (43,560 sq.ft/acre) * (1ft/12 in) * (1hr/3600 sec) ≈ 1 ft^3/ sec or cfs.

Attachment IV-1

Sizing for Flow-Based Treatment Controls

Section C.—Sizing Flow-Based Treatment Controls based on the Uniform Intensity Approach

This method uses the Rational Method equation:

Q=CIA

Where:

Q is the design flow in cubic feet per second (cfs),
C is the drainage area runoff coefficient,
I is the design intensity (in/hr), and
A is the drainage area for the BMP (acres)

Step 1. Determine the drainage area for the BMP, A = _____ acres

Step 2 Determine the runoff coefficient, C = _____

It is more accurate to compute an area-weighted "C-factor" based on the surfaces in the drainage area (Table 3a), if possible, than to assume a composite "C-factor" such as those in Table 3b, especially for small drainage areas.

Step 3 Use a design intensity of **0.2 in/hr** for "I" in the Q=CIA equation.

I = __0.2 in/hour__

Step 4 Determine the design flow (Q) using Q = CIA

Q = C*I*A

Q = (**Step 2**) * (0.2 in/hr) * (**Step 1**)

Q = _____ acres-in/hr

Design Flow, Q = _____cfs[7]

[7] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) * (43,560 sq.ft/acre) * (1ft/12 in) * (1hr/3600 sec) ≈ 1 ft^3/ sec or cfs.

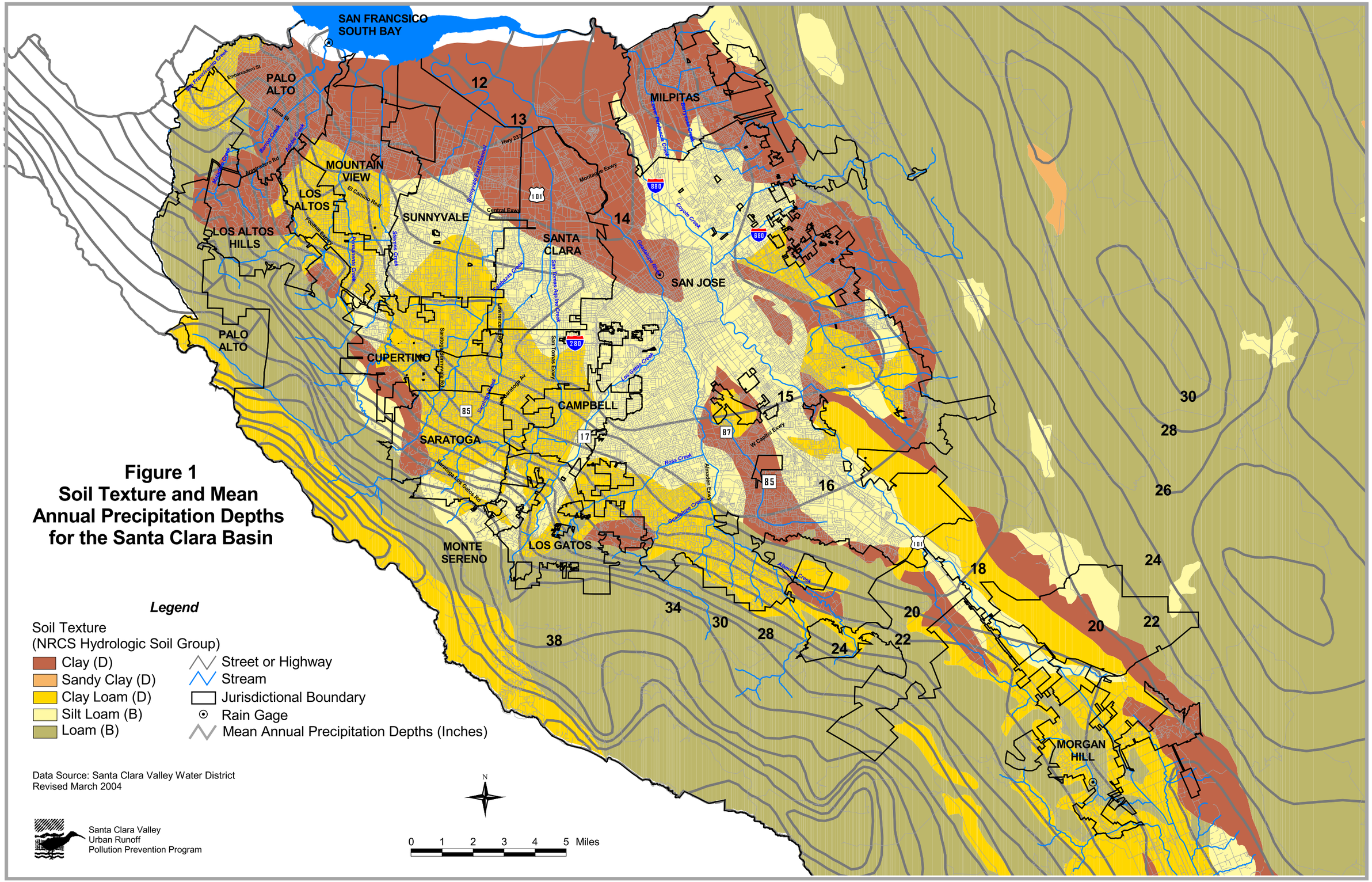


Figure 1
Soil Texture and Mean Annual Precipitation Depths for the Santa Clara Basin

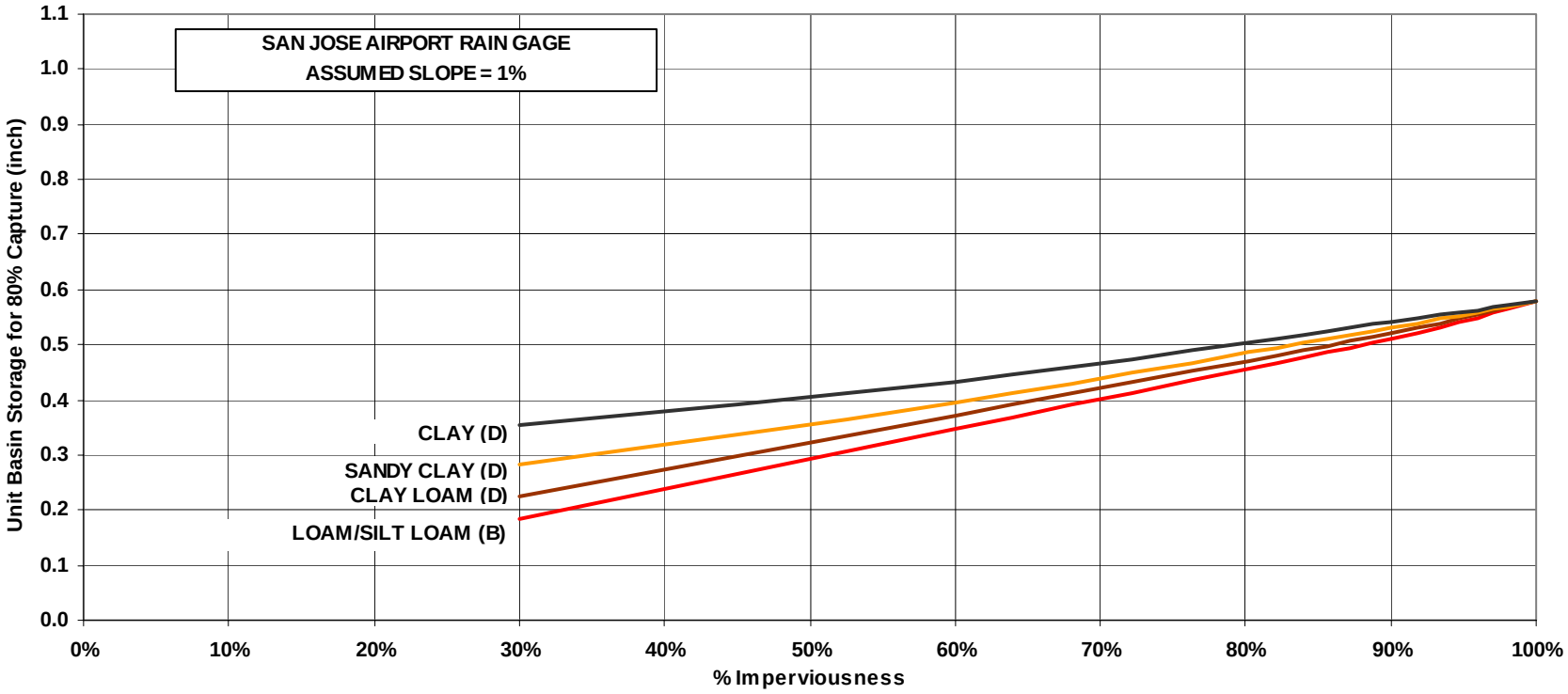


Figure 2-A Unit Basin Volume for 80% Capture - <u>San Jose Airport Rain Gage</u>

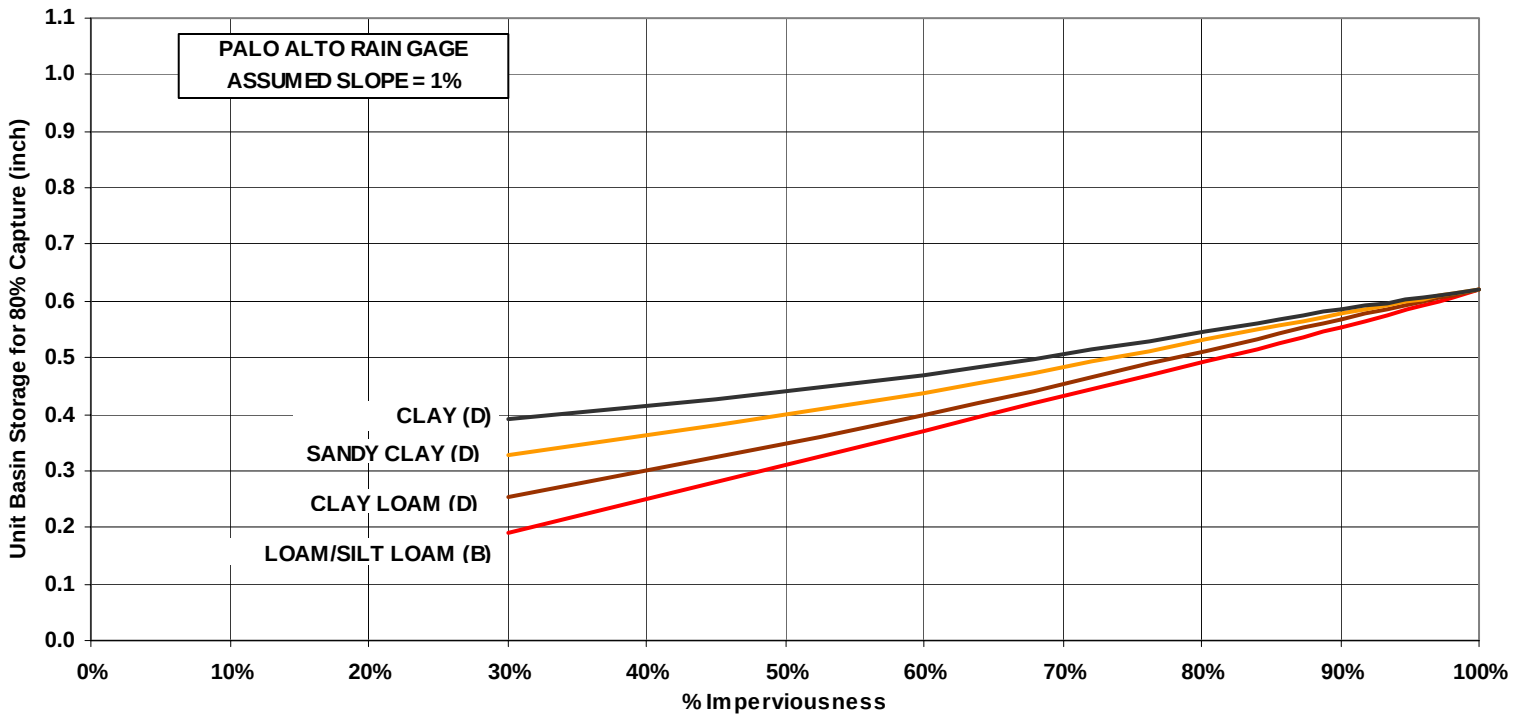


Figure 2-B Unit Basin Volume for 80% Capture - <u>Palo Alto Rain Gage</u>

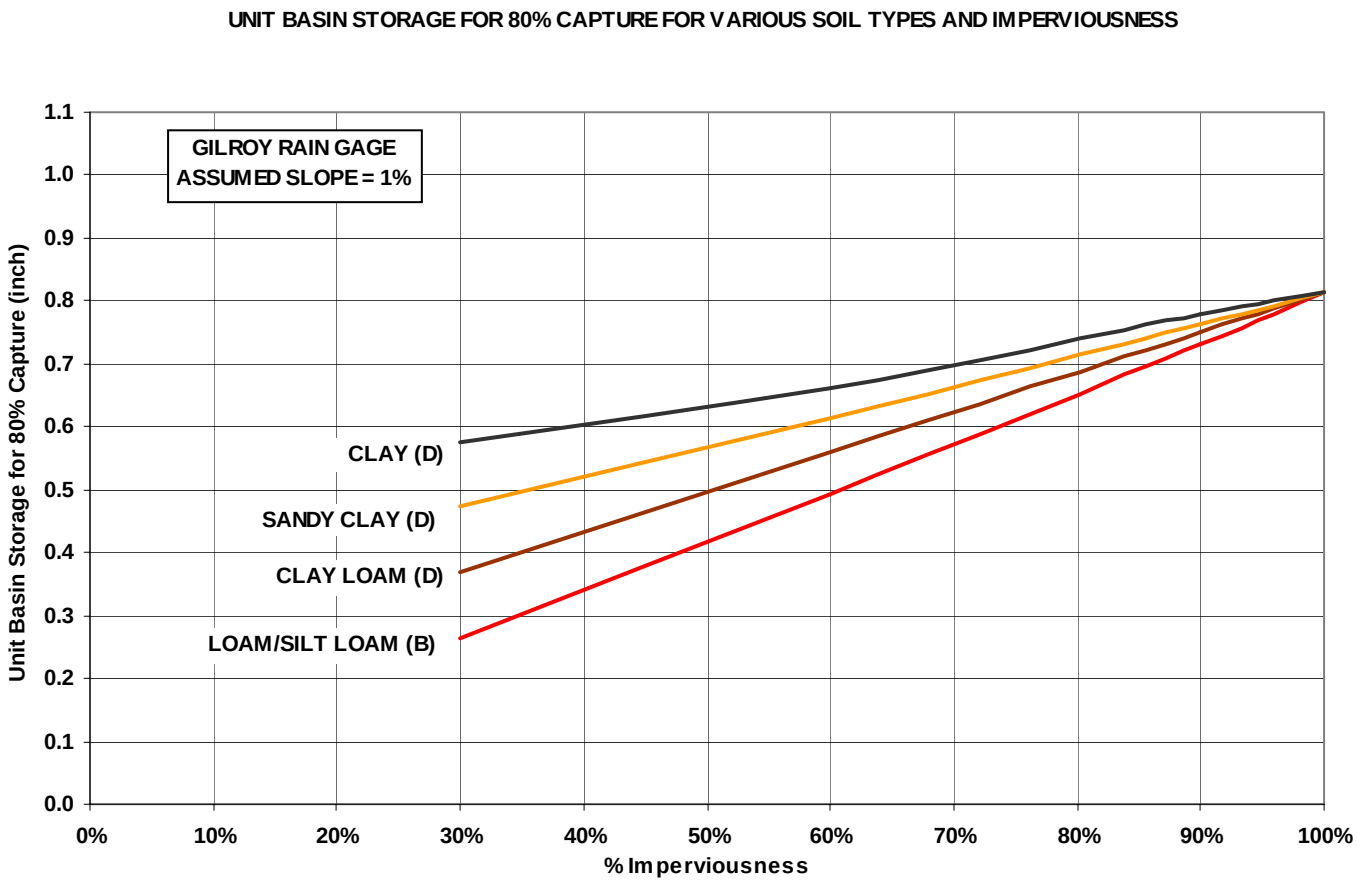


Figure 2-C Unit Basin Volume for 80% Capture - <u>Gilroy Rain Gage</u>

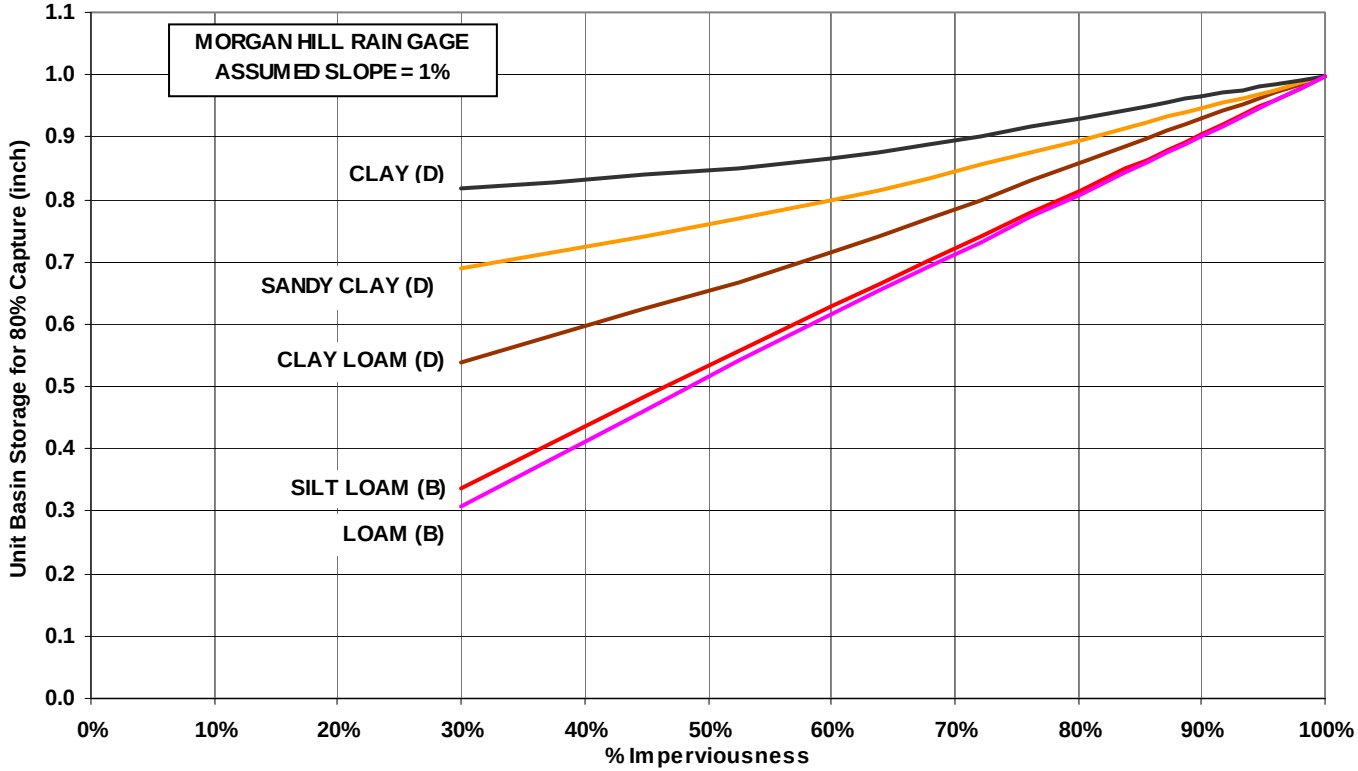


Figure 2-D Unit Basin Volume for 80% Capture - <u>Morgan Hill Rain Gage</u>

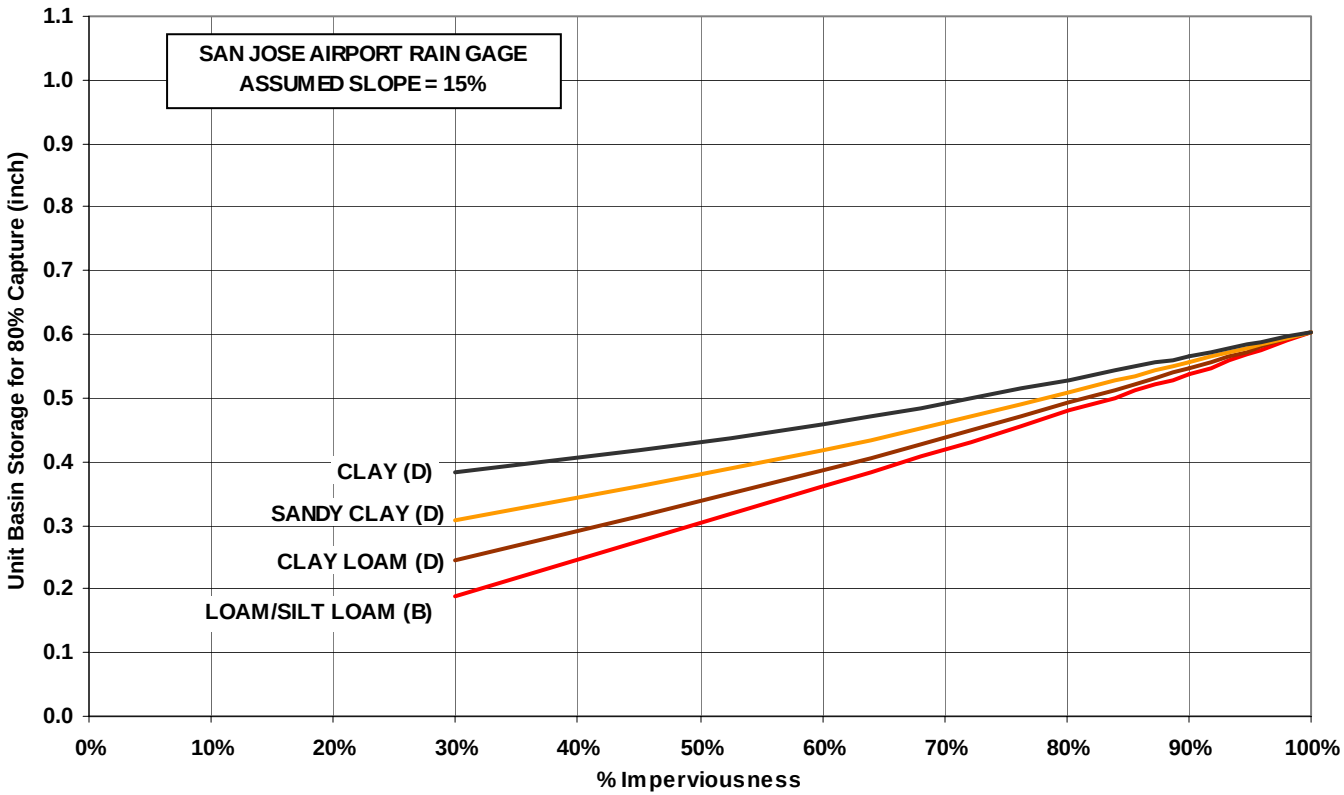


Figure 3-A Unit Basin Volume for 80% Capture - <u>San Jose Airport Rain Gage</u>

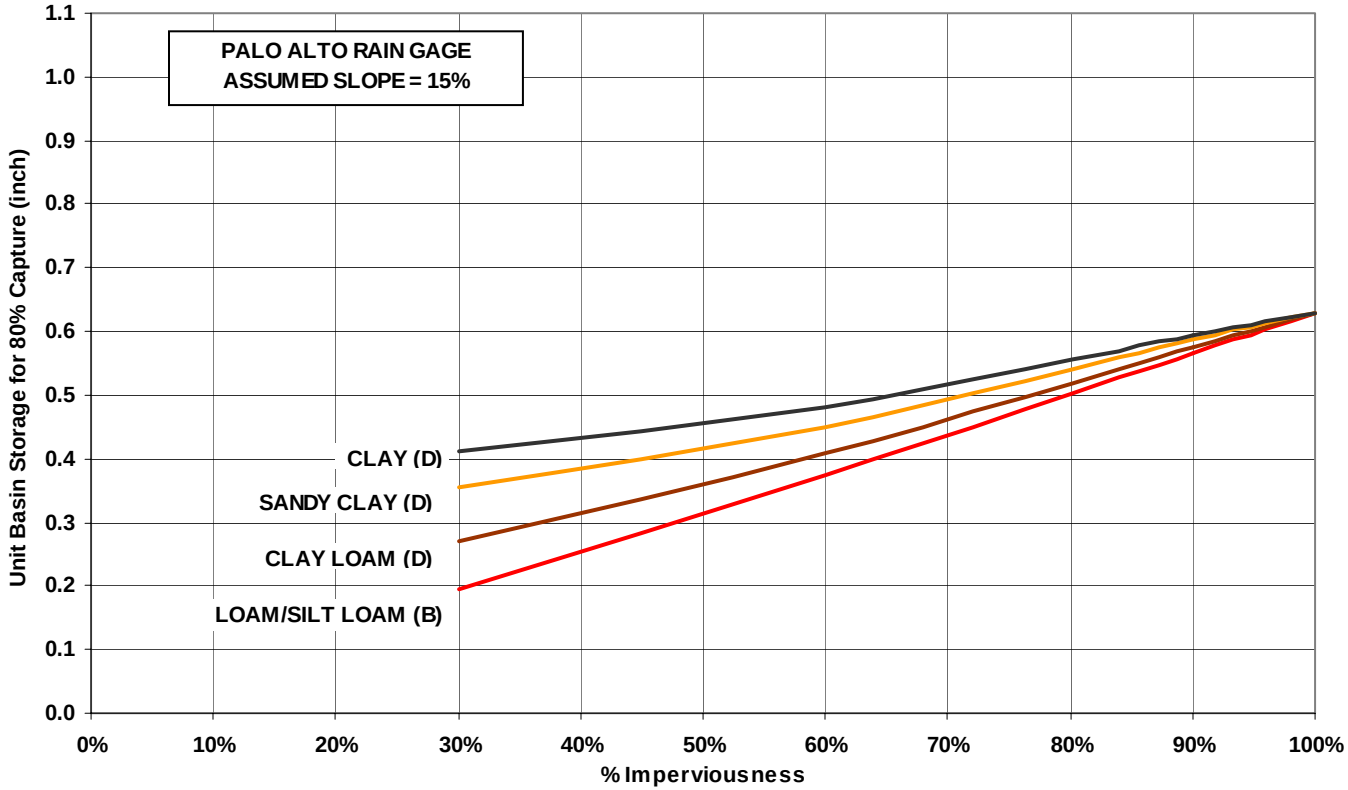


Figure 3-B Unit Basin Volume for 80% Capture - <u>Palo Alto Rain Gage</u>

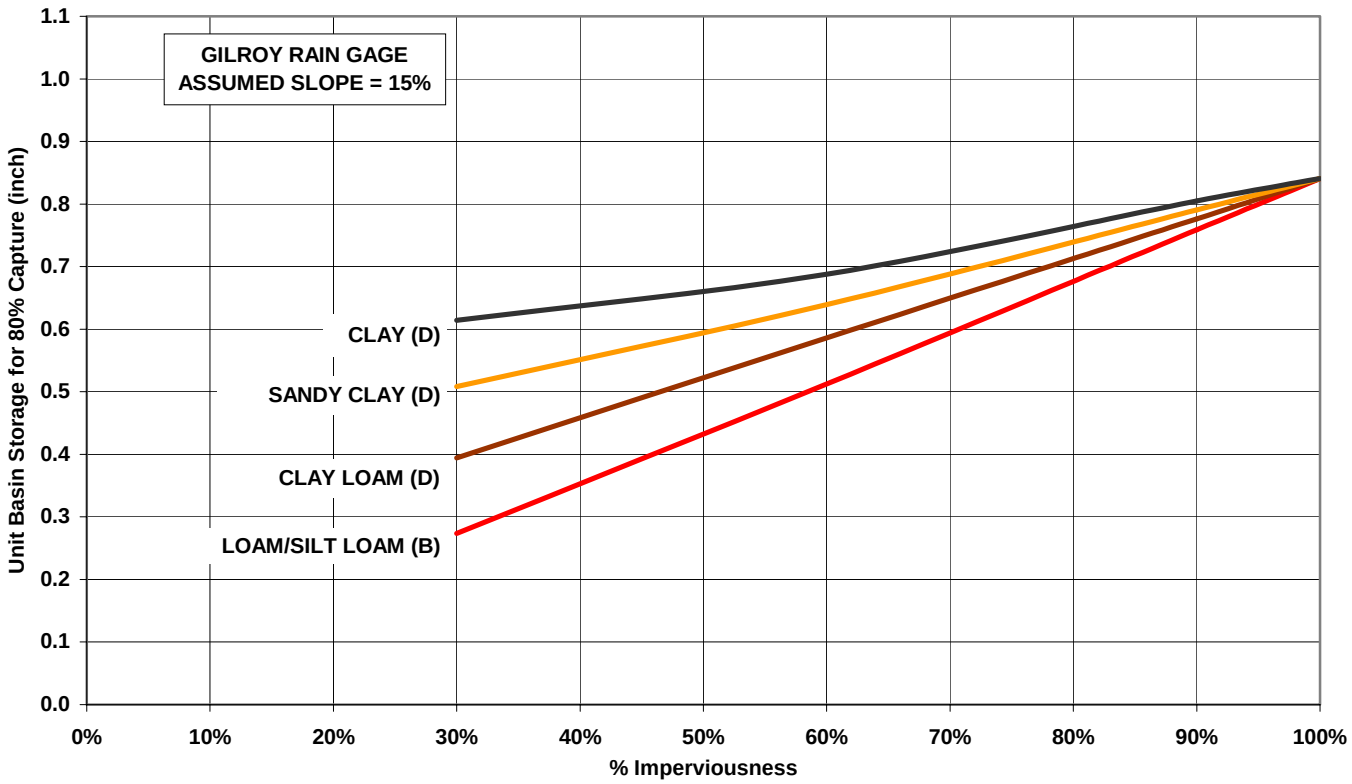


Figure 3-C Unit Basin Volume for 80% Capture - <u>Gilroy Rain Gage</u>

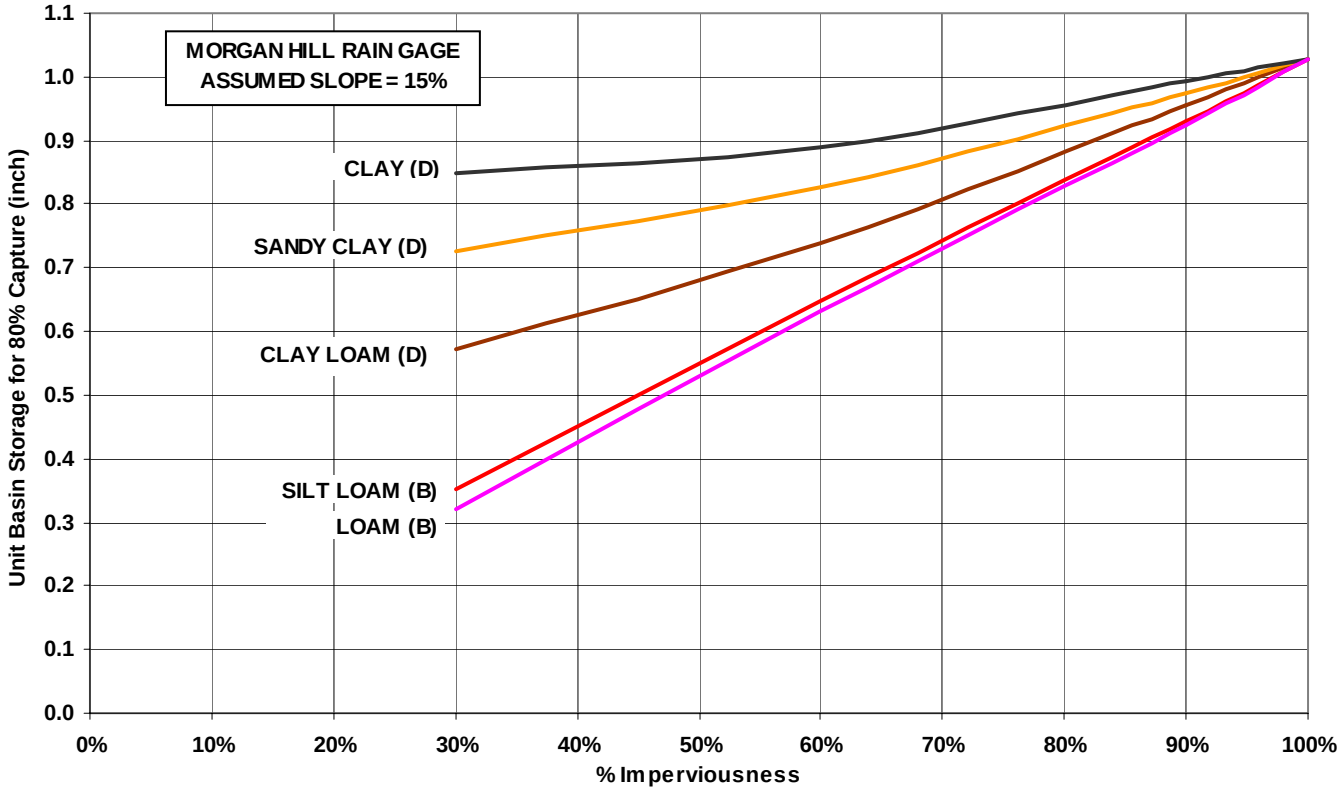


Figure 3-D Unit Basin Volume for 80% Capture - <u>Morgan Hill Rain Gage</u>

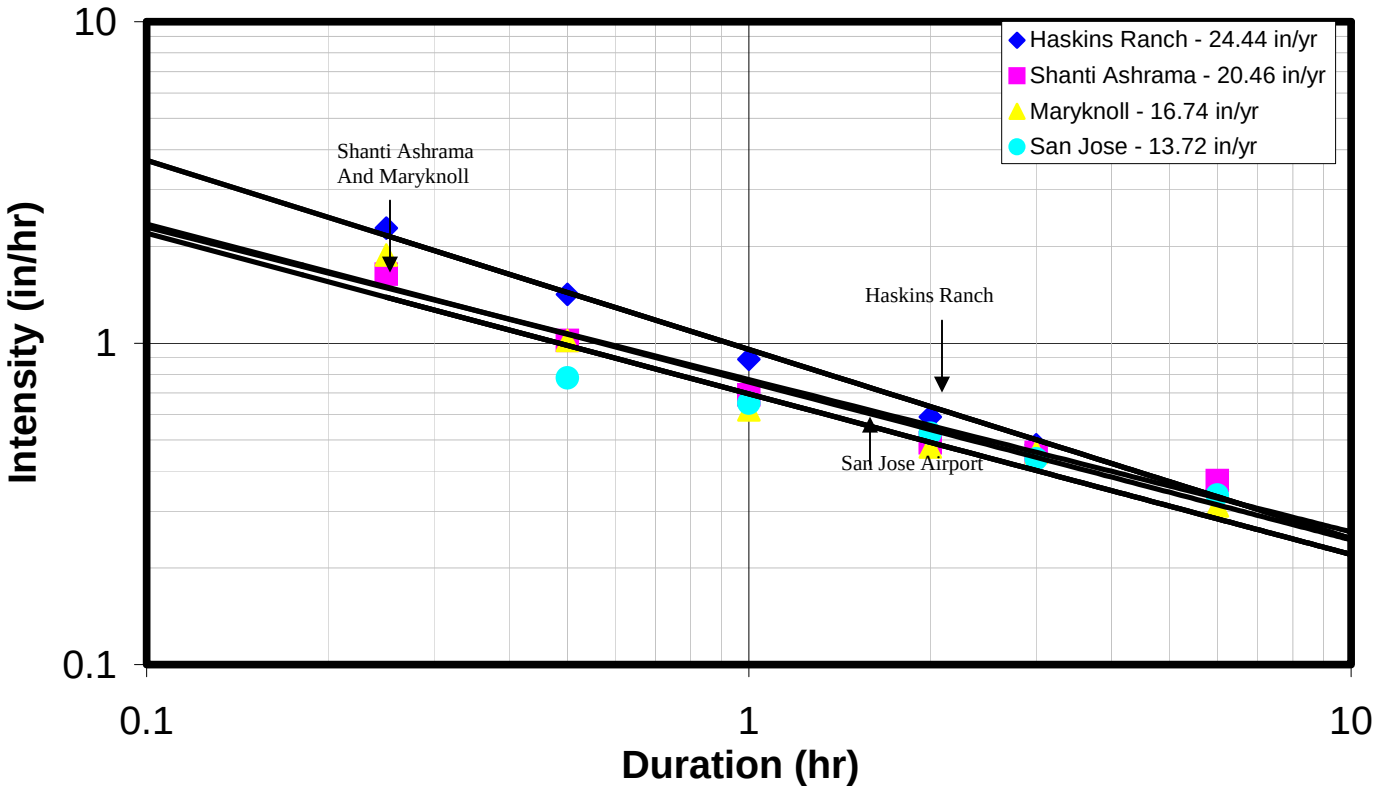


Figure 4 Intensity-Frequency-Duration Curves for a 50-Year Return Period for Haskins Ranch, Shanti Ashrama, Maryknoll, and San Jose Airport Rain Gages

ATTACHMENT IV-2

Example Completed Worksheets
Single-Family Subdivision

Attachment IV-2
Residential Example Problems
Single-Family Subdivision

The following are examples of how to size treatment controls using the Sizing Criteria Worksheets (Attachment IV-1) as well as all of the figures and tables that can be found in Chapter IV of the C.3 Handbook. These examples demonstrate the calculations for sizing possible BMPs at an actual development site, a proposed single-family subdivision in the southeast end of the City of Santa Clara. It should be noted that the examples demonstrate how to size BMPs for two different components of the project: the paved public areas of the project in this case streets and the single family homes. In this example both types are needed for the project to comply. The conditions and results for the two analyses are summarized below.

Given: 10-acre (435,600 ft^2) single-family subdivision with the following:
1-acre (43,560 ft^2) proposed city park
131,040 square feet (30%) of pavement (paved public streets)
87 residences with:
- 3,000 square feet per lot (261,000 ft^2)
- 130,500 square feet (50%) of rooftops
- 39,150 square feet (15%) of walkways (includes patio areas)
- 1% slope on-site

Example 1: Sizing for Volume-Based Controls

- Pavement (paved public streets) drain to one BMP
- Sizing for Volume-Based Controls

Example 2: Sizing for Flow-Based Controls

- Rooftop and walkway runoff for each lot drains to individual onsite BMPs
- Sizing for Flow-Based Controls

Table of Results

Example	BMP Size	Comments
1. Volume-Based	7,629 cubic feet	All public streets/sidewalks drain to one BMP
2. Flow-Based	0.0094 cfs (4.2 gal/min)	Each lot drains to individual onsite BMP

Example 1: Sizing for Volume-Based Controls

This example demonstrates use of the CA Stormwater BMP Handbook Volume Approach.

Given: 10-acre (435,600 ft^2) single-family subdivision with the following:

1-acre (43,560 ft^2) proposed city park
131,040 square feet (30%) of pavement (paved public streets)
87 residences with:
- -3,000 square feet per lot (261,000 ft^2)
- -130,500 square feet (50%) of rooftops
- -39,150 square feet (15%) of walkways (includes patio areas)

1% slope on-site

All pavement runoff drains to BMP, excluding lot areas

Task: Determine BMP volume required to effectively detain and treat stormwater runoff from pavement areas.

Step 1: Determine the drainage area for the BMP (A)

Total Drainage Area to BMP = A
= Total Area –Areas draining to individual BMPs on each lot
= 435,600 ft^2 – 261,000 ft^2 (lot area)

$\boxed{= 174{,}600\ ft^2}$

Step 2: Determine percent imperiousness of the drainage area.

a. Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP.

Total Impervious Area = Pavement Area

$\boxed{= 131{,}000\ ft^2}$

b. % impervious area = (amount of impervious area/drainage area for the BMP)*100
= (**Step 2a**/**Step 1**)*100
= (131,040 ft^2/174,600 ft^2)*100

$\boxed{= 75\%}$

Step 3: Determine from Figure 2 the mean annual precipitation (MAP) at the project site location. The subdivision is located between the isopleths with values of 14 and 15. A value of 14.9 is estimated from the figure.

$\boxed{MAP_{site} = 14.9 \text{ inches}}$

Step 4: Identify the rain gage closest to the project site from the following list:

$\boxed{\text{San Jose Airport } MAP_{gage} = 13.9 \text{ in}}$

Step 5: Determine the rain gage correction factor for the precipitation at the site using the information from **Step 3** and **Step 4**.

Correction Factor = MAP_{site} (**Step 3**)/MAP_{gage} (**Step 4**)

= 14.9 inches/13.9 inches

= 1.07

Step 6: Identify representative soil type for BMP drainage area

a. Identify from Figure 1 (Attachment IV-1) the soil type that is representative of the pervious portion of the project: (in order of increasing infiltration capability)

____ Clay ____ Sandy Clay ____Clay Loam __X__ Silt Loam ____ Loam

b. Does the site planning allow for protection of natural areas and associated vegetation and soils so that the soils outside the building footprint are not graded/compacted? No

If your answer is no, and the soil will be compacted during site preparation and grading, the soil's infiltration ability will be decreased. Consider modifying your answer to a soil with a lower infiltration rate (e.g., Silt Loam to Clay Loam or Clay).

Modified soil type: ___Clay____

Step 7: Determine the average slope for the drainage area for the BMP: __1%__

Step 8: Determine the unit basin storage volume from sizing curves.

a. Slope ≤ 1% or less

Use Figure 3-A "Unit Basin Volume for 80% Capture, 1% Slope" corresponding to the nearest rain gage in San Jose. Find the % imperviousness of the drainage area (see answer to **Step 2**, above) on the x-axis. From there, find the line corresponding to the soil type (from **Step 6**), and obtain the unit basin storage on the y-axis.

For this example, with 75% imperviousness and a clay soil type the Unit Basin Storage is.

Unit Basin Storage = 0.49 (inches)

Step 9: Size the BMP

The BMP volume is calculated by multiplying the correction factor by the unit storage volume by the drainage area.

BMP Volume = Rain Gage Correction Factor * Unit Basin Storage Volume * Drainage Area

= (**Step 5**) * (**Step 8**) * (**Step 1**)

= 1.07* 0.49 inches * 174,600 ft^2 * (1 foot/12 inches)

BMP Volume = **7,629 cubic feet**

⇒ **Volume-based BMP controls will be sized to provide 7,629 cubic feet of storage for stormwater treatment.**

Example 2: Sizing for Flow-Based Controls

This example is demonstrates use of the California Stormwater BMP Handbook Flow Approach.

Given: 10-acre (435,600 ft^2) single-family subdivision with the following:
1-acre (43,560 ft^2) proposed city park
131,040 square feet (30%) of public streets
87 residences with:
3,000 square feet per lot (261,000 ft^2)
1,500 square feet per lot (50%) of rooftops
450 square feet per lot (15%) of walkways (includes patio areas)
1% slope on-site
All runoff drains to BMPs on individual lots

Task: To determine the BMP flow required to effectively treat stormwater runoff.

Step 1. Determine the drainage area for the BMP (A)
Total Drainage Area to BMP = 3,000 ft^2 =

0.0689 acres

Step 2a: Estimate the amount of impervious surface (rooftops, hardscape, streets, and sidewalks, etc.) in the area draining to the BMP.
Total Impervious Area = Roof Area + Walkway Area
= 1,500 ft^2 + 450 ft^2

= 1,950 ft^2

Note: Although each individual lot does not exceed 43,560 ft^2 (or 1 acre); the combination of impervious area in the 87 units in the subdivision does trigger BMP requirements. In this exercise, the individual lot BMP is being sized.

Step 2b: Determine the watershed runoff coefficient, C from the Tables 5a. and 5.b. in the C.3 Handbook. From these tables, roofs and concrete were selected as the character of the impervious surfaces. A runoff coefficient of 0.75 was assumed for both surfaces (since the roof area is the majority of the impervious surface).

C = 0.75

Step 4: Determine from the figure in Attachment V-3 of the C.3 Manual the mean annual precipitation (MAP) at the project site location. The subdivision is located between the isopleths with values of 14 and 15. A value of 14.9 is estimated from the figure.

MAP_{site} = 14.9 inches

Step 5: Determine the mean annual rainfall at the gage closest to the site:

San Jose Airport MAP_{gage} = 13.9 in

Step 6: Determine the rain gage correction factor for the precipitation at the site using the information from **Step 4** and **Step 5**.

Correction Factor = MAP_{site} (**Step 4**)/MAP_{gage} (**Step 5**)

Correction Factor = 14.9 inches/13.9 inches

= 1.07

Step 7: Identify the gage closest to the site from the following list to determine I, the design intensity:

Gages	**85th Percentile Hourly Rainfall Intensity (in/hr)**	**Design Rainfall Intensity (I) (in/hr)**
San Jose Airport	0.087	**0.17**
Palo Alto	0.096	0.19
Gilroy	0.11	0.21
Morgan Hill	0.12	0.24

Step 8. Determine the corrected design rainfall intensity (I) for the site:

Design intensity (site) = Correction factor * Design rainfall intensity for closest rain gage

= (**Step 6**) * (**Step 7**)

= 1.07 * (0.17 inches/hour)

= 0.182 inches/hour

Step 9. Determine the design flow (Q) using the Rational Method equation

Q = C*I*A

Q = (**Step 3**) * (**Step 8**) * (**Step 1**)

Q = (0.75) * (0.182in/hr) * (0.0689 acres)

Q = 0.0094 cfs **(4.2 gallons per minute)**

⇒ **Flow-based BMP controls will be sized to treat a flow of 0.0094 cfs of stormwater for each lot.**

V PEAK FLOW AND VOLUME CONTROL MEASURES (HYDROMODIFICATION MANAGEMENT PLAN GUIDANCE)

V.1 INTRODUCTION

The goal of this Chapter is to provide guidance on applying HMP requirements and appropriately sizing flow duration controls to meet the requirements of Provision C.3.

Some projects may be subject to the NPDES permit's Provision C.3.f, which limits increases in runoff peak flow, duration and volume where such increases may cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses. The Program has developed a Hydromodification Management Plan (April 2005) (HMP) that delineates areas where such increases will be detrimental to channel health and water quality and proposes means of managing such situations to maintain the pre-project flow conditions after development. Projects where increased discharges present minimal potential for erosion or other impacts to beneficial uses are exempt from the requirements of the HMP.

V.2 HYDROMODIFICATION CONTROL REQUIREMENTS

Definitions

Land development adversely affects the runoff ***hydrograph*** (flow pattern) from a site by increasing the impervious area, decreasing natural vegetation, changing grading and soil compaction, and creating new drainage facilities. These development activities decrease site infiltration, increase volume, duration, and frequency of flows, and increase connectivity of runoff to creeks. Overall, these effects can cause stream channel erosion and impair beneficial uses of the stream channel. This change in runoff characteristics from a drainage area caused by changes in land use conditions is defined as ***hydromodification***.

Projects that add/replace 1 acre or more of impervious surface were formerly known as Group 1 projects. See Chapter 2, page II-2, for more information.

The hydromodification control requirements in the NPDES permit's Provision C.3.f can be summarized as follows:

- Increases in runoff peak flow, volume, and duration shall be managed for all projects that add/replace 1 acre or more of impervious surface;
- Post-project runoff shall not exceed estimated pre-project rates and durations;
- These conditions apply to areas where such increases in runoff flow or volume can cause increased erosion of creek beds and banks.

These management requirements will be implemented through the Program's *Hydromodification Management Plan* (HMP). SCVURPPP submitted the final HMP report to the Water Board in April 2005, and key provisions of the HMP Report were adopted into the Program's permit on July 20, 2005.

The Hydromodification Management Plan Final Report (April 2005) and the permit amendment adopting the key provisions of the HMP are available at www.scvurppp.org.

The HMP documents the Program's development, testing and application of a watershed assessment method to evaluate potential hydrograph changes and impacts to stream channels from proposed projects, and identify where such changes can cause increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses. The report also presents a summary of the technical analyses performed to evaluate methods of hydromodification control. The HMP is not designed to correct existing erosion problems, but to prevent worsening of creek channel erosion problems from new or redevelopment projects.

V.3 HYDROMODIFICATION CONTROL STANDARDS AND APPLICABILITY

A recommended management objective and performance criteria were developed based on the watershed assessments and technical analyses described in the HMP. These have now been adopted into the permit as part of Provision C.3.f.

Management Objective

Stormwater discharges from any non-exempt development/ redevelopment project that creates or replaces one acre or more of impervious surface[1] shall not cause an increase in the erosion potential of the receiving stream over the pre-project (existing) condition, i.e., an Erosion Potential Index[2] of up to 1.0 will be maintained for stream segments downstream of the project discharge point.

Performance Criteria

1. Projects shall meet the management objective by providing stormwater controls as needed to maintain the pre-project stream erosion potential. Stormwater controls may include a combination of on-site, off-site (drainage area) and in-stream measures.
2. On-site controls that are designed to provide flow duration control to the pre-project condition are considered to meet the erosion potential management objective and comply with the HMP.

[1] The HMP will continue to apply only to projects that create/replace one acre or more of impervious surface until such time as this size threshold is changed through such mechanisms as a region-wide permit, a blanket permit amendment for all Bay Area Permittees, or through reissuance of the SCVURPPP permit accomplished in a consistent fashion with the other Bay Area Permittees.

[2] The Erosion Potential Index is explained in detail in the HMP Report, Chapter 3, Section 3.3. For most HMP applications, project applicants and Co-permittee staff will not need to compute this index if on-site flow controls are provided.

3. Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations from 10% of the pre-project 2-year peak flow (Qc) up to the pre-project 10-year peak flow.

Definitions

Flow duration means the number of times (or hours) that a certain runoff or stream flow rate occurs over a long period of time. A graph of flow rates versus the number of times they occur is called a ***flow duration curve***.

Critical Flow, Qc, is defined as the stream flow that produces the critical shear stress that initiates bed movement or that erodes the toe of stream banks.

4. Where on-site measures are not practicable for achieving flow duration control criteria, projects shall comply with the HMP requirements through the use of appropriate site design, source control, and treatment control measures with flow control benefits to the maximum extent practicable. In addition, where available, off-site and/or in-stream controls must be used to meet the management objective.

5. Projects located on sites less than or equal to 20 acres in size that are not part of a larger phased development ("Small Site Project") shall comply with the HMP requirements through the use of appropriate site design, source control, and treatment control measures with flow control benefits to the maximum extent practicable. In addition, where available, off-site and/or in-stream controls must be used to meet the management objective.

6. Off-site (drainage area) or in-stream controls may be implemented to address potential project impacts in lieu of or in combination with on-site controls, where an approved plan, including an appropriate funding mechanism, is in place that accounts for the stream changes expected to result from changes in project runoff conditions. The off-site or in-stream controls or combination of controls shall be designed to achieve the hydromodification management objective from the point of discharge to the stream as far downstream as potential impacts will occur.

Exempt Areas and Projects

HMP applicability maps for the Santa Clara Valley and selected individual cities are available at www.scvurppp.org.

A flow chart for determining whether HMP requirements apply to a particular development project is presented in Attachment V-1. Figure V-1 presents a Santa Clara Valley map with classification of subwatershed areas for determining applicability of HMP requirements. The applicant should refer to the local municipality for a more detailed applicability map and policy guidance. The following table presents the areas that are identified and shaded on the map with the corresponding HMP applicability.

Subwatershed Colors	HMP Applicability
purple	Catchments draining to exempt channels[1]: HMP not required
red	Subwatersheds greater than or equal to 65% impervious and greater than or equal to 90% built out: HMP encouraged but not required
yellow	Subwatersheds less than 65% impervious and greater than or equal to 90% built out: HMP required on projects over 50 acres and encouraged on other projects
green	Subwatersheds less than 90% built out: HMP required

[1]Exempt channels include those that are tidally influenced, continuously hardened, Sunnyvale East Channel, Sunnyvale West Channel or underground storm drain discharging directly to the Bay.

The total project area should be used to determine if HMP requirements apply when reviewing the flow chart in Attachment V-1 or Figure V-1. However, if a project site straddles two different subwatershed characterizations (e.g., green and yellow) the separate drainage areas in each subwatershed are used to determine the change in impervious surface and whether full HMP requirements apply to that drainage area. For example, say the total area of a project is 25 acres but a 10-acre drainage area is in the green subwatershed and 15 acres is in the yellow subwatershed according to Figure V-1. The 10-acre drainage area in the green subwatershed would need to meet full HMP requirements. The 15 acres in the yellow subwatershed would be encouraged to implement flow control BMPs to the maximum extent practicable.

Figure V-1 provides guidance on HMP requirement exemptions based on project location and the condition of the stream segment to which the project ultimately discharges. The following provides guidelines that Co-permittees can use to identify project characteristics that may cause a project to be exempt from hydromodification controls (e.g., project size, or the project will cause no increase in the potential for erosion or other impact to beneficial uses):

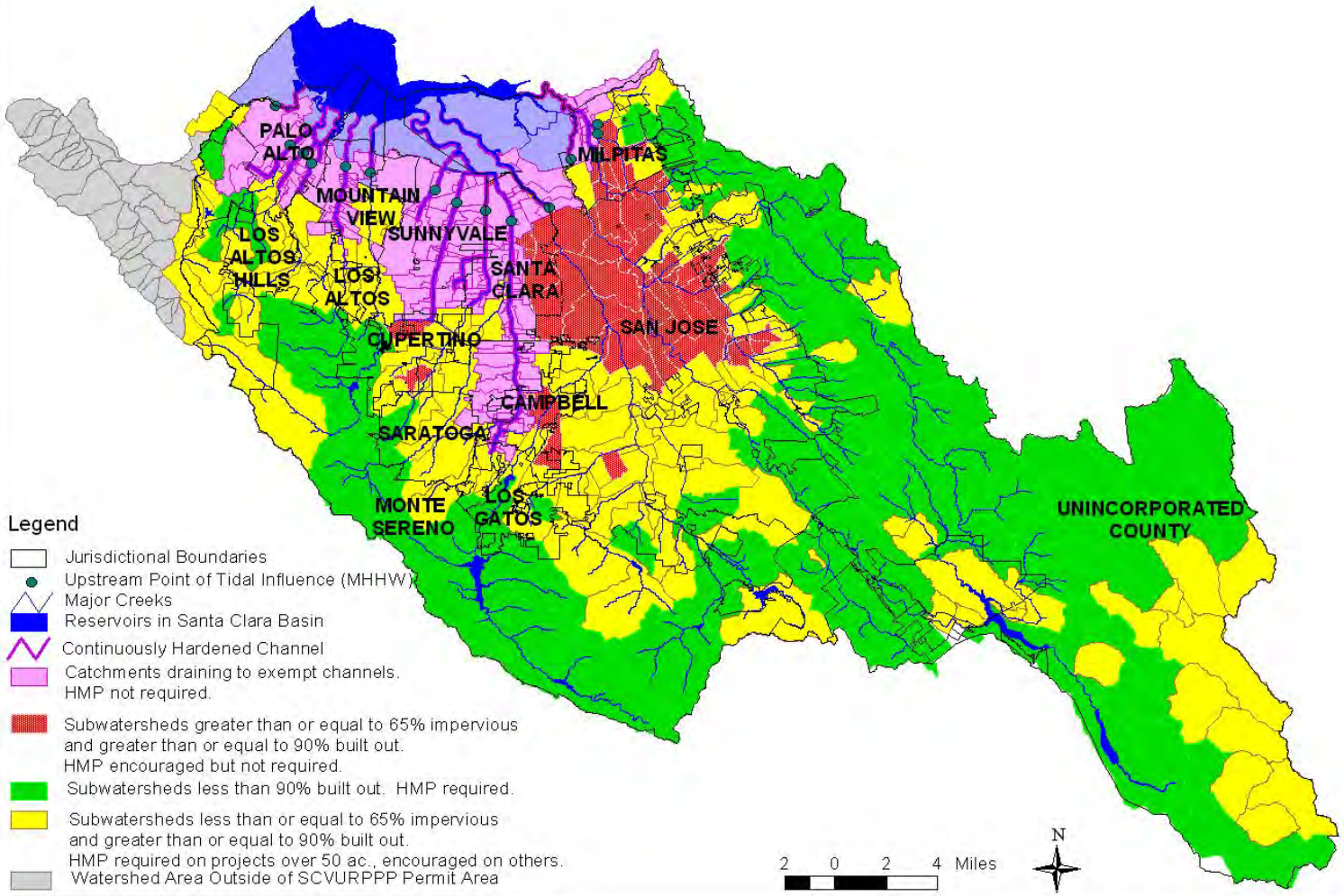
a. A project does not increase the amount of impervious area on the site and does not significantly change the drainage pattern from the site.

b. A project can show that even though the impervious surface area has increased, actual runoff will be less because permeability of the remaining area will be enhanced by the project and there is less directly connected impervious surface.

c. A project proponent conducts stream-specific field and modeling studies that are consistent with the method used in the HMP to estimate the impacts of a particular project and demonstrates there will be no increase in potential for erosion or other adverse impact to beneficial uses.

d. A project creates or replaces less than 1 acre of impervious surface or consists of a single family dwelling on a single lot.

Figure V-1. Classification of Subwatershed and Catchment Areas For Determining Applicability of HMP Requirements



V.4 SELECTION OF HYDROMODIFICATION CONTROL MEASURES

Hydromodification controls are measures designed to meet the management objective and performance criteria presented above and can be classified into the following categories:

- Onsite controls (e.g., site design, treatment and flow control measures);
- Offsite or regional controls (e.g., detention/retention basins, bypass pipelines, and large scale facilities to serve more than one development project);
- In-stream controls (e.g., grade control structures to reduce channel slope, terraces, bypass channels, and bank stabilization and re-vegetation).

Selection Process

The following three-step process is recommended for selecting hydromodification control measures:

Step 1: Select Appropriate Site Design Measures**:** Various site planning concepts can be used to help minimize quantities of runoff from the site. A list of site design techniques is provided in Chapter III of this handbook.

Step 2: Select Treatment Control Measures to Help Reduce the Volume and/or Rate of Runoff**:** After selecting appropriate site design measures, the second step in the selection process is to utilize treatment controls that also provide flow reduction benefits. All Provision C.3. new development and significant redevelopment projects that create or replace 1 acre or more of impervious surface require stormwater treatment measures. Chapter III lists treatment controls that may be appropriate for conditions in Santa Clara Valley and considerations for their selection. In many cases, this selection process results in more than one candidate treatment control. For projects that must comply with the HMP, an effort should be made to select those treatment controls that also help reduce hydromodification effects. For example, treatment measures utilizing retention and infiltration (e.g., bioretention facility) can reduce runoff volumes and extended detention basins can provide flow rate control.

The Bay Area Hydrology Model (BAHM), discussed below in Section V.5, will have the capability of determining the reduction in flow from treatment measures and the resulting reduction in size or number of flow control measures needed for the site. A qualitative comparison of the treatment controls listed in Table III.1 can be done to determine how effective (low, medium, high) they are at reducing flow for HMP requirements. The *Category A: BMPs defined as Infiltration Devices* would have the highest rating. *Category B: BMPs not defined as Infiltration Devices because they treat stormwater prior to infiltration into the subsurface* includes all landscape measures that utilize infiltration through surface soils. Therefore, Category B would have a medium rating since infiltration, while not the primary treatment mechanism, still occurs. The last category, *Category C: BMPs that discharge treated stormwater directly to the storm drain system*, would have the lowest qualitative rating for reducing flow and subsequently reducing HMP requirements.

Step 3: Select Additional or Modify Measures to Meet Hydromodification Standard: If site design and treatment measures are insufficient to mitigate hydromodification impacts of the development project, additional flow control(s) will be required. Such controls could be similar to the treatment controls considered above, but would need to be increased in the size or capacity, and the outlet structure modified to manage the discharge to meet the hydromodification standard for flow duration control.

Due to the cost of land, limited available space on project sites, and the limited infiltration capacity of soils in Santa Clara Valley, a combination of on-site, off-site, and/or in-stream measures may need to be considered to meet HMP requirements. Options are as follows:

On-site Controls. In addition to the site design and treatment measures described above, options for on-site flow duration controls include above-ground detention basins, underground vaults or detention structures, or modifications to treatment measures to achieve the proper flow control.

Off-site Controls. The most likely scenario for off-site controls would be the use of a regional flow control facility that would serve the needs of multiple developments. Such a facility would require the coordination of multiple projects in close proximity. At the present time, there are no plans for such facilities to be constructed by public agencies.

In-stream Controls. The likely scenario for in-stream controls is one in which development project proponents contribute to the funding of an in-stream project constructed by the Water District. In order to implement in-stream controls, a District project needs to be identified which can address the impacts of the proposed development, given information about the increase in impervious surface and the discharge point of the project. In addition, a mechanism to collect funds from a development project proponent and a methodology to determine a development project's contribution based on its proportionate impact to the receiving stream must be in place. Work toward developing these funding elements is currently underway.

V.5 DESIGN OF FLOW DURATION CONTROLS

General Approach

For a details on the design of flow duration control facilities, refer to Attachment V-2 and the HMP Report and technical appendices.

On-site controls designed to provide flow duration control to the pre-project condition are considered to comply with the HMP. The flow duration control approach involves: 1) simulating the runoff from the project site, pre- and post-project, using a hydrologic model with a continuous rainfall record; 2) generating flow-duration curves from the results; and 3) designing a flow control facility such that when the post-project time series of runoff is routed through the facility, the discharge pattern matches the pre-project flow-duration curve. Facilities that are designed to match the pre-project hydrograph for a single design storm event do not effectively protect the receiving stream from the increased durations of runoff flows from multiple small storm events. See

Attachment V-2 for a detailed discussion of designing flow control facilities and generating flow-duration curves.

Hydrologic Modeling

There are several hydrologic models available as public domain software that can be used to simulate pre- and post-project hydrology. These include the Army Corps of Engineers' Hydrologic Engineering Center Hydrologic Modeling System (HEC-HMS), Environmental Protection Agency's Hydrologic Simulation Program-Fortran (HSPF), and EPA's Stormwater Management Model (SWMM). These models are complex and require specialized expertise in order to apply them properly.

A list of consulting firms qualified to use continuous simulation models and design flow control facilities is available on the Program's website www.scvurppp.org.

The Program, in cooperation with the Alameda and San Mateo County stormwater programs, is funding the development of an automated modeling and flow control facility sizing tool for use in Santa Clara Valley and other parts of the Bay Area. The Bay Area Hydrology Model (BAHM) will make it easy for project proponents to design, and municipal staff to review, flow control facilities in the Bay Area. The BAHM is expected to be completed in Fall 2006, and training opportunities and a users manual will be provided to municipal staff and the development community.

V.6 REVIEW AND APPROVAL OF HYDROMODIFICATION CONTROLS

Local Development Review Process

Section II of this handbook describes the changes to Co-permittees' development project review processes that are necessary to address the requirements of Provision C.3. Attachment II-2, *Incorporating Provision C.3 Requirements into the Development Review Process Flow Chart*, includes consideration of HMP requirements as part of the review process. In general, hydromodification controls should be considered at the same times in the process that site design and treatment measures are considered. Not only does this ensure that the requirements are met during the review process, but it provides the opportunity to consider the combined flow control benefit of all of the BMPs selected.

It is desirable to consider hydromodification controls as early in the project planning stages as possible. One of the first steps is to determine whether the project falls under the C.3 requirements at all and then whether the HMP requirements apply to the project. The flow chart in Attachment II-3 can be used to determine C.3 applicability and the flow chart in Attachment V-1 can be used to determine HMP applicability.

Evaluation Process

The following is a guideline for evaluating the impacts of and requirements for a development project.

1. Determine the potential applicability of the HMP requirements to the proposed project, using the flow chart in Attachment V-1 and the exemption map in Figure V-1 as a guide.

2. If the project is not exempt from HMP requirements, it has the potential to cause hydromodification impacts on the receiving stream and must use the performance criteria to determine how it will meet the management objective. The next step is to identify the performance criteria applicable to the project.

   a. Consider whether the project is a "Small Site Project" (less than or equal to 20 acres in size). If so, then this project must meet Performance Criteria 4 and 5, and Criterion 3 may also apply. The project will comply with the HMP through the use of site design and treatment control measures with flow control "benefits", i.e. measures that accomplish some reduction in runoff volume. The project owner/developer will also be required to contribute funding to an off-site or in-stream project to mitigate any additional flows that are not controlled with the on-site measures, <u>if such off-site or in-stream projects are available and a funding mechanism and methodology for determining developer contributions are in place</u>. If this option is not available, a Small Site Project may implement site design, source control, and treatment control BMPs with flow control benefits to the maximum extent practicable (MEP). The cost of these BMPs may be taken into account when determining what is the MEP (see discussion under #3 below).

      Guidance on selection and design of site design, source control, and treatment BMPs is provided in Chapters III and IV and the CASQA BMP Handbooks. Appropriate BMPs for flow control on Small Site Projects include small scale, distributed stormwater management techniques such as bioretention facilities, infiltration trenches, filter strips, vegetated swales, and detention in landscape areas. When selecting and sizing site design measures and treatment BMPs to comply with the HMP, the objectives are to: 1) reduce runoff volume through the reduction of impervious surface and providing opportunities for infiltration; and 2) increase the time of concentration of runoff to approximate that of the pre-project condition. Time of concentration can be increased by lengthening flow paths and allowing impervious areas to flow onto pervious areas. The goal is to match pre- and post-project runoff volume and time of concentration of runoff on the site to the MEP.

Definitions

→ ***Time of concentration*** is defined as the length of time required for runoff to travel from the most remote point in the drainage area to the point of interest, say a storm drain inlet or receiving water.

   b. Other non-exempt projects will be required to meet Performance Criteria 1, 2, 3, and 5. These projects are required to perform a more detailed analysis to compare pre-project and post-project runoff patterns for the project site. When available, the BAHM can be used to design flow control facilities. Before the BAHM is available, or to design alternative flow control measures, the following steps must be taken. Flow duration curves illustrating the distribution of flows resulting from a continuous

rainfall record will need to be generated for the pre- and post-project conditions. This is accomplished using a continuous simulation hydrology model or a sizing tool based on a continuous simulation model. These or similar tools will then be used to design flow control BMPs, such as a flow duration basin, that produce a discharge pattern that matches the pre-development flow duration curve. A detailed description of the process for sizing a flow duration basin is provided in Attachment V-2.

3. After a project has gone through the analyses described in Step 2 above, the next step for the developer is to incorporate the flow control BMPs into the project design.

   Meeting the flow duration control criteria generally requires some type of detention and/or infiltration facilities that reduce the volume and control the rate of post-project discharge. These types of facilities may not be suitable for the project site due to space limitations, soil conditions, depth to groundwater, and other factors, and in some cases, these limitations cannot be overcome at a reasonable cost.

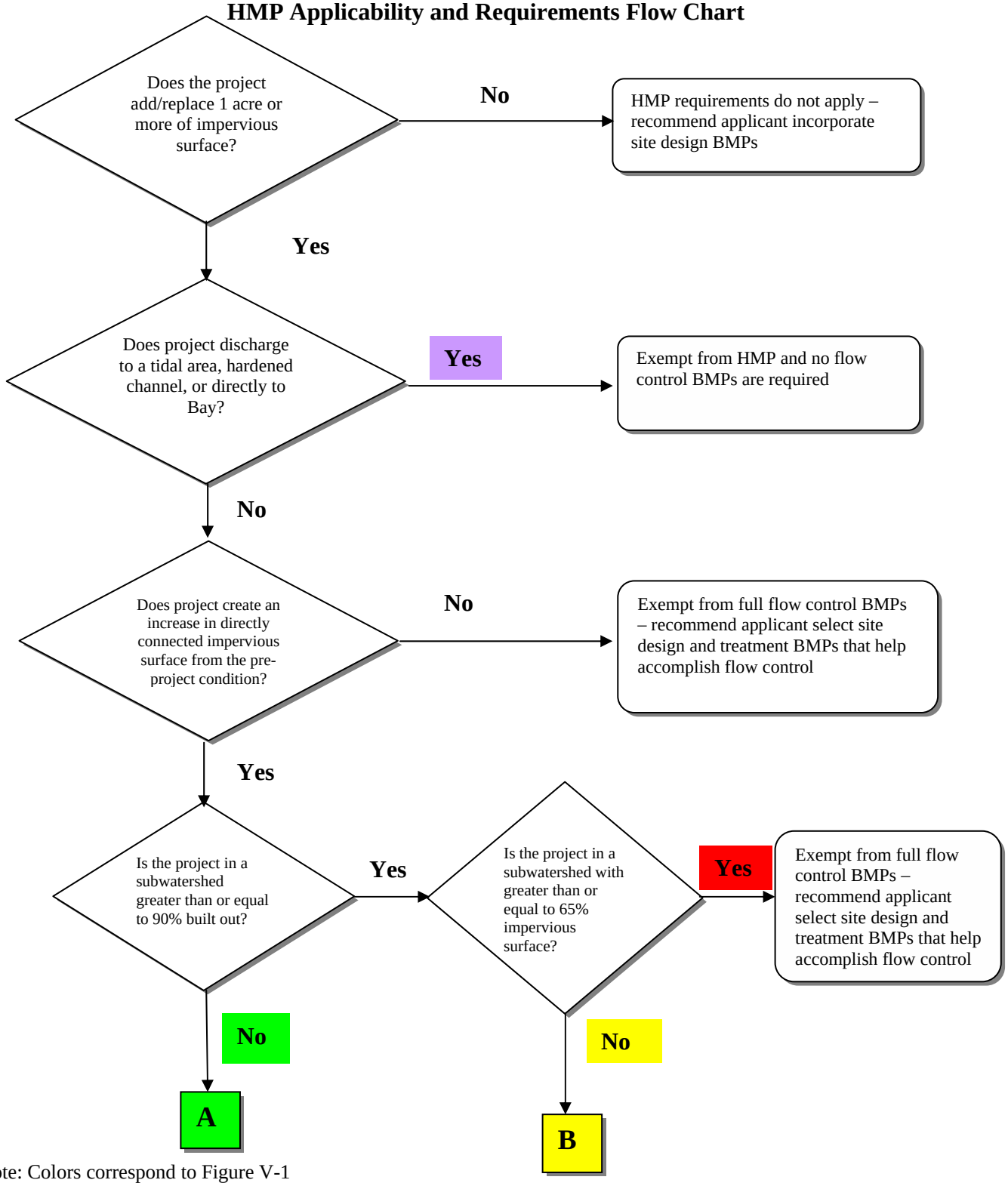
   In this case, it is recommended that the developer be required to submit a report demonstrating the impracticability of flow control BMPs with the plan for stormwater controls on the project site. The report should provide the reasons for impracticability, the relevant site data, and cost estimates performed according to the guidance in this Handbook. The District and appropriate Co-permittee will then determine whether an in-stream project and appropriate funding mechanism, as well as any additional funding required, to mitigate the additional flows. If an in-stream project, funding mechanism, and additional funding are available, the developer is required to contribute funding to these additional measures to fully meet the management objective. If not, a project for which flow duration control is impracticable must use site design, source control, and/or treatment BMPs to achieve performance criteria to the maximum extent practicable.

   Full implementation of the HMP will be considered impracticable if the combined construction cost of both required stormwater treatment and flow control measures exceeds 2% of the project construction cost (excluding land costs). If a developer demonstrates that the cost to fully comply with the HMP and other C.3 treatment requirements will exceed this cost threshold, a determination may be made by the reviewing agency that the project may implement HMP controls on-site to the MEP and contribute to an in-stream project if available. Guidance on estimating treatment and HMP control measure costs for application of the 2% “cost cap” criterion is provided in Attachment V-3.

ATTACHMENT V-1

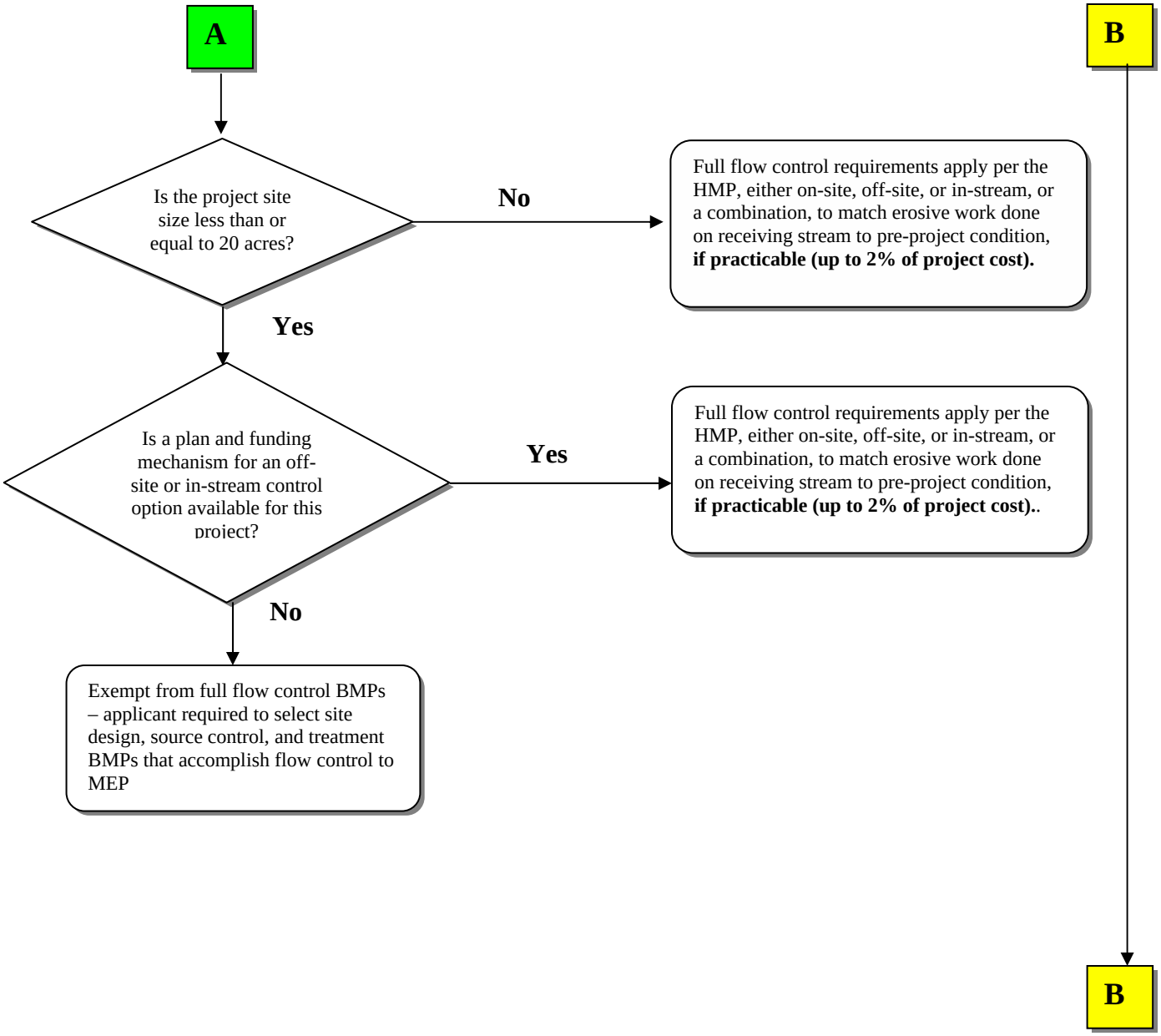
HMP Applicability and Requirements Flow Chart

Attachment V-1
HMP Applicability and Requirements Flow Chart



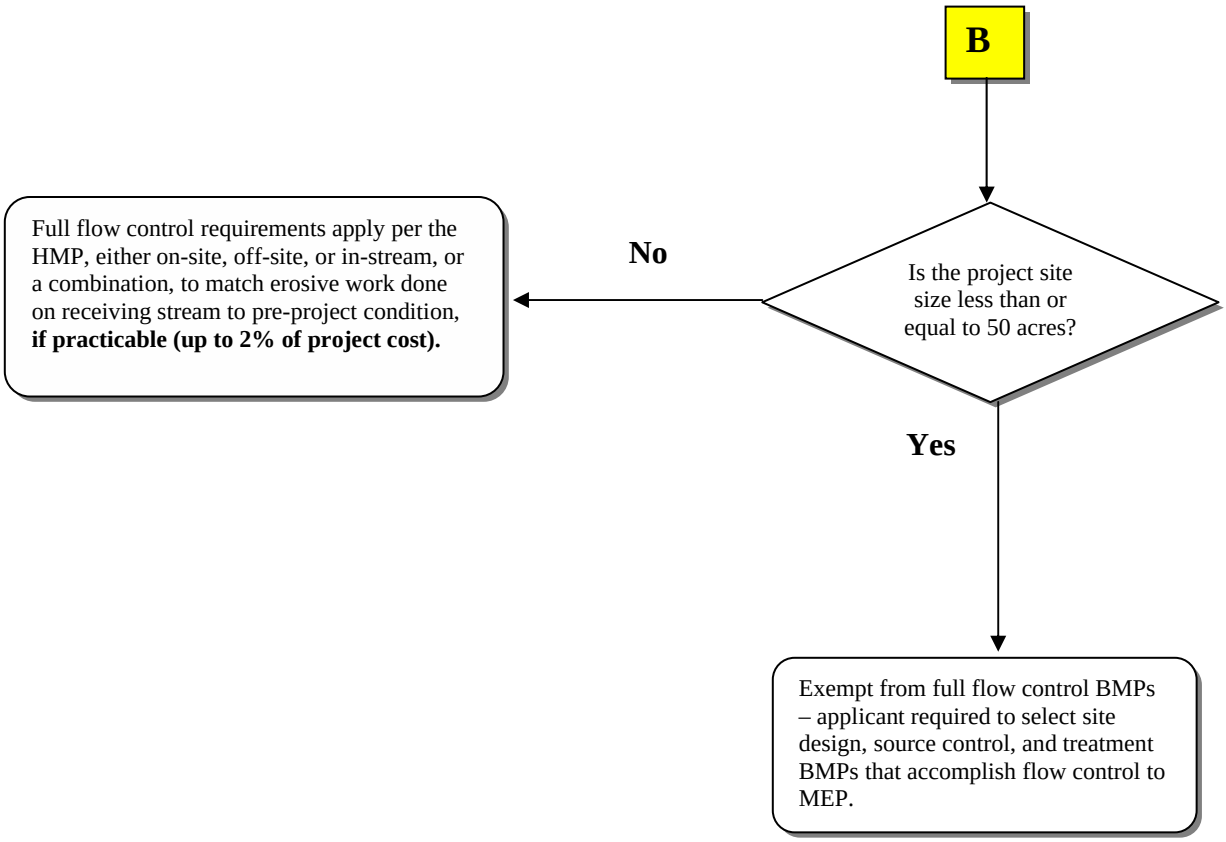
Note: Colors correspond to Figure V-1

Attachment V-1 (Cont'd)
HMP Applicability and Requirements Flow Chart



Note: Colors correspond to Figure V-1

Attachment V-1 (Cont'd)
HMP Applicability and Requirements Flow Chart



Note: Colors correspond to Figure V-1

ATTACHMENT V-2

Introduction to Flow Duration Basin Design
and
Flow Duration Basin Design Guidance Technical Memorandum

Attachment V-2
Introduction to Flow Duration Basin Design

This introduction to flow duration basin design is excerpted from a technical memorandum entitled "Flow Duration Basin Design Guidance" (GeoSyntec Consultants and EOA, Inc., March 2005). The technical memorandum is included in its entirety following this introductory section, on page 5, and is also available in Appendix F of the Hydromodification Management Plan – Final Report (April 2005) available at www.scvurppp.org. The following is a brief overview of the flow duration basin design approach for meeting HMP requirements[1].

On-site controls designed to provide flow duration control to the pre-project condition are considered to comply with the HMP. The flow duration control approach involves: 1) simulating the runoff from the project site, pre- and post-project, using a continuous rainfall record; 2) generating flow-duration curves from the results; and 3) designing a flow control facility such that when the post-project time series of runoff is routed through the facility, the discharge pattern matches the pre-project flow-duration curve. See the following section on hydrologic models for a discussion on generating flow-duration curves.

The flow control facility is a detention basin that diverts and retains a certain portion of the runoff. The portion to be retained is essentially the increase in surface runoff volume created between the pre-project and post-project condition. This captured increase in volume must be discharged to the ground via infiltration (and/or evapotranspiration if vegetation present) from the basin, released at a very low rate to the receiving stream (at the critical flow for basin design, Qcp, or 10% of the pre-project 2-year storm), and/or diverted to a safe discharge location or other infiltration site, if feasible.

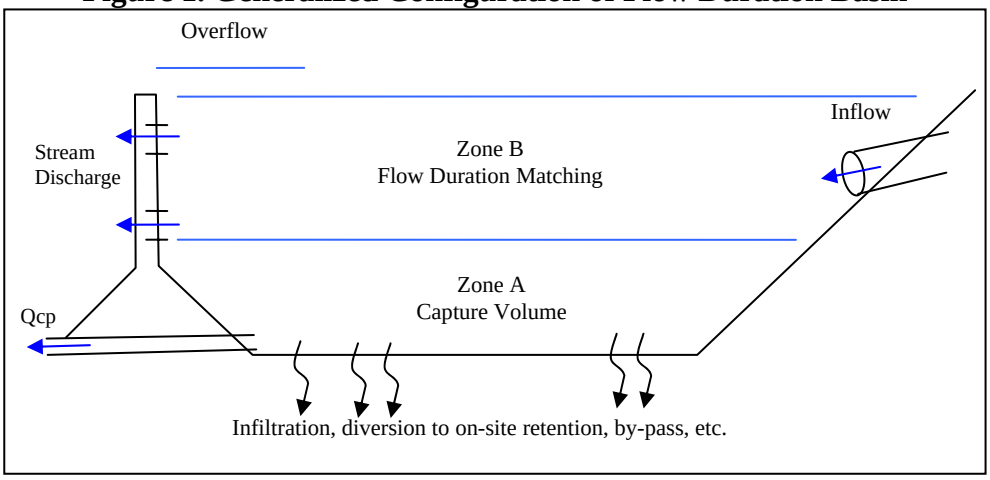
As shown in Figure 1, the flow duration basin is designed to have two pools, a low flow pool (Zone A) and a high flow pool (Zone B). The low flow pool is designed to capture the difference in volume of runoff between the pre- and post-project conditions. It will also capture small to moderate size storms, the initial portions of larger storms, and dry weather flows. The high flow pool is designed to store and release higher flows to maintain, to the extent possible, the pre-project runoff conditions. The flow duration basin can also serve as a water quality treatment facility and can be designed to treat dry and wet weather flows using a combination of extended detention and natural treatment processes. Most dry weather "nuisance flows" will also infiltrate in the basin depending on the infiltration rate.

The flow duration basin is sized using an iterative process of adjusting basin storage as well as selecting and adjusting orifice sizes in the outlet structure. The low flow pool within the basin is initially sized to capture the increase in runoff volume that is generated from the development project. This capture volume is dependent on the development characteristics, the soil types, and the magnitude of increase in impervious surfaces. The post-project runoff calculations should take into account planned stormwater treatment measures that may detain or infiltrate runoff. Project proponents should see local municipality guidance for standard design criteria and

[1] The Bay Area Hydrology Model (BAHM) and User Manual are expected to be available by late 2006. Project proponents and municipal staff may choose to use the BAHM to design and/or review flow control facilities. The basic design approach described here is utilized in the BAHM.

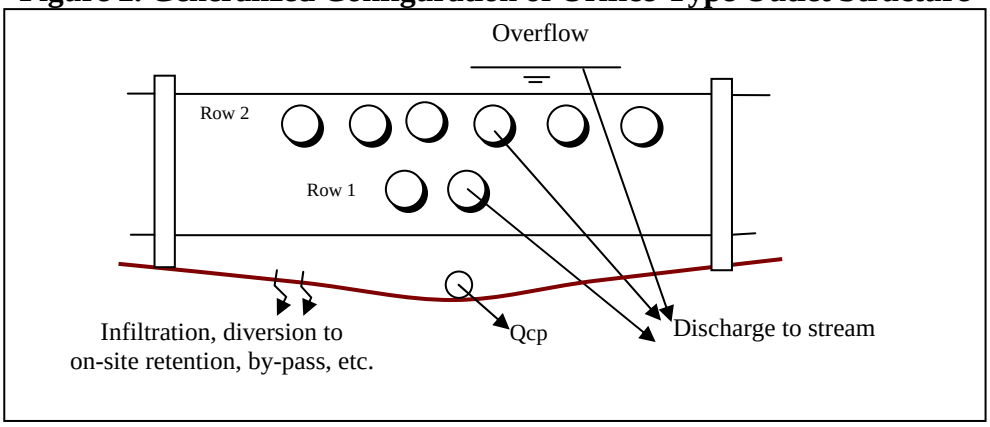
policies (e.g. municipality may encourage basins with at least a 4:1 side slope integrated into the landscape rather than a deeper basin).

Figure 1. Generalized Configuration of Flow Duration Basin



Once the lower pool is sized to capture the correct volume of runoff, the upper pool of the basin is sized to detain and discharge larger flows through an outlet structure in such a way as to reproduce the flow duration curve (hydrograph). Figure 2 illustrates an outlet structure consisting of a series of orifices at set elevations above the basin bottom. The number, diameter, and elevation of these orifices are determined by a trial and error approach (King County, 1998). The number, size and placement will vary from basin to basin depending on project conditions. The combination of sizing the lower portion of the basin and the upper portion to detain and discharge high flows has the affect of capturing the correct volume of runoff and matching the pre-project distribution of hourly flows. A weir and orifice combination could also be designed to accomplish the same level of control. A detailed description of the process for sizing a flow duration basin is provided in the technical memorandum.

Figure 2. Generalized Configuration of Orifice-Type Outlet Structure



The hydromodification control standards were applied to several case studies in the HMP. From these examples several conclusions were drawn.

- The flow duration basin sizing approach can be applied to development sites of different sizes and land use types. The area required for flow duration basins seems to be between 2 to 7 percent of the contributing catchment area, depending on the infiltration capacity of the soil and the basin depth. Where projects have good soil infiltration rates and utilize low-impact development strategies, less land area may be required (1.5 to 2 percent).
- Basin size can be reduced by applying volume reduction or low impact design strategies. For example, disconnecting impervious area such as roof drains and discharging runoff to landscaping, swales and/or infiltration trenches reduces the difference in volume between pre- and post-project runoff that need to be controlled in the basin.
- Qcp should be incorporated in every basin design but its relative impact on basin sizing is dependent on project size and soil infiltration rates. The Qcp rates for small basins may require small orifice diameters as small as 2 inches.

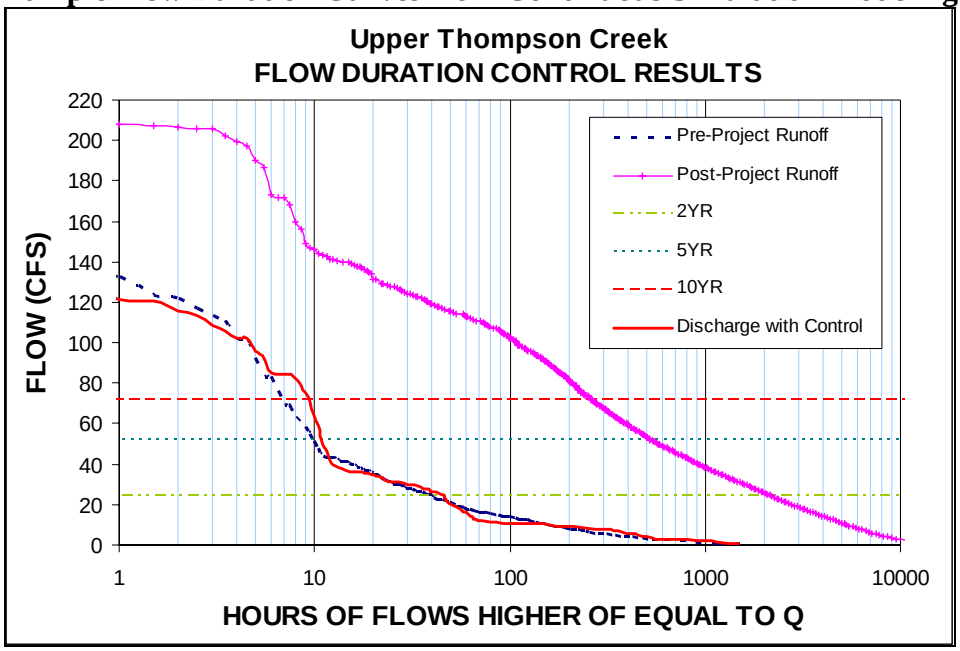
Hydrologic Models

The first two steps in designing a flow control facility are simulating the runoff from the project site, pre- and post-project, using a continuous rainfall record and generating flow-duration curves (see Figure 3 for example flow duration curves from continuous simulation modeling). Both of these steps are done using a hydrologic model. The HMP concluded that hydromodification controls designed for a discrete or design storm event do not provide adequate protection of the erosion potential of streams. The recommended method for hydromodification control is to maintain the pre-project flow duration curve via a flow duration control structure.

There are several hydrologic models available as public domain software that can be used[2]. The Program[3] is funding the adaptation of an automated modeling and flow control facility sizing tool[4] for use in Santa Clara Valley and other parts of the Bay Area. The Bay Area Hydrology Model (BAHM) will help developers design, and municipal staff review, detention facilities in the Bay Area.

[2]: Army Corps of Engineers' Hydrologic Engineering Center Hydrologic Modeling System, Environmental Protection Agency's (EPA's)Hydrologic Simulation Program-Fortran, and EPA's Stormwater Management Model.
[3] Funding is in cooperation with the Alameda County and San Mateo County municipal stormwater programs.
[4] The Western Washington Hydrology Model.

Figure 3. Example Flow Duration Curves from Continuous Simulation Modeling



Flow Duration Basin Design Guidance

Prepared by GeoSyntec Consultants and EOA, Inc.

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Table F-1 Resulting Flow Duration Basin Characteristics

INTRODUCTION

The flow duration (FD) basin design process is essentially an iterative process where the designer selects basin storage volumes and outlet configurations and compares the resulting discharge flow duration curve to the pre-project results. Guidelines on selecting the initial estimates are provided, as well as guidance for adjusting storage and outlet configurations. The affects of increasing or decreasing orifice diameter, invert elevation (weir elevation), and number (length); and basin storage are summarized.

DESCRIPTION OF THE FLOW DURATION BASIN

The flow duration control approach involves: 1) simulating the runoff from the project site, pre- and post-project, using a continuous rainfall record (50 years of record in this case); 2) generating flow-duration curves from the results; and 3) designing a flow control facility such that when the post-project time series of runoff is routed through the facility, the discharge pattern matches the pre-project flow-duration curve. The flow control facility is a detention basin that diverts and retains a certain portion of the runoff. The portion to be retained is essentially the increase in surface runoff volume created between the pre-project and post-project condition. This captured increase in volume is typically discharged to the ground via infiltration (and/or evapotranspiration if vegetation is present) in the basin, released at a very low rate to the receiving stream (at the critical flow for basin design, Qcp, or 10% of the “pre-project” 2-year storm), and/or diverted to a safe discharge location or other infiltration site, if feasible. For the

examples presented here, the captured runoff is assumed to be infiltrated in the basin and discharged at Qcp (see next section for computation of Qcp).

The flow duration basin is designed to have two pools (Figure F-1), a low flow pool (Zone A) and a high flow pool (Zone B). The low flow pool is designed to capture small to moderate size storms, the initial portions of larger storms, and dry weather flows. The high flow pool is designed to store and release higher flows to maintain, to the extent possible, the pre-project runoff conditions. The flow duration basin can also serve as a water quality treatment facility and can be designed to treat dry and wet weather flows using a combination of extended detention and natural treatment processes. Most dry weather "nuisance flows" will also infiltrate in the basin.

The flow duration basin is sized using an iterative process of adjusting basin storage as well as selecting and adjusting orifice sizes in the outlet structure. The low flow pool within the basin is initially sized to capture the increase in runoff volume that is generated from the impervious surfaces. This capture volume is dependent on the development characteristics, the soil types, and the magnitude of change in runoff created by the proposed development. Previous analyses have shown that area requirements have less to do with the range of storms selected for management and more to do with site and development characteristics.

Once the lower pool is sized to capture the correct volume of runoff, the upper pool of the basin is sized to detain and discharge larger flows through a specific set of orifices in such a way as to reproduce the flow duration curve. The number, diameter, and elevation of these orifices are determined by a trial and error approach (King County, 1998). The combination of sizing the lower portion of the basin and the upper portion to detain and discharge high flows has the affect of capturing the correct volume of runoff and matching the pre-project distribution of hourly flows.

The outlet structure is designed to reproduce the pre-developed flow duration (runoff histogram) using orifice diameter and elevation above the bottom of the basin. Figure F-2 illustrates the outlet structure. The number, size and placement will vary from basin to basin depending on project conditions. The headwall could be constructed using steel plates in a manner that allows owner/operators to easily change the outlet configuration to improve basin performance if necessary.

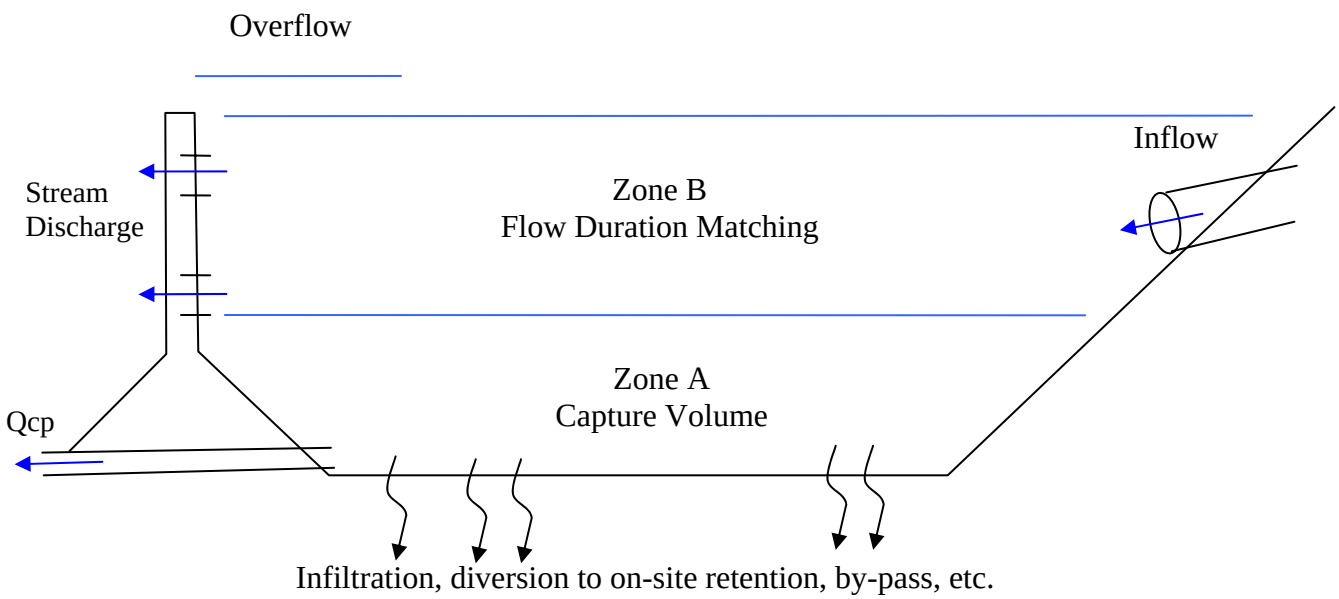


Figure F-1. Generalized Configuration of Flow Duration Basin

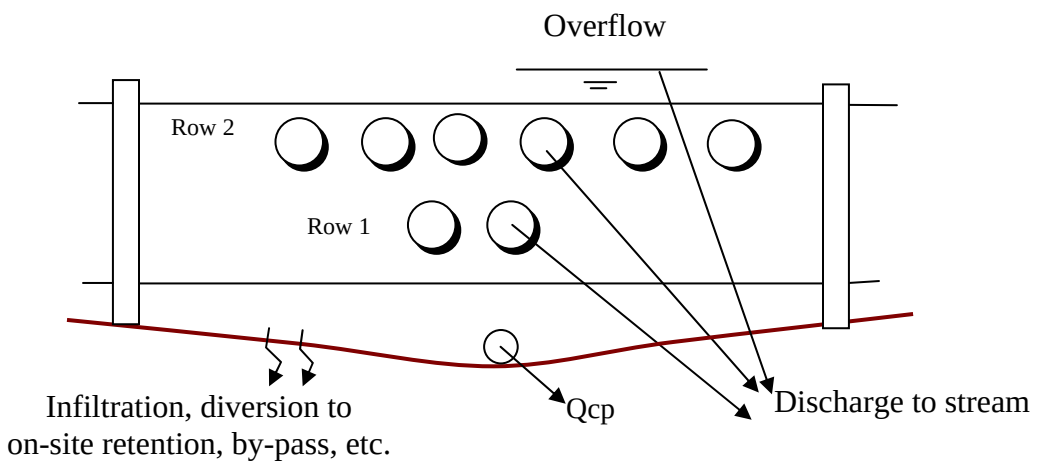


Figure F-2. Generalized Configuration of Orifice-Type Outlet Structure

DETERMINATION OF ALLOWABLE LOW FLOW DISCHARGE, QCP

The critical flow of a stream (Qc) is defined as the flow that produces the critical shear stress that initiates bed movement or erodes the toe of stream banks. A goal of hydromodification management is to control the discharge of the increased flow and volume created by development to below Qc, to minimize the potential for increased erosion. In order for the critical flow to be useful to dischargers in design of on-site hydromodification control structures, the critical flow in the stream must be partitioned or related to an on-site project-based variable. For this purpose, the in-stream critical flow was related to the pre-urban 2-year peak flow in the stream. Based on the hydrologic studies of Thompson and Ross Creeks (Chapter 3 of the HMP Report), the critical flow was generalized as being approximately 10% of the 2-year peak flow under undeveloped land use conditions.

Using this relationship, the allowable low flow discharge from a flow control structure on a project site, Qcp, can be calculated as 10% of the pre-project 2-year peak flow from the site. In computing Qcp, the original condition of the site before development must be considered. This does not imply that the developer is being required to provide flow controls to match pre-development conditions; rather, it is a means of apportioning the critical flow in a stream to individual projects that discharge to that stream, such that cumulative discharges do not exceed the critical flow in the stream.

Qcp can be computed using any standard engineering method for calculating the peak flow for a 2-year return period storm event. These include the Rational Method, synthetic design storm hydrograph approaches, and continuous simulation model records. In the Rational Method, the equation Q = CiA is used, where discharge (Q) is a function of the drainage area (A), rainfall intensity (i), and a runoff coefficient (C). The rainfall intensity can be obtained from local agency intensity-duration-frequency curves, using an estimated time of concentration for the undeveloped site. The runoff coefficient should also be selected to represent the undeveloped site and can be found in a number of standard engineering references.

As an example, the allowable low flow discharge for the San Jose Small Site Example (see Chapter 6 of the HMP Report and Technical Memorandum #8) was calculated using the Rational Method. The project drainage area (A) for the small site example is equal to 3.6 acres. The runoff coefficient (C) selected for this analysis is equal to 0.36, and is based on the undeveloped, pre-urban condition of the project site. Using a time of concentration of roughly 6 minutes for the undeveloped project site, the rainfall intensity (i) for the 2-year event was determined from Figure 6 of the County of Santa Clara Drainage Manual (March 1966) to equal 1.5 inches/hour. Therefore, the 2-year design discharge for the undeveloped project site is equal to:

$Q_{2\text{-yr}} = CiA = (0.36 * 1.5 * 3.6) = 1.94$ cfs

and

10% of $Q_{2\text{-yr}} = 0.19$ cfs

Therefore, the design Qcp for the flow-duration-basin sizing analysis of the small site example is equal to 0.19 cfs.

PROCEDURES FOR SIZING A FLOW DURATION BASIN

1. Data file preparation
   a. Need long-term (~25-50 years) stormwater runoff records for pre- and post-development conditions. These are generated using hydrologic programs, such as HEC-HMS, SWMM, and HSPF. Input to these programs is a long-term precipitation record (generally in hours although 15 minute data could be used), project area and development information, and soils information, to produce a long-term continuous runoff record.

2. Compute Pre- and Post- Flow Duration Curves
   a. For each of the runoff records, develop a histogram[5] and cumulative frequency distribution of the hourly runoff values. Use the post-project record to select histogram flow range and bin (interval) increments. Use consistent increments for the pre-project flow histogram and the post-project with control measures in place histogram.
   b. When generating the cumulative frequency distribution it is preferable to begin the count with the largest flow bin proceeding downwards to the smallest value. <u>The cumulative frequency distribution is the flow duration curve</u>.

3. Select Initial Estimates for Basin
   a. Area: set the starting area at ~2% to 7% of the catchment area. FD basins in catchments with clay soils are about 2%, while basin collecting runoff from sandy soils can be up to 7%. This seems to be a reasonable starting point.
   b. Depth: range from 2 to 10 feet. The storage of the basin will be determined from the iterative analysis; however, local jurisdictions may have limitations on depth of a basin. Shallow depths may be preferred for multi-purpose facilities.

4. Select Initial Estimate for Outlet Structure
   a. Start with ONLY a bottom orifice, which is sized to discharge at a maximum rate equal to the critical flow rate (Qcp = 10% of pre-project 2-year peak flow) when the basin is full. The volume of the initial FD basin can be approximated by routing post-project flows through this basin with the bottom orifice and weir overflow, and then comparing the total number of hours of the resulting FD curve at Qcp to the pre-project curve at this flow magnitude. Adjust the volume of the initial FD basin so that these curves match in total number of flow hours at Qcp. Increasing the basin storage volume moves the FD curve to the left. Decreasing storage volume moves the curve to the right.
   b. After adjusting the basin storage volume, then add one orifice at ¾ of the effective depth of the basin. Set the orifice diameter at 6 inches. The lowest orifice corresponds to the lowest arc of the flow duration curve.
   c. After adjusting the basin storage volume and adding the first orifice, then add a second orifice at ⅞ of the effective depth of the basin. The combined first and second orifice

[5] A histogram is a graphical representation of the frequency distribution of a series of data. The histogram provides a visual impression of the shape of the distribution as well as the amount of scatter. A histogram is developed by dividing the range of values in the data set into equal intervals. The procedure is to count the number of data points that fall into each interval, thereby determining the frequency of occurrence of flows with similar magnitudes for each interval.

corresponds to the second arc of the flow duration curve, and represents the combined flows.

d. Increasing the lower orifice diameter will adjust the slope and curvature of the lowest arc of the flow duration curve. Increasing orifice diameter increases the range of flow magnitude that can be discharged through this orifice, which shifts the arc upwards. Decreasing orifice diameter reduces the lowest arc.
e. Increasing or decreasing orifice elevation shifts the transition point between arcs along the FD curve. Increasing the elevation moves the transition point left and upwards, while decreasing the elevation moves the point right and downwards.
f. Increasing storage volume also helps match the curve in the upper high flow range. In most cases, the facility can be sized so that a small amount of overflow occurs during infrequent large flows.
g. Refinements should be made in small increments and performing one change at a time. It is best to begin with sizing the storage volume and then adjusting the number/size of the lowest orifice to match the lowest part of the FD curve first. Then proceed upwards by adding and adjusting the next highest orifice discharges to match the remaining portion of the FD curve.

5. The range of discharge capacity should approximately match the range of pre-project discharge.
   a. Orifice diameters should be selected such that the range of flows, given the range of hydraulic head on the orifice, approximates the range of flows discharging from the site under pre-project conditions.

6. Stage-Discharge Relationship
   a. The stage-discharge relationship is defined by the sum of all the outflows from the basin: 1) discharge by infiltration through the wetted bottom of the basin; 2) discharge through a small orifice discharging at the critical flow rate (Qcp); and 3) discharge through the outlet structure designed to match the pre-project flow duration curve.

TEST FOR GOODNESS-OF-FIT

Matching flow duration curves is the preferred method of hydromodification management to protect the beneficial uses of streams. The question addressed in this section is, how close do these curves need to match?

Figure F-3 shows the flow duration curves for the small 12-lot subdivision in San Jose described in Section 5.3 of the HMP Report. This figure includes the pre-project, post-project, and post-project with BMP flow duration curves. Based on this figure, the post-project with BMP curve closely matches the pre-project curve for small frequent flows up to 1.5 cfs, than deviates for less frequent high flows. Visually this looks like a pretty good match. However, the HMP needs a consistent and accurate means to measure the difference and limit deviations above the pre-project conditions.

According to the Western Washington flow duration basin sizing guidelines (Washington Department of Ecology, 2000), the post-project curve cannot exceed the pre-project curve by more than 10%, over no more than 10% of the length of the curve. Deviations less than the pre-

project condition are allowed and unlimited[6]. Basins designed with large over control will require larger land areas.

Figure F-4 plots the difference between the pre- and post- cumulative volume, which is simply the magnitude of flow for each bin in the histogram times the frequency of that bin, and then summed. Flows less than Qcp are not included. The difference is plotted as a percent of the cumulative pre-project volume. The figure shows, or expresses, the definition of the goodness-of-fit in terms of runoff volume. The cumulative post-project runoff volume cannot exceed the cumulative pre-project volume by more than 10%, over no more than 10% of the length of the curve. Also, the total cumulative runoff volume over the full histogram cannot exceed the pre-project condition.

Figure F-3

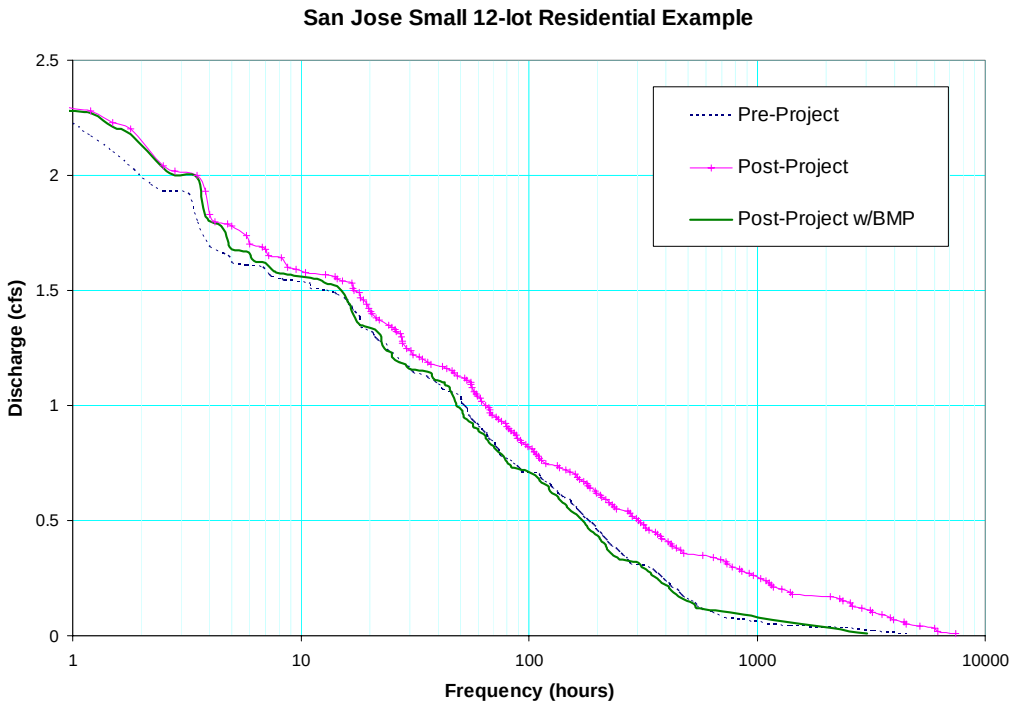
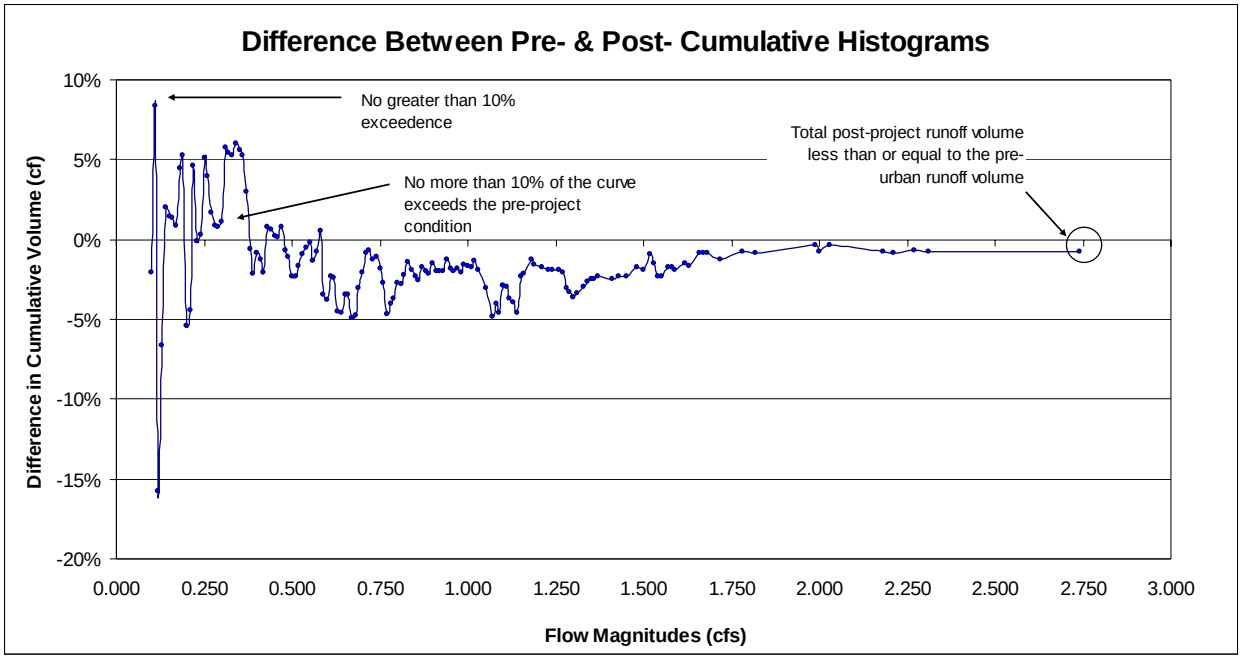


Figure F-4

[6] Deviations are unlimited with respect to erosion but habitat issues could require limits on too little runoff.



REPORTING AND GRAPHICS

This section describes the recommended reporting information and presentation graphics useful for conveying the adequacy of flow duration basin sizing to agencies plan review staff. This information includes a table of resulting basin characteristics, histograms of resulting flow characteristics, and flow duration curves of resulting flow characteristics.

TABLE OF BASIN CHARACTERISTICS

Table 1 below lists the basin characteristic information to be included and presents example information for three scenarios. The characteristics presented should include basin volume, area, depth, drain time, and discharge modes.

Table F-1
Resulting Flow Duration Basin Characteristics

Basin Characteristics	DESIGN SCENARIOS		
	Discharge at infiltration rate only	Discharge at infiltration rate plus <Qc	Basin size with roofs disconnected
Basin Volume (acre-feet)	0.11	0.10	0.08
Basin Size (% catchment)	2.1%	1.7%	1.3%
Basin Size (%DCIA)	4.6%	3.7%	2.8%
Basin Depth (feet)	1.75 ft	2.25 ft	2.5 ft
Drain time (days)	3.7 days	<1 day	3.6 days
Qc (cfs)	0	0.1 cfs	0

Infiltration Rate (loss through wetted bottom, cfs)	0.2 in/hr	0.2 in/hr (0.01 cfs)	0.2 in/hr
Outlet type and dimensions (inches)	Orifice: 3 to 6-inches	Orifice: 3 to 6-inches	Orifice: 3 to 6-inches

HISTOGRAM SHOWING PRE-PROJECT, POST-PROJECT, AND POST-PROJECT WITH BMP RESULTS

Figure F-5 presents the resulting histograms using the 716 acre Thompson Creek example. The histograms for pre-project, post-project and post-project with BMPs are shown. The frequency scale is shown as logarithmic to highlight the differences throughout the flow bin scale, otherwise the differences at the high flow end would be hard to observe.

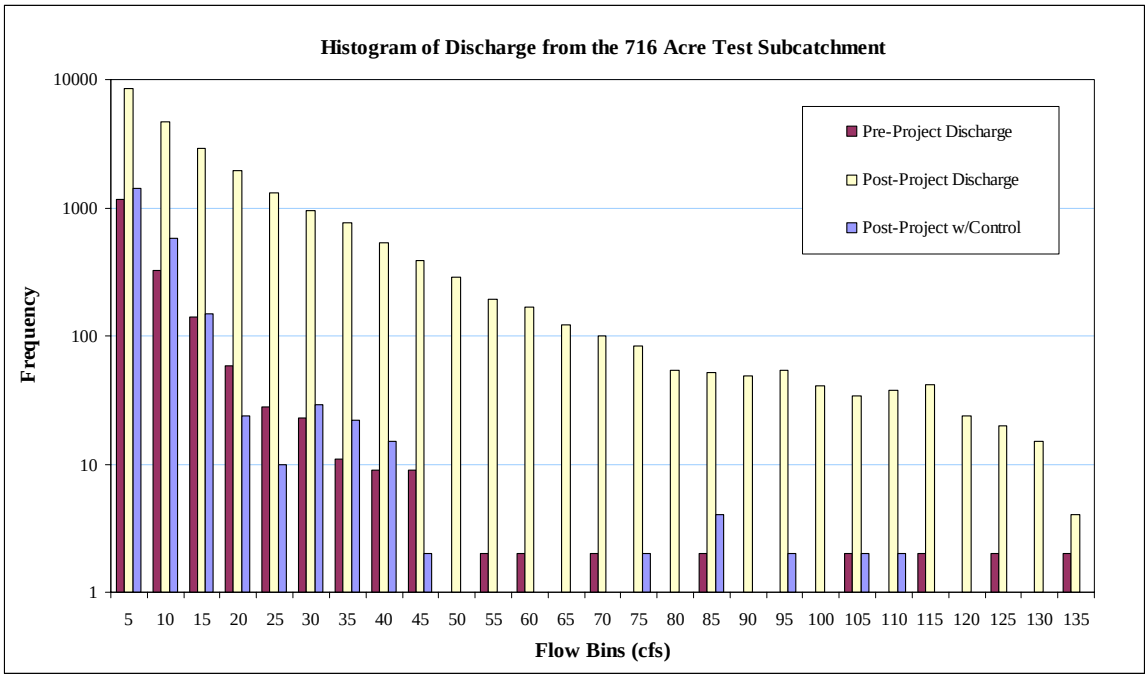


Figure F-5. Histogram of Discharge from the 716 Acre Test Subcatchment

FLOW DURATION CURVES SHOWING PRE-PROJECT, POST-PROJECT AND POST-PROJECT WITH BMP

Figure F-6 presents the resulting flow duration curves for the same Thompson Creek example. The flow duration curves for pre-project, post-project and post-project with BMPs are shown. The frequency scale is shown as logarithmic to highlight the differences throughout the flow bin scale; otherwise the differences at the high flow end would be hard to observe.

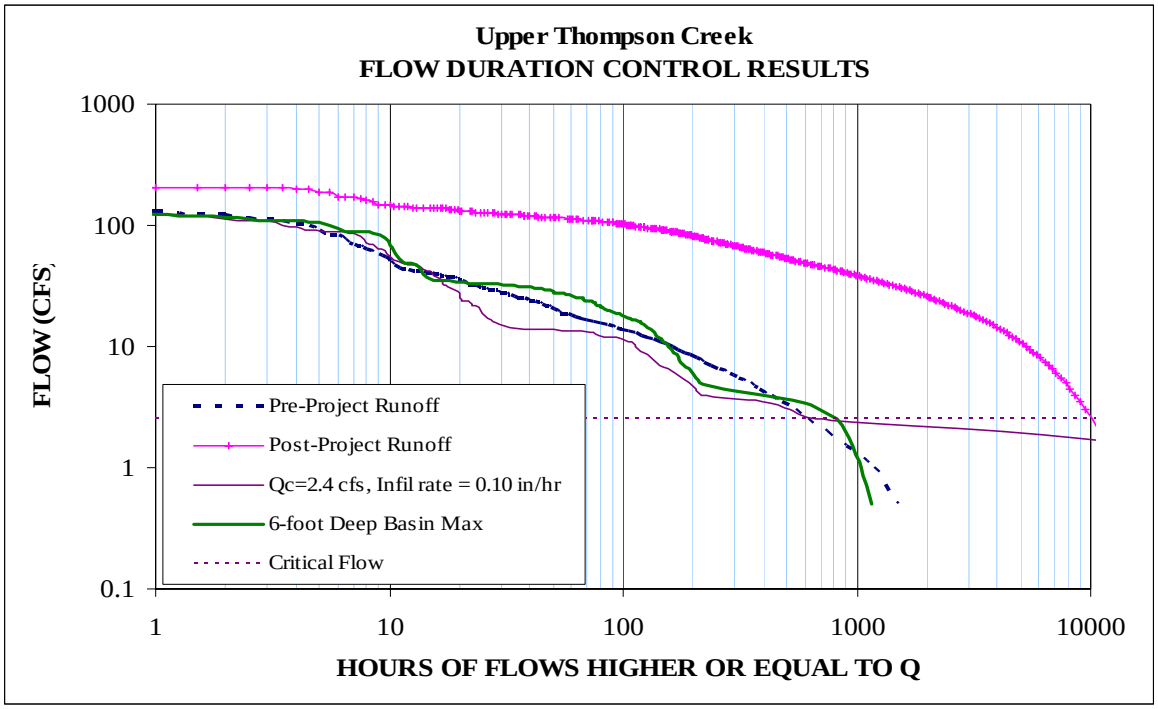


Figure F-6. Example Flow Duration Curves

OUTLET DESIGN FOR THE PURPOSE OF MATCHING FLOW-DURATION

The following addresses a number of detention basin outlet design considerations as they pertain to the goal of matching pre- and post-project flow-duration distributions.

Comparison of Multi-tier Rectangular Weir and Circular Orifice Outlet Designs

In an effort to identify significant outlet design criteria for matching pre- and post-project flow-duration, the relative performance of two outlet configurations was considered: a 3-tier rectangular, sharp-crested weir, and an outlet consisting of three tiers of circular orifices. Each outlet was assumed to discharge flows from a detention basin 1200 feet long by 1000 feet wide, with a maximum depth of 4 feet and 3:1 side slopes. Infiltration rates through the bottom of the wetted surface of the basin were assumed to be 0.2 in/hr. Downstream discharges for each outlet were calculated from a 50-year continuous rainfall time-series, input to a runoff-storage-discharge model.

Figure F-7 shows the general design of the multi-tiered rectangular weir and circular orifice outlets analyzed.

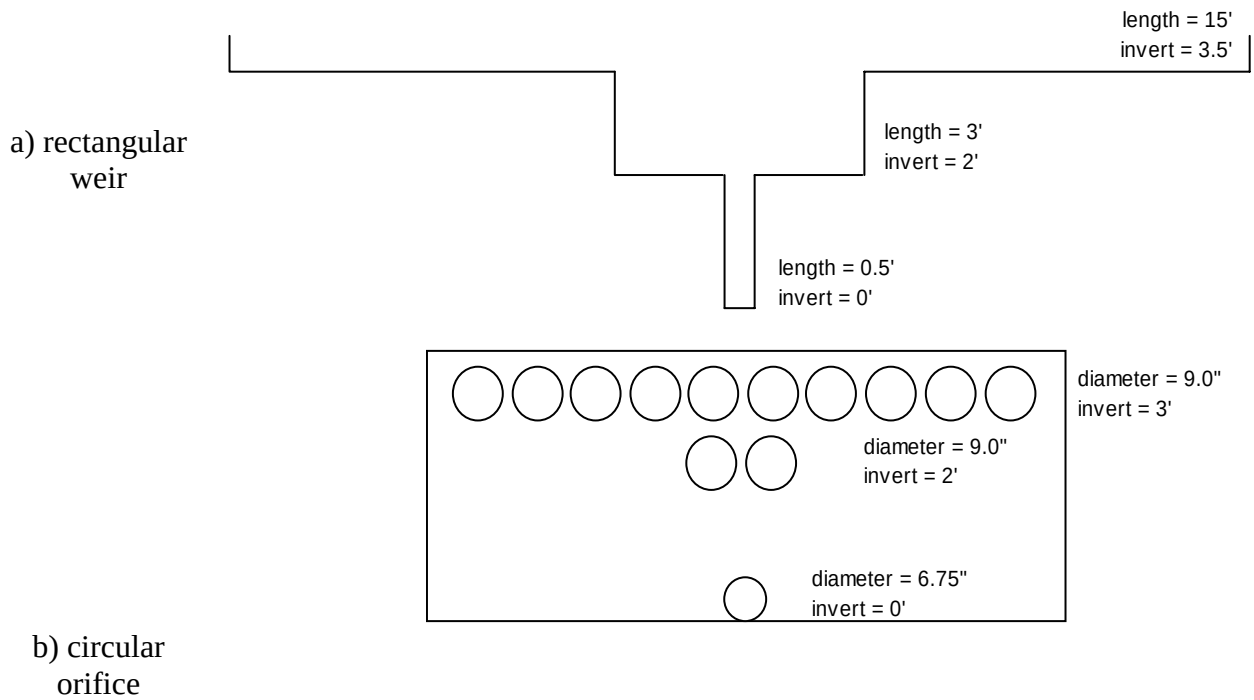


Figure F-7: 3-Tier Sharp-Crested Rectangular Weir (A) and Circular Orifice (B) Outlet Designs

The cumulative flow-duration distribution calculated for a 50-year continuous runoff-storage-discharge simulation of each outlet design is plotted in Figure F-8 alongside the flow-duration curves for the modeled pre-project catchment, post-project without flow control, and the critical discharge threshold (Qcp) (2.4 cfs in this simulation).

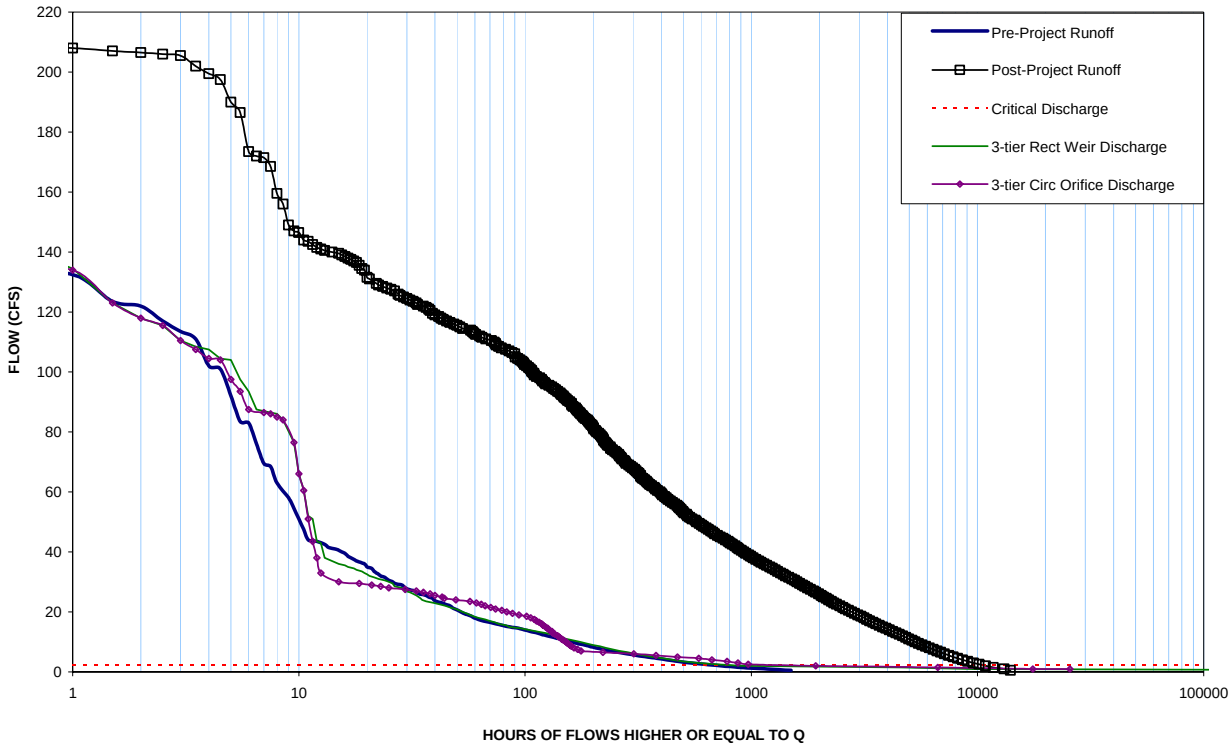


Figure F-8. Flow Duration Control Results

The 3-tier rectangular weir appears to provide a closer match to the pre-project flow-duration curve than the 3-tier circular orifice design, particularly for discharges of approximately 30 cfs or less, which constitute 96% of the pre-project flow duration. While both the rectangular and circular orifice simulations fail to match the pre-project curve above 43 cfs, flows of this magnitude represent roughly 1% of the modeled flow duration. If more time were invested, the the orifice design could be improved to achieve a closer match.

The relative performance of the rectangular weir as compared to the circular orifice design is more evident when Figure F-8 is re-plotted on a log-log scale, as provided in Figure F-9.

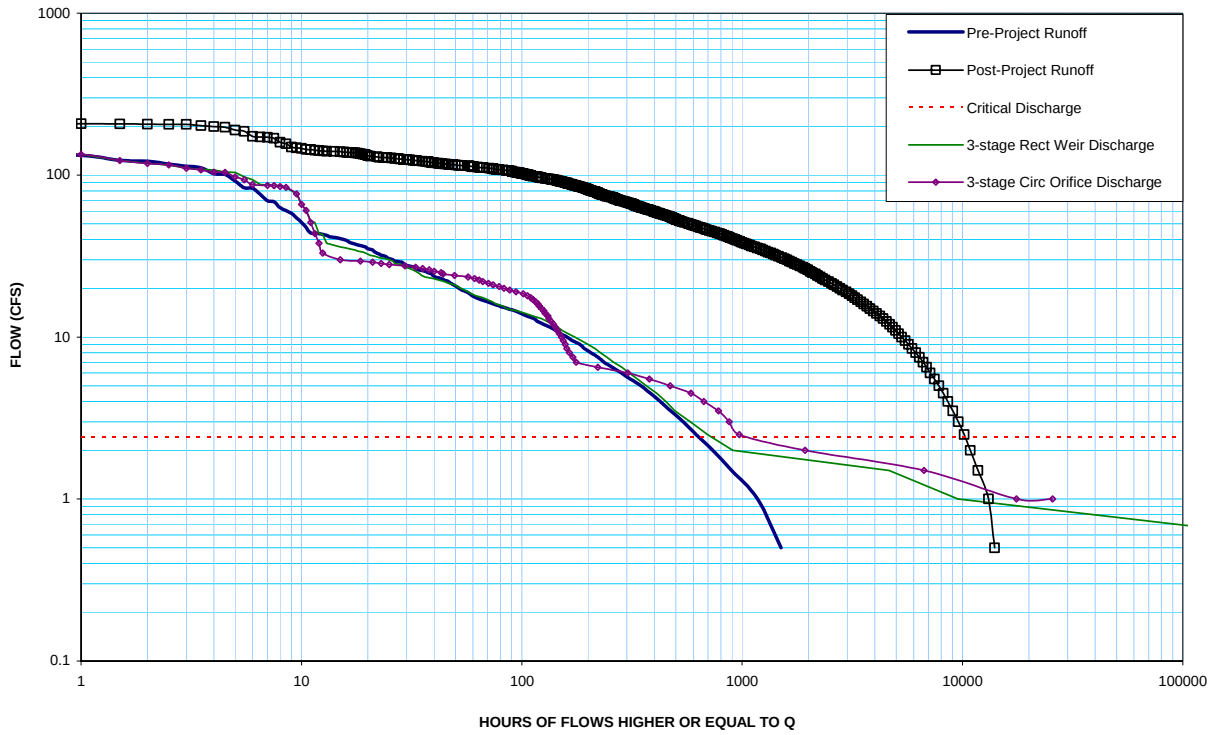


Figure F-9. Flow Duration Curve Results – Log-Log Scale

The expanded scale highlights the difference in curve shape between the rectangular and the circular orifice outlet designs. The multi-stage rectangular outlet closely follows the smooth, convex shape of the pre-project curve, with the exception of large, low-duration flows (Q > 43 cfs) and flows less than the designated "Critical Discharge". In contrast, the circular orifice outlet curve meanders about the pre-project curve, resulting in a significant proportion of duration where post-project flows are greater than those modeled for the pre-project conditions.

Comparison of the respective stage-discharge curves for each of the two designs, as shown in Figure F-10, illustrates the critical difference. For each tier of the circular orifice outlet, the stage-discharge relationship is convex, whereas the rectangular outlet yields a smoother, approximately concave curve, as is desired to match the pre-project flow-duration.

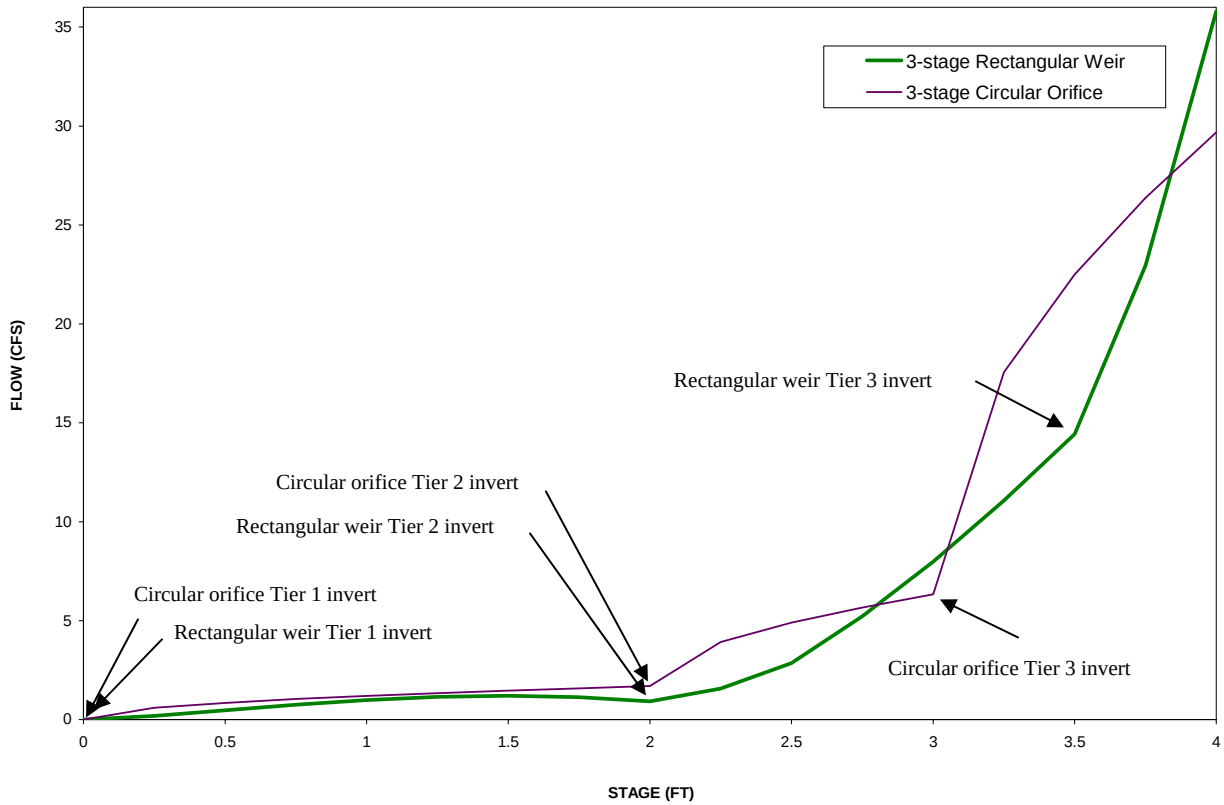


Figure F-10. Stage-Discharge Curves

In summary, these results suggest that an "ideal" outlet design in terms of matching flow-duration is similar to the multi-tier rectangular weir analyzed here, but with smooth, curved sides as shown in Figure F-11, rather than a stepped design. It is assumed that a power equation could be derived for such an outlet, thereby facilitating design and sizing calculations.

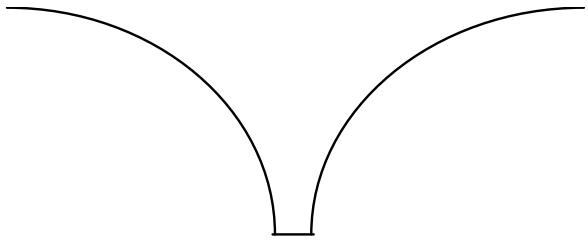
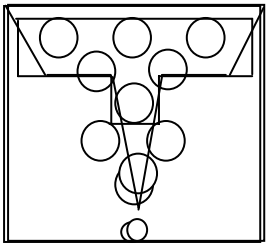
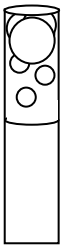


Figure F-11.Continuous curve outlet design



Alternative Outlet Designs

The outlet designs compared in this analysis represent only two possible configurations. Figure F-12 displays several additional conceptual designs. The actual performance of these configurations was not analyzed here. However, the performance of these designs can be easily evaluated by looking at stage-discharge curves for any proposed design.



a) perforated plate or pipe

or

b) circular orifice/rectangular weir combination

c) v-notch/trapezoidal weir combination

Figure F-12. Alternative outlet designs

Possible outlet configurations vary in terms of complexity of design and construction, and in suitability for matching flow-duration. Of the three above, the perforated outlets (6a) offer the greatest flexibility, as essentially any number of orifices of varying diameter may be used to achieve the desired stage-discharge relationship; however this design is difficult to construct properly. The other two designs combine different outlet shapes to develop this relationship. Based on results from the 3-tier rectangular weir analysis, it is presumed that the performance of these alternative methods is associated with how well they approximate the shape of the design in Figure F-11 and a smooth concave stage-discharge relationship.

Limitations on Three Stage Outlet Design

In order to achieve acceptable matching of the pre- and post-project flow duration curves at low, high-duration flows (e.g. < 4 cfs) in this analysis, it was necessary to significantly constrict the size of the lowermost tier (6” at most for L1 of the rectangular weir, 6.75” diameter for the circular orifice outlet)[i]. Such a small low-flow outlet size exposes the structure to a heightened risk of clogging. It is presumed that such an issue arises with any relevant outlet design – namely, that to match the very low, high duration pre-project flows, a blockage-prone low-flow outlet is required, and will be part of any design configuration.

A possible solution is to employ an outlet design that is not prone to clogging by incorporating a filtration component for low flow in order to screen out small debris. For example, flows could pass through a high flow rate (large diameter) perforated vertical riser embedded in crushed stone and filter fabric before discharging through the outlet control (e.g. multi-stage weir or series of orifices).

DATA AND RESOURCE REQUIREMENTS

The primary data requirements for flow duration basin sizing are long term flow records from the project site, representing pre-project and post-project conditions. The post-project flow record is then routed through hydraulic modeling software (e.g. SWMM, HEC-RAS), which approximates the effect of a flow duration basin, represented as a stage-storage-discharge curve, in order to match the pre-project condition.

The long term precipitation records and watershed hydrologic characteristics, used to create the necessary flow records through the application of hydrology modeling software (e.g. HEC-HMS, SWMM, HSPF), are also required.

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[i] A secondary issue which arises is that the standard sharp-crested rectangular weir discharge equations break down when applied to very narrow crest lengths under high hydraulic head. To account for minor energy losses at the contraction of the weir crest, the "effective" length of each stage crest (L) is calculated as follows:

$$L_e = L - 0.1nH$$

where: L_e = effective length of weir crest (ft)
L = measured length of weir crest (ft)
n = number of contractions (2)
H = head above crest (ft)

From this equation, the effective length of L1 goes to zero when the head above the crest is 5 times the measured crest length, resulting in zero discharge when calculated from the standard equation for a sharp-crested rectangular weir.

$$Q = C\, L_e\, H^{3/2}$$

where: Q = discharge (cfs)
C = discharge coefficient, C = 3.27 + 0.4 (H/P)

This yields an unsatisfactory result for this stage of the weir.

ATTACHMENT V-3

Guidance on Estimating Treatment and HMP Control Measure Costs for Application of the 2% "Cost Cap" Criterion

The SCVURPPP HIP Work Group is developing a memo or fact sheet to provide guidance on estimating treatment and HMP control measure costs for application of the 2% "cost cap" criterion. THIS ATTACHMENT WILL BE PROVIDED AT A LATER DATE.

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

VI OPERATION AND MAINTENANCE

VI.1 INTRODUCTION

Maintenance is recognized as a critical component of stormwater treatment BMP effectiveness and useful life. In accordance with Provision C.3.e, each Co-permittee is responsible for implementing a program to verify that stormwater treatment BMPs on private and public property are properly operated and maintained. As a result, all owners/operators of developments subject to Provision C.3 are required to operate and maintain their BMPs so that they continue to perform properly as designed, and that they minimize potential nuisances and public health impacts from vector breeding. This chapter provides the following information:

The goal of the chapter is to provide owners and operators of permanent stormwater BMPs guidance in proper operation and maintenance of their facilities.

- Elements of stormwater BMP operation and maintenance (O & M) verification programs;
- Description of typical stormwater treatment BMP requirements of landowners;
- BMP fact sheets and guidance on how to use them;
- Municipality responsibilities in implementing their O & M program;
- Guidance on prioritizing and determining the frequency of stormwater treatment BMP inspections;
- Stormwater treatment BMP maintenance cost estimates;
- Options for disposal of residuals from stormwater treatment BMPs; and
- Vector control issues relating to BMP operations and maintenance.

The following discussion has been generalized to apply to all Co-permittees. Specific requirements and regulations for each Co-permittee may be inserted into Attachments VI-1 and VI-1 to this chapter.

VI.2 BMP OPERATION AND MAINTENANCE VERIFICATION PROGRAM

Each Co-permittee has developed or is developing a stormwater BMP operation and maintenance verification program to comply with the NPDES permit Provision C.3.e. The verification program is a compilation of elements that gives

the Co-permittee the framework to enforce stormwater treatment BMP maintenance. In addition, a verification program provides property owners direction in the operation and maintenance of their stormwater treatment BMPs.

Typical elements of a stormwater BMP operation and maintenance verification program are included in Table VI.1. Elements of primary importance include stormwater ordinances, maintenance agreements and arrangements, performance bonds and maintenance easement agreements.

Table VI.1
Key Elements of a Typical Stormwater Treatment BMPs Operation and Maintenance Verification Program[1]

• Stormwater Operation and Maintenance Ordinance
• Performance Bonds
• Inspection and Maintenance Agreements and Arrangements
• Maintenance Easement Agreements
• Construction Inspection Checklists
• Maintenance Inspection Checklists
• BMP Performance Criteria and Design Guidance
• BMP Maintenance Educational Materials
• BMP Tracking Systems
• Tracking Systems with Poor BMP Maintenance and Performance
• Maintenance Plans
• Maintenance Unit Costs
• Maintenance Notifications and Reminders
• Component for Following up on Poor Maintenance and Performance
• Pollution Prevention Compliance
• As-Built Certification
• Maintenance of Proprietary Products

Co-permittees have provided their Stormwater Treatment BMP Operation and Maintenance Verification Program (verification program) materials in Attachment VI-1. *For those Co-permittees still developing their verification program, several Program guidance memorandums are provided to assist with verification program set-up on the Program website at www.scvurppp.org.*

[1] Source: http://www.cwp.org/Maintenance_0702.htm

VI.3 REQUIREMENTS OF LANDOWNERS

Many of the elements in the verification program require compliance and performance by the landowner. Landowners who are subject to Permit Provision C.3 must comply with the operation and maintenance language of the Co-permittee's stormwater treatment BMP ordinance or policy. The purpose of the ordinance or policy is to ensure that:

a) Stormwater treatment BMP designs facilitate ease of maintenance; and
b) Regular inspection and maintenance activities are completed by the landowner.

Maintenance and operation ordinances usually consist of concise language requiring maintenance easement agreements, inspection and maintenance agreements, inspections, right-of-entry for inspection, consequences of failure to maintain practices, record keeping, enforcement and penalties.

The Co-permittee's stormwater verification program may require the submittal of performance and/or maintenance securities by the landowner. A performance security is a financial tool used to guarantee that in the event of a developer or contractor's default, funds are available to finish the construction of a stormwater treatment system and ensure its proper functioning. Maintenance securities are often required after construction to guarantee the performance of stormwater management systems.

Agreements for BMP maintenance and inspection and access are formal contracts between a local government and a property owner, such as a homeowners association, designed to ensure that specific maintenance functions are performed in exchange for permission to develop property. These agreements are typically recorded instruments, running with the land and binding on all future owners.

Basic language included in a typical agreement includes the following:

a. *Performance of Routine Maintenance.* Private landowners (i.e., commercial/industrial property owners, homeowners associations, developers, private residents, etc.) must take responsibility for every aspect of maintenance, including routine maintenance and major repair. (Co-permittee responsibilities include inspection, education programs, maintenance tracking and enforcement.)

b. *Annual Inspection/Maintenance and Certification.* Co-permittees require regular inspection of the stormwater treatment system by the landowner, with the actual frequency depending upon the type of BMP and the municipality's ordinance or guidelines. The inspection covers the entire facility, including berms, outlet structure, pond areas, access roads, etc. Observed deficiencies, required maintenance and repairs are documented in an inspection report that is submitted to the local municipality, who may then choose to verify facility information through inspection. Co-permittees require the landowner to certify that the stormwater system is

regularly inspected and maintained. The landowner may use a standardized inspection form provided by the Co-permittee for the inspections, included in Attachment VI-2, to facilitate uniform collection and reporting of data. To assist the landowner, Co-permittees may also provide maintenance fact sheets (see Chapter VI.4) and other appropriate documentation relating to proper long term operation and maintenance.

c. *Inspection Requirements.* Co-permittees may commit to performing an annual verification inspection of the stormwater system, or may choose to inspect when deemed necessary, based on the type of treatment device, results of the self-inspection process and available resources.

d. *Limitation of Liability.* The maintenance agreement imposes no liability of any kind whatsoever on the local municipality.

e. *Failure to Maintain Stormwater Systems.* If a system is found to be in failure, there are civil or criminal penalties for operation and maintenance violations. Authority may be given in the agreement to the municipality to charge costs incurred for maintenance and repairs back to the property owner.

f. *Access to Stormwater Systems*. Maintenance easement agreements grant permission to Co-permittees or their authorized agents and employees to enter a property (to inspect stormwater systems) whenever necessary. It ensures access from the public right-of-way and ample space to inspect and maintain stormwater management systems.

VI.4 STORMWATER TREATMENT BMP INSPECTION AND MAINTENANCE FACT SHEETS

In January 2003, the California Stormwater Quality Association (CASQA) updated the Municipal, New Development and Redevelopment, Construction and Industrial/Commercial Best Management Practice (BMP) handbooks that provide general guidance for selecting and implementing BMPs to reduce pollutants in runoff. Collectively, the four handbooks address BMP selection throughout the life of a project – from planning and design – through construction – and into operation and maintenance. Individually, each handbook is geared to a specific target audience during the project development. All four handbooks are available at www.cabmphandbooks.com.

As part of the Municipal BMP Handbook, CASQA developed 16 fact sheets that provide pertinent information on the inspection and maintenance requirements for treatment control BMPs. To supplement the CASQA treatment BMP fact sheets, Program staff developed fact sheets for an additional six (6) stormwater treatment system BMPs. A list of fact sheets is shown in Table VI.2. Copies of the fact sheets are provided in Attachment VI-3. Recommended inspection and maintenance frequencies are presented in each fact sheet.

Table VI.2
Treatment Control BMP Fact Sheets

BMP	Source	Reference Number
Bioretention	CASQA —	TC-32
Drain Insert*	CASQA —	MP-52
Exfiltration Trench	SCVURPPP	na
Extended Detention Basin	CASQA —	TC-22
Hydrodynamic Separators*	SCVURPPP	
Infiltration Basin	CASQA —	TC-11
Infiltration Trench	CASQA —	TC-10
Media Filter†*	CASQA —	TC-40, MP-40
Multiple Systems	CASQA —	TC-60
Planter Boxes	SCVURPPP	
Porous Pavement	SCVURPPP	
Retention/Irrigation	CASQA —	TC-12
Roof Gardens	SCVURPPP	
Underground Detention Systems*	SCVURPPP	
Vegetated Buffer Strip	CASQA —	TC-31
Vegetated Swale	CASQA —	TC-30
Vortex Separator*	CASQA —	MP-51
Water Quality Inlet	CASQA —	TC-50
Wet Pond	CASQA —	TC-20
Wet Vault*	CASQA —	MP-50
Wetland*	CASQA —	MP-20

* indicates treatment control is manufactured (proprietary)
† Two Fact Sheets (Public Domain and Proprietary) were created for this Treatment Control BMP

Maintenance Standards and Proper Inspection and Maintenance Procedures

Inspection maintenance standards identify the key parameters that trigger the need for maintenance activities for each BMP. For example, inspections of detention basins include measuring sediment accumulation with sediment measuring sticks. When sediment accumulates beyond established threshold values, sediment removal is required.

The maintenance standards assist private and public property owners in identifying proper inspection and maintenance procedures and assist public agency staff in the oversight of these facilities. The Co-permittees are developing maintenance standards[2] and public and private inspection and maintenance checklists for use during inspections.[3] Inspection results will be documented and tracked over time (by municipal staff) to determine the effectiveness of maintenance activities.

VI.5 MUNICIPALITY'S RESPONSIBILITES IN THEIR STORMWATER TREATMENT BMP INSPECTION PROGRAM

To ensure long-term operation and maintenance (O&M) of stormwater treatment BMPs, it is necessary to include five (5) program elements into municipal inspection programs:

1. Maintain Information Regarding Installed Treatment BMPs. BMP information will be initially gathered with the Reporting Form for Planning Procedures Performance Standard and Provision C.3.n. Reporting Requirements (Attachment VII-4). For additional information on data management, see Chapter VII.

2. Establish Inspection Priorities and Frequencies. Each year, Co-permittees are required to inspect a subset of prioritized stormwater treatment systems for appropriate operation and maintenance, and to conduct any needed follow-up and correction. Eight (8) criteria (listed below, not in order of importance) were used by the Co-permittees to prioritize their municipal inspection list of public and privately-owned stormwater treatment BMPs.

   - Likelihood of failure resulting in high repair and/or replacement costs;
   - Level of maintenance needed for proper performance and operation;
   - Decline in operational effectiveness due to age;
   - Located in areas with ongoing construction activities (i.e., increased sediment loading);

[2] Model maintenance standards are found within the document entitled *Utilities Surface Water Maintenance Standards for Public and Private Systems (Draft), December 2002* and can be found on the Program website at www.scvurppp.org.
[3] Model public and private inspection and maintenance checklists developed by the City of Bellevue, WA are provided on the Program website at www.scvurppp.org..

- Owned and/or maintained by residential owners;
- Complaints and/or facility owner/operator with history of non-compliance;
- Likelihood of creating habitats favorable for mosquito production; and
- Potential to support endangered species populations.

The last two (2) criteria, likelihood of mosquito production and potential to support endangered species, are under the purview of other agencies (i.e., Santa Clara County Vector Control District and U.S. Fish and Wildlife Service, respectively). As applicable, Co-permittees coordinate these aspects of their inspection programs with these agencies.

Municipal Inspection Frequencies. The Co-permittees have each developed initial jurisdiction-specific inspection frequencies that they must follow to ensure proper operation or compliance by landowners with maintenance standards. Co-permittees may adjust these frequencies over time to reflect actual BMP maintenance needs on a site-by-site basis.

The following factors are considered when determining appropriate inspection frequencies:

- Type of BMP;
- Local climate and precipitation;
- Land use type;
- Level of effort required for inspection. In general, BMPs with limited access (for maintenance) may require more frequent inspections;
- Existence of maintenance contracts;
- Fluctuation in economic resources; and
- CASQA BMP Municipal Handbook includes suggested inspection frequencies for stormwater treatment system BMPs constructed in California.

The Co-permittees may adjust these frequencies to accommodate site-specific conditions. For example, higher inspection frequencies should be considered for stormwater treatment system BMPs installed in areas that receive more rainfall. BMPs that treat large runoff volumes will accumulate higher amounts of pollutants over time. Inspection frequencies should also account for impacts from large storm events. Similarly, stormwater treatment system BMPs that are in land uses suspected of generating high concentrations of pollutants (e.g., sediments, oil and grease) should be inspected more frequently to ensure proper operation.

The mechanism by which stormwater treatment system BMPs are maintained can also impact the frequency of municipal inspection. If private property owners can demonstrate that maintenance is occurring according to design specifications or contracted out to a private

maintenance company, Co-permittees may consider giving these treatment controls a lower inspection priority.

The type and total number of BMPs inspected each year also depends on the cost of follow-up activities (e.g., the response required to address improperly maintained BMPs) and the availability of resources to conduct inspections. As a result, Co-permittees may have to adjust the type and total number of inspections conducted in a particular year based on available funding.

3. Provide Staff Training. To ensure proper facility inspection and maintenance of stormwater treatment BMPs, Co-permittees train their respective staffs in proper maintenance and operational procedures.

4. Conduct BMP Inspections. The four (4) major aspects of a stormwater treatment BMP inspection include:

   a) *Notify landowner of inspection.* The municipality provides educational materials[4] to ensure that stormwater treatment BMP owners and operators are aware of their obligations and responsibilities regarding inspection and maintenance. The BMP Fact Sheets in Attachment VI-3 are a good educational resource regarding inspection and maintenance considerations.

      A notification of inspection letter[5] is provided to inform the BMP owner or operator that an inspection is scheduled. The letter supplies detailed information about what the BMP owner or operator can expect; encourages the completion of routine maintenance actions prior to the inspection, and other pertinent information relating to the inspection.

   b) *Pre-inspection preparation.* The municipal inspector reviews background information such as: site plans/as-built drawings; previous inspection results; necessary procedures (e.g., underground confined space entry); and inspection and maintenance protocols. At this time any necessary tools and equipment are assembled.

   c) *Conduct inspections.* Co-permittees use standardized inspection checklists to document each stormwater treatment BMP inspection. At a minimum, inspection checklists should:

      --Contain specific parameters to reduce subjectivity;
      --Link problems with specific actions;
      --Track maintenance activities for BMPs over time; and
      --Integrate well into a relational database.

[4] A list of possible educational materials, site-specific information to review and inspection equipment to gather or review prior to an inspection is also provided on the on the Program website at www.scvurppp.org.
[5] Examples of facility inspection notification letters are provided at the Program website at www.scvurppp.org.

d. *Inspection follow-up and maintenance notification.* Written documentation is provided to the BMP owner or operator describing the inspection results and compliance status. In addition, the letter should include a list of necessary repairs or maintenance, if applicable, A Notice of Violation identifying the nature of the violation and list of repairs or maintenance needed to bring the facility into compliance. It identifies a compliance schedule and the consequences of non-compliance.

5. Prepare Documentation and Effectiveness Evaluation. Copies of all inspection related documents are returned by the Co-permittee for tracking. Chapter VII provides guidance on the overall strategy to manage data relevant to the reporting requirements described in Permit Provision C.3.e.iii.

VI.6 STORMWATER TREATMENT BMP MAINTENANCE COST ESTIMATES

Table VI.3 provides construction and maintenance cost estimates for selected stormwater treatment BMPs. Construction costs are included since several BMP O & M costs are presented as a percentage of the total construction cost. The cost estimates are "ballpark" figures and may be most useful at the planning level (i.e., comparison of relative costs between different treatment control BMPs) and may be of limited use for predicting actual BMP O & M costs.

Factors Influencing BMP Construction, Inspection and Maintenance Costs

A significant variation in construction and maintenance costs exists between selected stormwater treatment system BMPs (Table VI.3). Several factors influence BMP construction and maintenance costs:

- Type of BMP
- Size of BMP
  - –Rainfall quantity
  - –Drainage area size
  - –Site characteristics (e.g., impervious area; soil stability)
- Location of BMP (i.e., above or below ground)

Other factors affecting maintenance costs include BMP access and disposing of collected residuals. Although a stormwater treatment BMP constructed below-surface is less costly to construct due to reduced land costs, it is more expensive to maintain than a surface measure. Sediment accumulation in stormwater treatment system BMPs is another factor that may affect maintenance costs. When residuals are disposed of at off-site landfills, disposers are required to follow the waste acceptance criteria established by each landfill. In most cases, landfills will accept sediments generated from residential stormwater conveyance structures without analytical results. However, disposers may be required to characterize (by analytical testing) sediments prior to disposal. Additional guidance regarding the disposal of BMP residuals at local landfills is provided in Chapter VI.7. This guidance also includes the waste acceptance criteria of several County landfills.

Table VI.3: Maintenance Costs

Stormwater treatment BMP	BMP Handbook[1]		EPA Study[2]		BASMAA Guidance[3]		CalTrans Study[4]	
	Construct (units vary)	Annual Maintenance (units vary)	Construct ($/cubic ft)	Annual Maintenance (% const cost)	Construct ($/acre)	Annual Maintenance (total $)	Construct (total $)	Annual Maintenance (Hours)
Infiltration basin	$2-18 cu ft	5-10% const costs	1.3	5-10			$241,000-$273,000	193
Infiltration trench	$5-50 cu ft	5-20% const costs	4	5-20			$196,000-$218,000	70
Vegetated filter strip	$0.3-0.7 sq ft	$350/acre	0.0-1.3	$320/acre			$100,000	202
Vegetated swale	$0.25-0.5 sq ft	$0.58-0.75 per linear ft	0.5	5-7	240-669	$790	$59,000-$156,000	211
Bioretention	$3-40 sq ft	N/a	5.3	5-7				
Porous pavement	$10,105 acre	$3,960/year						
Wet pond	$45k - 450k (1 acre-foot)	3-5% of const costs			11,065-13,600	$500-2,600	$694,000	570
Constructed wetland	$57k (1 acre-foot)	3-5% of const costs	0.6-1.25	2				
Extended detention basin	$41.6k (1 acre-foot)	3-5% of const costs	0.5-1.0	<1	4500	$2,000	$166,000-$855,000	136
Media filter (Sand filter)	$18.5k (1 acre site)	$1706/year	3.0-6.0	11-13	15,900	N/a	$231,000-$479,000	93
Underground detention tank					18,375-183,900	N/a		
Drain inlet filter	$2-3k	N/a			6,410-17,072	N/a	$32,000-$44,000	118
Oil/Water Separator							$178,000	139

[1] California Stormwater Quality Association. Stormwater Best Management Practice Handbook: New Development and Redevelopment, April 2003 .
[2] United States Environmental Protection Agency, Office of Water. EPA-821-R-99-012: Preliminary Data Summary of Urban Storm Water Best Management Practices-Chapter 6: Costs and Benefits of Storm Water BMPs, August 1999.
[3] Gary R. Minton.*A Survey of Installation and Maintenance Costs of Stormwater Treatment Facilities*, June 2003.
[4] Stormwater Program, California State University-Sacramento: Office of Water Programs. *California Department of Transportation BMP Retrofit Pilot Program*, January 2001.

VI.7 THE DISPOSAL OF RESIDUALS FROM STORMWATER TREATMENT BMPS AT COUNTY LANDFILLS

Residuals are defined as trash, oil and grease, filter media and fine sediments that are collected from stormwater treatment BMPs that may or may not be contaminated. In general, results of various studies across the country indicate that residuals are not hazardous. As a result, most residuals can be disposed of at landfills after dewatering. This Chapter provides general guidelines for residual disposal and an EPA fact sheet on the topic. To supplement the information provided in EPA's fact sheet, information from local agencies and private companies was gathered on the procedures for testing, handling and disposing of stormwater treatment BMP residuals in Santa Clara County.

EPA Stormwater O & M Fact Sheet

The EPA fact sheet entitled *Storm Water O&M Fact Sheet: Handling and Disposal of Residuals* describes BMP maintenance programs and methods for handling and disposing of residuals from stormwater treatment BMPs[6]. The EPA Stormwater O & M fact sheet includes: 1) properties of residuals collected from a variety of stormwater treatment BMP treatment systems; 2) a general description of BMP operation and maintenance requirements; 3) key program elements for handling and disposing of residuals; and 4) specific information on residual disposal from case studies.

The fact sheet presents three general approaches to handling and disposing stormwater residuals. These include:

- Centralized treatment;
- Treatment at satellite facility or landfill; and
- On-site treatment.

Acceptance Criteria at Local Landfills

Table VI.4 provides a list of disposal facilities and locations obtained from the Santa Clara County Integrated Waste Management website (www.reducewaste.org). It also indicates which facilities accept sediment and the approximate cost for disposing non-hazardous residuals. All landfills in Santa Clara County are classified as Class II. This type of landfill only accepts non-hazardous waste that contains a minimum of 50 percent solids and no free liquids. Waste acceptance criteria for certain landfills within Santa Clara County include:

- Palo Alto Landfill – In accordance with the *Draft Palo Alto Landfill Soil Acceptance Policy*, the soil acceptance review may require a certification statement of clean sources or a bulk chemistry sample. (Appendix **G**)

[6] The EPA a fact sheet entitled *Storm Water O&M Fact Sheet: Handling and Disposal of Residuals* is provided on the Program website at www.scvurppp.org.

- Kirby Canyon Landfill – Laboratory analysis of soil material is required on a case-by-case basis. The *Kirby Canyon Recycling and Disposal Facility: Waste Acceptance Criteria* provides sampling and disposal information. (Appendix **G**)
- Newby Island Sanitary Landfill – Provides a list of site-specific waste constituent levels. (Appendix **G**)

Waste characterization requirements are usually based on land use; type of facility where sediments are generated; and past sampling results (i.e., additional testing is not necessarily required after first waste characterization).

Table VI.4
Disposal Facility Location, Contact Information And Acceptable Waste Materials*

Disposal Facility	Type	Location	Contact	Sediment ("Soil") Accepted	Cost
Pacheco Pass Landfill	II	3675 Pacheco Pass Hwy Gilroy, CA	408-847-4142	Yes	$3.00/ton
Newby Island Landfill	II	1601 Dixon Landing Rd Milpitas, CA	408-432-1234	Yes	$7.15/ton
Kirby Canyon Landfill	II	910 Scheller Ave. San Jose, CA	408-779-2206	Yes	$12.50/ton
Palo Alto Landfill**	II	2380 Embarcardero Rd Palo Alto, CA	650-329-2655	Yes	Unknown
Guadalupe Rubbish Disposal Co.	II	15999 Guadalupe Mines Rd San Jose, CA	408-268-1666	No	NA
Zanker Road Landfill	II	705 Los Esteros Rd San Jose, CA	408-263-2385	No	NA
Sunnyvale Transfer Station	II	301 Carl Rd Sunnyvale, CA	408-683-4443	No	NA
San Martin Transfer Station	II	14070 Llagas Ave San Martin, CA	408-847-4142	No	NA

*SWIS Data Base
** Palo Alto Landfill only accepts wastes generated by City of Palo Alto residents or businesses.

Handling and Disposal of Residuals by Private Companies

An option for property owners is to have a BMP company perform maintenance on their BMPs. Table VI.5 provides a list of typical maintenance activities for stormwater catch basin inserts and interceptor units. These companies generally require an annual maintenance contract with the property owner for each stormwater treatment BMP. Services typically provided include inspection, maintenance, handling and disposal of all residuals. Catch basins and inlet filters should be cleaned out before each storm and often during heavy storms to keep from clogging. Storm water interceptors and CDS units are usually cleaned twice

per year and the media filter is replaced annually. Debris and sediment is pumped out (using vacuum trucks), transported and disposed of at a local Class II landfill. The gray water collected from stormwater treatment systems is usually left within, placed back into the system (catch basin inlet filters) or removed and properly disposed. Maintenance costs for each stormwater treatment BMP are influenced by local conditions (e.g., land use activity and size of drainage area).

Table VI.5

Typical Maintenance Activities for Selected BMPs

Stormwater treatment BMP	Maintenance	Handling & Disposal of Residuals	Testing Performed[2]
Storm Water Catch Basin Inlet Filters	• Vacuum and Pressure wash before each storm and if necessary during storm • Replace filter media annually	• Remove debris (litter, organic material) and sediment; disposed at Class II Landfill • Replace filter media; placed in 55-gallon drum and disposed at Class I Landfill	• Annual test of sediment sample requested by landfill; • Obtain EPA Profile # for filter media
Storm Water Interceptors and CDS Units	• Inspect, measure and clean twice/year • Replace filter media annually	• Remove debris (litter, organic material) and sediment; disposed at Class II Landfill • Replace filter media; placed in 55-gallon drum and disposed at Class I Landfill	• Annual test of sediment sample requested by landfill; • Obtain EPA and CA waste codes for filter media

[1] Information was obtained from Ric Campos, President, Storm Water Inspector and Maintenance Services, Discovery Bay, CA.
[2] Cost for a single sediment sample was reported to be approximately $2,000. Analytical testing requirements of residuals are determined by the landfill and are based on the stormwater treatment BMP type and land use activity (e.g., parking lots in commercial areas) occurring within the drainage area of the stormwater treatment BMP.

Filter media and contaminant pillows used in stormwater treatment systems are designed to absorb petroleum hydrocarbons present in stormwater runoff. As a result, all filter media is considered a Class I hazardous waste (when removed for disposal) and requires proper disposal in accordance with California EPA and RCRA regulations. The responsible party (hazardous waste generator) is required to assign all applicable California and EPA waste codes and place hazardous filter media within a Department of Transportation-approved shipping container for transport to a Class I landfill. Stormwater treatment BMP maintenance companies ensure proper handling and disposal of residuals and provide the property owner with certification of disposal in accordance with applicable regulations. Attachment III-4 provides a list of local maintenance companies.

Analytical testing requirements of residuals are determined by the landfill and are based on the stormwater treatment BMP type and land use activity (e.g., parking lots in commercial areas) occurring within the drainage area of the stormwater treatment BMP. For example, landfills usually require different analyses for

residuals collected from BMPs located within pre-construction land uses then for residuals collected from BMPs located within developed sites. In general, landfills require more stringent testing (i.e., additional constituents) for land uses that have a higher potential for stormwater pollution. If the initial analytical results are below the landfill's waste acceptance criteria threshold, the landfill will continue to accept residuals collected from stormwater treatment systems in the future, as long as the land use does not significantly change. Analytical testing costs range from $400 to $2,000.[7]

VI.8 VECTOR CONTROL ISSUES RELATING TO BMP OPERATION AND MAINTENANCE

Improper BMP design and maintenance are the two primary factors contributing to mosquito and other vector production (including midges, rodents, black flies and cockroaches). Guidance on proper design and site planning necessary to reduce the need for maintenance and to reduce the likelihood of mosquito vector problems is included in Chapter III. Additional information on maintenance is provided below.

There are several benefits of taking a proactive approach to vector control. They include:

- Avoiding the creation of public nuisances, potential fines, and subsequent corrective measures;
- Reducing the reliance on insecticides;
- Reducing long-term costs of vector control;
- Reducing the number of potential complaints; and
- Maintaining a good public perception.

Ultimately, proper BMP site design and maintenance will help ensure that the achievement of storm water quality objectives does not conflict with public health protection.

Proper BMP Maintenance to Reduce or Eliminate Mosquito Production

Adequate monitoring and routine maintenance is imperative to reduce or eliminate mosquito production. First and foremost, BMPs should be maintained so they do not hold standing water. Therefore, maintenance activities should focus on maintaining water flow by managing vegetation; reducing standing water by ensuring proper infiltration and drainage operation; and restricting access to systems with standing water by sealing off openings.

Certain BMPs may support additional numbers of vectors as the controls age. With proper ongoing maintenance, such degradation over time can be stemmed.

[7] Charlie Fleischmann, Revel Environmental Manufacturing, and Dave Fitzpatrick, SWIMS

Mosquito Control

Periodic use of mosquito control agents may be necessary to reduce or eliminate mosquitoes in stormwater treatment BMPs. Within the urban environment, vector control measures that address the aquatic phases of a mosquito's life cycle (larvicides) are preferable to those control measures designed to address adult mosquitoes (adulticides). Once mosquitoes have reached their adult stage, they are capable of dispersal from aquatic systems, which makes adequate control nearly impossible, even when insecticides are dispersed into the air. Excessive application of insecticides can have potentially toxicological effects on aquatic life and other species.

The type and manner of application of mosquito control agents must meet the requirements of the Pesticide Control Management Plan included in the NPDES permit. In Santa Clara County, the Santa Clara County Vector Control District performs mosquito control.

Program's Relationship with the Santa Clara County Vector Control District

Permit Provision C.3 discusses the close collaboration and cooperative effort between the Co-permittees, local vector control agencies, Regional Board staff and the State Department of Health Services in identifying appropriate vector control measures that minimize potential nuisances and public health impacts resulting from vector breeding. To assist the Vector Control District in inventorying stormwater treatment BMPs that may be mosquito sources, Co-permittees should submit the following information to the Program on a routine basis (see below for more information):

- List of properties (public and private) with their physical address;
- Property owner/responsible party contact information;
- The type of treatment control BMP installed on the property.

The program will compile this information and provide it to the Santa Clara County Vector Control District. In addition, large stormwater treatment BMPs with vector control issues may require a Vector Control Management Plan. The Vector Control District is only interested in inspecting BMPs that might provide a suitable habitat for mosquito production.

VI.9 REFERENCES

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Treatment BMP Inspection Program Elements

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Fact sheets from all four BMP Handbooks may be individually downloaded from the California Stormwater treatment BMP Handbook website at www.cabmphandbooks.com.Click on the BMP Handbook of interest and download the treatment control BMP found within each handbook's Table of Contents.

Utility of Existing Stormwater treatment BMP Cost Estimates

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Additional resources, which are posted on the Program's website, provide BMP construction, inspection and maintenance costs. They include the following:

Cost Analysis: Washington Department of Ecology Year 2001 Minimum Requirements for Stormwater Management in Western Washington (prepared by Herrera Environmental Consultants, Inc, August 2001), posted on Program website at www.scvurppp.org.

Best Management Practices Guide for Stormwater treatment BMP: Maintenance of Structural BMPs (prepared by the Greater Vancouver Sewerage and Drainage District) posted on Program website at www.scvurppp.org

Santa Clara Valley
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C.3. Handbook

ATTACHMENT VI-1

Co-permittee Stormwater Treatment BMP Operation and Maintenance Verification Program

To be supplied by Co-permittee as Adopted

For those Co-permittees still developing their verification program, several Program guidance memorandums are provided to assist with verification program set-up on the Program website at www.scvurppp.org.

Santa Clara Valley
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C.3. Handbook

ATTACHMENT VI-2

Co-Permittee Inspection Form for Project Proponent

To be supplied by Co-permittee

Model public and private inspection and maintenance checklists developed by the City of Bellevue, WA are provided on the Program website at www.scvurppp.org.

ATTACHMENT VI-3

California Stormwater BMP Handbook and SCVURPPP Maintenance Fact Sheets

The Fact Sheets are linked here.

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VII DATA MANAGEMENT AND REPORTING

VII.1 INTRODUCTION

Because of the comprehensive information needs required by Permit Provision C.3, Co-permittees are encouraged to enter and store the appropriate data in a comprehensive database for efficient tracking, analysis, and reporting. This chapter of the Handbook provides guidance on collecting the appropriate data necessary for showing compliance with Provision C.3. It includes information about the SCVURPPP model data collection form, guidance for municipalities on preparing a database to track projects through their life, insight into the data management considerations needed for long-term operation and maintenance, and guidance on reporting the data to the Regional Board via annual reports.

VII.2 C.3 DATA NEEDS

The goal of this Chapter is to provide guidance on collecting and providing data necessary for reporting on Provision C.3 implementation progress to the Regional Board.

Attachment VII-1 contains a comprehensive list of the data needs to comply with the SCVURPPP's Permit Provision C.3. (New and Redevelopment Requirements). The list comprises the data necessary from all stages of the development project review process to ensure compliance with specific chapters of Provision C.3, rather than just the data needed for reporting. The Program developed a model Program C.3 data collection form to meet these needs (Attachment VII-2).

Although portions of the data sheet will be useful to project proponents early in the development planning process as guidance and encouragement for reducing impervious surfaces, the final data should be collected at the building permit stage. The following guidance is provided to assist Co-permittees and/or project proponents with completing the form.

Project Name: Provide name of owner/project proponent.

APN #: Provide Assessor's Parcel Number of site.

Applicant Name: Provide full legal name of owner/project proponent.

Project Location: On the first line, indicated the address of the proposed project site. If a street address is not available, provide other descriptors such that the site could be located. On the second line, indicate the watershed that the project is located in (main creek/river, or Bay) and the immediate receiving water (tributary, creek, Bay). For more information, see Chapter V.

Item 1. Project Type. Indicate whether the project is Residential, Commercial Industrial, Public, or Roadway per the definitions in the municipality's zoning code. For mixed-use developments, select all applicable boxes. Public projects include institutional developments such as governmental offices and public schools. Although often a subcategory of public projects, roads are listed separately due to their distinguishing characteristics. Also, indicate whether the project will be located on an undeveloped site (New Development) or at a site with existing development (Redevelopment).

If the project is a single-family residential home that is not part of a larger common plan of development, then the project will be considered in compliance with Provision C.3 despite the amount of impervious surface area if appropriate pollutant source control and site design measures. This includes the use of landscaping to appropriately treat roof and house-associated impervious surface runoff.

Item 2. Project Size. The six subsections in this item provide a pathway for determining the total and percent increase or replacement of impervious surface area (see items d. and e., respectively). The amount of impervious surface at the site is essential to determining the applicability of Group 1 and Group 2 requirements for requiring and sizing stormwater treatment BMPs.

Item 3. Type of Pesticide Reduction Measures Used. This item addresses those parts of Provision C.3 that require Co-permittees to collect information regarding the types of pesticide reduction measures implemented for those new development and significant redevelopment projects falling into the Group 1 and Group 2 categories defined in the permit amendment. Provision C.3.n.ii calls for a "summary of the types of pesticide reduction measures required for those new development and significant redevelopment projects to be addressed under Provision C.3.c[1]…." Provision C.9.d.ii contains several tasks related to the control of pesticide use at new and redevelopment projects, including requiring mechanisms to encourage the consideration of pest-resistant landscaping and design features. Co-permittees should check the appropriate boxes if educational materials such as fact sheets or information on pest resistant plants is provided to the owner/project proponent (Education), or if the pesticide-reduction related Conditions of Approval were placed on the project (Conditions of Approval) (See Chapter

[1] C.3.c. refers to applicable projects: Group 1 projects (projects having 1 acre or more of impervious surface area) shall implement the requirements by October 15, 2003. Group I projects (projects having 10,000 square feet or more of impervious surface area) shall implement the requirements starting on April 15, 2005.

II.6.). Some development projects may not have a landscaping component. In such cases "Doesn't Apply" should be checked.

Item 4. Types of Stormwater Controls Used. This item provides three selections: treatment measures, source control measures, and site design measures. These chapters refer to categories of specific stormwater control measures found on page 3. Co-permittees and/or project proponents can indicate on page 3 what specific stormwater control measures will be incorporated into the project. If the control(s) fall under the headings of stormwater treatment, source controls, and/or site design, the requisite boxes should be checked on page 2 as well. Single-family residential homes not part of a common development need only consider or incorporate source control and site design measures to be compliant with Provision C.3. For additional information on stormwater treatment measures, see Chapter III, IV, and VI. For additional information on source controls and site design measures, see Chapter III. Additional resources include BASMAA's Start at the Source (1999) available at www.scvurppp.org, and the California Stormwater BMP Handbooks, located on the web at www.cabmphandbooks.com.

Item 5. Hydromodification Management Plan (HMP) Applicability. The project may need to meet additional requirements associated with the Hydromodification Management Plan (Chapter V). In subsection 5.a. of this item, indicate whether the project will create an increase in impervious surface area compared to the pre-project condition. If 'No", the project is exempt form HMP. If "Yes", proceed to subsection 5.b.

Under subsection 5.b, indicate whether the project discharges into a tidal area, a channel hardened continuously to the Bay or directly to the Bay. If "Yes," the project is exempt from HMP. If "No", proceed to subsection 5.c.

Under subsection 5.c, indicate whether the project is an "infill project in a highly developed watershed." (This definition will be provided by the municipal stormwater staff.). If "Yes", the project is exempt from HMP. If "No," the requirements of the HMP will need to be met.

Specific Stormwater Control Measures. The list on page 3 of the data form provides a method to indicate the stormwater treatment, source control, and site design measures that will be incorporated into the project. The controls listed are consistent with those described in the selection matrices (see Chapter III). Boxes are provided to indicate the number of such systems installed, in the case of stormwater treatment BMPs. For database entry on long-term maintenance tracking, Co-permittees may want to assign codes for each of the measures to ease the entry process (see next chapter on developing a tracking database).

Treatment Control Details. A table is provided on Page 4, allowing the Co-permittee to enter additional details on the stormwater treatment BMPs being installed and maintained for the project. Information includes an identifier for each BMP installed, information on whether the BMP is flow or volume-based, or both (see the selection matrices in Chapter III for guidance), and

the sizing method used. (Chapter IV). Infiltration limitations, such as vertical distance, horizontal distance, and if the project site is in a Santa Clara Valley Water District (SCVWD) Recharge Area are provided (see Chapter III for more information on infiltration limitations to protect groundwater aquifers). Maintenance responsibility information that needs to be collected includes the name and contact information for the responsible party or parties and the type of O&M agreement entered into.

Reviewed By. This final chapter at the bottom of page 4 provides locations for representatives of the planning, building, engineering, and other departments or divisions to indicate their review and approval of the completed data form as a means of promoting interdepartmental communication regarding stormwater controls. There is also a location to indicate who performed data entry into the database. More information on creating an effective database is described next.

VII.3 OVERALL STRATEGY FOR EFFECTIVE DATA MANAGEMENT

To effectively manage data relevant to the reporting requirements described in Permit Provision C.3.e.iii, each Co-permittee should implement a useful data management structure. This structure should include the following:

- A data management structure that links the operations and maintenance verification program (C.3.e) and reporting requirements (C.3.n);
- A mechanism for maintaining and transferring relevant data among individual departments or units; and
- Standardized fields and categories used for reporting purposes.

A discussion of this structure is provided below. In addition, information relevant to the Santa Clara County Vector Control District, existing data management resources (City of Bellevue, WA) and a summary of the recommended data management approach is also provided.

a. Linkage of C.3.e and C.3.n Data

To demonstrate implementation of the revised Performance Standard for Planning Procedures for New Development and Redevelopment (PPPS), the C.3 Permit Oversight Ad Hoc Task Group developed model reporting forms (Attachment VII-3) for Co-permittee use. The data provided within each form will be submitted within individual Co-permittee Annual Reports. Some of the fields listed in the PPPS model reporting forms will demonstrate implementation of BMP O & M verification programs (C.3.e). They include property owner, responsible party and type of treatment BMP. In addition, Co-permittees are required to provide information which identifies inspected stormwater treatment BMPs and BMP inspection results. The PPPS model reporting forms do not require the tracking or submittal of these data types.

b. Transfer of Data between Departments

In some cases, the tracking of C.3.n and C.3.e data may be performed by different departments/units. As a result, a mechanism that allows for the efficient

transfer of data should be developed. For example, if a municipality's planning department/unit tracks pre-construction data (e.g., property owner/responsible party and treatment BMP type) and its code enforcement department/unit tracks post-construction data (e.g., treatment BMP inspection results), the data management structure should be developed to allow for the seamless transfer of data among different department/units.

At a minimum, the mechanism should include standardized fields to ensure that consistent data is transferred. Recommended standardized fields are described below. Information may be transferred using hard copy report forms or electronic files. The storage of data within a spreadsheet or relational database would be the most efficient mechanism for transferring relevant data between individual departments/units.

c. Standardized Fields and Categories

Standardized fields are recommended to maintain consistency among various data management structures and provide for efficient transfer of data between them. Co-permittees should use the following standardized fields to satisfy C.3.e reporting requirements:

1. Property owner;
2. Responsible party;
3. Treatment Control BMP Type*;
4. Address or physical location of BMP;
5. Treatment Control BMP Inspection Date; and
6. Inspection results.

* For treatment control BMP type, standardized categories should be used. A good starting point for a list of BMP types are the list of Treatment Control BMP Fact Sheets is shown in Table VI.2.

Information Relevant to Santa Clara County Vector Control District

Due to problematic designs and improper maintenance, certain treatment control BMPs may provide suitable habitat for mosquito production. To evaluate and reduce all potential mosquito breeding sites within Santa Clara County, the Santa Clara County Vector Control District (Vector Control District) would like to have the ability to review and inspect certain stormwater BMPs. Information relevant to the Vector Control District and procedures regarding the submittal of information to the Program on a routine basis is provided in Chapter VI. Co-permittees should use standardized fields to allow for the efficient compilation and transfer of data to the Vector Control District and individual Co-permittees.

Existing Data Management Resources

Existing databases (used to track and manage stormwater BMP inspection data) are useful resources Co-permittees may use to enhance or develop their data management mechanisms. One example is the Microsoft Access® database developed by the City of Bellevue, WA. The City of Bellevue database is a relational database used to track inspections and stormwater maintenance of privately owned BMPs. It has the capability to generate reports and letters used

for the City's BMP O & M verification program. Information on the City of Bellevue's inspection program can be found on their website at http://www.ci.bellevue.wa.us/page.asp?view=1318.

Data Management Recommendations

It is strongly suggested that individual Co-permittees adopt the following data management approach for tracking and managing data relevant to their BMP O&M verification programs:

1. Develop a mechanism for maintaining and transferring relevant pre-construction data (C.3.n) among individual municipal departments/units that track and manage BMP inspection data (C.3.e).
2. Adopt the six (6) standardized fields and standardized categories for treatment control BMPs discussed above.
3. Incorporate standardized fields and categories into existing data management schemes.
4. Develop or improve data management structures that allow tracking of C.3.e and C.3.n data.

VII.4 REPORTING REQUIREMENTS

Co-permittees are required to submit an annual report to the Regional Board yearly by September 15th, indicating their compliance with the NPDES permit requirements, and progress in continually improving the local stormwater program. Program staff has prepared a standard stormwater reporting form for new and redevelopment activities (see Attachment VII-3).

ATTACHMENT VII-1

Provision C.3 Data Requirements

Attachment VII-1
C.3 Data Requirements

I. General Project Information

A. Project Name*
B. Applicant Name
C. Project Location (address, watershed)
D. Type of Project (new or redevelopment; residential, commercial, industrial, or road)*
   1. If new development:
      a. Site size (acres, sq.ft.)*
      b. Total impervious surface area (acres, sq.ft.)*
      c. Percent imperviousness
   2. If redevelopment:
      a. Site size (acres, sq.ft.)*
      b. Existing impervious surface area (acres, sq.ft.)
      c. Impervious surface area added or replaced (acres, sq.ft.)*
      d. Total impervious surface area (acres, sq.ft.)
      e. Percent increase/replacement of impervious surface area (c/b x 100%)
      f. Area of land disturbance (acres, sq.ft.)*

II. Best Management Practices (BMPs)

A. Treatment BMPs Constructed (description or code)
B. Numeric Sizing Criteria Used (flow and/or volume-based, method, by BMP)
C. Infiltration Limitations
   1. Vertical distance from the base of the infiltration device to the seasonal high groundwater mark (ft.)
   2. Horizontal distance from any water supply wells (ft.)
   3. Located in a designated SCVWD recharge area? (Y/N)
D. Site Design Measures Used (description or code)
   1. Designated open space area (acres, sq. ft.)
   2. Is the site near a stream or waterway?
      a. Distance from the top of the bank to the nearest impervious surface
E. Source Control Measures Required (description or code, from model list)
F. Maintenance of BMPs
   1. Responsible Party (public/private)
   2. Name and address of responsible party
   3. Type of O&M Agreement (list or code)

III. Receiving System

A. Discharge point of project (municipal storm drain system, creek, or Bay)
B. Receiving Water

IV. Miscellaneous

A. Waiver (Project name, location and type from Section I.)
   1. Percent impervious surf ace in final design
   2. Reason for granting a waiver
   3. Terms of the waiver
   4. Stormwater treatment project receiving benefit
   5. Date of completion of project receiving benefit
B. Types of Pesticide Reduction Measures Used (description or code from model list)*

*Data collected since April 17, 2002 per NPDES permit Provision C.3.n

ATTACHMENT VII-2

C.3 Data Form

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

STAFF ONLY
Date of Building Permit: _____
Permit #: _____

PROVISION C.3 SUMMARY DATA FORM

What Projects Apply?

All projects creating, adding, or replacing 43,560 sq. ft.* (1 acre) or more of impervious surface on the project site must fill out this worksheet and submit it to the Building Division prior to building permit issuance. Interior remodeling projects and routine maintenance or repair projects, and projects involving only construction of sidewalks, bicycle lanes, trails, bridge accessories, guardrails, and landscape features are NOT required to complete this worksheet.

What is an Impervious Surface?

An impervious surface prevents the infiltration or passage of water into the soil. Onsite impervious surfaces include building rooftops, paved patios, covered patios, driveways, parking lots, paved walkways, sidewalks and streets.

For More Information

For more information regarding selection of Best Management Practices for stormwater pollution prevention or stormwater treatment contact: _____

Project Name: _____**APN #**__ __ __ - __ __ - __ __ __
Project Description: _____
Applicant Name: _____
Project Location:_____
(address)
Project Location:_____
(watershed) (receiving water)

1. **Project Type (Check all that apply):**

☐ Residential ☐ Commercial ☐ Industrial ☐ Public ☐ Road

☐ New Development ☐ Redevelopment

If Residential, does the project consist of a single-family home that is not part of a larger common plan of development? ☐ Yes ☐ No

If yes, skip to Question 3. The project will be considered in compliance with Provision C.3 with the incorporation of appropriate pollutant source control and site design measures, and the use of landscaping to appropriately treat runoff from the roof and house-associated impervious surfaces (e.g., runoff from roofs, patios, driveways, sidewalks, and similar surfaces).

*** NOTE: After April 15, 2005, the threshold may be reduced to 10,000 sq. ft. or other minimum project size. See municipal stormwater staff for information.**

2. Project size:

a. Site size _____sq. ft.

b. Existing impervious surface area (includes land covered by buildings, sheds, patios/covers, parking lots, streets, sidewalks, paved walkways and driveways onsite)_____sq. ft.

c. Impervious surface area created, added, or replaced_____sq. ft.

d. Total impervious surface area (new + existing)_____sq. ft.

e. Percent increase/replacement of impervious surface area_____ %
c/b(100%)

f. Estimated area of land disturbance during construction _____ sq. ft.
(including clearing, grading, or excavating).

3. Type of Pesticide Reduction Measures Used (Check all that apply):

☐ Education (e.g., fact sheet, plant list) ☐ Conditions of Approval ☐ Doesn't Apply
☐ Other (Describe:_____)

4. Types of Stormwater Controls Used (check all that apply, using lists at end):

☐ Treatment Measures ☐ Source Control Measures ☐ Site Design Measures
☐ Alternative Compliance (attach documentation)

5. Hydromodification Management Plan Applicability:

a. Does project create an increase in impervious surface from the pre-project condition (i.e., is 2.d. > 2.b.)?

☐ Yes (continue) ☐ No – exempt from HMP, go to page 3

b. Does project discharge to a tidal area, a channel hardened continuously to the Bay, or directly to the Bay?

☐ No (continue) ☐ Yes – exempt from HMP, go to page 3

c. Is project an "infill project in a highly developed watershed" (check with municipal stormwater staff for definitions).

☐ No, project must implement HMP requirements

☐ Yes – exempt from HMP, go to page 3

Specific Stormwater Control Measures:

Stormwater Treatment

- ❑ Biofilter (vegetated swale or strip)
- ❑ Bioretention
- ❑ Detention basin (dry)
- ❑ Wet pond (detention)
- ❑ Underground detention (e.g. Porous Pavement Recharge Bed)
- ❑ Media filter (sand, organic matter, manufactured)
- ❑ Hydrodynamic device (commercially available in-line treatment unit e.g. wet vault, vortex separator)
- ❑ Infiltration trench or basin
- ❑ Retention/irrigation
- ❑ Constructed wetland (basin or channel)
- ❑ Water quality inlet filter
- ❑ Drain insert
- ❑ Green Roof (rooftop vegetation)
- ❑ Other _____

Source Controls

- ❑ Alternative Building Materials
- ❑ Wash area/racks, drain to sanitary sewer
- ❑ Covered dumpster area, drain to sanitary sewer
- ❑ Swimming pool/fountain drain to sanitary sewer
- ❑ Beneficial landscaping (minimizes irrigation, runoff, pesticides and fertilizers; promotes treatment)
- ❑ Outdoor material storage protection
- ❑ Covers, drains for loading docks, maintenance bays, fueling areas
- ❑ Maintenance (street sweeping, catch basin cleaning)
- ❑ Storm Drain Signage
- ❑ Green or Blue Roofs
- ❑ Other _____

Site Design

- ❑ Minimize land disturbance
- ❑ Minimize impervious surfaces
- ❑ Minimum-impact street design
- ❑ Minimum-impact parking lot design
- ❑ Cluster structures/ pavement
- ❑ Permeable pavement
- ❑ Alternative driveway design
- ❑ Disconnect downspouts
- ❑ Microdetention in landscape
- ❑ Preserved open space: _____ ac. or ft.(circle one)
- ❑ Protected riparian and wetland areas, riparian buffers (Setback from top of bank: _____ft.)
- ❑ Other _____

Santa Clara Valley
Urban Runoff
Pollution Prevention Program

STAFF ONLY
Date of Building Permit: _____
Permit #:_____

Treatment Control Details

Treatment BMP	Numeric Sizing Criteria Used			Infiltration Limitations	
	Flow	**Volume**	**Sizing Method**	**Vertical Distance**	**Horizontal Distance**

A. Property Owners Name _____
B. Responsible Party—Stormwater Treatment Measure Owner or Operator's Information:
   a. Name: _____
   b. Address: _____
   c. Phone/Fax/E-mail: _____

This section to be completed by Municipal staff

More Detailed Information About Access Assurance and O&M Responsibilities:

Describe how access permission is assured for O&M verification by public agencies or their representatives (e.g., municipality, Regional Water Quality Control Board, and County Vector Control District):

_____

_____

Indicate how responsibility for O&M is assured. Check all that apply:

- ☐ Signed statement from private entity accepting responsibility for O&M until responsibility is legally transferred.
- ☐ Signed statement from public entity _____ accepting responsibility from O&M until responsibility is legally transferred. (Name)
- ☐ Written conditions in the sales or lease agreement requiring the buyer or lessee to assume O&M (in case of purchase and sale agreements, conditions shall survive the close of escrow).
- ☐ Written test in projects conditions, covenants and restrictions for residential properties assigning O&M responsibilities to the homeowner association.
- ☐ Any other legally agreement or mechanism that assigns responsibility (describe below).

_____

Reviewed:

Community Development Department

Planning Division: _____

Building Division: _____

Public Works Department

Engineering: _____

Other (Specify): _____

Return form to: _____

Data entry performed by:_____

ATTACHMENT VII-3

Co-permittee Reporting Form for Planning Procedures Performance Standard and Provision C.3.n.i Reporting Requirements

[Co-permittee Name]

Reporting Form for Planning Procedures Performance Standard

and Provision C.3.n.i. Reporting Requirements

Part 1

New Development and Significant Redevelopment Projects[1]

Reviewed and/or Approved During _____

Project Name	Project Type[2]	Site Size (ac. or s.f.)	New Impervious Surface (s.f.)[3]	Area of Land Disturbed (Ac.)[4]	Project Status	Storm Water Control Measures Included in Project
Private Projects						
Public Projects						

[1] Prior to April 15, 2005, list all projects with new impervious surface area greater than 1 acre (43,560 s.f.).
After April 15, 2005, list all projects with new impervious surface area greater than 10,000 s.f.

[2] Describe project type, as defined in Provision C.3.c.

[3] "New" is defined as impervious surface created, added or replaced.

[4] If the site is a "significant redevelopment", list the area of land disturbance, if information is readily available.

[Co-permittee Name]
Reporting Form for Planning Procedures Performance Standard
and Provision C.3.n.ii. & iii. Reporting Requirements

Part 2

Stormwater Control Measures[5]

Reviewed and/or Approved During FY_____

Project Name	Treatment BMPs	Numeric Sizing Criteria Used	O&M Responsibility Mechanism and Responsible Party	Site Design Measures	Source Control Measures	Pesticide Reduction Measures
Private Projects						
Public Projects						

[5] Prior to April 15, 2005, list all* projects with new impervious surface area greater than 43,560 s.f. (1 acre).
After April 15, 2005, list all projects with new impervious surface area greater than 10,000 s.f.
See SCVURPP "C.3. Handbook: Guidance for Implementation of Stormwater Requirements for New and Redevelopment Projects".
*Projects that do not require stormwater treatment because they fall under the Alternative Compliance Program must be reported as per Provision C.3.g.v. (see Reporting Form Part 3).

[Co-permittee Name]
Reporting Form for Planning Procedures Performance Standard
and Provision C.3.g.v. Reporting Requirements

Part 3

Alternative Compliance/Waiver Program Projects
Reviewed and/or Approved During FY_____

Project Name and Location	Project Type	Final Percent Impervious Surface	Reasons for Allowing Alternative Compliance	Alternative Compliance Terms	Project Receiving Benefit (Date of Completion)
Private Projects					
Public Projects					

GLOSSARY OF TERMS

Beneficial Use	A waterbody's beneficial uses are the resources, services, and qualities of aquatic systems that are the ultimate goals of protecting and achieving high water quality. The beneficial uses of surface waters, groundwaters, marshes, and mudflats serve as a basis for establishing water quality objectives and the discharge prohibitions or conditions necessary to attain them.
Best Management Practice (BMP)	Any program, technology, process, siting criteria, operational method or measure, or engineered system, which when implemented prevents, controls, removes, or reduces pollution. Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the water pollution. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.
Bioretention	System designed to filter pollutants from runoff using a combination of vegetated buffer strip, sand bed, ponding area, organic layer, planting soil, and plants.
Buffer Strip or Zone	Strip of erosion-resistant vegetation over which stormwater runoff is directed.
Catch Basin	Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavements.
Clean Water Act (CWA)	The Federal Water Pollution Prevention and Control Act, or Clean Water Act (33 United States Code 1251 et seq.) is structured to control or eliminate surface water pollution and establish uniform standards for publicly owned treatment works, direct industrial discharges and indirect industrial discharges.
Conditions of Approval (COAs)	Requirements the City may adopt for a project in connection with a discretionary action (e.g., adoption of an EIR or negative declaration or issuance of a use permit). COAs may include features to be incorporated into the final plans for the project and may also specify uses, activities, and operational measures that must be observed over the life of the project.
Conduit	Any channel or pipe for directing the flow of water.
Constructed Wetland	Constructed detention basins that have a permanent pool of water throughout the year and capacity for temporary additional storage of runoff that is released via an outlet structure. They differ from wet ponds in that they are typically shallower and have greater vegetation coverage.

Construction General Permit	A NPDES permit issued by the State Water Resources Control Board (SWRCB) for the discharge of stormwater associated with construction activity from soil disturbance of one (1) acre or more.
Contained and Flow-Through Planter Box	Structures that are built on either impervious (contained) or pervious surfaces (flow-through) designed to intercept rainfall and slowly drain it through filter media and out of planter.
Conveyance System	Any channel or pipe for collecting and directing the stormwater.
Culvert	A covered channel or a large diameter pipe that crosses under a road, sidewalk, etc.
Design Storm	A synthetic rainstorm defined by rainfall intensities and durations.
Detention	The temporary storage of stormwater runoff in ponds, vaults, within berms, or in depressed areas to allow treatment by sedimentation and metered discharge of runoff at reduced peak flow rates. See Infiltration and retention.
Directly-Connected Impervious Area (DCIA)	The area covered by a building, impermeable pavement, and/or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable land area (e.g., turf buffers).
Directly Discharging	Outflow from a drainage conveyance system that is composed entirely or predominantly of flows from the subject, property, development, subdivision, or industrial facility, and not commingled with the flows from adjacent lands.
Discharge	A release or flow of stormwater or other substance from a conveyance system or storage container.
Drawdown Time	The time required for a stormwater detention or infiltration BMP to drain and return to the dry-weather condition. For detention BMPs, drawdown time is a function of basin volume and outlet orifice size. For infiltration BMPs, drawdown time is a function of basin volume and infiltration rate.
Dry Well	Structure placed in an excavation or boring, or excavation filled with open-graded rock, that is designed to collect stormwater and infiltrate into the subsurface soil.
Environmentally Sensitive Area (ESA)	An area "in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments" (California Public Resources Code § 30107.5). Areas subject to stormwater mitigation requirements are: 303d listed water bodies in all reaches that are unimproved and soft- bottomed and all California Coastal Commission's Environmentally Sensitive Habitat Areas as delineated on maps in Local Coastal Plans. The California Department of Fish and Game's (CDFG) Significant Natural Areas map will be considered for inclusion as the department field verifies the designated locations.
Erosion	The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices relating to farming, residential or industrial development, road building, or timber cutting.

Excavation	The process of removing earth, stone, or other materials, usually by digging.
Extended Detention Basin	Constructed basins with drainage outlets that are designed to detain runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow settling of sediment and pollutants
Filter Fabric	Geotextile of relatively small mesh or pore size that is used to: (a) allow water to pass through while keeping sediment out (permeable); or (b) prevent both runoff and sediment from passing through (impermeable).
Flow-based BMPs	BMPs that treat pollutants from a moving stream of water through filtration, infiltration, and/or biological processes.
Grading	The cutting and/or filling of the land surface to a desired shape or elevation.
Groundwater	Subsurface water that occurs beneath the water table in soils, and geologic formations that are fully saturated.
Hazardous Substance	(1) Any material that poses a threat to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive; (2) Any substance named by EPA to be reported if a designated quantity of the substance is spilled in the waters of the United States or if otherwise emitted into the environment.
Hazardous Waste	By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (flammable, corrosivity, reactivity, or toxicity), or appears on special EPA lists.
Hydrodynamic Device	Flow-through structures with a settling or separation unit that removes sediments and other pollutants.
Hydromodification Management Plan (HMP)	Required by the C.3 provisions to the stormwater NPDES permit, the HMP will be submitted to the Regional Water Quality Control Board (Regional Board) in June 2004. The HMP, once approved by the Regional Board, will be implemented so that post-project runoff shall not exceed estimated pre-project rates and/or durations, where the exceedance would result in increased potential for erosion or other adverse impacts to beneficial uses. (See Chapter V.)
Illegal Discharges	Any discharge to a municipal separate storm sewer that is not composed entirely of stormwater, except discharges authorized by an NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.
Imperviousness	Term applied to surfaces – roads, sidewalks, rooftops, and parking lots – that prevent or inhibit rainfall from sinking into groundcover and groundwater.
Impracticable	As applied to on-site treatment BMPs, technically infeasible excessively costly, as demonstrated by set criteria.
Infeasible	As applied to on-site treatment BMPs, impossible to implement because of technical constraints specific to the site.
Infiltration	Seepage of runoff through the soil to mix with groundwater. See retention.
Infiltration and Exfiltration Trench (Includes Trench Drain)	Long narrow trench filled with permeable material (e.g., gravel), which may contain perforated pipe (exfiltration), designed to store runoff and infiltrate through the bottom and sides into the subsurface soil.

Infiltration Basin	Shallow impoundment that is designed to infiltrate stormwater into the subsurface soil.
Inlet	An entrance into a ditch, storm sewer, or other waterway
Intensity-Duration-Frequency (IDF)	An adjunct to the rational method (see), IDF allows calculation of the governing rainfall intensity based on the estimated time required for runoff flows from the farthest point of a drainage area to reach the point where peak flows are to be determined.
Lined Retention Pond/Irrigation System	System designed to capture runoff in a holding pond with impervious bottom and subsequently use the captured volume for irrigation of landscape with natural pervious areas.
Low Impact Development/Better Site Designs	Low Impact Development is an integrated site design methodology that uses small-scale detention and retention to replicate pre-existing site hydrological conditions.
Material Storage Areas	On site locations where raw materials, products, final products, by-products, or waste materials are stored.
Maximum Extent Practicable (MEP)	Standard, established by the 1987 amendments to the Clean Water Act, for the implementation of municipal stormwater pollution prevention programs.
Media Filtration Device	Two-chambered systems that include a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media.
New Development	Land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.
Non-Stormwater Discharge	Any discharge to municipal separate storm drain that is not composed entirely of stormwater. Discharges containing process wastewater, non-contact cooling water, or sanitary wastewater are non-stormwater discharges.
Non-Structural Source Control Measure	Low technology, low cost activities, procedures, or management practices designed to prevent pollutants associated with site functions and activities from being discharged with Stormwater runoff. Examples include good housekeeping practices, employee training, standard operating practices, inventory control measures, etc.
Notice of Intent (NOI)	A formal notice to State Water Resources Control Board submitted by the owner/developer that a construction project is about to begin. The N0I provides information on the owner, location, type of project, and certifies that the permittee will comply with the conditions of the State Construction General Permit.
NPDES Permit	An authorization, license, or equivalent control document issued by EPA or an approved State agency to implement the requirements of the National Pollutant Discharge Elimination System (NPDES) program. As part of the 1972 Clean Water Act, Congress established the NPDES permitting system to regulate the discharge of pollutants from municipal sewers and industries. The NPDES was expanded in 1987 to incorporate permits for stormwater discharges as well.

Numeric Criteria	Sizing requirements for stormwater treatment BMPs established in Provision C.3.d. of the SCVURPPP stormwater NPDES permit.
Outfall	The point where stormwater discharges from a pipe, channel, ditch, or other conveyance to a waterway.
Percentile Rainfall Intensity	A method of determining design rainfall intensity based on a ranking of storms, over a long period, by rainfall intensity and selection of a percentile.
Permeability	A property of soil that enables water or air to move through it. Usually expressed in inches/hour or inches/day.
Permeable Pavement	Permeable hardscape or paved surface that allows surface runoff to infiltrate into surface soil (e.g., turf block, brick, natural stone, cobbles, gravel).
Planned Unit Development (PUD)	Allows land to be developed in a manner that does not conform to existing zoning requirements. Allows greater flexibility and innovation because the PUD is regulated as one unit instead of each lot being regulated separately.
Pollutant	A substance introduced into the environment that adversely affects the usefulness of a resource.
Precipitation	Any form of rain or snow.
Pretreatment	Treatment of wastewater before it is discharged to a wastewater collection system.
Process Wastewater	Wastewater that has been used in one or more industrial processes.
Provision C.3	A reference to the Provisions, added in November 2001, by the Regional Water Quality Control Board to the SCVURPPP stormwater NPDES permit requiring SCVURPPP to change its development review process to control the flow of stormwater and stormwater pollutants from new and redevelopment sites. (Regional Board Order 01-119.)
Rational Method	A method of calculating runoff flows based on the ratio of pervious and impervious areas, rainfall intensity, and tributary area. See Chapter IV and Appendix F.
Redevelopment	A project on a previously developed site that results in the addition or replacement of impervious surface on such an already developed site. Development that includes, but is not limited to the following: the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; land disturbing activities related with structural or impervious surfaces.
Regional (or Watershed) Stormwater Treatment Facility	A facility that treats runoff from more than one project or parcel.
Regional Water Quality Control Board, San Francisco Bay Area Regional Board	One of nine (9) California Regional Boards, the Regional Board for the San Francisco Bay Region is responsible for implementing pollution control provisions of the Clean Water Act and California Water Code within the area that drains to San Francisco Bay.
Retention	The storage of stormwater to prevent it from leaving the development site; may be temporary or permanent.

Roof Garden	Vegetated roof systems that retain and filter stormwater prior to drainage off building rooftops.
Runoff	Water originating from rainfall and other precipitations (e.g., sprinkler irrigation) that is found in drainage facilities, rivers, streams, springs, seeps, ponds, lakes, wetlands, and shallow groundwater.
Runon	Stormwater surface flow or other surface flow that enters property other than that where it originated.
Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP)	SCVURPPP is established by a memorandum of understanding among 13 Santa Clara Valley cites and towns, Santa Clara County, and the Santa Clara Valley Water District, who are listed as Co-permittees in an NPDES Stormwater discharge permit issued by the Regional Water Quality Control Board. SCVURPPP implements common tasks and assists the member agencies to implement their local stormwater pollution prevention programs.
Secondary Containment	Structures, usually dikes or berms, surrounding tanks or other storage containers and designed to catch spilled material from the storage containers.
Sedimentation	The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff
Sediments	Soil, sand, and minerals washed from land into water usually after rain, that accumulate in reservoirs, rivers, and harbors, destroying aquatic animal habitat and clouding the water so that adequate sunlight might not reach aquatic plants.
Source Control BMP or Measure	Any schedules of activities, structural devices, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent stormwater pollution by reducing the potential for contamination at the source of pollution.
Spill Guard	A device used to prevent spills of liquid materials from storage containers.
Storm Drain System	Network of above and belowground structures for transporting stormwater to streams or outfalls.
Storm Drains	Above and belowground structures for transporting stormwater to streams or outfalls for flood control purposes.
Storm Event	A rainfall event that produces more than 0.1 inch of precipitation and is separated from the previous storm event by at least 72 hours of dry weather.
Stormwater	Stormwater runoff, snow-melt runoff, surface runoff, and drainage, excluding infiltration and irrigation tailwater.
Stormwater Control Operation & Maintenance Verification Plan	A plan detailing operation and maintenance requirements for stormwater treatment BMPs incorporated into a project.
Stormwater Control Plan	A plan specifying and documenting permanent site features and BMPs that are designed to control pollutants for the life of the project.
Stormwater NPDES Permit	The permit issued to 13 Santa Clara Basin cities and towns, Santa Clara County, and the Santa Clara Valley Water District by the Regional Water Quality Control Board for the San Francisco Bay Region. Order 01-024. Order 01-119 amended Provision C.3 of the permit.

Stormwater Pollution Prevention Plan (SWPPP)	A plan providing for temporary measure to control sediment and other pollutants during construction.
Structural BMP or Control Measure	Any structural facility designed and constructed to mitigate the adverse impacts of stormwater and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both Treatment Control BMPs and Source Control BMPs.
Treatment	The application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media adsorption, biodegradation, biological uptake, chemical oxidation and UV radiation.
Treatment Control BMP or Measure	Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.
Underground Detention System	System that consists of underground detention tank, vault or pipes that is designed to fill with stormwater during large storm events and slowly release it back into stormwater conveyance systems over a number of hours.
Unlined or Open-Bottomed Vault or Box Below Grade	Below grade structure designed to receive runoff from conveyance systems and store stormwater. Storage structure allows infiltration of stormwater into subsurface soil. (Includes bubble ups and permeable pavement with underground storage)
Unlined Retention Basin	A basin without an outlet that is designed for storing runoff and infiltrating stormwater into the subsurface soils. Basin is not designed to drain runoff into any stormwater conveyance system.
Vegetated Filter Strip	Linear strips of vegetated surfaces that are designed to treat sheet runoff flow from adjacent surfaces.
Vegetated Swale	Open, shallow channels with vegetation covering side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points.
Volume-based BMPs	BMPs that detain stormwater for a certain period and treat primarily through settling and infiltration.
Water Quality Inlet	Systems that contain one or more chambers that promote sedimentation of coarse materials and separation of undissolved oil and grease from Stormwater.
Water Quality Volume (WQV)	For BMPs that depend on detention to work, the volume of water that must be detained to achieve maximum extent practicable pollutant removal. This volume of water must be detained for a specified drawdown time.
WEF Method	A method for determining the required volume of treatment BMPs, recommended by the Water Environment Federation and American Society of Civil Engineers. Described in Urban Runoff Quality Management (WEF/ASCE, 1993).
Wet Pond	Constructed detention basins that have a permanent pool of water throughout the year and capacity for temporary additional storage of runoff that is released via an outlet structure. They differ from constructed wetlands in that they typically have a greater average depth and less vegetation.

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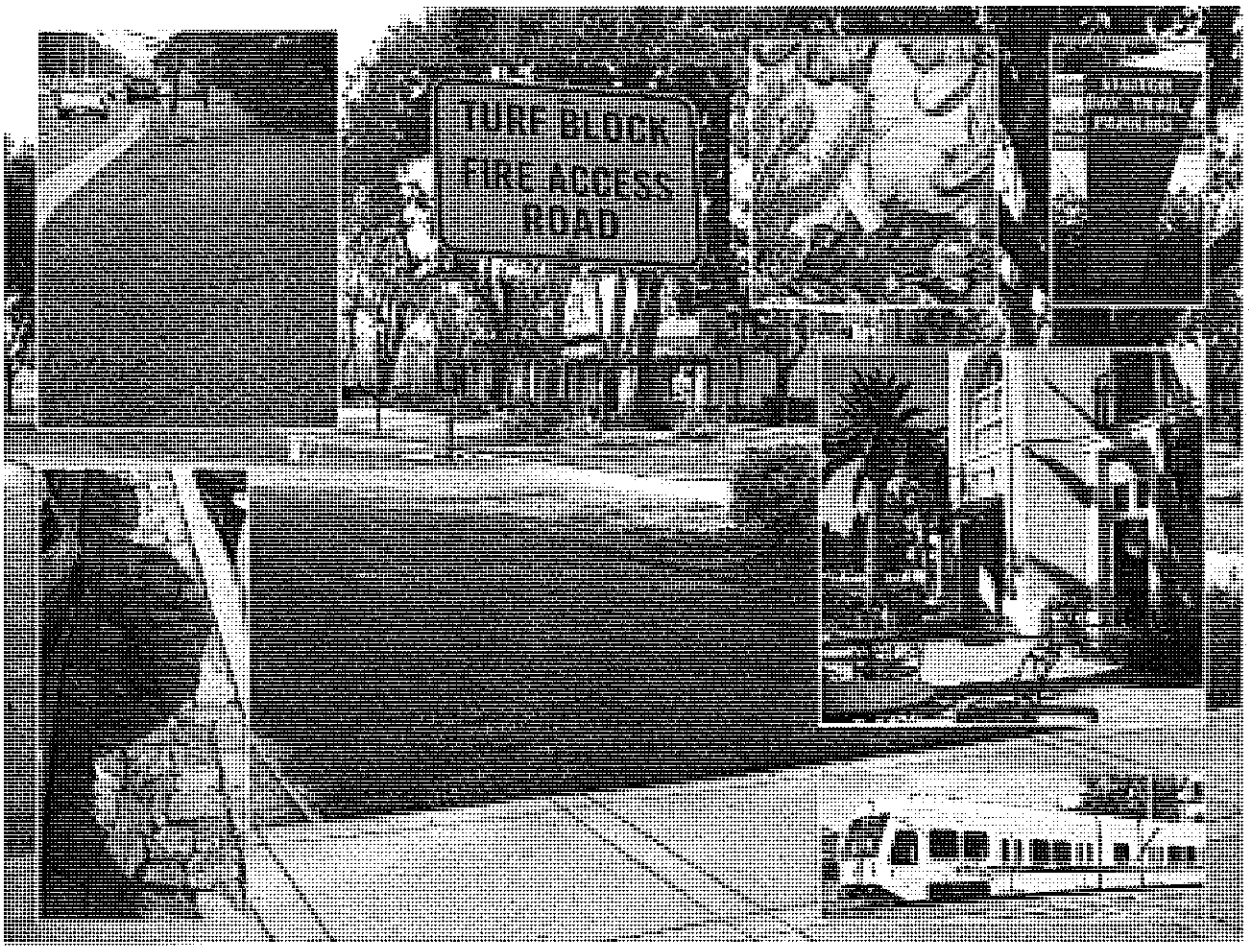
Developments Protecting Water Quality

A Guidebook of Site Design Examples



Santa Clara Valley
Urban Runoff
Pollution Prevention Program

February 2007

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Urban Runoff
Pollution Prevention Program

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Prepared by:
EOA, Inc.

CREDITS

This report was prepared for the Santa Clara Valley Urban Runoff Pollution Prevention Program for use by the Program co-permittees, the additional municipalities that were reviewed, and the Santa Clara Basin Watershed Management Initiative (WMI) Core Group and appropriate subgroups.

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COYOTE CREEK STREAM

STEWARDSHIP PLAN

Special acknowledgement is made to the following people for their diligent efforts in completing the Coyote Watershed Stream Stewardship Plan.

District's Project Team

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Stream Stewardship Plan Summary

The Santa Clara Valley Water District's Board of Directors established the Ends Policy to further the District's mission for comprehensive water/flood management programs to better serve the community. The Ends Policy, in part, envisions a watershed in which:

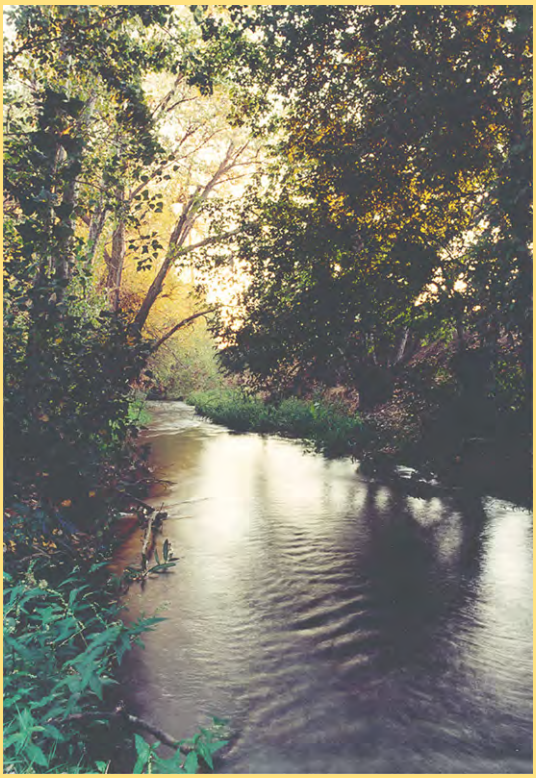
1. **There is a healthy and safe environment for residents and visitors.**
   - 1.1 There is a reliable supply of healthy, clean drinking water.
   - 1.2 There is a reduced potential for flood damages.
2. **There is an enhanced quality of life in Santa Clara County.**
   - 2.1 Watersheds, streams, and the natural resources therein are protected and when appropriate enhanced or restored.
   - 2.2 There are additional open spaces, trails, and parks along creeks and in the watersheds when reasonable and appropriate.

The Santa Clara Valley Water District (District) developed the Stream Stewardship Plan (SSP or Plan) to provide a strategic approach for implementing the Ends Policy using a watershed management approach to provide stream stewardship within the Coyote Watershed.

> "The vision of the Coyote Watershed Stream Stewardship Program is a watershed in which the water resources are managed to provide living streams; a healthy, safe, and enhanced quality of life for people and wildlife; and improvement of the habitats they occupy."

The Coyote Watershed is the largest watershed in the Santa Clara Basin and consists of all of the land that drains into the Coyote Creek or its 29 major tributaries. The Coyote Watershed is home to over 1,000,000 people and also provides aquatic and riparian habitat for plants and animals, including a number of threatened or endangered species. Flooding events have frequently occurred within the Watershed. As a result, many of

Figure ES-1
Upper Penitencia Creek



the creek channels along the valley floor have been modified for flood protection with the addition of earthen levees or concrete and rock lined channels, which provide limited habitat. One of the goals of the watershed management approach is to promote multi-objective projects that provide flood protection and protect natural resources to improve the quality of life within Santa Clara County.

Development of the Stream Stewardship Plan:

The Plan was developed in a collaborative manner between District Staff and local stakeholders through the creation of a short-term work group within the Santa Clara Basin Watershed Management Initiative (WMI) as shown on Figure ES-2.

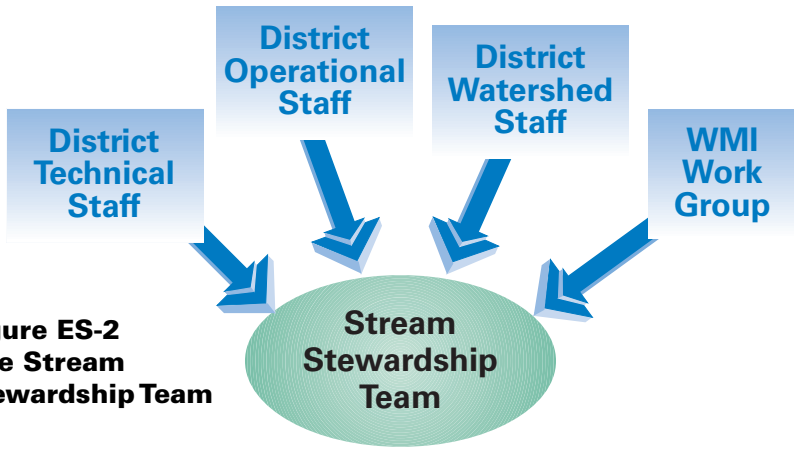


Figure ES-2 The Stream Stewardship Team

The work group provided a method for obtaining input and support from WMI stakeholders, avenues for preliminary coordination with other agencies, and assisted in identification of candidate projects, guidelines and the vision for the Watershed. Workgroup members contributed to the SSP through three different levels of participation: through being on the e-mail distribution list, attending workgroup meetings, and providing written comments. In addition, the WMI Core Group has been provided with updates on this Plan through monthly meetings and mailings.

The work group assisted District Staff in identifying important issues to be addressed in the plan, drafting the outline of the plan, and participating in visioning exercises to develop goals and objectives and brainstorm potential data gaps or candidate projects. Many District staff from the Coyote Watershed Program, Office of Countywide Watershed Management, and the Water

Supply Division also contributed to SSP work.

The Plan compiled existing regulatory, physical, environmental, and institutional conditions in the Coyote Watershed and summarized projects done by other agencies affecting the watershed. Development of the Plan's vision, goals, objectives, and candidate projects are based in part on the condition of the Watershed as represented by the available data. However, the compilation of data indicated that additional data is needed regarding the environmental condition of the Watershed. As a result, many of the identified candidate projects are studies to obtain more information and data. One of the recommendations for the future is to conduct a watershed study to more fully evaluate the environment/habitat condition of the Watershed and to update the Plan to incorporate the new data.

The District Ends Policy formed the basis of a visioning process that established a vision, goals and objectives for the Coyote Watershed. Candidate programs and projects were developed for those cases in which the existing conditions did not meet the Watershed goals and objectives. The Plan team developed criteria to rank how closely each program or project supported the Watershed goals. The result was a list of candidate programs and projects ranked from several perspectives, including meeting flood protection goals, environment/ habitat restoration goals, and community participation/recreation goals.

Implementation of the Plan will move the District towards accomplishing the District's mission and implementing the Ends Policy. Implementation of individual projects within the District includes consideration of a number of factors. These factors could include availability of funding, requirements of existing mandates or regulations, and immediate-need projects such as those in response to emergencies, requests from partner agencies, or urgent Board issues. The Plan's list of candidate projects and programs and their resultant ranking is now another tool that can be used by District management to

The team developed criteria to rank how closely each program or project supported the watershed goals.

The plan provides a logical framework for linking to other regional planning efforts

help select projects for funding and implementation. The highest-ranking projects from the Plan are those that best fulfill the goal of implementing the Ends Policy within the Coyote Watershed. These projects are summarized in Table ES-1 at the end of the Executive Summary.

The project ranking process in this Plan includes only the candidate projects identified as part of the Coyote Watershed Stream Stewardship Plan. As a watershed management approach is adopted in other watersheds, additional linkages will be needed to integrate the prioritization and implementation of projects resulting from various Capital Improvement Programs, including other stream stewardship plans, the District's Integrated Water Resources Plan (IWRP), and the Fisheries Aquatic Habitat Collaborative Effort (FAHCE) programs. A comprehensive ranking of all projects within the District should be considered as a tool to help select projects for funding at the District level.

There are a number of on-going regional efforts in parallel to the Plan. The results of those regional efforts are important to the management of Coyote Watershed in the long run. The Plan is intended to provide a logical framework for establishing the linkage to these efforts rather than to short cut or to duplicate them. It is also important to recognize the Plan is not the end of the District's efforts for stewardship efforts; it is rather a coherent framework for coordinated efforts within the Coyote Watershed.

The Stream Stewardship Plan is a dynamic document that will be modified as conditions change within the Watershed. Implementation of the Plan will move the District towards accomplishing the District's mission and implementation of the Ends Policy. This Plan includes a discussion of how the watershed management strategies can be implemented including performance measures to track the effectiveness of the Plan, drivers for project selection and implementation, roles and responsibilities of various District divisions and units, potential partnerships with non-District agencies, and how the Plan will be updated.

The Plan includes the following chapters:

Tables ES-2
Stream Stewardship Plan Contents

Chapter 1	Introduction
Chapters 2 - 7	Compilation of Existing Watershed Data
Chapter 8	Vision, Goals, and Objectives
Chapters 9 - 11	Candidate Projects, Programs, Guidelines, and Activities
Chapter 12	Project Ranking Process
Chapter 13	Funding
Chapter 14	Implementation

ES.1 What is the Coyote Watershed?

The Coyote Watershed, shown on Figure ES-3, consists of all of the land that drains into the Coyote Creek or its 29 major tributaries. Encompassing an area of over 320 square miles, it is the largest watershed in the Santa Clara Basin and is wholly contained within Santa Clara County. The watershed extends northward from Morgan Hill to the Alameda County border, and comprises the city of Milpitas, eastern San Jose, the northern tip of Morgan Hill and unincorporated lands of Santa Clara County.

The south and east sides of the Watershed are bounded by the Diablo Range while Coyote Creek largely forms the western side. The Watershed is home to over 1,000,000 people and also provides habitat for several endangered or threatened species including the California

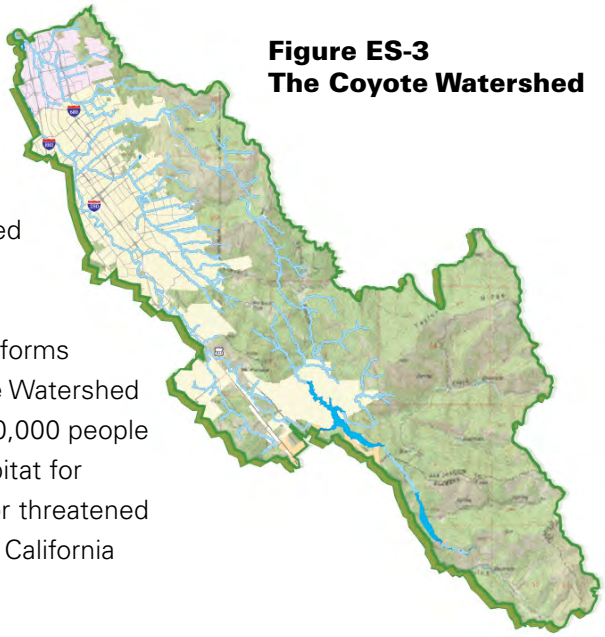


Figure ES-3
The Coyote Watershed

red-legged frog, bank swallow, steelhead, Chinook salmon, Santa Clara Valley Dudleya, and 12 other species of plants and animals.

Figure ES-4. Unmodified channels provide the best habitat.

The Coyote Watershed stretches over a large and varied topography. The eastern and southern portions are upland areas with elevations ranging up to 4,000 feet. The upland areas are sparsely populated. Some of the creeks in the uplands areas are still in their natural condition. Unmodified channels with abundant trees and a wide corridor provide the best riparian habitat, water quality, and flood protection. Areas of channels with no trees contain herbaceous vegetation, which provide habitat for amphibians, reptiles, rodents, and birds. Areas with trees provide more cover and habitat for native fish and other aquatic species. The creeks that have not been impacted by flood improvement projects or channel modifications include: Boyds, San Felipe, Cow, Carlin Canyon, Packwood, Hoover, Spinter Valley, Spring, Shingle, and Las Animas.

The northern and western portions comprise the heavily developed valley floor area and include the Cities of San Jose and Milpitas. The valley floor's increasing density of development, transportation corridors, and encroachment into the flood plain has had a profound impact on the stream corridors of the watershed. Development limits the natural meandering of a stream, which impacts riparian, aquatic, and wildlife habitats. Pavement and buildings associated with development also make the ground's surface less pervious and increases the rate of runoff during storm events. This increases the volume of storm water runoff that a creek is expected to carry in a given time and also increases the amount of sediment and debris carried by the runoff. The sediment and debris settles in the stream channels and further comprises the stream's hydraulic capacity.

Flooding events have frequently occurred within the watershed.

Recent flooding events include large portions of San Jose and Milpitas in l997, and at the Berryessa/Calera Creek confluence in 1998. Twenty percent of the Coyote Watershed is located within the Federal Emergency Management Agency (FEMA) 1% floodplain and homeowners must purchase flood insurance as a condition of home loans. All cities and towns in Santa Clara County participate in the National Flood Insurance Program, which provides federally-backed flood insurance to communities that enact and enforce floodplain regulations. In addition, the local agencies of Santa Clara County also participate in the Community Rating System program, which rewards communities that participate in flood management and education over and beyond the minimum requirements.

In response to the flooding events, approximately 407,000 feet, or 77 miles of creek channels along the valley floor have been modified for flood protection with the addition of earthen levees, trapezoidal concrete channels, floodwalls, culverts or concrete and rock lined channels. Design and operation of the modified channels were historically focused on conveying 100-year storm flows and accommodating new development adjacent to the stream corridors. The modifications provide limited opportunities for multi-objective purposes such as creation of riparian habitat, aquatic habitat or recreation for flood protection.

Figure ES-5. Flood control projects have modified 77 miles of natural stream channels.

More recent projects have incorporated a wider range of goals such as aquatic and riparian habitat restoration and public access in addition to the 100-year flood protection goal. The Plan provides the framework to design future projects that would implement multiple components of the District's Ends Policy, which would help to integrate multi-objectives into District projects.

ES.2 Who Has Jurisdiction Over the Coyote Watershed?

A plethora of governmental and regulatory agencies manage and regulate many aspects of the Coyote Watershed. The five general levels of governmental authority working in the Watershed include:

- Municipalities;
- Santa Clara County;
- Special District Regional Agencies including the Santa Clara Valley Water District;
- State Agencies; and
- Federal Agencies

The Santa Clara Valley Water District plays an important role in the Coyote Watershed. The District is the comprehensive water management agency for Santa Clara County providing wholesale water supply, flood protection, and watershed stewardship. The implementation of District projects and programs are subject to the regulations and requirements established by the applicable state and federal regulatory agencies, which are listed in Table ES-3.

In addition to the governmental agencies, many stakeholder groups are also involved in Watershed activities. Stakeholder groups are cross-sections of the community and provide valuable input to the development and execution of District activities. There are numerous stakeholder groups active in the Coyote Watershed including the partial list shown in Table ES-4.

Many of the stakeholder groups also participate in the Santa Clara Basin Watershed Management Initiative (WMI). The Santa Clara Basin Watershed Management Initiative (WMI) is a collaborative, stakeholder driven effort among representatives from regional and local public agencies (e.g. United States Environmental Protection Agency, San Francisco Bay Regional Water Quality Control Board, California Department of Fish and Game), civic, environmental, resource conservation and agricultural groups (e.g. CLEAN South Bay, Santa Clara County Streams for Tomorrow, Greenbelt Alliance); professional and trade organizations (e.g. Silicon Valley Manufacturing Group, Silicon Valley Chamber of Commerce); business and industrial sectors (e.g. , California Restaurant

Association, Home Builders Association of Northern California); and the general public. The WMI's mission is to protect and enhance the Watershed, creating a sustainable future for the community and the environment. The WMI created a special working group that has provided the primary stakeholder input for development of the Stream Stewardship Plan.

The Plan provides a method to relate the stream stewardship concept to other programs. It implements portions of the WMI process by identifying candidate projects and activities. It identifies potential funding avenues for projects. When the WMI Watershed Action Plan is prepared, the results will be incorporated into Plan updates. The Plan also complements WMI efforts by identifying what the District will do to benefit the Watershed.

Table ES-3
Governmental Agencies Working Within the Coyote Watershed

TOPIC	LEAD AGENCIES
Flood Management and Control	• Federal Emergency Management Agency • California Department of Water Resources • US Army Corps of Engineers • Santa Clara Valley Water District
Water Quality	• US EPA • State Water Resources Control Board • San Francisco Regional Water Quality Control Board
Drinking Water Quality	• California EPA • Department of Health Services • Santa Clara Valley Water District
Water Rights	• California Department of Water Resources • State Water Resources Control Board • US Bureau of Reclamation
Wetlands and Riparian Zones	• Regional Water Quality Control Board • Bay Conservation and Development Commission • US Army Corps of Engineers
Endangered Species and Fisheries	• US Fish and Wildlife Service • California Department of Fish and Game • National Marine Fisheries Service
Land Use	• San Jose, Milpitas, Morgan Hill • Santa Clara County • California State Lands Commission • Bay Conservation and Development Commission
Transportation	• Valley Transportation Authority • Metropolitan Transit Commission
Vector Control	• Santa Clara County
Pesticides	• Department of Pesticide Regulation

Table ES-4
Partial List of Stakeholder Groups Active in the Coyote Watershed

CLEAN South Bay	Santa Clara Valley Audubon Society
Home Builders Association of Northern California	Sierra Club
League of Women Voters	Silicon Valley Manufacturing Group
San Jose Silicon Valley Chamber of Commerce	Silicon Valley Pollution Prevention Center
Santa Clara County Streams for Tomorrow	Silicon Valley Toxics Coalition

ES.3 What are the Plan's Goals and Objectives?

The Ends Policy is the foundation for establishing the Plan's vision, goals and objectives. In collaboration with the Coyote Watershed Workgroup, a Vision Statement was developed by the District to incorporate the intent of the Ends Policy without limiting the potential outcomes associated with time, resources or jurisdictions. The vision developed for the Coyote Watershed Plan is: a watershed in which the water resources are managed to provide a healthy, safe, and enhanced quality of life for people and wildlife; and improvement of the habitats they occupy.

Five main areas of concern were identified to achieve the Vision. One goal was identified for each area of concern, with the exception of Flood Protection/Channel Maintenance, for which two goals were identified. Each goal listed in Table ES-5 helps to fulfill a component of the Vision, and is generally linked to a second level Ends Policy.

Multiples objectives were identified for each goal to create more specific principles for implementing the Ends Policy and identifying candidate projects, guidelines and activities. A total of 36 objectives were identified and are listed in Chapter 8. The objectives became the foundation for identifying candidate watershed projects, guidelines and activities necessary to achieve the goals and vision of the Coyote Watershed. Figure ES-6 summarizes the overall process and products for the Stream Stewardship Plan.

Table ES-5
Goals of the Stream Stewardship Plan

WATER SUPPLY
Provide adequate supply of sufficient quality water for human and wildlife purposes
FLOOD PROTECTION/CHANNEL MAINTENANCE
Protect humans, wildlife, and property from damaging floods
Increase ecological health and appearance of our natural and modified channels
ENVIRONMENT/HABITAT
Protect, enhance, and restore habitat for wildlife
COMMUNITY PARTICIPATION/RECREATION
Encourage community participation in Coyote Watershed Stewardship activities
PLAN IMPLEMENTATION
Implement the Plan in an efficient and effective manner

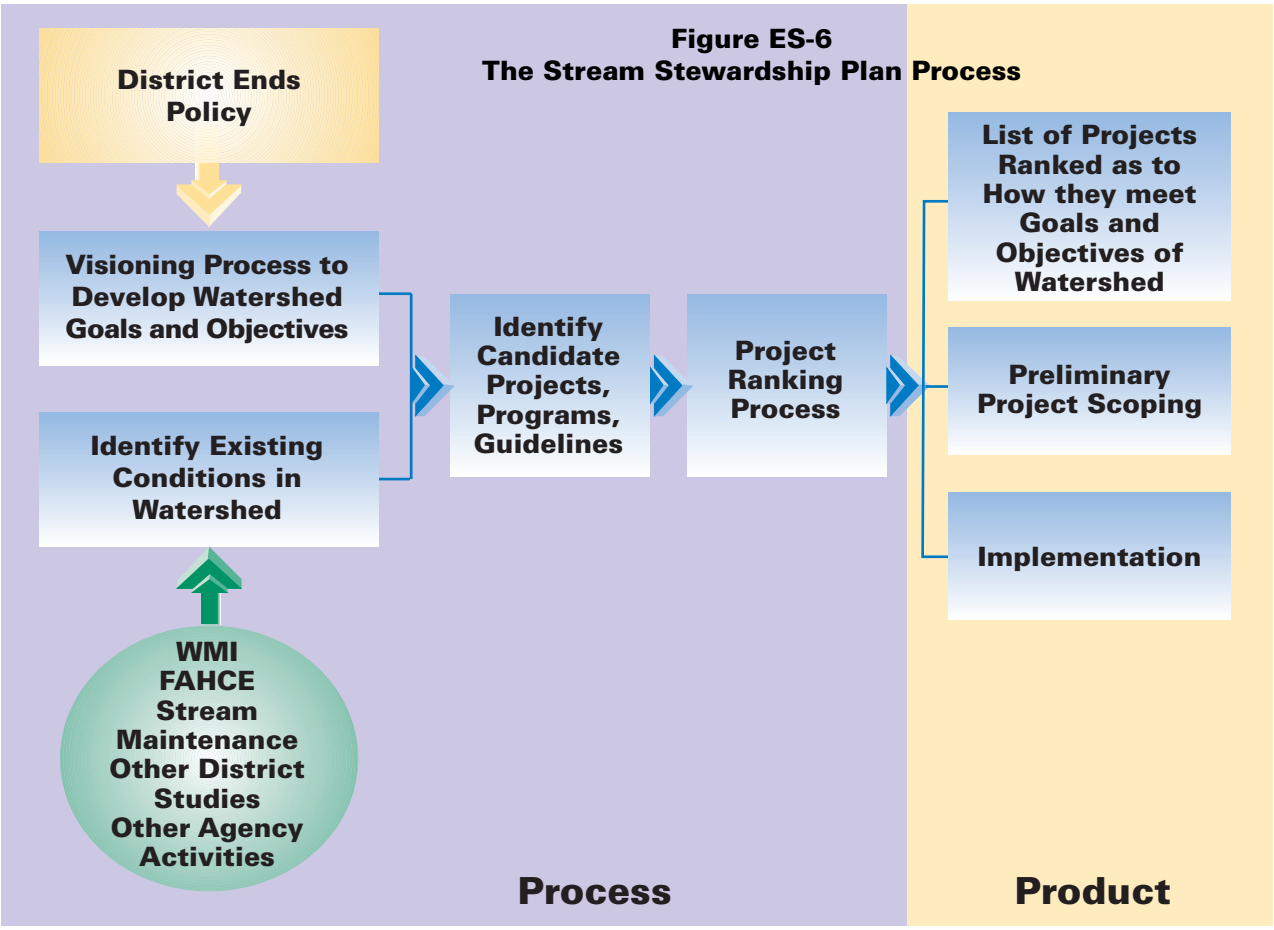


Figure ES-6
The Stream Stewardship Plan Process

ES.4 What are the Candidate Projects?

Candidate programs, projects, activities, and guidelines were developed through a series of brainstorming sessions with District technical Staff and the WMI work group. Candidate programs or projects were identified for each objective to help achieve each goal. **Programs** are broad series of planning or implementation tasks that could be long-term or a continuing, ongoing

endeavor. **Projects** refer to specific tasks that have a definite start and end date and associated budget such as a specific construction project or document preparation. **Guidelines** refer to a set of developed policies that help direct the District towards achieving the Plan goals and objectives. **Activities** are the operations and maintenance tasks within or beyond the Coyote Watershed that the District or others would pursue in support of the vision, goals, and objectives.

Candidate programs, projects,and activities were identified to meet each objective.

Initially, 87 candidate programs/projects/activities were identified. Upon further consideration, the Plan team determined that under the water supply goal, only those projects related to watershed activities were pertinent to the Stream Stewardship Plan. The Plan team recognized that the water supply projects pertaining strictly to supply of safe and reliable drinking water would continue to be considered under the District's IWRP. Therefore, the Plan established the linkage to the IWRP and removed the drinking water related projects from consideration within the Plan to avoid duplication. The team also recognized that candidate projects under the Plan Implementation goal were processes for carrying out the other projects identified in the Plan. They were therefore removed from consideration as stand-alone candidate projects.

The end result was 66 candidate projects/programs grouped under five categories as shown on Figure ES-7. The figure also describes in general terms, the types of projects contained within each category. Four of the categories correspond to four of the five areas of concern identified in the goal-setting process. Projects within the Plan Implementation goal were not included as candidate projects as mentioned above. The fifth category, O&M, is a compilation of candidate stream stewardship operations and maintenance activities developed by District Staff in Chapter 11.

The candidate projects and programs are described in detail in Appendix C. Table ES-1, which is located at the end of the Executive Summary, summarizes key data for each project.

Figure ES-7
Categories of Candidate Projects

ENVIRONMENT/HABITAT

14 PROJECTS TO:

- Restore and increase habitat
- Preserve and enhance natural habitat
- Provide fish and frog screens
- Provide fish passages
- Protect and restore buffers for lowlands

FLOOD PROTECTION

27 PROJECTS TO:

- Minimize expansion of the 1% floodplain
- Reduce the potential for flood damages
- Reduce flood insurance costs
- Protect, preserve natural flood plains

COMMUNITY PARTICIPATION/ RECREATION

11 PROJECTS TO:

- Ensure public safety
- Meet community aesthetics
- Increase recreational features
- Foster respect for the environment
- Provide outreach and partnership

O&M

8 PROJECTS TO:

- Improve firebreaks
- Improve administrative systems
- Improve incident response and training
- Manage streams and reservoir

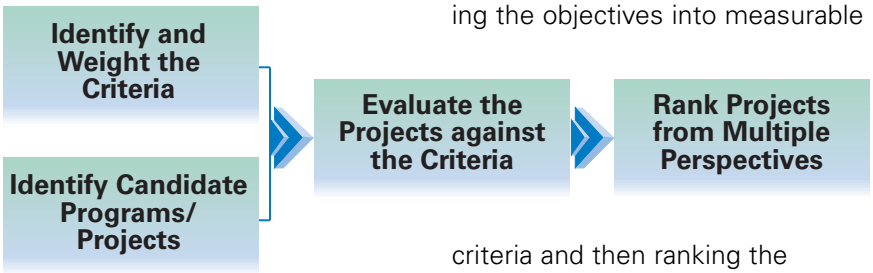
WATER SUPPLY

6 PROJECTS TO:

- Determine pipeline feasibility
- Protect water supplies
- Sustain native fisheries
- Reduce pollutants
- Restore impaired water bodies
- TMDL Program

ES.5 How Were the Projects Ranked?

Figure ES-8
Project Ranking Process



The candidate projects and programs were ranked by translating the objectives into measurable criteria and then ranking the projects against the criteria. Providing stewardship of District maintained streams requires evaluation from a watershed approach, i.e. determining how flood protection, habitat enhancement, recreation, and community participation can be integrated in a project. The ranking process reflects this viewpoint and incorporates multi-perspective criteria to evaluate and rank the projects on how they best fulfill the goals and objectives of the Plan and the Board's Ends Policy.

The criteria were divided into three main categories consistent with the Plan goals; flood protection, environment/habitat, and community participation/ recreation as shown on Table ES-6. Water supply was not one of the main categories since supply of safe and reliable drinking water is addressed in the IWRP. Within each category, specific criteria were developed to measure how well each project fulfilled the Plan's goals and objectives. For the flood protection category, the criteria were similar to those currently used in the District's Waterways Management Model. For the other categories, the criteria were developed through a series of workshops with the Plan team and the WMI work group.

Table ES-6
Criteria Used in the Project Ranking Process

FLOOD PROTECTION/ CHANNEL MANAGEMENT	• Reduce potential flood damages • Protect areas of development • Rehabilitate existing facilities • Manage sediment • Encourage multipurpose uses
ENVIRONMENT/HABITAT	• Protect and preserve ecological health • Sustain native fisheries • Reduce pollutants • Improve wildlife habitats • Protect buffer areas • Protect wetlands
COMMUNITY PARTICIPATION/RECREATION	• Ensure public safety • Increase recreational features • Promote outreach and education

The projects were then ranked from various perspectives, giving differing emphasis to each of the main categories. The first three perspectives emphasized, respectively, flood protection, environment/habitat, and community participation/ recreation. The top rated projects differed with each perspective.

When flood protection criteria were emphasized, the top ranked projects were more traditional flood protection projects that reduced the potential for flood damages. The District is already implementing the top five projects in this perspective.

For the environment/habitat perspective, projects ranking high were those that emphasized protection and preservation of the environment and habitat. The top-rated projects increased open space, improved the management of the stream channels for habitat enhancement, and provided regional planning efforts to study and improve habitat.

For the community participation/ recreation perspective, the top projects included a mix of projects that met the multi-objective criteria of ensuring public safety, increasing recreational features, and promoting general public outreach and involvement. The top projects in this perspective included increased open space and property acquisitions or non-core district activities such as trash collection in the stream channels.

The fourth perspective was a balanced perspective giving an equal weight to each of the three main categories. The top-ranked projects from this perspective were those that achieved multiple goals. These included projects that increased open spaces and trails, flood protection projects outside of the stream channel, and improved stream and reservoir management methods. The top three projects in this perspective were the same as for the community participation/recreation perspective. Table ES-7 shows the top three projects from each perspective.

During implementation, the list of ranked projects can be used to select the highest-ranking projects

During implementation, the list of ranked projects can be used to help select the highest-ranking projects from a specific category to match available funding.

Table ES-7. Top Projects from Each Perspective

Project Rankings	Rank in SSP Perspective			
	FP	EH	CPR	Balanced
FP1-B-04 : L. Silver Cr Flood Protection Project	1	52	18	17
FP1-B-07 : Berryessa/Calera Cr Flood Protection Project	2	53	19	18
FP1-B-05 : L. Silver Cr/Thompson Cr Flood Protection Project	3	58	42	34
FP1-E-01 : Open Space Acquisition	23	1	14	5
CPR-C-02 : Open Spaces, Trails & Parks MP	21	2	1	1
FP1-B-02 : Storm Water Detention and Infiltration	6	3	32	4
CPR-C-02 : Open Spaces, Trails & Parks MP	21	2	1	1
FP1-B-03 : Property Buy-out	11	30	2	2
FP2-E-01 : Trash Collection in Stream Channels	22	13	3	3

from a specific category to match available funding. For example, if funding were available specifically for flood protection projects, the ranking of projects from that perspective would show which projects best meet the flood protection goals and objectives of the Watershed. Alternatively, the list of ranked projects can be used as a method to garner support and obtain external funding for implementation of highly ranked projects for which funding is not currently available within the District.

ES.6 How Are Projects Funded?

Work in the Coyote Watershed is funded from three District funds; the Coyote Watershed Fund, Stream Stewardship Fund, and Clean Safe Creeks Fund. The Clean Safe Creeks Fund was added during fiscal year 2001-02 and is funded by revenue from a special tax approved by Santa Clara County voters in November 2000. Each of the three funds receives both annual income and one-time receipts as shown in Table ES-8.

The percentage of funding from each of the three funds will vary over time. Table ES-9 shows the estimated funding from each fund for fiscal years 2002 and 2016.

Table ES-8
Coyote Watershed Funding Sources

FUNDS	ANNUAL INCOME	ONE-TIME FUNDING SOURCES
Watershed Fund	Ad valorem property tax Benefit assessments Investment income	Certificates of Participation State subventions Federal funding Local cost sharing
Watershed and Stream Stewardship Fund	Ad valorem property tax Investment income	State funding Federal funding Local cost sharing
Clean Safe Creeks Fund	Measure B special tax Investment income	State funding Federal funding Local cost sharing

Reliability and constraints on one-time funding sources are considerations for project funding. Federal and state funding can include opportunity grants that are tied to implementation of specific programs or projects. The proceeds from the Certificates of Participation are reliable funding. Federal participation dollars and state monies are considered less reliable sources. This is because state and federal funding amounts are voted upon each year by the state congress in Sacramento and federal congress in Washington D.C., then are subject to veto by the governor or president, respectively. However, the District is committed to work with Federal and state agencies as well as other partner entities for funding for watershed projects.

Table ES-9
Percentage of Funding From Each Fund

Fiscal Year	Coyote Watershed Fund	Stream Stewardship Fund	Clean Safe Creeks Fund
2002	23%	6%	71%
2016	7%	73%	20%

ES.7 How Are Projects Implemented?

Selecting a project for implementation or deciding when to implement a project requires careful consideration. For each of the candidate projects the District could serve as the lead, a partner or a supporter in the implementation. In serving as a partner or a supporter, the District would need to coordinate with other agencies in deciding which project gets implemented first. Shared priority and availability of funding would be the main considerations.

For District-led projects, implementation of projects still requires consideration of a number of factors as shown in Figure ES-9. There are several types of projects competing for available funding. Some projects are required to meet existing mandates or regulations. A second type of project is one that meets an immediate need such as response to emergencies, requests from partner agencies, or urgent Board issues. Another category of projects is the candidate projects developed and ranked during the Plan process. This category currently includes only the projects developed by the Coyote Watershed Plan. As stream stewardship plans are developed for other watersheds, the list of candidate projects that have been developed and ranked in response to stream stewardship goals and objectives may expand to all of the watersheds within the District. If funding were not avail-

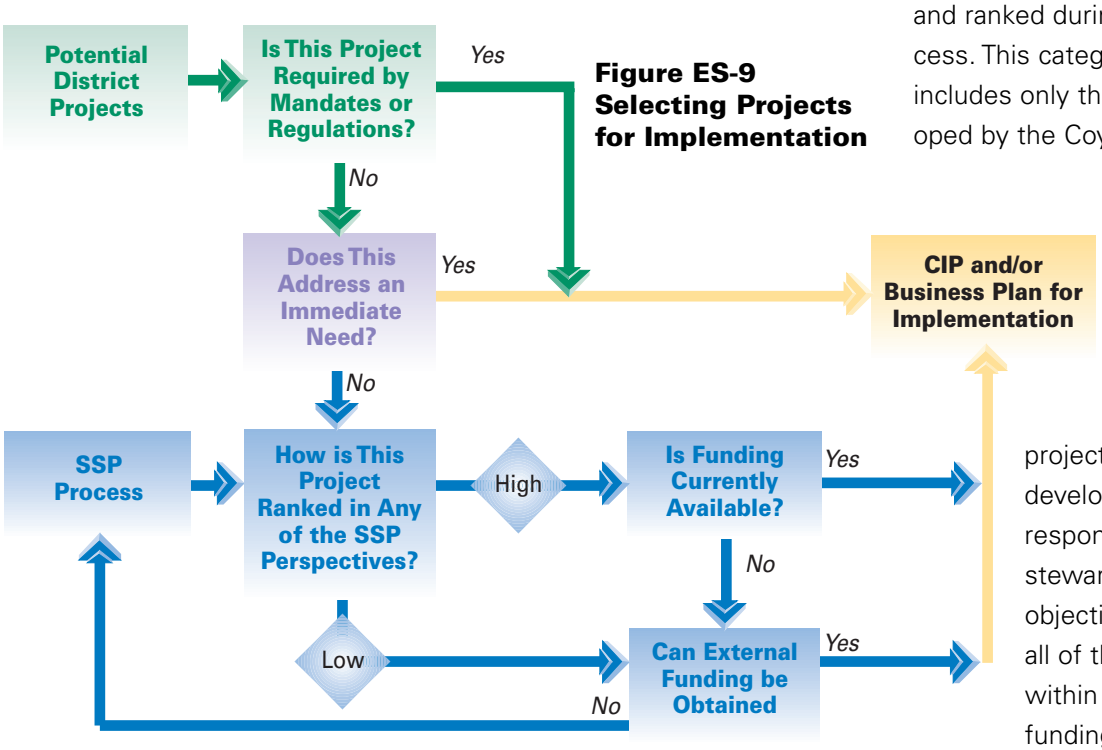


Figure ES-9 Selecting Projects for Implementation

able for the Plan candidate projects, they would be returned to the Plan process for re-consideration during the next Plan update.

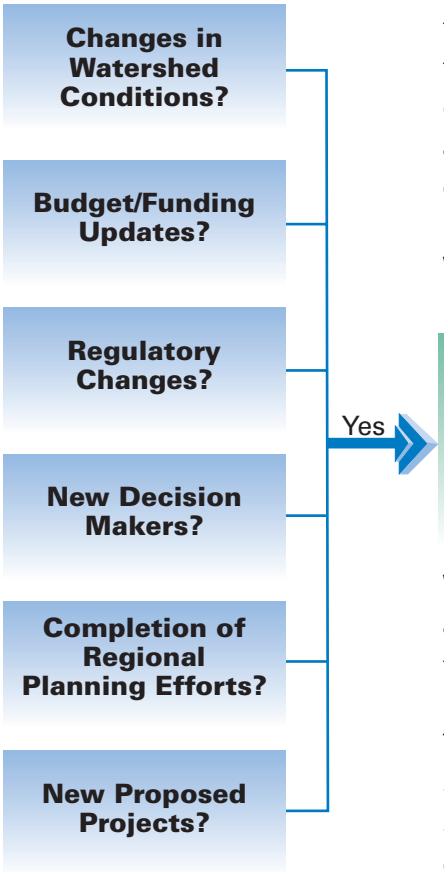
Project implementation starts with a project workplan. The Candidate Project Detail Sheets included in Appendix C serve as a preliminary scoping document for preparation of the workplans for the programs and projects identified in the Plan. After projects are selected for implementation, it is anticipated they will be implemented using the sound project management procedures and programs already in place within the District. The Plan is intended to link with the District's existing organization infrastructure, partnership opportunities, and public outreach efforts as discussed in Chapter 14. The Plan provides the initial identification and selection of candidate projects for implementation through the following unique Plan features:

- Compilation and update of Watershed conditions
- Identification of multi-objective candidate projects to meet specific watershed needs in a manner that reflects the District Ends Policy
- Ranking process to compare how candidate projects fulfill the identified goals and objectives of the Watershed

ES.8 How Will the Stream Stewardship Plan be Updated?

This Plan is intended to be a reference and guidance document for the District to facilitate efficient long-term realization of the Board's Ends policy in the Coyote Watershed. It is meant to be a dynamic document that is adaptive and able to address changes in Watershed conditions, and assist the Watershed Manager in identifying candidate projects meeting the goals and objectives of the Watershed.

Figure ES-10
Triggers for Updating the Plan



The Plan is intended to provide a logical framework for establishing the linkage to other regional efforts, rather than to short cut or to duplicate them. It is important to recognize this Plan is not the end of District's efforts for stewardship efforts; it is rather a coherent framework for coordinated efforts within the Coyote Watershed.

The Plan will be updated as conditions change within the Watershed. Figure ES-10 identifies a number of triggers for updating the Plan.

The Coyote Watershed Plan may serve as a guide towards expansion of the stream stewardship concept to the other watersheds within the Santa Clara Basin. Stream stewardship across the basin will help fulfill the vision of the District's Ends Policy and result in watersheds that not only provide a healthy and safe environment for residents and visitors, but also enhance the quality of life in Santa Clara County.

...watersheds that not only provide a healthy and safe environment for residents and visitors, but also enhance the quality of life in Santa Clara County.

Special acknowledgement is made to the following people for their diligent efforts in completing the Coyote Watershed Stream Stewardship Plan.

District's Project Team

Beau Goldie, Sarah Young, Deborah Amshoff and Neddal Ali-Adeeb
for Stream Stewardship Plan
George Fowler for the Coyote Watershed Capital Project Contract Manager
Marc Klemencic for the Coyote Watershed Manager

Other District Staff Consulted During the Preparation of the SSP

Barbara Judd, Bill Hoeft, Bill Smith, Bill Springer, Chris Elias, Chris Tulloch, Cindy Roessler, Colby Smith, Dale Jacques, Don Arnold, George Fowler, Jason Christie, Jose Ortiz, Kenneth McKenzie, Laura Young, Linda Schafthauser, Nancy Immekeppel, Patrick Esteban, Scott Akin, Teddy Morse, Tiffany Hernandez.

Coyote Watershed Workgroup

Amy Glad, Bill Dejager, David Dunlap, Debra Caldon, Don Rocha, Don Weden, Dunia Noel, Janell Hillman, Jennifer Peritz, Keith Anderson, Kristen Sipes, Lawrence Johmann, Mondy Lariz, Pat Showalter, Ray Hybarger, Rhys Rowland, Richard McMurtry, Sherry Hudson, Sue Eakins, Tara Kelly, Trish Mulvey, Val Blakely, Valiela Luisa, Vivian Blomenkamp.

Contractors

Raines, Melton & Carella, Inc. Prime Contractor: Curtis Lam, Jenifer Ramsey, Marilyn Bailey, Randy Raines, Roxanne Stachon, Tamara Simbirdi, Brent Johnson, Jean Matuska. Sub-Contractor CH2M Hill: Allan Highstreet, Claudia Zahorcak.

Stream Stewardship Plan Summary

The Santa Clara Valley Water District's Board of Directors established the Ends Policy to further the District's mission for comprehensive water/flood management programs to better serve the community. The Ends Policy, in part, envisions a watershed in which:

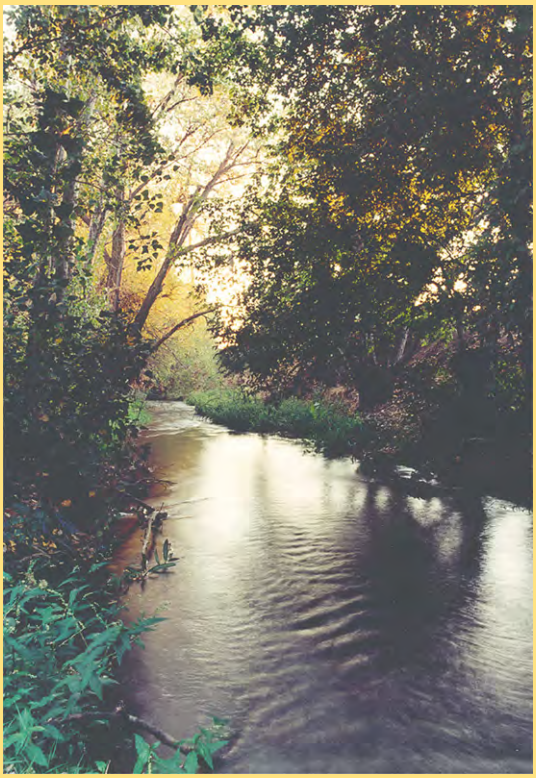
1. **There is a healthy and safe environment for residents and visitors.**
   - 1.1 There is a reliable supply of healthy, clean drinking water.
   - 1.2 There is a reduced potential for flood damages.
2. **There is an enhanced quality of life in Santa Clara County.**
   - 2.1 Watersheds, streams, and the natural resources therein are protected and when appropriate enhanced or restored.
   - 2.2 There are additional open spaces, trails, and parks along creeks and in the watersheds when reasonable and appropriate.

The Santa Clara Valley Water District (District) developed the Stream Stewardship Plan (SSP or Plan) to provide a strategic approach for implementing the Ends Policy using a watershed management approach to provide stream stewardship within the Coyote Watershed.

> "The vision of the Coyote Watershed Stream Stewardship Program is a watershed in which the water resources are managed to provide living streams; a healthy, safe, and enhanced quality of life for people and wildlife; and improvement of the habitats they occupy."

The Coyote Watershed is the largest watershed in the Santa Clara Basin and consists of all of the land that drains into the Coyote Creek or its 29 major tributaries. The Coyote Watershed is home to over 1,000,000 people and also provides aquatic and riparian habitat for plants and animals, including a number of threatened or endangered species. Flooding events have frequently occurred within the Watershed. As a result, many of

Figure ES-1
Upper Penitencia Creek



the creek channels along the valley floor have been modified for flood protection with the addition of earthen levees or concrete and rock lined channels, which provide limited habitat. One of the goals of the watershed management approach is to promote multi-objective projects that provide flood protection and protect natural resources to improve the quality of life within Santa Clara County.

Development of the Stream Stewardship Plan:

The Plan was developed in a collaborative manner between District Staff and local stakeholders through the creation of a short-term work group within the Santa Clara Basin Watershed Management Initiative (WMI) as shown on Figure ES-2.

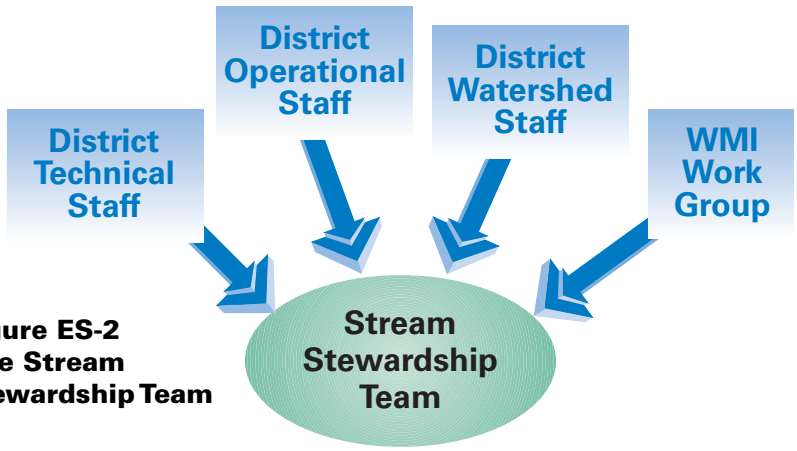


Figure ES-2 The Stream Stewardship Team

The work group provided a method for obtaining input and support from WMI stakeholders, avenues for preliminary coordination with other agencies, and assisted in identification of candidate projects, guidelines and the vision for the Watershed. Workgroup members contributed to the SSP through three different levels of participation: through being on the e-mail distribution list, attending workgroup meetings, and providing written comments. In addition, the WMI Core Group has been provided with updates on this Plan through monthly meetings and mailings.

The work group assisted District Staff in identifying important issues to be addressed in the plan, drafting the outline of the plan, and participating in visioning exercises to develop goals and objectives and brainstorm potential data gaps or candidate projects. Many District staff from the Coyote Watershed Program, Office of Countywide Watershed Management, and the Water

Supply Division also contributed to SSP work.

The Plan compiled existing regulatory, physical, environmental, and institutional conditions in the Coyote Watershed and summarized projects done by other agencies affecting the watershed. Development of the Plan's vision, goals, objectives, and candidate projects are based in part on the condition of the Watershed as represented by the available data. However, the compilation of data indicated that additional data is needed regarding the environmental condition of the Watershed. As a result, many of the identified candidate projects are studies to obtain more information and data. One of the recommendations for the future is to conduct a watershed study to more fully evaluate the environment/habitat condition of the Watershed and to update the Plan to incorporate the new data.

The District Ends Policy formed the basis of a visioning process that established a vision, goals and objectives for the Coyote Watershed. Candidate programs and projects were developed for those cases in which the existing conditions did not meet the Watershed goals and objectives. The Plan team developed criteria to rank how closely each program or project supported the Watershed goals. The result was a list of candidate programs and projects ranked from several perspectives, including meeting flood protection goals, environment/ habitat restoration goals, and community participation/recreation goals.

Implementation of the Plan will move the District towards accomplishing the District's mission and implementing the Ends Policy. Implementation of individual projects within the District includes consideration of a number of factors. These factors could include availability of funding, requirements of existing mandates or regulations, and immediate-need projects such as those in response to emergencies, requests from partner agencies, or urgent Board issues. The Plan's list of candidate projects and programs and their resultant ranking is now another tool that can be used by District management to

The team developed criteria to rank how closely each program or project supported the watershed goals.

The plan provides a logical framework for linking to other regional planning efforts

help select projects for funding and implementation. The highest-ranking projects from the Plan are those that best fulfill the goal of implementing the Ends Policy within the Coyote Watershed. These projects are summarized in Table ES-1 at the end of the Executive Summary.

The project ranking process in this Plan includes only the candidate projects identified as part of the Coyote Watershed Stream Stewardship Plan. As a watershed management approach is adopted in other watersheds, additional linkages will be needed to integrate the prioritization and implementation of projects resulting from various Capital Improvement Programs, including other stream stewardship plans, the District's Integrated Water Resources Plan (IWRP), and the Fisheries Aquatic Habitat Collaborative Effort (FAHCE) programs. A comprehensive ranking of all projects within the District should be considered as a tool to help select projects for funding at the District level.

There are a number of on-going regional efforts in parallel to the Plan. The results of those regional efforts are important to the management of Coyote Watershed in the long run. The Plan is intended to provide a logical framework for establishing the linkage to these efforts rather than to short cut or to duplicate them. It is also important to recognize the Plan is not the end of the District's efforts for stewardship efforts; it is rather a coherent framework for coordinated efforts within the Coyote Watershed.

The Stream Stewardship Plan is a dynamic document that will be modified as conditions change within the Watershed. Implementation of the Plan will move the District towards accomplishing the District's mission and implementation of the Ends Policy. This Plan includes a discussion of how the watershed management strategies can be implemented including performance measures to track the effectiveness of the Plan, drivers for project selection and implementation, roles and responsibilities of various District divisions and units, potential partnerships with non-District agencies, and how the Plan will be updated.

The Plan includes the following chapters:

Tables ES-2
Stream Stewardship Plan Contents

Chapter 1	Introduction
Chapters 2 - 7	Compilation of Existing Watershed Data
Chapter 8	Vision, Goals, and Objectives
Chapters 9 - 11	Candidate Projects, Programs, Guidelines, and Activities
Chapter 12	Project Ranking Process
Chapter 13	Funding
Chapter 14	Implementation

ES.1 What is the Coyote Watershed?

The Coyote Watershed, shown on Figure ES-3, consists of all of the land that drains into the Coyote Creek or its 29 major tributaries. Encompassing an area of over 320 square miles, it is the largest watershed in the Santa Clara Basin and is wholly contained within Santa Clara County. The watershed extends northward from Morgan Hill to the Alameda County border, and comprises the city of Milpitas, eastern San Jose, the northern tip of Morgan Hill and unincorporated lands of Santa Clara County.

The south and east sides of the Watershed are bounded by the Diablo Range while Coyote Creek largely forms the western side. The Watershed is home to over 1,000,000 people and also provides habitat for several endangered or threatened species including the California

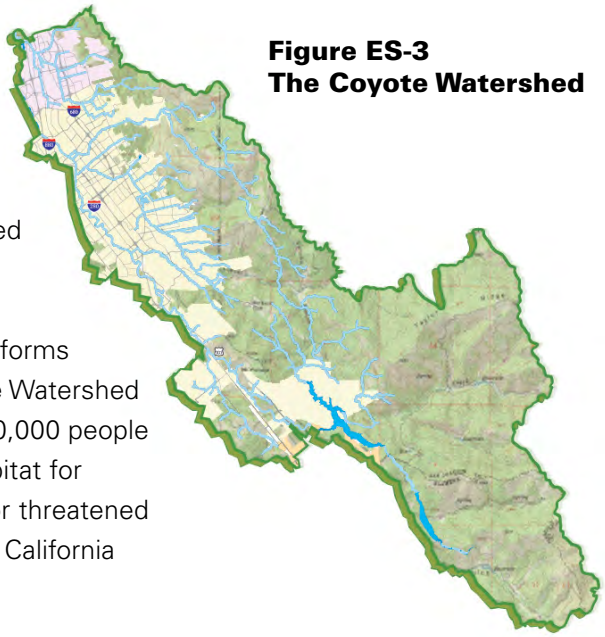


Figure ES-3
The Coyote Watershed

red-legged frog, bank swallow, steelhead, Chinook salmon, Santa Clara Valley Dudleya, and 12 other species of plants and animals.

Figure ES-4. Unmodified channels provide the best habitat.

The Coyote Watershed stretches over a large and varied topography. The eastern and southern portions are upland areas with elevations ranging up to 4,000 feet. The upland areas are sparsely populated. Some of the creeks in the uplands areas are still in their natural condition. Unmodified channels with abundant trees and a wide corridor provide the best riparian habitat, water quality, and flood protection. Areas of channels with no trees contain herbaceous vegetation, which provide habitat for amphibians, reptiles, rodents, and birds. Areas with trees provide more cover and habitat for native fish and other aquatic species. The creeks that have not been impacted by flood improvement projects or channel modifications include: Boyds, San Felipe, Cow, Carlin Canyon, Packwood, Hoover, Spinter Valley, Spring, Shingle, and Las Animas.

The northern and western portions comprise the heavily developed valley floor area and include the Cities of San Jose and Milpitas. The valley floor's increasing density of development, transportation corridors, and encroachment into the flood plain has had a profound impact on the stream corridors of the watershed. Development limits the natural meandering of a stream, which impacts riparian, aquatic, and wildlife habitats. Pavement and buildings associated with development also make the ground's surface less pervious and increases the rate of runoff during storm events. This increases the volume of storm water runoff that a creek is expected to carry in a given time and also increases the amount of sediment and debris carried by the runoff. The sediment and debris settles in the stream channels and further comprises the stream's hydraulic capacity.

Flooding events have frequently occurred within the watershed.

Recent flooding events include large portions of San Jose and Milpitas in l997, and at the Berryessa/Calera Creek confluence in 1998. Twenty percent of the Coyote Watershed is located within the Federal Emergency Management Agency (FEMA) 1% floodplain and homeowners must purchase flood insurance as a condition of home loans. All cities and towns in Santa Clara County participate in the National Flood Insurance Program, which provides federally-backed flood insurance to communities that enact and enforce floodplain regulations. In addition, the local agencies of Santa Clara County also participate in the Community Rating System program, which rewards communities that participate in flood management and education over and beyond the minimum requirements.

In response to the flooding events, approximately 407,000 feet, or 77 miles of creek channels along the valley floor have been modified for flood protection with the addition of earthen levees, trapezoidal concrete channels, floodwalls, culverts or concrete and rock lined channels. Design and operation of the modified channels were historically focused on conveying 100-year storm flows and accommodating new development adjacent to the stream corridors. The modifications provide limited opportunities for multi-objective purposes such as creation of riparian habitat, aquatic habitat or recreation for flood protection.

Figure ES-5. Flood control projects have modified 77 miles of natural stream channels.

More recent projects have incorporated a wider range of goals such as aquatic and riparian habitat restoration and public access in addition to the 100-year flood protection goal. The Plan provides the framework to design future projects that would implement multiple components of the District's Ends Policy, which would help to integrate multi-objectives into District projects.

ES.2 Who Has Jurisdiction Over the Coyote Watershed?

A plethora of governmental and regulatory agencies manage and regulate many aspects of the Coyote Watershed. The five general levels of governmental authority working in the Watershed include:

- Municipalities;
- Santa Clara County;
- Special District Regional Agencies including the Santa Clara Valley Water District;
- State Agencies; and
- Federal Agencies

The Santa Clara Valley Water District plays an important role in the Coyote Watershed. The District is the comprehensive water management agency for Santa Clara County providing wholesale water supply, flood protection, and watershed stewardship. The implementation of District projects and programs are subject to the regulations and requirements established by the applicable state and federal regulatory agencies, which are listed in Table ES-3.

In addition to the governmental agencies, many stakeholder groups are also involved in Watershed activities. Stakeholder groups are cross-sections of the community and provide valuable input to the development and execution of District activities. There are numerous stakeholder groups active in the Coyote Watershed including the partial list shown in Table ES-4.

Many of the stakeholder groups also participate in the Santa Clara Basin Watershed Management Initiative (WMI). The Santa Clara Basin Watershed Management Initiative (WMI) is a collaborative, stakeholder driven effort among representatives from regional and local public agencies (e.g. United States Environmental Protection Agency, San Francisco Bay Regional Water Quality Control Board, California Department of Fish and Game), civic, environmental, resource conservation and agricultural groups (e.g. CLEAN South Bay, Santa Clara County Streams for Tomorrow, Greenbelt Alliance); professional and trade organizations (e.g. Silicon Valley Manufacturing Group, Silicon Valley Chamber of Commerce); business and industrial sectors (e.g. , California Restaurant

Association, Home Builders Association of Northern California); and the general public. The WMI's mission is to protect and enhance the Watershed, creating a sustainable future for the community and the environment. The WMI created a special working group that has provided the primary stakeholder input for development of the Stream Stewardship Plan.

The Plan provides a method to relate the stream stewardship concept to other programs. It implements portions of the WMI process by identifying candidate projects and activities. It identifies potential funding avenues for projects. When the WMI Watershed Action Plan is prepared, the results will be incorporated into Plan updates. The Plan also complements WMI efforts by identifying what the District will do to benefit the Watershed.

Table ES-3
Governmental Agencies Working Within the Coyote Watershed

TOPIC	LEAD AGENCIES
Flood Management and Control	• Federal Emergency Management Agency • California Department of Water Resources • US Army Corps of Engineers • Santa Clara Valley Water District
Water Quality	• US EPA • State Water Resources Control Board • San Francisco Regional Water Quality Control Board
Drinking Water Quality	• California EPA • Department of Health Services • Santa Clara Valley Water District
Water Rights	• California Department of Water Resources • State Water Resources Control Board • US Bureau of Reclamation
Wetlands and Riparian Zones	• Regional Water Quality Control Board • Bay Conservation and Development Commission • US Army Corps of Engineers
Endangered Species and Fisheries	• US Fish and Wildlife Service • California Department of Fish and Game • National Marine Fisheries Service
Land Use	• San Jose, Milpitas, Morgan Hill • Santa Clara County • California State Lands Commission • Bay Conservation and Development Commission
Transportation	• Valley Transportation Authority • Metropolitan Transit Commission
Vector Control	• Santa Clara County
Pesticides	• Department of Pesticide Regulation

Table ES-4
Partial List of Stakeholder Groups Active in the Coyote Watershed

CLEAN South Bay	Santa Clara Valley Audubon Society
Home Builders Association of Northern California	Sierra Club
League of Women Voters	Silicon Valley Manufacturing Group
San Jose Silicon Valley Chamber of Commerce	Silicon Valley Pollution Prevention Center
Santa Clara County Streams for Tomorrow	Silicon Valley Toxics Coalition

ES.3 What are the Plan's Goals and Objectives?

The Ends Policy is the foundation for establishing the Plan's vision, goals and objectives. In collaboration with the Coyote Watershed Workgroup, a Vision Statement was developed by the District to incorporate the intent of the Ends Policy without limiting the potential outcomes associated with time, resources or jurisdictions. The vision developed for the Coyote Watershed Plan is: a watershed in which the water resources are managed to provide a healthy, safe, and enhanced quality of life for people and wildlife; and improvement of the habitats they occupy.

Five main areas of concern were identified to achieve the Vision. One goal was identified for each area of concern, with the exception of Flood Protection/Channel Maintenance, for which two goals were identified. Each goal listed in Table ES-5 helps to fulfill a component of the Vision, and is generally linked to a second level Ends Policy.

Multiples objectives were identified for each goal to create more specific principles for implementing the Ends Policy and identifying candidate projects, guidelines and activities. A total of 36 objectives were identified and are listed in Chapter 8. The objectives became the foundation for identifying candidate watershed projects, guidelines and activities necessary to achieve the goals and vision of the Coyote Watershed. Figure ES-6 summarizes the overall process and products for the Stream Stewardship Plan.

Table ES-5
Goals of the Stream Stewardship Plan

WATER SUPPLY
Provide adequate supply of sufficient quality water for human and wildlife purposes
FLOOD PROTECTION/CHANNEL MAINTENANCE
Protect humans, wildlife, and property from damaging floods
Increase ecological health and appearance of our natural and modified channels
ENVIRONMENT/HABITAT
Protect, enhance, and restore habitat for wildlife
COMMUNITY PARTICIPATION/RECREATION
Encourage community participation in Coyote Watershed Stewardship activities
PLAN IMPLEMENTATION
Implement the Plan in an efficient and effective manner

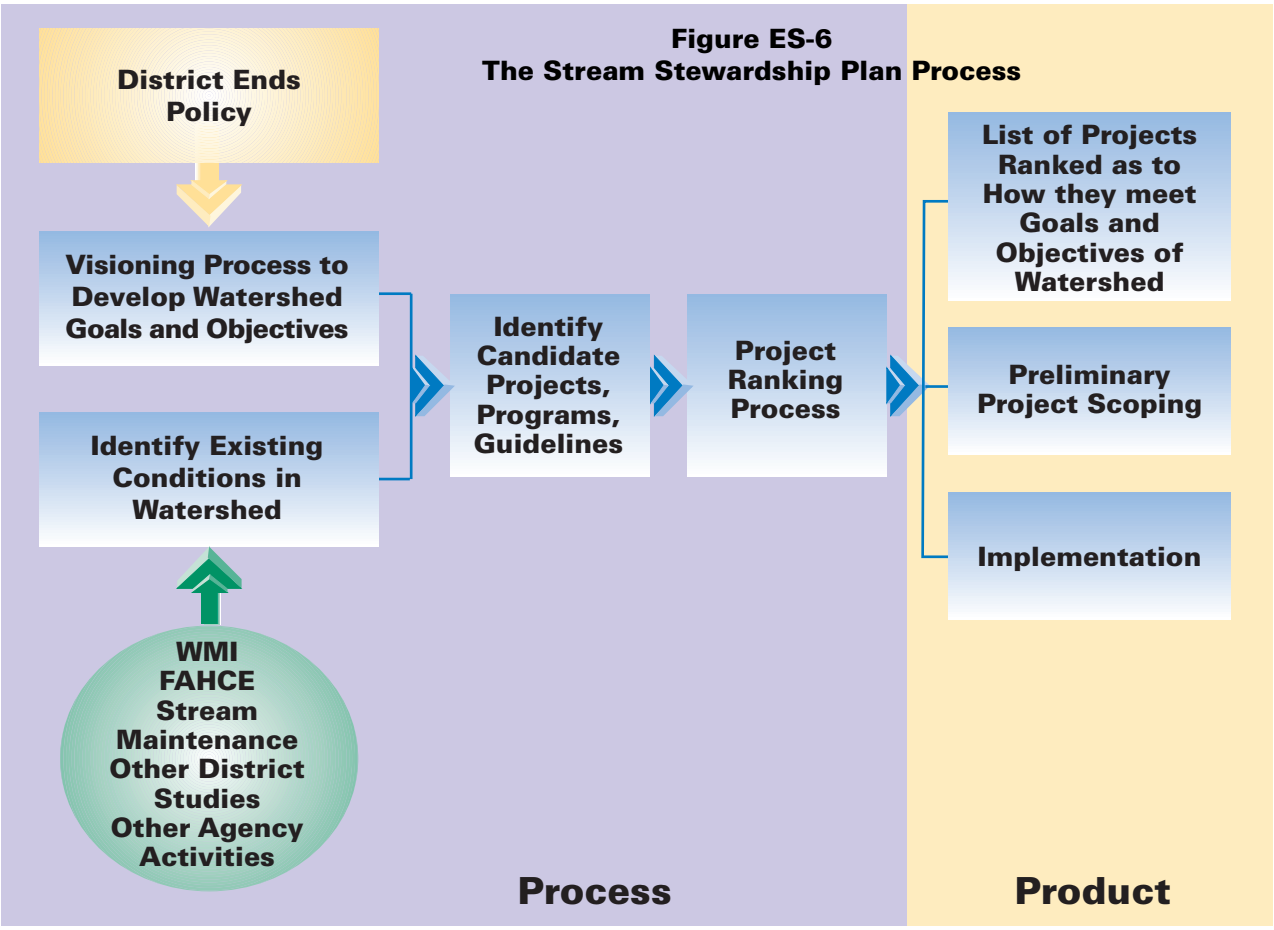


Figure ES-6
The Stream Stewardship Plan Process

ES.4 What are the Candidate Projects?

Candidate programs, projects, activities, and guidelines were developed through a series of brainstorming sessions with District technical Staff and the WMI work group. Candidate programs or projects were identified for each objective to help achieve each goal. **Programs** are broad series of planning or implementation tasks that could be long-term or a continuing, ongoing

endeavor. **Projects** refer to specific tasks that have a definite start and end date and associated budget such as a specific construction project or document preparation. **Guidelines** refer to a set of developed policies that help direct the District towards achieving the Plan goals and objectives. **Activities** are the operations and maintenance tasks within or beyond the Coyote Watershed that the District or others would pursue in support of the vision, goals, and objectives.

Candidate programs, projects,and activities were identified to meet each objective.

Initially, 87 candidate programs/projects/activities were identified. Upon further consideration, the Plan team determined that under the water supply goal, only those projects related to watershed activities were pertinent to the Stream Stewardship Plan. The Plan team recognized that the water supply projects pertaining strictly to supply of safe and reliable drinking water would continue to be considered under the District's IWRP. Therefore, the Plan established the linkage to the IWRP and removed the drinking water related projects from consideration within the Plan to avoid duplication. The team also recognized that candidate projects under the Plan Implementation goal were processes for carrying out the other projects identified in the Plan. They were therefore removed from consideration as stand-alone candidate projects.

The end result was 66 candidate projects/programs grouped under five categories as shown on Figure ES-7. The figure also describes in general terms, the types of projects contained within each category. Four of the categories correspond to four of the five areas of concern identified in the goal-setting process. Projects within the Plan Implementation goal were not included as candidate projects as mentioned above. The fifth category, O&M, is a compilation of candidate stream stewardship operations and maintenance activities developed by District Staff in Chapter 11.

The candidate projects and programs are described in detail in Appendix C. Table ES-1, which is located at the end of the Executive Summary, summarizes key data for each project.

Figure ES-7
Categories of Candidate Projects

ENVIRONMENT/HABITAT

14 PROJECTS TO:

- Restore and increase habitat
- Preserve and enhance natural habitat
- Provide fish and frog screens
- Provide fish passages
- Protect and restore buffers for lowlands

FLOOD PROTECTION

27 PROJECTS TO:

- Minimize expansion of the 1% floodplain
- Reduce the potential for flood damages
- Reduce flood insurance costs
- Protect, preserve natural flood plains

COMMUNITY PARTICIPATION/ RECREATION

11 PROJECTS TO:

- Ensure public safety
- Meet community aesthetics
- Increase recreational features
- Foster respect for the environment
- Provide outreach and partnership

O&M

8 PROJECTS TO:

- Improve firebreaks
- Improve administrative systems
- Improve incident response and training
- Manage streams and reservoir

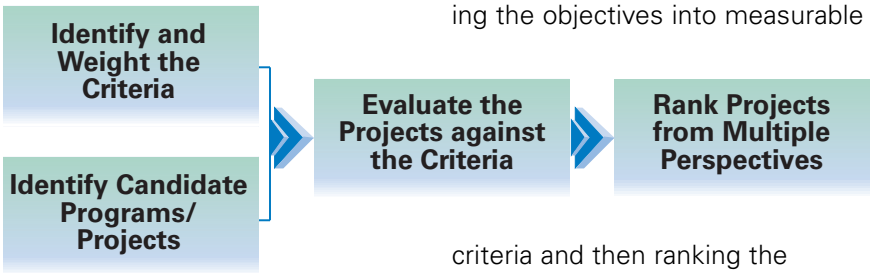
WATER SUPPLY

6 PROJECTS TO:

- Determine pipeline feasibility
- Protect water supplies
- Sustain native fisheries
- Reduce pollutants
- Restore impaired water bodies
- TMDL Program

ES.5 How Were the Projects Ranked?

Figure ES-8
Project Ranking Process



The candidate projects and programs were ranked by translating the objectives into measurable criteria and then ranking the projects against the criteria. Providing stewardship of District maintained streams requires evaluation from a watershed approach, i.e. determining how flood protection, habitat enhancement, recreation, and community participation can be integrated in a project. The ranking process reflects this viewpoint and incorporates multi-perspective criteria to evaluate and rank the projects on how they best fulfill the goals and objectives of the Plan and the Board's Ends Policy.

The criteria were divided into three main categories consistent with the Plan goals; flood protection, environment/habitat, and community participation/ recreation as shown on Table ES-6. Water supply was not one of the main categories since supply of safe and reliable drinking water is addressed in the IWRP. Within each category, specific criteria were developed to measure how well each project fulfilled the Plan's goals and objectives. For the flood protection category, the criteria were similar to those currently used in the District's Waterways Management Model. For the other categories, the criteria were developed through a series of workshops with the Plan team and the WMI work group.

Table ES-6
Criteria Used in the Project Ranking Process

FLOOD PROTECTION/ CHANNEL MANAGEMENT	• Reduce potential flood damages • Protect areas of development • Rehabilitate existing facilities • Manage sediment • Encourage multipurpose uses
ENVIRONMENT/HABITAT	• Protect and preserve ecological health • Sustain native fisheries • Reduce pollutants • Improve wildlife habitats • Protect buffer areas • Protect wetlands
COMMUNITY PARTICIPATION/RECREATION	• Ensure public safety • Increase recreational features • Promote outreach and education

The projects were then ranked from various perspectives, giving differing emphasis to each of the main categories. The first three perspectives emphasized, respectively, flood protection, environment/habitat, and community participation/ recreation. The top rated projects differed with each perspective.

When flood protection criteria were emphasized, the top ranked projects were more traditional flood protection projects that reduced the potential for flood damages. The District is already implementing the top five projects in this perspective.

For the environment/habitat perspective, projects ranking high were those that emphasized protection and preservation of the environment and habitat. The top-rated projects increased open space, improved the management of the stream channels for habitat enhancement, and provided regional planning efforts to study and improve habitat.

For the community participation/ recreation perspective, the top projects included a mix of projects that met the multi-objective criteria of ensuring public safety, increasing recreational features, and promoting general public outreach and involvement. The top projects in this perspective included increased open space and property acquisitions or non-core district activities such as trash collection in the stream channels.

The fourth perspective was a balanced perspective giving an equal weight to each of the three main categories. The top-ranked projects from this perspective were those that achieved multiple goals. These included projects that increased open spaces and trails, flood protection projects outside of the stream channel, and improved stream and reservoir management methods. The top three projects in this perspective were the same as for the community participation/recreation perspective. Table ES-7 shows the top three projects from each perspective.

During implementation, the list of ranked projects can be used to select the highest-ranking projects

During implementation, the list of ranked projects can be used to help select the highest-ranking projects from a specific category to match available funding.

Table ES-7. Top Projects from Each Perspective

Project Rankings	Rank in SSP Perspective			
	FP	EH	CPR	Balanced
FP1-B-04 : L. Silver Cr Flood Protection Project	1	52	18	17
FP1-B-07 : Berryessa/Calera Cr Flood Protection Project	2	53	19	18
FP1-B-05 : L. Silver Cr/Thompson Cr Flood Protection Project	3	58	42	34
FP1-E-01 : Open Space Acquisition	23	1	14	5
CPR-C-02 : Open Spaces, Trails & Parks MP	21	2	1	1
FP1-B-02 : Storm Water Detention and Infiltration	6	3	32	4
CPR-C-02 : Open Spaces, Trails & Parks MP	21	2	1	1
FP1-B-03 : Property Buy-out	11	30	2	2
FP2-E-01 : Trash Collection in Stream Channels	22	13	3	3

from a specific category to match available funding. For example, if funding were available specifically for flood protection projects, the ranking of projects from that perspective would show which projects best meet the flood protection goals and objectives of the Watershed. Alternatively, the list of ranked projects can be used as a method to garner support and obtain external funding for implementation of highly ranked projects for which funding is not currently available within the District.

ES.6 How Are Projects Funded?

Work in the Coyote Watershed is funded from three District funds; the Coyote Watershed Fund, Stream Stewardship Fund, and Clean Safe Creeks Fund. The Clean Safe Creeks Fund was added during fiscal year 2001-02 and is funded by revenue from a special tax approved by Santa Clara County voters in November 2000. Each of the three funds receives both annual income and one-time receipts as shown in Table ES-8.

The percentage of funding from each of the three funds will vary over time. Table ES-9 shows the estimated funding from each fund for fiscal years 2002 and 2016.

Table ES-8
Coyote Watershed Funding Sources

FUNDS	ANNUAL INCOME	ONE-TIME FUNDING SOURCES
Watershed Fund	Ad valorem property tax Benefit assessments Investment income	Certificates of Participation State subventions Federal funding Local cost sharing
Watershed and Stream Stewardship Fund	Ad valorem property tax Investment income	State funding Federal funding Local cost sharing
Clean Safe Creeks Fund	Measure B special tax Investment income	State funding Federal funding Local cost sharing

Reliability and constraints on one-time funding sources are considerations for project funding. Federal and state funding can include opportunity grants that are tied to implementation of specific programs or projects. The proceeds from the Certificates of Participation are reliable funding. Federal participation dollars and state monies are considered less reliable sources. This is because state and federal funding amounts are voted upon each year by the state congress in Sacramento and federal congress in Washington D.C., then are subject to veto by the governor or president, respectively. However, the District is committed to work with Federal and state agencies as well as other partner entities for funding for watershed projects.

Table ES-9
Percentage of Funding From Each Fund

Fiscal Year	Coyote Watershed Fund	Stream Stewardship Fund	Clean Safe Creeks Fund
2002	23%	6%	71%
2016	7%	73%	20%

ES.7 How Are Projects Implemented?

Selecting a project for implementation or deciding when to implement a project requires careful consideration. For each of the candidate projects the District could serve as the lead, a partner or a supporter in the implementation. In serving as a partner or a supporter, the District would need to coordinate with other agencies in deciding which project gets implemented first. Shared priority and availability of funding would be the main considerations.

For District-led projects, implementation of projects still requires consideration of a number of factors as shown in Figure ES-9. There are several types of projects competing for available funding. Some projects are required to meet existing mandates or regulations. A second type of project is one that meets an immediate need such as response to emergencies, requests from partner agencies, or urgent Board issues. Another category of projects is the candidate projects developed and ranked during the Plan process. This category currently includes only the projects developed by the Coyote Watershed Plan. As stream stewardship plans are developed for other watersheds, the list of candidate projects that have been developed and ranked in response to stream stewardship goals and objectives may expand to all of the watersheds within the District. If funding were not avail-

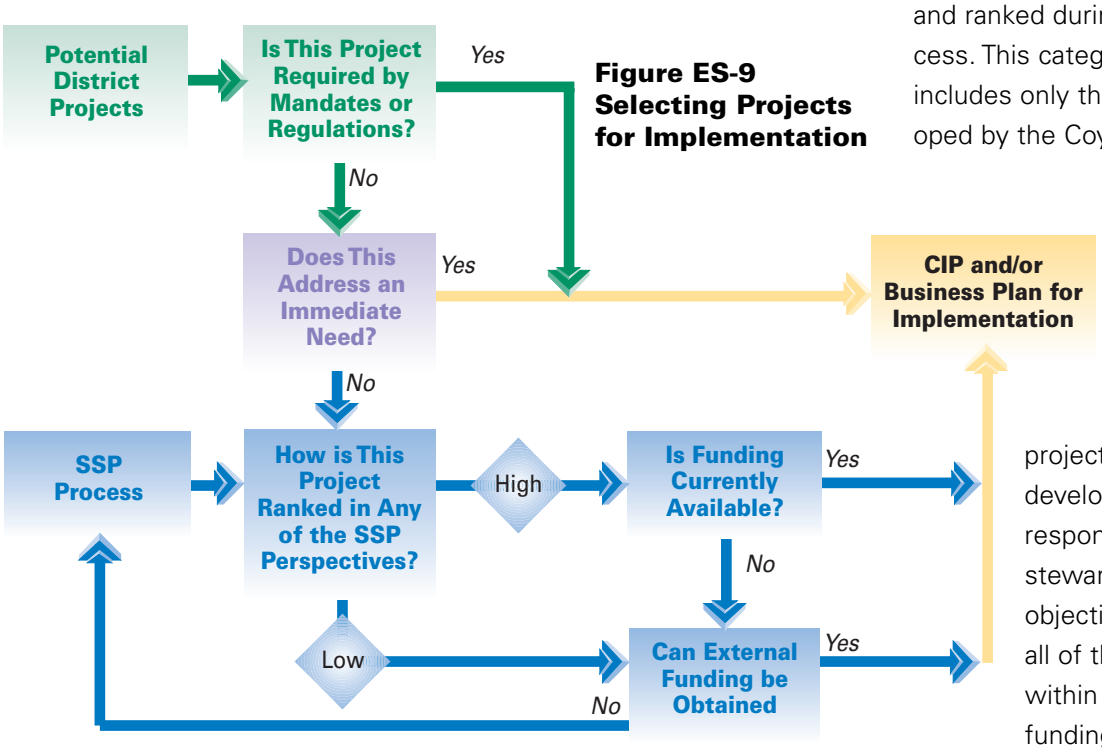


Figure ES-9 Selecting Projects for Implementation

able for the Plan candidate projects, they would be returned to the Plan process for re-consideration during the next Plan update.

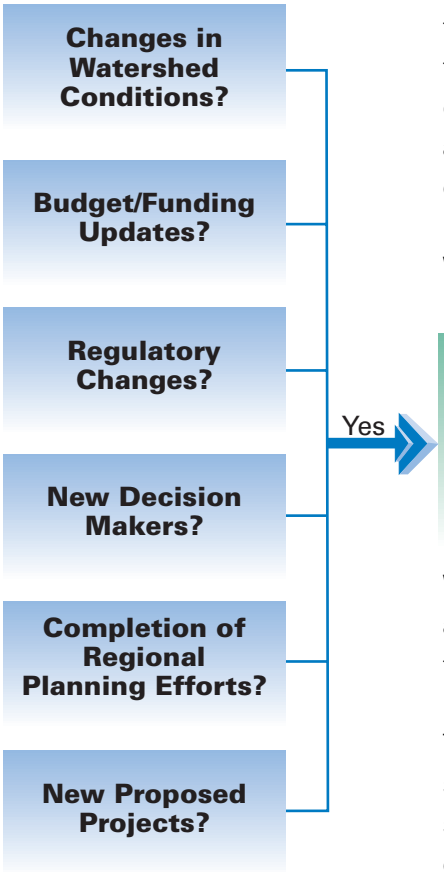
Project implementation starts with a project workplan. The Candidate Project Detail Sheets included in Appendix C serve as a preliminary scoping document for preparation of the workplans for the programs and projects identified in the Plan. After projects are selected for implementation, it is anticipated they will be implemented using the sound project management procedures and programs already in place within the District. The Plan is intended to link with the District's existing organization infrastructure, partnership opportunities, and public outreach efforts as discussed in Chapter 14. The Plan provides the initial identification and selection of candidate projects for implementation through the following unique Plan features:

- Compilation and update of Watershed conditions
- Identification of multi-objective candidate projects to meet specific watershed needs in a manner that reflects the District Ends Policy
- Ranking process to compare how candidate projects fulfill the identified goals and objectives of the Watershed

ES.8 How Will the Stream Stewardship Plan be Updated?

This Plan is intended to be a reference and guidance document for the District to facilitate efficient long-term realization of the Board's Ends policy in the Coyote Watershed. It is meant to be a dynamic document that is adaptive and able to address changes in Watershed conditions, and assist the Watershed Manager in identifying candidate projects meeting the goals and objectives of the Watershed.

Figure ES-10
Triggers for Updating the Plan



The Plan is intended to provide a logical framework for establishing the linkage to other regional efforts, rather than to short cut or to duplicate them. It is important to recognize this Plan is not the end of District's efforts for stewardship efforts; it is rather a coherent framework for coordinated efforts within the Coyote Watershed.

The Plan will be updated as conditions change within the Watershed. Figure ES-10 identifies a number of triggers for updating the Plan.

The Coyote Watershed Plan may serve as a guide towards expansion of the stream stewardship concept to the other watersheds within the Santa Clara Basin. Stream stewardship across the basin will help fulfill the vision of the District's Ends Policy and result in watersheds that not only provide a healthy and safe environment for residents and visitors, but also enhance the quality of life in Santa Clara County.

...watersheds that not only provide a healthy and safe environment for residents and visitors, but also enhance the quality of life in Santa Clara County.