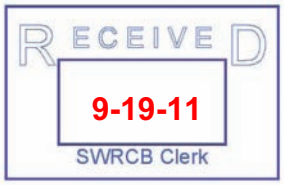
ZM

9/21/11 Bd. Workshop
Caltrans MS4 Permit
Deadline: 9/19/11 by 12:00 noon

September 19, 2011



Charles Hoppin, Chair and Board Members
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

VIA ELECTRONIC MAIL: commentletters@waterboards.ca.gov

Re: Comment Letter – Caltrans MS4 Permit

Dear Chair Hoppin and Board Members:

On behalf of Heal the Bay, California Coastkeeper Alliance and the Natural Resources Defense Council, we welcome the opportunity to submit these comments on the "Draft Statewide National Pollutant Discharge Elimination System (NPDES) Permit for the Discharge of Storm Water Runoff from the California Department of Transportation's (Department) Municipal Separate Storm Sewer System (MS4)" dated August 18, 2011 ("Permit" or "Draft Permit"). Our organizations have been actively involved throughout California in ensuring the control of stormwater pollution generally, and Caltrans' pollution in particular, for many years. We have significant interest in the development, adoption, implementation and enforcement of this Draft Permit, and will work closely with you and your staff to ensure its effectiveness in reducing the ongoing pollution of the waters of the state.

We commend the State Water Board for several improvements to the Draft Permit. For example, the Low Impact Development (LID) requirements have been strengthened and additional Total Maximum Daily Load (TMDL) wasteload allocations (WLAs) have been included. However, many of the concerns outlined in our March 14, 2011 letter remain unaddressed. Since the Public Notice for the Draft Permit only solicits comments on changes from the last version, we limit our comments below to these modifications and attach our previous letter for reference. We do have a number of concerns with the modifications to the Draft Permit and offer recommendations below to ensure that the Draft Permit is consistent with both the letter and intent of the law, and that it effectively protects the health of the state's invaluable waterways. As described in more detail below, our key comments and recommendations include the following:

- infeasibility of onsite retention should be demonstrated; ZM-1
- the flow-through option for onsite retention should be eliminated; ZM-2
- both acute and chronic toxicity monitoring should be conducted at every site; ZM-3
- any monitoring sites that exceed water quality objectives during a sampling event should remain on the monitoring list; ZM-4
- discharge and receiving water quality monitoring should occur concurrently to better understand if a discharge is causing and contributing to a water quality standard exceedance; ZM-5
- remove the provision that Caltrans need not analyze constituents in Attachment II where the Regional Water Board finds there is little chance the constituent is present in the discharge; ZM-6
- work with the regional boards to ensure that Appendix IV is complete; ZM-7
- the Draft Permit needs to clarify that agricultural runoff is not an exempted pollutant from the prohibition against non-stormwater discharges; ZM-8
- the Draft Permit needs to be improved to ensure that non-storm water runoff – including landscape irrigation and agricultural irrigation – is "*effectively prohibited.*" ZM-9

I. Post-Construction Storm Water Treatment Controls

ZM-10 The Draft Permit requires that "Treatment control BMPs constructed for Department and Non Department projects shall be designed to infiltrate, harvest and re-use, or evapotranspire the storm water runoff volume from an 85th percentile 24-hour storm event."[1] We strongly support this revised provision. Mandating a certain volume of onsite stormwater retention prevents all pollution in that volume of retained stormwater from being discharged to receiving waters. This requirement is consistent with other MS4 permits, ordinances, and regulations around the country. For example, the Regional Water Quality Control Boards for the Los Angeles, Santa Ana, and San Diego Regions have all recently adopted MS4 permits that effectively require new and redevelopment projects to retain onsite the 85th percentile storm through use the of LID practices that infiltrate, harvest and reuse, or evapotranspire stormwater runoff unless technically infeasible to do so.[2]

ZM-11 The modified post-construction requirements also state that "[t]he Department shall use Low Impact Develop (LID) principles with the goal of mimicking *pre-project* hydrology."[3] Requirements that a project meet pre-project conditions are not adequately protective of water quality, and will ensure that impervious surfaces that generate polluted runoff or high volumes of

[1] Draft Permit at 39.
[2] *See* Los Angeles Regional Water Quality Control Board, Order No R4-2010-0108 (July 8, 2010) (Ventura County MS4 Permit) (through use of an Effective Impervious Area limitation, the Permit effectively requires retention of 95 percent of the 85th percentile storm); Santa Ana Regional Water Quality Control Board, Order No. RB8-2009-0030 (May 22, 2009) (North Orange County MS4 Permit); San Diego Regional Water Quality Control Board, Order No. R9-2009-0002 (December 16, 2009) (South Orange County MS4 Permit).
[3] Draft permit at 39, emphasis added.

runoff persist in the built environment effectively indefinitely. In order to address the presence of impervious surfaces that generate runoff contributing to flooding, erosion, and other volume related impacts to receiving waters, the Draft Permit should use the term "pre-development" in place of "pre-project" in its post construction and hydromodification criteria. The Draft Permit should also clearly state that "pre-development" refers not to the condition of a site prior to construction of the particular project under review, but rather the condition of a site in its undeveloped state.

ZM-12 → The Draft Permit allows for alternative compliance of onsite retention if infeasibility is demonstrated. While we agree that an "off-ramp" for infeasibility is appropriate, the Draft Permit is not clear on how infeasibility is demonstrated. The Draft Permit also includes a flow-through option, which is an unacceptable alternative. Specifically, the Draft Permit states that:

> In the event the entire runoff volume from an 85th percentile 24-hour storm event cannot be infiltrated, harvested and re-used, or evapotranspired, the excess volume may be treated by a flow-through treatment system. The release of the excess volume shall be designed for a maximum rate equal to the runoff flow produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area (Excess Volumetric Rate).[4]

The Permit must outline how infeasibility will be demonstrated. To utilize alternative compliance measures, Caltrans must demonstrate that compliance with the applicable post-construction requirements would be technically infeasible by submitting a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect. This will ensure that stormwater will be kept onsite to the maximum extent.

ZM-13 → Further, we do not support flow-through treatment systems as an alternative to traditional LID practices (infiltration, reuse or evapotranspiration). These requirements fail to meet the Clean Water Act requirements that the Draft Permit "shall require controls to reduce the discharge of pollutants to the maximum extent practicable." Flow-through systems do not provide the same water quality and water supply benefits of LID approaches. Retaining the 85th percentile storm runoff volume onsite would prevent 100 percent of the runoff from the 85th percentile storm, and therefore, 100 percent of the pollutants in that runoff, from ever reaching receiving waters. Even at two times the rainfall intensity of the 85th percentile storm, this type of device will fail to reduce pollutants in stormwater to nearly the same level as will onsite retention.[5] Thus, the flow-through option should be eliminated, and instead, the "off-ramp" should include only nearby offsite LID projects with a 1.5 volume multiplier to incentivize creativity to retain the water

[4] Draft Permit at 40.
[5] R. Horner (2009) Assessment of Hydrologic and Water Quality Implications of Stormwater Management under Provisions of the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit, at 4-5.

onsite. Specifically, we urge the State Board to modify the "Alternative Compliance with Treatment Sizing Criteria" provision as follows:

> "… the Department may satisfy outstanding treatment requirements by meeting one or more of the following requirements, in order of preference:
>
> > (1) Upon approval by the applicable Regional Water Board, installing ~~Equivalent Offsite Treatment~~ infiltration, reuse and/or evapotranspiration projects that retain 1.5 times the volume of the 85th percentile 24-hour storm generated onsite, at an offsite location in the same watershed and ensuring the provision of long-term maintenance of any applicable treatment measures; or
> >
> > (2) Upon approval by the applicable Regional Water Board, contributing ~~Equivalent Funds~~ payment in lieu to fund a Regional Board-approved Regional Project that retain, through infiltration, reuse and/or evapotranspiration, 1.5 times the amount of stormwater generated onsite."

ZM-14

We additionally support the requirement for Caltrans to conduct a minimum of 36 pilot LID retrofit projects statewide.[6] It is critical that "retrofit" becomes part of the dialogue when managing stormwater pollution. However, the Permit should include critical retrofit project details, such as: performance criteria, sizing criteria and the size of the area to be treated.

II. Monitoring

Toxicity Monitoring

ZM-15

The Draft Permit states that a chronic toxicity analysis is only required for non-storm water sites, while acute toxicity tests are required at all sites.[7] Instead, both acute *and* chronic toxicity monitoring should be conducted at *every* site. As the Draft Permit states, this is especially important because the "Department's discharges indicate a need to monitor acute and chronic toxicity according to U.S. EPA protocol."[8] Toxicity testing is also no longer required by the Draft Permit if the first samples do not indicate toxicity. With so much variability from storm-to-storm and year-to-year, it is critical to continue toxicity monitoring. Since Caltrans applies pesticides, herbicides and fungicides at different times of the year, it is important to understand toxicity impacts year-round.

Action Levels

ZM-16

There are several issues with the Water Quality Action Levels (Table 1) as newly proposed. First, the Draft Permit allows Caltrans to discontinue monitoring at a site when no exceedances

[6] Draft Permit at 53.
[7] Draft Permit at 27.
[8] Draft Permit at 12-13.

of the "action levels" are found. There is so much variability from storm-to-storm and year-to-year that only locations with zero exceedances should be discontinued and changed to new sites. Without an adequate sample size over time, the state will be unable to adequately track progress and implement enhanced controls as needed. It is important to observe trends over time, especially when there are any noted exceedances, to inform current and new actions to control pollution. Any monitoring sites that exceed water quality objectives during any sampling event should remain on the monitoring list. Additionally, we suggest selecting at least 25 fixed sites to be monitored consistently each year throughout the permit cycle.

ZM-17 The Draft Permit also calls for receiving water monitoring to begin and discharge monitoring to end when a discharge exeedance is found. Instead, discharge and receiving water monitoring should occur concurrently to better understand if a discharge is causing and contributing to a water quality standard exceedance.

ZM-18 Finally for clarification purposes, what is the time period for the Action Level Exceedances? We assume that this evaluation takes place every year, but this section is unclear.

Attachment II Constituents

The Draft Permit states that "[o]n a site specific basis, the Department need not analyze for constituents in Attachment II where the Regional Water Board finds that there is little chance that they are present in the discharge."[9] We urge the State Water Board to remove this provision. ZM-19 Attachment II contains a fairly basic list of pollutants, which already specifies certain types of projects needing to monitor for only a subset of pollutants. Due to variability in stormwater and the wide variety of pesticides, herbicides fungicides and fertilizers that Caltrans applies, it is inappropriate to deem a pollutant as having "little chance" of being present. Monitoring is necessary to confirm this is an accurate statement. At a minimum, Caltrans should monitor for all constituents in Attachment II for the first two years to ensure that these pollutants are not present in the discharge.

III. TMDL Compliance

In our March 14, 2011 comments, we noted that Appendix IV (TMDL Implementation Requirements) was incomplete for Region IV. Given the numerous discrepancies for that region ZM-20 alone, it is likely that other regions have errors that must also be addressed. We are pleased that most of the errors in Region IV have been corrected in the Draft Permit, except several adopted TMDLs are still missing in their entirety (Colorado Lagoon Toxics, Los Cerritos Metals, Santa Clara Chloride and San Gabriel River Metals and Selenium). While we appreciate that the Draft Permit requires that "…the Department shall comply with all applicable TMDL-related requirements even If not included in Attachment IV,"[10] the Draft Permit must include all WLAs,

[9] Draft Permit at 27.
[10] Draft Permit at 63.

milestones and requirements from the applicable TMDLs in order to demonstrate that the Permit's provisions will ensure that Caltrans achieves the TMDLs' goals. "[O]nce a TMDL is developed, effluent limitations in NPDES permits must be consistent with the WLA's in the TMDL."[11] Thus, we urge the State Water Board to work with regional boards to ensure that Appendix IV is complete.

Attachment V includes "region specific requirements." While we strongly support the provision requiring compliance with both single sample and geometric mean bacteria objectives, it is unclear why the Santa Monica Bay and Marine Del Rey Harbor Bacteria TMDLs are the only requirements for Region 4 listed in this section. Please clarify the difference between Attachment V and Attachment IV.

ZM-21

IV. Agricultural Irrigation Runoff

Federal law requires that MS4 permits "shall include a requirement to effectively prohibit non-stormwater discharges into the storm sewers."[12] The Draft Permit enumerates certain non-stormwater discharges that "are conditionally exempt from [the] prohibition" against non-stormwater discharges into the MS4 system.[13] However, federal regulations under the Clean Water Act are clear that sources of pollution cannot be exempted from the prohibition against non-stormwater discharges.[14] As discussed in our March 14, 2011 comments, agricultural runoff is a significant source of pollution in and around Caltrans' stormwater systems. Accordingly, agricultural runoff cannot be exempted from the prohibition against non-stormwater discharges.

ZM-22

While the Board has deleted the phrase "including agricultural irrigation water" from the list of exempted discharges and the accompanying footnote stating that agricultural irrigation water remains conditionally exempt only if "regulated by WDRs or conditional waivers of WDRs" and if the Department provides reasonable support to the monitoring activities of the regulated

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[11] *Communities for a Better Environment, supra,* 132 Cal.App.4th at p. 1322 (citing 40 C.F.R. § 122.44(d)(1)(vii)(B)) (NPDES permits must be "consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the State and approved by the EPA"); *see also City of Arcadia v. State Water Resources Control Board* (2006) 135 Cal.App.4th 1392, 1404 (quoting *Communities for a Better Environment*, *supra*, 132 Cal. App.4th at p. 1322; *Dioxin/Organochloride Center v. Clarke* (9th Cir. 1995) 57 F.3d 1517, 1520 ("When a TMDL and specific wasteload allocations for point sources have been established, any NPDES permits issued to a point source must be consistent with the terms of the TMDL and WLA").

[12] 33 U.S.C. § 1342(p)(3)(B)(ii) (emphasis added).

[13] Draft Permit at 19.

[14] 40 C.F.R. § 122.26(d)(2)(iv)(B)(1). We note that Section 402(p)(3)(B)(ii) of the CWA requires that permits for discharge from municipal sewers "effectively prohibit non-stormwater discharges," and does not create *any* authorization for exemption of such discharges. The Clean Water Act's implementing regulations under 40 C.F.R. § 122.26(d)(2)(iv)(B)(1) set forth the circumstances under which the co-permittee must specifically design a program to "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" of specified non-storm water discharges or flows identified by the municipality as sources of pollutants. Yet, the requirement of an enforcement program to "detect and remove . . . illicit discharges," does not support the construction, seemingly implemented by the Tentative Order, that certain specified categories of non-stormwater discharges are "*exempt . . . unless*" they are identified as a source of pollution. Tentative Order, p. 18 (emphasis added).

discharger.[15] the Permit still includes the broader term "irrigation water" on the list of exempted discharges, which could be read to include agricultural irrigation water. In order to effectively prohibit the discharge of agricultural runoff, the State Water Board should clarify that agricultural runoff is not a type of exempted irrigation water (eg. "irrigation water, not including agricultural runoff.").

ZM-23 → Even with the above clarification, the revised Permit still fails to meet the legal standard of effectively prohibiting non-stormwater discharges. Instead of effectively prohibiting agricultural runoff, the State Water Board takes the requirements of a conditionally exempt pollutant, and turns it into a Best Management Practice (BMP).[16] "Facilitating monitoring activities" does not effectively prohibit agricultural runoff from entering Caltrans's MS4 system, and thus does not meet the legal standard under Clean Water Act Section 402(p)(3)(B)(ii). Since a BMP requiring the same obligation as a condition for an exempt pollutant accomplishes nothing and does not meet the legal standard of effectively prohibiting agricultural runoff, we ask the State Water Board to re-visit the BMPs for "Non-storm water Activities/Discharges."

BMPs for non-stormwater activities must effectively and clearly prohibit the discharge of agricultural runoff in Caltrans' MS4, and must include specific requirements that will ensure that

ZM-24 → Caltrans demonstrates that it is actually achieving this prohibition. The Permit should also include monitoring and reporting requirements by which Caltrans demonstrates progress toward "detecting and removing" such illegal discharges, consistent with federal law. Such requirements are particularly important in those regions where there is no region-wide conditional waiver or WDRs for irrigated agriculture at all (Regions 1, 2 and 6 and 7). Again, this is also the case where the State or Regional Boards, Caltrans, or others have information showing that other non-stormwater discharges (such as landscape irrigation) cause pollution in and around Caltrans' stormwater systems.[17]

* * *

In the 12 years that have passed since adoption of the current Caltrans stormwater permit, we have learned much about the constituents, fate, transport, impacts and control of stormwater pollution. While the proposed Draft Permit incorporates some of these "lessons learned," additional direction must be given to ensure that the Permit complies with the letter and intent of the law and protects the health of California's invaluable waterways.

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[15] Draft Permit at 19.

[16] *See* Draft Permit at 60. The Department shall provide reasonable support to the monitoring activities of agricultural dischargers whose runoff enters the MS4. Reasonable support includes facilitating monitoring activities, providing necessary access to monitoring sites, and cooperating with monitoring efforts as needed. It does not include actively conducting monitoring or providing funding.

[17] Water Quality Ordinances Update: Hearing Before the Board of Supervisors and Orange County Flood Control District, (2011), *available at* http://cams.ocgov.com/Web_Publisher/Agenda02_01_2011_files/images/A10-001604.HTM.

Thank you for your attention to these comments. We look forward to working with you and your staff to ensure the swift adoption of a protective Caltrans stormwater permit.

Best regards,

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March 14, 2011

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VIA ELECTRONIC MAIL: commentletters@waterboards.ca.gov

Re: Comment Letter – Caltrans MS4 Permit

Dear Chair Hoppin and Board Members:

The California Coastkeeper Alliance (CCKA), representing California's 12 Waterkeeper organizations, and Heal the Bay welcome the opportunity to submit these comments on the "Draft Statewide National Pollutant Discharge Elimination System (NPDES) Permit for the Discharge of Storm Water Runoff from the California Department of Transportation's (Department) Municipal Separate Storm Sewer System (MS4) ("Tentative Order" or "Draft Permit"). Our organizations have been actively involved throughout California in ensuring the control of stormwater pollution generally, and Caltrans' pollution in particular, for many years. We have significant interest in the development, adoption, implementation and enforcement of this Draft Permit, and will work closely with you and your staff to ensure its effectiveness in reducing the ongoing pollution of the waters of the state from this source.

We commend the State Board for taking action in the Draft Permit in several areas, particularly the provisions that enhance transparency, address fish crossings, and improve monitoring. We have a number of recommendations that are needed to ensure that the Draft Permit is consistent with both the letter and intent of current law, and that it effectively protects the health of the state's invaluable waterways. As described in more detail below, our key comments and recommendations include the following:

- the Draft Permit needs to be improved to ensure that non-storm water runoff – including landscape irrigation and agricultural irrigation – is "*effectively prohibited*";
- the stipulated mandate resulting from District 7 litigation that requires a 20% "treatment or reduction" in stormwater discharges below 1994 levels should be applied statewide;
- the definition and application of "maximum extent practicable" needs to be strengthened to meet the letter and intent of the law;
- numeric effluent limits need to be added, for example for "high priority pollutants," because they are both feasible and necessary to ensure water quality standards are met;

- the Draft Permit must include specific provisions to eliminate waste discharges into ASBSs and ensure maintenance of natural water quality for discharges near ASBSs;
- monitoring needs to be enhanced and more clearly linked to enforcement, so that progress may be tracked, changes made and violations swiftly acted on as appropriate;
- the definition of new development and re-development must be expanded to allow for appropriate action to protect waterways;
- the low-impact development requirements must be tied to specific numeric metrics for performance;
- the hydromodification controls must be expanded to include some proposed exemptions, and the applicable standard should be the site pre-development, rather than pre-project;
- BMP effectiveness needs to be more definitively assessed and reported on;
- the "eroding lands" requirements in the District 11 Consent Decree should be clearly incorporated into the Draft Permit on a statewide basis;
- the Draft Permit must incorporate specific wasteload allocations, and other detailed implementation provisions and milestones, necessary to ensure compliance with adopted TMDLs; and *all* applicable TMDLs must be specifically included in the Draft Permit; and
- Attachment V, "Region Specific Requirements," needs to be updated to better reflect current actions to control Caltrans stormwater runoff around the state.

Further detail is provided below, tracked in the order it appears in the Draft Permit.[1]

INTRODUCTION

Though the permit update before us is many years overdue, we welcome its attempts to better reflect the current knowledge about controlling pollutants in stormwater. Knowledge about stormwater movement, constituents, sampling and control has expanded greatly since the adoption of the current permit in 1997. This new information is appropriately included in the Draft Permit.

We believe, however, that the Draft Permit fails to meet the letter and intent of the law in addressing the significant, known discharges from Caltrans' MS4 into the waters of the state, including sensitive areas of special biological significance (ASBSs). In an average year, over six million gallons of oil runs into California's waters from our roads and sidewalks,[2] the equivalent of over 110 *Cosco Busan* spills. As one other example, we provide below the results of a sampling effort by San Francisco Baykeeper last fall of Caltrans' outfalls, in part to complement the U.S. EPA order[3] finding numerous violations based on the audit of Caltrans' MS4 operations[4] in

[1] SWRCB, "Tentative Order No. 2011-XX-DWQ, NPDES No. Cas000003, National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit/Waste Discharge Requirements (WDRs) for State of California Department Of Transportation" ("Tentative Order" or "Draft Permit"), available at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/caltrans/tentorder_public8.pdf.

[2] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment, *Characterization of Used Oil in Stormwater Runoff in California* (September 2006), available at: http://www.oehha.ca.gov/water/reports/OilInRunoff0906.pdf.

[3] *In the Matter of State of California, Dep't of Transportation*, "Findings of Violation and Order for Compliance," Docket No. CWA-2009-2011-0001 (U.S. EPA Region 9, Oct. 26, 2010),), *see* http://www.epa.gov/region9/water/npdes/ms4audits.html#caleval.

Districts 1 through 4.[5] As can be seen from this typical example, Caltrans' discharges significantly exceed water quality objectives for copper, which is a serious threat to the viability of aquatic species, and also demonstrates consistent exceedances for zinc and other compounds.

Such results, coming on the heels of disappointing audit findings after a decade of Permit implementation (and ongoing litigation in other Districts), indicate that much work needs to be done to implement and enforce strong Permit provisions that protect California's waterways. Given the ongoing slide in the health of California's aquatic ecosystems, an "all hands on deck" approach needs to be taken to reverse ingrained polluting habits and achieve clean discharges in the coming permit cycle.

Caltrans Sampling Results[6]

Site	2009 Traffic count (# cars per day)	Parameter measured	Baykeeper sample value (µg/L)	Basin Plan Marine WQO (µg/L) – 4 day average	Basin Plan Marine WQO (µg/L) – 1 hour average
Highway 101 near airport exit	Peak = 250,000; average daily = 243,000	Copper	120	6.0	9.4
		Lead	26	8.1	210
		Nickel	8.0	8.2	74
		Zinc	200	81	90
		TSS	77	-	-
I-280 near Mariposa exit	Peak = 102,000; average daily = 97,000	Copper	100	6.0	9.4
		Lead	17	8.1	210
		Nickel	6.6	8.2	74
		Zinc	160	81	90
		TSS	59	-	-
I-880 near 7th Street exit	Peak = 128,000; average daily = 125,000	Copper	78	6.0	9.4
		Lead	24	8.1	210
		Nickel	8.5	8.2	74
		Zinc	200	81	90
		TSS	7	-	-

[4] Caltrans, "Municipal Separate Storm Sewer System (MS4) Compliance Audit," conducted for U.S. EPA Region 9 and SWRCB (Feb. 26, 2010), *see* http://www.epa.gov/region9/water/npdes/ms4audits.html#caleval.

[5] In this audit, U.S. EPA found multiple ongoing violations of the Caltrans Permit across all aspects of the Permit and all Districts evaluated. The resulting U.S. EPA Order attempts to correct these deficiencies; EPA's instructions should be carefully considered and incorporated into the current Draft Permit as appropriate.

[6] San Francisco Baykeeper, Stormwater Samples, taken Oct. 24, 2010, analyzed by Curtis & Tompkins. All sites discharge to San Francisco Bay.

NON-STORMWATER DISCHARGES MUST BE *EFFECTIVELY PROHIBITED*[7]

Federal law requires that MS4 permits "shall include a requirement to *effectively prohibit* non-stormwater discharges into the storm sewers."[8] The Draft Permit states that certain enumerated non-stormwater discharges "are conditionally exempt from [the] prohibition" against non-stormwater discharges into the MS4 system.[9] However, federal regulations under the CWA are clear that when any of the categories of non-stormwater discharges identified as exempt in the Tentative Order are identified as sources of pollution, they are disallowed.[10] Caltrans' own data indicates that listed non-stormwater discharges are indeed regular sources of pollutants, and so should be "removed" according to federal regulations. For example, as shown in the table below, Caltrans' data indicates that agricultural runoff is a significant source of pollution in and around Caltrans' stormwater systems. Agriculture runoff consists of many pollutants, including: pesticides, sediment, salts, pathogens, and heavy metals. However, despite the clear direction of the law and regulations to control this pollution, and the facts showing that it is indeed a source of pollutants, the Board takes the untenable position that if agricultural irrigation water is "regulated by WDRs or conditional waivers of WDRs" and if the Department cooperates with organizations conducting monitoring of such discharges, the discharges are not expected to be a source of pollutants and need not be prohibited by the Department.[11]

State and Regional Water Board databases and reports similarly demonstrate significant, ongoing contamination associated with even "regulated" agricultural runoff. In November 2010, the Central Coast Regional Water Quality Control Board (CC RWQCB) stated that agricultural discharges (pesticides, sediment, nutrients) are a "major cause of water pollution" in the Central Coast Region.[12] The CC RWQCB further states that water quality impairments are well documented, severe, and widespread.[13] While agricultural runoff has been regulated by a conditional waiver for years, the CC RWQCB still finds agricultural discharges "continue to contribute to already significantly impaired water quality."[14] Clearly, the CC RWQCB does not agree with the SWRCB that agricultural runoff regulated by WDRs or conditional waivers of WDRs is not a source of pollutants.

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[7] Tentative Order, Sec. B. pp. 18-19.
[8] 33 U.S.C. § 1342(p)(3)(B)(ii) (emphasis added).
[9] Tentative Order, p. 18.
[10] 40 C.F.R. § 122.26(d)(2)(iv)(B)(1). We note that Section 402(p)(3)(B)(ii) of the CWA requires that permits for discharge from municipal sewers "effectively prohibit non-stormwater discharges," and does not create *any* authorization for exemption of such discharges. The Clean Water Act's implementing regulations under 40 C.F.R. § 122.26(d)(2)(iv)(B)(1) set forth the circumstances under which the co-permittee must specifically design a program to "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" of specified non-storm water discharges or flows identified by the municipality as sources of pollutants. Yet, the requirement of an enforcement program to "detect and remove . . . illicit discharges," does not support the construction, seemingly implemented by the Tentative Order, that certain specified categories of non-stormwater discharges are "*exempt . . . unless*" they are identified as a source of pollution. Tentative Order, p. 18 (emphasis added).
[11] Tentative Order, p. 18 (emphasis added).
[12] Central Coast Regional Water Quality Control Board, "Recommendations for Water Code Waiver for Agricultural Discharges," p. 7 (2010), *available at* http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/12_09_2010_staffrpt/AgOrder_StaffReport.pdf.
[13] *Id.*
[14] *Id.*

The CV RWQCB similarly disagrees with the SWRCB that agricultural runoff regulated by WDRs or conditional waivers of WDRs is not a source of pollutants. In July 2010, after years of operation under a conditional waiver, the CV RWQCB admitted that agricultural discharge "can affect water quality by transporting constituents of concern" including pesticides, sediment, nutrients, salts, pathogens, and heavy metals from agricultural fields.[15] The CVRWCB finds that many water bodies are impaired because of "pollutants from agricultural sources."[16] Approximately 9,493 miles of rivers and some 513,130 acres of lakes statewide are listed under Section 303(d) as being impaired by irrigated agriculture.[17] In fact, the CV RWQCB finds that over 60% of regional water quality exceedances occur during irrigation season.[18]

Throughout Central Valley monitoring sites pesticide levels "exceed known toxicity thresholds for test species."[19] Studies show that sediment toxicity occurs in all zones of the Central Valley, most likely caused by pyrethroids, a replacement pesticide for organophosphates.[20] The CV RWQCB found that salinity in all zones of the Central Valley is a concern.[21] Heavy metals, such as those found in herbicides, are causing "widespread" toxicity.[22] Lastly, pathogen indicators, such as fecal coliform and E. coli, are "ubiquitous" in sampling throughout agricultural areas.[23] In the face of consistent information about the contamination caused by agricultural irrigation, *even where waivers and WDRs are in place*, it is simply unsupportable to assume that these regulatory controls translate to "no pollutants" under the Draft Permit.

Agricultural irrigation run-off is not just a pervasive problem for regional boards; it is a problem for Caltrans. In the Caltrans Characterization Study performed for the Draft Permit, monitoring results indicated that "conventional pollutants, trace metals, and nutrients were higher in agricultural" areas.[24] Caltrans's own monitoring sites "exhibited higher concentrations of most conventional pollutants (EC, DOC, TDS, TOC, TSS)" for agricultural areas than all other land uses.[25] Trace metals found in Caltrans's storm drains around agricultural areas showed "consistently higher concentrations" than for other land uses.[26] Nutrient pollution followed the same pattern, as

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[15] Central Valley Regional Water Quality Control Board, "Irrigated Lands Regulatory Program, Draft Program Environmental Impact Report," p. 1-1 (July 2010), *available at* http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/long_term_program_development/draft_program_eir_july2010/peir_ch1.pdf.
[16] *Id.*
[17] *Id.*
[18] State Water Resources Control Board & Central Valley Regional Water Quality Control Board, "Report to the California State Legislature Joint Legislative Budget Committee on Reduction of Agricultural Pollution Runoff into the Sacramento-San Joaquin Delta," p. 2 (2011), available at: http://www.cacoastkeeper.org/document/report-to-legislature-on-delta-agricultural-pollution.pdf.
[19] Central Valley Regional Water Quality Control Board, "Revised Draft 2007 Review of Monitoring Data Irrigated Lands Conditional Waiver Program," p. 3 (2007), *available at* http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/monitoring_data/staff_monitoring_data_analysis/2007_monitoring_data_report/2007_data_review/exec_summ.pdf.
[20] *Id.*
[21] *Id.*
[22] *Id*. at 2.
[23] *Id*. at 3.
[24] California Department of Transportation, "Storm Water Monitoring & Data Management," p. 67 (2003), *available at* http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-03-065.pdf.
[25] *Id*. at 55.
[26] *Id.*

total phosphorus, orthophosphate, and TKN were "significantly higher" in agricultural areas.[27] Orthophosphate, however, was found to decrease in Caltrans' stormwater data as the Annual Average Data Traffic (AADT) increased.[28] Caltrans explains this result could only come from "other sources or conditions responsible for orthophosphate in runoff (e.g. agricultural land uses or higher percentages of landscaped areas)."[29]

Caltrans's own data charts further demonstrate that agricultural irrigation is a pollutant, regardless of the current regulatory methodologies (which have far to go to be able to manage these pervasive sources of pollution). In Table 3-17 of the Caltrans Characterization Study below, Caltrans monitoring data found 22 out of 24 pollutants had increased levels due to the surrounding land use.[30] Of those 22 pollutants, 15 of them had increased levels due to agricultural land use.[31] As Caltrans concludes:

> Patterns of significant differences in runoff quality from different predominating land uses are summarized as follows:
>
> - **Conventional parameters**: Runoff from highway sites in agricultural and commercial areas exhibited higher concentrations of most conventional pollutants (EC, DOC, TDS, TOC, TSS) than the overall average and all other land uses. Highway sites in predominantly residential, transportation, and open land use areas generally exhibited lower than average conventional pollutant concentrations in runoff.
> - **Trace metals:** Runoff from highway sites in agricultural and commercial areas also exhibited consistently higher concentrations of most trace metals than for other land uses. Predominantly residential, transportation, and open land use areas [32]generally exhibited average or lower than average metals pollutant concentrations in runoff. Exceptions to this pattern were total and dissolved copper and total and dissolved zinc, which were significantly higher than average in transportation areas.
> - **Nutrients:** Nutrient concentrations in highway runoff followed the same general pattern. Total phosphorus, and TKN were significantly higher in agricultural and commercial areas, and orthophosphate was also higher in agricultural area. Other land uses generally nutrient concentrations that were not significantly different from the overall average.

In sum, Caltrans' data indicates that, regardless of regulatory mech*anism*, agricultural land *use in fact* demonstrably contributes to Caltrans's pollutant levels in its stormwater discharge, and cannot be ignored.

Already, a precedent has been set in California for complying with the law and regulations in "detecting and removing" agricultural irrigation discharges into the storm sewer system. In the most recent NPDES stormwater permit adopted by the San Diego Regional Water Quality Control

[27] *Id*.
[28] *Id*. at 34.
[29] *Id*.
[30] *Id.* at 56.
[31] *Id*.
[32] *Id*. at 55.

Board, the Regional Board decided that six discharge exemptions were no longer warranted because they "were determined to be significant sources of pollution."[33] Of the six exemptions, "irrigation run-off from agriculture" is no long exempted under the San Diego Region NPDES permit.[34] Supporting San Diego Regional Board legal analysis concluded that "Federal law mandates . . . that non-storm water discharges be effectively prohibited from entering the MS4."[35] We urge the SWRCB to follow San Diego's sound factual and legal decision that agricultural irrigation is a source of pollutants, and should not be conditionally exempted in the instant MS4 permit.

Clean Water Act Section 402(p)(3)(B)(ii) states that "[p]ermits for discharges from municipal storm sewers . . . shall include a requirement to *effectively prohibit* non-stormwater discharges into the storm sewers." (Emphasis added.) The Draft Permit's attempt at a pseudo-prohibition has been rendered *ineffective* by the concurrent allowance of an exception based on the unsupported guess that agricultural runoff "regulated" under waivers is not a source of pollutants. Undeniable evidence to the contrary indicates that a new approach must be taken.

The Permit cannot ignore clear and incontrovertible evidence in the record that agricultural runoff (among other non-stormwater runoff sources, such as landscape irrigation) do in fact currently, and within the life of the permit will, cause pollution in and around Caltrans' stormwater systems. As such, the Permit must effectively and clearly *prohibit* the discharge of agricultural runoff in Caltrans' MS4, and must include specific requirements that will ensure that Caltrans demonstrates that it is actually achieving this prohibition. The Permit should also include monitoring and reporting requirements by which Caltrans demonstrates progress toward "detecting and removing" such illegal discharges, consistent with federal law. Such requirements are particularly important in those regions where there is *no* region-wide conditional waiver or WDRs for irrigated agriculture at all (Regions 1, 2 and 6 and 7). Again, this is also the case where the State or Regional Boards, Caltrans, or others have information showing that other non-stormwater discharges (such as landscape irrigation) cause pollution in and around Caltrans' stormwater systems.

[33] Water Quality Ordinances Update: Hearing Before the Board of Supervisors and Orange County Flood Control District, (2011), *available at* http://cams.ocgov.com/Web_Publisher/Agenda02_01_2011_files/images/A10-001604.HTM.
[34] *Id.*
[35] Memorandum from Catherine George Hagan, Senior Staff Counsel, San Diego Regional Water Quality Control Board to Chair Wright and SD RWQCB Members, "Regulatory Authority for Imposing Numeric Effluent Limits on Dry Weather, Non-Storm Water Discharges, in Municipal Storm Water Permits," p. 4 (Nov. 5, 2009), available at: http://www.cacoastkeeper.org/document/nonstormwater_runoff_region_9%5B1%5D.pdf.

Table 3-17 Significant Variation Due to Surrounding Land Use

Pollutant Category	Parameter	Fraction	Significant Variation due to Surrounding Land Use?	Land Uses with Significant Differences from Overall Average Runoff Quality for Land Uses	
				Land Uses Above Overall Average	Land Uses Below Overall Average
Conventional	DOC		YES	AG	TRANS
	EC		YES	AG, COMM	RES, TRANS
	Hardness as CaCO3		YES	AG, TRANS	RES
	pH		YES	COMM, OPEN	TRANS
	TDS		YES	AG, COMM	ns
	Temperature		YES	RES	OPEN
	TOC		YES	AG, COMM, MXD	OPEN, RES
	TSS		YES	AG, COMM	ns
Trace Metals	As	Total	YES	COMM	MXD
	Cd	Total	YES	COMM	ns
	Cr	Dissolved	YES	OPEN	TRANS
	Cr	Total	NO	ns	ns
	Cu	Dissolved	YES	AG, TRANS	OPEN, RES
	Cu	Total	YES	AG, COMM	OPEN, RES
	Ni	Dissolved	YES	AG	TRANS
	Ni	Total	YES	AG, COMM	TRANS
	Pb	Dissolved	NO	ns	ns
	Pb	Total	YES	AG, COMM	TRANS
	Zn	Dissolved	YES	TRANS	OPEN
	Zn	Total	YES	AG, COMM, TRANS	MXD, OPEN, RES
Nutrient	NO3-N		NO	ns	ns
	Ortho-P	Dissolved	YES	AG	TRANS
	P	Total	YES	AG, COMM	ns
	TKN		YES	AG, COMM, TRANS	OPEN

Notes: Threshold for statistical significance is $p < 0.05$ for all comparisons and effects. "ns" indicates not significant at the 95% confidence level. Land Use designations: AG = Agriculture, COMM = Commercial, MXD = Mixed, no dominant land use determined, OPEN = Open, RES = Residential, TRANS=Transportation

Caltrans, "Storm Water Monitoring & Data Management: Discharge Characterization Study Report," CTSW-RT-03-065.51.42, p. 56 (Nov. 2003).

THE PROVISION OF THE DISTRICT 7 STIPULATION THAT CALLS FOR A "20% REDUCTION IN STORMWATER DISCHARGES BELOW 1994 LEVELS" SHOULD BE APPLIED STATEWIDE

NGO litigation against Caltrans in District 7 resulted in detailed litigation agreements to which Caltrans has been bound for years. One central provision to these agreements is a requirement that "stormwater discharges are treated or otherwise reduced to a level at least twenty (20) percent below 1994 levels."[36] To achieve this 20% reduction, the agreements called for studies by corridor to determine appropriate BMPs, and provided a calculation mechanism to implement the agreement.

Among other things, the District 7 2008 Stipulation (attached) states that:

> The Corridor Stormwater Management Studies will propose, by each designated corridor, the appropriate treatment BMPs to be placed, such that Defendant's stormwater discharges are treated or otherwise reduced to a level at least twenty (20) percent below 1994 levels, (calculated in accordance with Exhibit A hereto,) within each watershed situated within the jurisdiction of the LARWQCB. Exhibit A is hereby incorporated by reference. Defendant will implement the BMPs in the Corridor Stormwater Management Studies to meet the Treatment Requirement set forth in Paragraph 3, infra, of this Stipulation and Order.

District 7 is bound by this language and under it, Caltrans is working toward the required 20% "treatment or reduction" mandate. This mandate sets a clear goal by which progress can be measured, and is one that can and must be implemented statewide. We urge the State Board to amend the Draft Permit to include this mandate, and require similar corridor studies that will ensure its achievement by a (named) date certain.

EFFLUENT LIMITATIONS SHOULD BE STRENGTHENED[37]

The Draft Permit's Definition of Maximum Extent Practicable (MEP) is Inadequate

Section 402(p) of the Clean Water Act establishes the MEP standard as a requirement for pollution reduction in stormwater permits. The Act states that discharges from MS4 systems "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." The Draft Permit defines MEP as:

> The minimum required performance standard for implementation of municipal storm water management programs to reduce pollutants in storm water. . . . MEP is the cumulative effect of implementing, evaluating, and making corresponding changes to

[36] *NRDC v. Caltrans*, Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist., Jan. 17, 2008) (attached). *See also NRDC v. Caltrans*, Stipulation Providing Clarifying Exhibits to Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist. July 2009) (attached).
[37] Tentative Order, Sec. C., p. 19.

> a variety of technically appropriate and economically feasible BMPs, ensuring that the most appropriate controls are implemented in the most effective manner. This process of implementing, evaluating, revising, or adding new BMPs is commonly referred to as the iterative process.[38]

Merely stating that the MEP standard creates a "minimum required performance standard" that is the "cumulative effect of implementing, evaluating, and making corresponding changes" to BMPs fails to adequately describe the requirements of the MEP standard. "[T]he phrase 'to the maximum extent practicable' does not permit unbridled discretion. It imposes a clear duty on the agency to fulfill the statutory command to the extent that it is feasible or possible."[39] The Draft Permit must clearly delineate and demonstrate the federally mandated minimum effort, or "floor," below which a permit *may not be approved* by EPA or by the responsible state agency. Unfortunately, the Draft Permit fails to provide this clear direction and evidence of the federal mandate.

The significance of this requirement has been recognized in a variety of jurisdictions. As one state hearing board held:

> [MEP] means to the fullest degree technologically feasible for the protection of water quality, except where costs are wholly disproportionate to the potential benefits . . . . This standard requires more of permittees than mere compliance with water quality standards or numeric effluent limitations designed to meet such standards . . . . The term "maximum extent practicable" in the stormwater context implies that the mitigation measures in a stormwater permit must be more than simply adopting standard practices. This definition applies particularly in areas where standard practices are already failing to protect water quality . . . .[40]

The North Carolina board found that the permits in question violated the MEP standard both because commenters highlighted measures that would reduce pollution more effectively than the permits' requirements and because other controls, such as infiltration measures, "would [also] reduce discharges more than the measures contained in the permits."[41]

The State Board should likewise recognize the significance of the MEP requirement and revise its definition accordingly.

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[38] Tentative Order, Appendix C, p. 5; *see also* Tentative Order, p. 7.
[39] *Defenders of Wildlife v. Babbitt* (D.D.C. 2001) 130 F.Supp.2d 121, 131 (internal citations omitted); *Friends of Boundary Waters Wilderness v. Thomas* (8th Cir. 1995) 53 F.3d 881, 885 ("feasible" means "physically possible").
[40] *North Carolina Wildlife Fed. Central Piedmont Group of the NC Sierra Club v. N.C. Division of Water Quality* (N.C.O.A.H. October 13, 2006) 2006 WL 3890348, Conclusions of Law 21-22 (internal citations omitted).
[41] *Id.* at Conclusions of Law 19.

Numeric Effluent Limitations Are Feasible and Required[42]

Disappointingly, the Draft Permit contains no numeric effluent limitations (NELs) except for Lake Tahoe. Instead, the Draft Permit asserts that BMPs are "appropriate" due to discharge variability, consistent with 40 CFR 122.4(k)(2).[43] No discussion or analysis is provided, however, as to the reason that NELs are possible in Lake Tahoe and not elsewhere. Certainly the seasonal use and weather patterns in Tahoe make for *more* discharge variability rather than less, which would support application of NELs more broadly statewide.

U.S. EPA recently weighed in on this matter, stating that "where the NPDES authority determines that MS4 discharges . . . . have the reasonable potential to cause or contribute to water quality standards excursions, permits for MS4s . . . should contain numeric effluent limitations where feasible to do so."[44] U.S. EPA further found that for adopted TMDLs that include wasteload allocations for stormwater discharges, "permits for . . . MS4 discharges *must c*ontain effluent limits and conditions consistent with the . . . WLAs in the TMDL."[45] EPA explained further that where the WLAs provide numeric pollutant loads or objectives, "the WLA should, where feasible, be translated into numeric WQBELs in the applicable stormwater permits."[46]

The experience in Lake Tahoe, an area with highly variable weather and use conditions, in successfully adopting NELs illustrates that the process is 'feasible." The threatened or impaired nature of many of the state's water bodies, and the known pollutant threats posed by Caltrans' stormwater, indicates that the process is necessary, a conclusion supported by the EPA Memo. NELs at a minimum should be explored for "high priority pollutants," based on percentage by which the most stringent WQO was exceeded. These include lead, copper, zinc, aluminum, diazinon, chlorpyrifos, and iron.[47] Monitoring results associated with other constituents may yield additional, appropriate NELs.

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[42] An additional approach to providing additional accountability and certainty in reducing pollutant discharges from stormwater is the use of a mass loading reduction requirement, to be fulfilled if the discharge exceeds a concentration standard. Mass loading is the multiplication product of runoff volume and concentration, and so reducing mass loading substantially requires decreases in both volume and concentration. If concentration limits have yet to be set, CTRs and the EPA Multi-Sector General (Industrial) Permit benchmarks can be used to trigger mass loading reductions. If flow quantity has not been measured, flow monitoring can either be immediately required, or it can be modeled based on area taken out of the surface drainage system (*e.g*., through infiltration and evapotranspiration) as an indicator of volume reduction. The 2008 District 7 Stipulation that is attached provides an example of calculations using area as a surrogate to determine flow changes. *NRDC v. Caltrans*, Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist., Jan. 17, 2008). Mass loading reductions can be used in addition to adopted numeric effluent limitations to address other pollutants, and can provide more certainty and protection for the state's waterways.

[43] Tentative Order, pp. 10-11.

[44] Memorandum from James Hanlon, U.S. EPA Office of Wastewater Management and Denise Keehner, U.S. EPA Office of Wetlands, Oceans and Watersheds to Water Management Division Directors, Regions 1-10, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs," p. 3 (Nov, 12, 2010) (EPA Memo).

[45] *Id.,* citing 40 CFR Sec. 122.44(d)(1)(vii)(B) (emphasis added).

[46] *Id.*

[47] Tentative Order, p. 10.

THE DRAFT PERMIT MUST INCLUDE SPECIFIC PROVISIONS TO ELIMINATE WASTE DISCHARGES INTO ASBSs

The California Ocean Plan states that:

> Waste shall not be discharged to areas designated as being of special biological significance. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas.[48]

The Draft Permit fails to take needed action to address Caltrans' illegal discharges into ASBSs, which have been going on for decades. Instead, the Draft Permit relies on Caltrans' hoped-for, blanket exception to the Ocean Plan for all of its discharges, on the apparent assumption that this request – made years ago – would eventually be granted. Allowing Caltrans to continue illegally discharging waste into ASBSs until some unknown point in the future is unacceptable. As noted above, without an exception (which has yet to materialize for Caltrans), the Ocean Plan prohibits discharge of waste (including stormwater runoff) into the ASBSs, and discharges near an ASBSs must be located a sufficient distance away to ensure maintenance of natural water quality.

Specifically with respect to Caltrans' releases, the State Board has declared that "transportation (including stream crossings)," is a high threat discharge.[49] Moreover, it considers higher threat sources, such as stormwater runoff from transportation, as a source of waste that "should be addressed immediately."[50] Given the continued expected delay in crafting a final ASBS enforcement program at the State Board level, now is the time to incorporate discharge controls into the Caltrans permit that eliminate their discharges into affected ASBSs.

We are also concerned that the Draft Permit only identifies discharges into 10 ASBSs: Redwoods National Park, Saunders Reef, James V. Fitzgerald, Año Nuevo, Carmel Bay, Point Lobos, Julia Pfeiffer Burns, Salmon Creek Coast, Laguna Point to Latigo Point and Irvine Coast. It appears likely that Caltrans is discharging stormwater into the following three additional ASBSs (if not more): Del Mar Landing, Jughandle Cove and Gerstle Cove. The Del Mar Landing watershed area "includes State Highway 1, which is less than a half-mile from the coast."[51] The SWRCB staff notes that there are "transportation/road runoff sources"[52] of pollution into this ASBS. The Jughandle Cove watershed "includes State Highway 1, which crosses over and may discharge to Jughandle Creek at a point approximately 100 meters upstream of the ASBS." The SWRCB finds that Highway 1 may lead to "potential high runoff."[53] Finally, the Gerstle Cove watershed "includes State Highway 1, which is less than a half-mile from the coast"[54] and transits directly through the watershed. There are also six naturally occurring gullies that the State Board believes "may carry non-point source pollutants" into the Gerstle Cove ASBS, possibly with the aid of Highway 1.

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[48] 2009 California Ocean Plan, Sec. III.E.1.
[49] State Water Resource Control Board: Oceans Unit, "Status Report: Areas of Special Biological Significance," p. 14 (2006), *available at* http://www.waterboards.ca.gov/water_issues/programs/ocean/docs/asbs/status_report_aug06.pdf.
[50] *Id.*
[51] *Id*. at 47.
[52] *Id*. at 48.
[53] *Id*. at 47.
[54] *Id*. at 48.

These three ASBSs should be added to the list, others should be explored for listing, and the Permit should be modified to include specific, effective controls on pollution into all affected ASBSs. Specific implementation provisions must described in the Stormwater Management Plan that begin immediately to achieve the prohibition for discharges into ASBSs, as well as to achieve natural water quality standards for discharges away from the ASBS that may impact the ASBS.[55] No further delays should be allowed. Additionally, ASBS-specific monitoring requirements should be added to track the progress of waste discharge reductions into ASBSs.

MONITORING REQUIREMENTS IN THE STORM WATER MANAGEMENT PLAN (SWMP) SHOULD BE ENHANCED[56]

Discharge Monitoring Should Track Problem Areas and Long-term Trends

We support the Draft Permit's inclusion of a minimum of three wet weather, including first flush, and two dry weather discharge samples at 100 monitoring locations per year.[57] This minimum monitoring frequency is necessary to account for variability in discharge. However, we have concerns with the procedure for determining future monitoring locations. In order to determine discharge monitoring locations for the following year, the Draft Permit provides criteria based on exceedance frequency and magnitude. The thresholds that trigger continued monitoring at a certain monitoring location are too high (*i.e.*, 3 exceedances out of 5 samples, 3 instances of acute toxicity out of 5 samples). There is so much variability from storm to storm and year to year that only those locations with zero exceedances should be changed to new sites. Without an adequate sample size over time, the state will be unable to adequately track progress and implement enhanced controls as needed. It is important to observe trends over time, especially when there are any noted exceedances, to inform current and new action to control pollution.

Any monitoring sites that exceed water quality objectives during any sampling event should remain on the monitoring list. In addition, we suggest selecting at least 25 fixed sites to be monitored consistently each year throughout the permit cycle. The Draft Permit should then maintain the requirement that "…no less than 50 locations…shall be new locations chosen from the

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[55] The State Board's Natural Water Quality Committee found that "natural water quality" can be determined along the California coast. (Southern California Coastal Water Research Project, "Natural Water Quality Committee Summation of Findings," Technical Report 625 (September 2010).) The Committee specifically noted the feasibility of a reference site approach, stating that it was "practical to approximate what ambient marine water quality would be like in the absence of (or minimally influenced by) waste discharges by comparing water quality parameters in ASBS to water quality parameters at reference sites." *Id.* Natural water quality should be based on the quality of coastal waters at the bottom of the least developed watersheds or those with the "lowest human presence." We thus recommend that the Board adopt the following description for a reference system that defines natural water quality: "The reference watershed(s) shall be the best attainable in the region as established, in order of priority, by: (1) substantial data demonstrating that established water quality standards (concentration criteria and beneficial uses) are achieved at or near the discharge point to the ocean; or (2) the lowest presence of human-dominated land uses, including urbanization, agriculture (crop and/or pasture), grazing, and timber harvest. In the event that no watershed in a region meets the first criterion and has no more than 5 percent human-dominated lands uses by area, the reference watershed(s) shall be the nearest located in another region that meets the first or second criterion."

[56] Tentative Order, Sec. E.2.c., pp. 24-31.

[57] *Id*. at 25.

candidate pool."[58] Monitoring of discharges to impaired waterbodies and discharges to ASBSs should be prioritized when selecting monitoring site locations.

In addition, acute and chronic toxicity monitoring should be conducted at every site. This is especially important as stated in the Draft Permit because the "Department's discharges indicate a need to monitor acute and chronic toxicity according to U.S. EPA protocol."[59]

Receiving Water Monitoring Requirements Should Include Additional Details

Monitoring that is adequate to determine compliance with the MS4 Permit is required by the Clean Water Act.[60] The Draft Permit fails to include a viable receiving water monitoring program that will provide compliance assurance and sufficient data to assess whether beneficial uses are being protected. It requires a receiving water monitoring program, yet the details of the program requirements are unclear. Specifically, the Draft Permit states that "[r]eceiving water shall include the constituents exceeding these criteria [based on WQO exceedances] and shall include testing for chronic toxicity when required by the Regional Board."[61] As written, it is unclear if this evaluation is conducted on a site-by-site basis or on the program as a whole. Moreover, there is no justification for allowing a Regional Board to simply waive the receiving water monitoring requirement. In addition, as discussed above, the criteria set an unreasonably high threshold for continued monitoring at any specific location.

Further questions that should be considered in reviewing the monitoring include: does the receiving water monitoring frequency match the discharge monitoring frequency? How many locations will be monitored, and will these complement the locations of discharge monitoring? Is the receiving water program conducted in addition to the "Long Term Monitoring Program"?

Receiving water monitoring locations where there are discharges to impaired waterbodies should be prioritized for monitoring. Finally, chronic toxicity testing and benthic macro-invertebrate monitoring should be required components of the program, in order to fully understand the impact of the discharge on aquatic life beneficial uses.

Reporting Requirements for Trash and Litter[62]

We strongly support the inclusion of reporting requirements for trash and litter, especially the quantitative measurements of the volume or weight of litter removed. Littered trash can easily make its way to through the storm drain system and threatens marine life and ocean environments. As such, it is important to understand the types of littered items, in particular single-use plastic

[58] Tentative Order, p. 27.
[59] *Id*. at 12.
[60] *See* 33 U.S.C. 1318(a)(A) ("The Administrator shall require the owner or operator of any point source to (i) to establish and maintain such records, (ii) make such reports, (iii) install, use, and maintain such monitoring equipment or methods… [and] (iv) sample such effluents…["to carry out the objective of this chapter"]); 40 C.F.R. §122.44(i)(l) (specifying monitoring requirements to determine compliance). *See also NRDC v. County of Los Angeles*, No. 10-56017 at 3370 (9th Cir. March 10, 2011) ("…all NPDES permits must include monitoring provisions ensuring that permit conditions are satisfied").
[61] *Id*. at 27.
[62] *Id*., Sec. E.2.c.(4), pp. 30-31.

items, which are collected. The Draft Permit should require that periodic trash characterization studies be performed on the litter collected and removed. This information will help decision-makers target items that are the most prevalent in the litter stream.

THE DRAFT PERMIT'S PROJECT PLANNING AND DESIGN SECTION FOR NEW DEVELOPMENT AND REDEVELOPMENT IS LEGALLY INADEQUATE

LID Is a Superior and Practicable Method of Addressing Stormwater

The Draft Permit does not require any specific level of low impact development ("LID")[63] implementation and would, as explained below, allow relatively ineffective conventional treat-and-discharge techniques to be used to address runoff and allow for wholesale waivers to be granted from otherwise universally applicable SUSMP sizing criteria. Indeed, the Draft Permit's LID provisions are entirely separated from the Draft Permit's numeric sizing criteria, and by the Fact Sheet's own admission, are generally "not required to be implemented but are listed in order of preference" for implementation. The lack of any specific numeric metric for implementation of LID results in the Draft Permit failing to meet the MEP standard.

The Project Planning and Design section is critical for addressing the root causes of stormwater pollution. As U.S. EPA has noted:

> Most stormwater runoff is the result of the man-made hydrologic modifications that normally accompany development. The addition of impervious surfaces, soil compaction, and tree and vegetation removal result in alterations to the movement of water through the environment. As interception, evapotranspiration, and infiltration are reduced and precipitation is converted to overland flow, these modifications affect not only the characteristics of the developed site but also the watershed in which the development is located. Stormwater has been identified as one of the leading sources of pollution for all waterbody types in the United States. Furthermore, the impacts of stormwater pollution are not static; they usually increase with more development and urbanization.[64]

This is particularly the case with discharges from highway or road surfaces; concentrations of pollutants in highway runoff frequently exceed numeric limits designed to protect the health of receiving waters.[65]

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[63] We advocate the implementation of LID practices because LID practices retain stormwater onsite through infiltration, harvesting and reuse, or evapotranspiration, thus ensuring that pollutant loads do not reach receiving waters. Others have advanced interpretations of "LID" that include the use of treat-and-discharge systems—these systems are not as effective as retention practices because the discharged water may still contain pollution, even if it is significantly attenuated. Our interpretation of "LID" is consistent with the U.S. EPA's: "LID comprises a set of approaches and practices that are designed to reduce runoff of water and pollutants from the site at which they are generated. By means of infiltration, evapotranspiration, and reuse of rainwater, LID techniques manage water and water pollutants at the source and thereby prevent or reduce the impact of development on rivers, streams, lakes, coastal waters, and ground water." U.S. Environmental Protection Agency, *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices*, at iii (December 2007).

[64] *Id*. at v.

[65] *See, e.g*., Caltrans, "Caltrans Tahoe Highway Runoff Characterization and Sand Trap Effectiveness Studies," CTSW-RT-03-054.36.02, p. ES-2 (June 2003), available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-03-054.pdf.

LID has been established as a *superior and practicable* strategy[66] and, therefore, must be required and fully integrated in the Permit. Accordingly, the U.S. EPA has called upon Regional Boards across California to prioritize the implementation of LID using numeric metrics. Notably, U.S. EPA threatened to "consider objecting to the [San Francisco Bay region's MS4] permit" if it did not include "additional, prescriptive requirements" for LID.[67] In North Orange County, EPA likewise observed that the MS4 "permit must include clear, measurable, enforceable provisions for implementation of LID . . . . We would not support replacing [volume retention-based] approaches with qualitative provisions that do not include measurable goals."[68]

Other government agencies in California and around the U.S. have come to the same conclusions. The California Ocean Protection Council, for instance, strongly endorsed LID last year by "resolv[ing] to promote the policy that new developments and redevelopments should be designed consistent with LID principles" because "LID is a practicable and superior approach . . . to minimize and mitigate increases in runoff and runoff pollutants and the resulting impacts on downstream uses, coastal resources and communities."[69] In Washington State, the Pollution Control Hearings Board has found that LID techniques are technologically and economically feasible and must, therefore, be required in MS4 permits.[70] The National Academy of Sciences recently issued a comprehensive report with the same recommendation for stormwater management programs: "Municipal permittees would be required under general state regulations to make [LID] techniques top priorities for implementation in approving new developments and redevelopments, to be used unless they are formally and convincingly demonstrated to be infeasible."[71]

While we are pleased that the Draft Permit does, in some measure, attempt to prioritize the use of LID, as demonstrated in the U.S. EPA comments quoted above, the prioritization of LID practices is insufficient by itself to meet the MEP standard and *must* be paired with a measurable requirement for the implementation of LID. This conclusion comports with the findings of a December 2007 report commissioned by the State Water Resources Control Board, which found that "[t]he important concept across all of [the] approaches [described in the report] is that the regulations established a *performance requirement to limit the volume of stormwater discharges*."[72] The report also noted that "[m]unicipal permits have the standard of Maximum Extent Practicable (MEP) which lends itself more naturally to specifying and enforcing a level of compliance for low

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[66] California Ocean Protection Council, *Resolution of the California Ocean Protection Council Regarding Low Impact Development*, at 2 (May 15, 2008) (OPC Resolution), available at: http://www.opc.ca.gov/2008/05/resolution-of-the-california-ocean-protection-council-regarding-low-impact-development/.

[67] Letter from Douglas E. Eberhardt, EPA, to Dale Bowyer, San Francisco Bay Regional Water Quality Control Board, at 1 (April 3, 2009).

[68] Letter from Douglas E. Eberhardt, EPA, to Michael Adackapara, Santa Ana Regional Water Quality Control Board, at 2-3 (February 13, 2009).

[69] OPC Resolution, *supra*, at 2.

[70] *Puget Soundkeeper Alliance et al. v. State of Washington, Dept. of Ecology, et al.* (2008) Pollution Control Hearings Board, State of Washington, No. 07-021, 07-026, 07-027, 07-028, 07-029, 07-030, 07-037, Phase I Final, at 6, 46, 57-58.

[71] National Academy of Sciences, Committee on Reducing Stormwater Discharge Contributions to Water Pollution, National Research Council, *Urban Stormwater Management in the United States*, at 500 (2008), available at: http://wren.palwv.org/documents/081015stormwater_discharge_final.pdf.

[72] State Water Resources Control Board, *A Review of Low Impact Development Policies: Removing Institutional Barriers to Adoption*, at 23 (December 2007) (emphasis added) (hereinafter "SWRCB LID Report"), available at: http://www.waterboards.ca.gov/water_issues/programs/low_impact_development/docs/ca_lid_policy_review.pdf.

impact development."[73] Given the clear mandate of the MEP standard for pollutant reduction, the Draft Permit remains legally insufficient due to the lack of a numeric performance requirement for LID.

The Draft Permit Does Not Contain—Nor Does it Justify the Lack of—Specific Standards for LID Implementation

The Fact Sheet notes that "[t]he proper implementation of LID techniques not only results in water quality protection benefits and a reduction of land development and construction costs, but also enhances property values, and improves habitat, aesthetic amenities, and quality of life."[74] However, the Fact Sheet's claim that "[t]he requirements of this Order facilitate the implementation of LID strategies to protect water quality, reduce runoff volume, and to promote sustainability"[75] are not borne out by its language. Instead, the Draft Permit's LID provisions represent a collection of vague provisions with no specific measurable outcome. Unfortunately, even the vast majority of the Draft Permit's LID provisions fall into this category, requiring only, for example, "*Conservation* of natural areas, *to the extent feasible*"; "*Minimization* of . . . impervious footprint"; "*Minimization* of disturbances to natural drainages"; "Use of climate-appropriate landscaping that *minimizes* irrigation and runoff [and] *promotes* surface infiltration . . . ."[76] Such vague provisions would not enable the State Board or Caltrans to measure the outcomes of, or to enforce, the Draft Permit's LID requirements, since implementation could vary enormously.

The Draft Permit Needs Revision to Establish an Onsite Retention Standard That Will Guide the Implementation of LID Practices

The Draft Permit fails to set a specific numeric performance standard for the implementation of LID at Priority Development Projects. As a result, provided that a project installs some, or *any*, LID features, it would comply with the Draft Permit as worded. In effect, LID features would not have to be sized to accommodate any meaningful quantity of stormwater. This is completely contrary to the exhortations of expert agencies and scientists, as described above, or standards already adopted in numerous MS4 permits, ordinances, and regulations around the country. For example, the Regional Water Quality Control Boards for the Los Angeles, Santa Ana, and San Diego Regions have all recently adopted MS4 permits that effectively require new and redevelopment projects to retain onsite the 85th percentile storm through use of LID practices that infiltrate, harvest and reuse, or evapotranspire stormwater runoff unless technically infeasible to do so.[77] West Virginia adopted a statewide Phase II MS4 permit that requires projects to retain onsite

[73] *Id.* at 4.
[74] Fact Sheet, p. 15 (citing U.S. EPA, 2007. *Reducing Stormwater Costs through Low Impact Development (LID) Strategies and Practices.* EPA 841-F-07-006, (2007), available at: www.epa.gov/nps/lid.
[75] *Id*.
[76] Tentative Order, p. 38 (emphasis added).
[77] *See* Los Angeles Regional Water Quality Control Board, Order No R4-2010-0108 (July 8, 2010) (Ventura County MS4 Permit) (through use of an Effective Impervious Area limitation, the Permit effectively requires retention of 95 percent of the 85th percentile storm); Santa Ana Regional Water Quality Control Board, Order No. RB8-2009-0030 (May 22, 2009) (North Orange County MS4 Permit); San Diego Regional Water Quality Control Board, Order No. R9-2009-0002 (December 16, 2009) (South Orange County MS4 Permit).

"the first one inch of rainfall from a 24-hour storm" event unless infeasible.[78] Federal buildings over 5,000 square feet must manage onsite (*i.e.*, prevent the offsite discharge of) the 95th percentile storm through infiltration, harvesting, and/or evapotranspiration.[79] And the state of Pennsylvania requires projects to capture at least the first two inches of rainfall from all impervious surfaces and retain onsite at least the first one inch of runoff (through reuse, evaporation, transpiration, and/or infiltration); at least 0.5 inches must be infiltrated.[80]

These jurisdictions have recognized the paramount importance of mandating onsite retention of a certain quantity of stormwater since onsite retention prevents *all* pollution in that volume of rainfall from being discharged to receiving waters. Caltrans itself has recognized this principle, stating that that "Infiltration basins and trenches [that retain water onsite] . . . provide the highest level of surface water quality protection. . . . [and] reduce the total amount of runoff, restoring some of the original hydrologic conditions of an undeveloped watershed."[81] Moreover, Caltrans has found that where use of infiltration BMPs was technically feasible, they "were among the most cost-effective BMPs tested."[82] By definition, Caltrans has found that, where technically feasible, retaining water onsite through this type of practice is MEP, under the Clean Water Act, therefore, it must be required.

Yet nowhere under the Draft Permit's Low Impact Development provisions is there any requirement that establishes a level of implementation for LID practices. Instead, the LID requirements are noticeably divorced from the Project Planning and Design section's "Numeric Sizing Criteria for Storm Water Treatment Controls."[83] Under this section, the Tentative Order requires only that "projects shall infiltrate at least 90 percent of the storm water runoff from an 85th percentile 24-hour storm event[84] *or* meet at least one of the numeric sizing criteria below" through use of treatment control methods.[85] Thus, whether to use infiltration practices which by Caltrans' own admission "provide the highest level of surface water protection" and are "among the most cost-effective practices" is entirely discretionary. As treatment control BMPs can include conventional controls and engineered solutions that are demonstrably inferior to retention

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[78] State of West Virginia Department of Environmental Protection, Division of Water and Waste Management, General National Pollution Discharge Elimination System Water Pollution Control Permit, NPDES Permit No. WV0116025 at 13-14 ((June 22, 2009), available at: http://www.dep.wv.gov/WWE/Programs/stormwater/MS4/permits/Documents/WV%20MS4%202009%20General%20Permit.pdf.

[79] 42 U.S.C. § 17094; U.S. EPA, "Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects," at 12 (2009), available at: http://www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf.

[80] Pennsylvania Department of Environmental Protection, "Pennsylvania Stormwater Best Management Practices Manual," Chapter 3, at 7 (December 30, 2006), at: http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305.

[81] Caltrans, "BMP Retrofit Pilot Program, Final Report," CTSW-RT-01-050, at viii (Jan. 2004), at: http://www.dot.ca.gov/hq/env/stormwater/special/newsetup/_pdfs/new_technology/CTSW-RT-01-050.pdf.

[82] *Id*. at ix.

[83] Tentative Order, p. 32.

[84] We note that even this requirement appears not to meet the requirements of State Water Resources Control Board (2000) Water Quality Order No. 2000-11, at 15-18, which require treatment of at least 100% (not 90%) of the 85th percentile storm event. Here, the Draft Permit would allow for 10 percent of the runoff from the 85th percentile storm to be discharged to the MS4 system without any treatment requirement whatsoever, in violation of WQ Order 2000-11.

[85] The Tentative Order defines Treatment Control BMPs as "Any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media absorption or any other physical, biological, or chemical process." (Tentative Order, Attachment VII – Glossary.)

practices,[86] the Draft Permit's language categorically fails to ensure that the requirements of the MEP standard will be met. Moreover, the Draft Permit appears to ignore the use of practices such as evapotranspiration or harvesting and reuse that are mandated by numerous other MS4 permits in California as a means of meeting the 85th percentile storm retention requirement.[87] Where feasible, infiltration, as well as these other practices that retain runoff onsite, *must* be required by the Draft Permit. The Draft Permit's language, which leaves it to the *discretion* of Caltrans whether to infiltrate runoff or utilize other treatment control methods, amounts to no requirement at all for infiltration, and ignores other practices that result in the onsite retention of stormwater. In effect, by promoting a discretionary approach to the use of LID, the Draft Permit ignores the requirements of the CWA's mandate to reduce the discharge of pollutants to the MEP.

The Draft Permit Provides No Justification for Any Allowance of Waivers from Numeric Sizing Criteria

Finally, under the Permit's Project Planning and Design section, where a project is found to "have minimal impact to water quality," the Executive officer may lessen, or waive entirely, the treatment control requirements for that project.[88] However, the CWA requires that discharges from MS4 systems "shall require controls to reduce the discharge of pollutants to the maximum extent practicable"; no basis exists to allow for such a waiver to be granted solely because a project's impact to water quality is "minimal." Any discharge of pollutants must be adequately addressed, to the extent practicable, in order to comply with the CWA's requirements.

Project Planning and Design Requirements for New Development and Redevelopment: Hydromodification Requirements[89]

We appreciate and welcome the much-needed inclusion of hydromodification requirements in the Draft Permit in Section E.2.(d)(1)(b)). We have concerns, however, with some of the exclusions on page 36 of the Draft Permit, which states:

> i) The following new and redevelopment projects are exempt from the hydromodification requirements:
> (1) Projects that add less than one acre of new impervious surface.
> (2) Projects that discharge directly to a tidally-controlled water body.
> (3) Projects that discharge to a completely lined or armored channel that outlets to a tidally-controlled water body.
> (4) Projects that discharge to an irrigation or water supply channel.

As to the first attempted exclusion, progressive additions of less than one acre can create significant cumulative impacts, which must be recognized rather than shelved as an exclusion. We also disagree with blanket exclusions for armored channels, because future restoration prospects are reduced with each additional impact allowance. We further ask that projects that discharge to an

[86] Horner, Dr. Richard, "Initial Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for the San Francisco Bay Area," at 3, 16-20 (2007) (hereinafter "Horner Initial Investigation") (attached).
[87] *See supra* n. 77.
[88] Tentative Order, Sec. E.2.(1)(a)(i)(3), p. 32.
[89] *Id*., Sec. E.2.d.(1)(b), pp. 34-37.

irrigation or water supply channels not be allowed to escape hydromodification requirements, if they in turn discharge to a water course that would be subject to those requirements if the discharge were immediate and direct (as will often be the case).

We also question whether the cited document, "Assessing Stream Channel Stability at Bridges in Physiographic Regions," is most appropriate for assessing for channel integrity and habitat protection (rather than bridge safety). Highway projects tend to be large and have high risks for hydromodification. They deserve a sophisticated method designed for the purpose. One such example may be from the San Diego municipal permit for "priority projects," a category in which most highway projects would fit.[90] We recommend consideration of the use of a computerized, continuous hydrologic simulation model to generate a flow record to compare a range of pre- and post-project flows with the potential to erode channels.

Finally, we urge the state to begin to follow the lead of other jurisdictions that are adopting "pre-development," rather than "pre-project," hydromodification corrections. For example, areas in Washington state usually use "pre-development," defined as the condition before European settlement (*i.e.*, the hydrology reflected the original natural land cover). Without this type of shift in thinking, our streams will continue to deteriorate. Sample language includes the following:

> Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be forested land cover [or prairie unless] the drainage area of the immediate stream and all subsequent downstream basins have had at least 40% total impervious area since 1985.[91]

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[90] "San Diego County and its copermittees are required to develop an HMP [Hydromodification Management Plan] under their National Pollutant Discharge Elimination System (NPDES) municipal storm water permit. The purpose and requirements of the HMP are described in a 2007 RWQCB order renewing the NPDES permit (Order No. R9-2007-0001). The purpose of the HMP is to identify guidelines for managing 'geomorphically-significant' flows that, if not controlled, would cause increased erosion in receiving water channels. Specifically, the HMP must identify low and high flow thresholds between which flows should be controlled so that the post-project flow rates and durations do not exceed pre-project levels between these two flow magnitudes. The Board Order requires that the HMP shall:

> Utilize continuous simulation of the entire rainfall record to identify a range of runoff flow[90] for which Priority Development Project post-project runoff flow rates and durations shall not exceed pre-project runoff flow rates and durations, where the increased flow rates and durations will result in increased potential for erosion or other significant adverse impacts to beneficial uses, attributable to changes in the flow rates and durations. The lower boundary of the range of runoff flows identify shall correspond with the critical channel flow that produces the critical shear stress that initiates channel bed movement or that erodes the toe of channel banks. The identified range of runoff flows may be different for specific watersheds, channels or channel reaches."

County of San Diego, "Final Hydromodification Management Plan," p. 5-1 (December 29, 2009), available at: http://www.projectcleanwater.org/pdf/susmp/final_hydromodification_management_plan_jan2011.pdf. *See also* San Diego RWQCB, Resolution R9-2010-0066, "Approval of the Hydromodification Management Plan for the County of San Diego, the Incorporated Cities of San Diego County, the San Diego Unified Port District, and the San Diego County Regional Airport Authority," available at: http://www.swrcb.ca.gov/rwqcb9/water_issues/programs/stormwater/docs/sd_permit/r9_2007_0001/updates_07-19-2010/Adopted_Res_R9-2010-0066.pdf.

[91] Washington State Dep't of Ecology, "Stormwater Management Manual for Western Washington," Volume 1, p. 2-33 (Feb. 2005), available at: http://www.ecy.wa.gov/pubs/0510029.pdf.

The stated objective of the above standard is to prevent increases in erosion rates, which is "vital, though by itself insufficient, to protect fish habitat" in streams.[92]

Project Planning and Design Requirements for New Development and Redevelopment: Stream Crossing Design Guidelines to Maintain Natural Stream Processes[93]

We support the language and direction of this section.

BMP Development and Implementation Strategies Should Be Strengthened[94]

One of the most significant shortcomings in previous stormwater permits is the lack of performance-based criteria for BMPs. As a result, BMPs are added as part of permit requirements or pollution abatement efforts without any focus on the quality of the water exiting the BMPs. An effective way to ensure the success of stormwater programs and the attainment of water quality standards is to assess BMPs based on performance. Flow-based design criteria are simply not adequate to ensure that water quality standards are consistently met because flow, and corresponding BMP size, is but one factor determining BMP effectiveness.

U.S. EPA noted the significance of setting clear criteria for effectively assessing BMP performance as follows:

> Permitting authorities should consider including numeric benchmarks for BMPs and associated monitoring protocols or specific protocols for measuring BMP effectiveness in stormwater permits. These benchmarks could be used as thresholds that would require the permittee to take additional action specified in the permit, such as evaluating the effectiveness of the BMPs, implementing and/or modifying BMPs, or providing additional measures to protect water quality.[95]

In order to ensure that BMPs are truly designed to the MEP and ensure that Caltrans' discharge meets water quality standards, we recommend that the Draft Permit require a performance evaluation for all structural best management practices used by the discharger to comply with the Permit (including retrofits and iterative requirements). Specifically, at least once per permit cycle, the discharger should submit a report to the State Board that includes a BMP performance evaluation. The report should identify three selected structural BMPs for each targeted pollutant of concern, and then detail an analysis on the efficacy of those BMPs for removing the identified pollutants of concern, in terms of pollutant removal efficiency and effluent water quality. The discharger would then select the best performing BMP of the three for each targeted pollutant. This evaluation will help determine the structural management practices that are truly the "best" management practices. This type of evaluation is also particularly necessary for discharges into impaired waters and ASBSs, for which BMP effectiveness is particularly critical.

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[92] *Id*., p. 2-34.
[93] Tentative Order, Sec. E.2.d.(1)(c), pp. 37-38.
[94] *Id*., Sec. E.2.e., pp. 40-42.
[95] EPA Memo, *supra*, at 3.

The long-term viability of BMPs should also be a specific consideration in the Draft Permit. The District 7 mandate for treatment or reduction of stormwater discharges to 20% below 1994 levels requires the use of a suite of long-term BMPs that will serve the operating highway over decades.[96] The Permit should contain direction to the Permittee with regard to the need for long-term BMPs and other actions needed to achieve a level of stormwater discharge treatment or reduction of 20% from 1994 levels, as is required in District 7.

Finally, all BMPs installed should be designed to handle the ¾-inch storm, which is currently the mandate in SUMP requirements.[97] This process will help move Caltrans further towards water quality standards attainment.

HIGHWAY MAINTENANCE MUST INCLUDE A VEGETATION ENHANCEMENT PLAN

The Draft Permit's section on Maintenance Activities includes a discussion on vegetation control.[98] However, this discussion is largely limited to pesticide, herbicide and fertilizer application. It fails to include a necessary set of requirements to ensure that soil stabilization through vegetation is consistent across watersheds; *i.e.*, dead, disappeared or eroded vegetation is replaced, rather than simply doused with chemicals.

The District 11 Consent Decree (attached separately) establishes a "Vegetation Enhancement and Maintenance Activities Plan"[99] that includes:

- A "program to enhance use the use of vegetation throughout all Caltrans rights-of-ways for the purpose of preventing erosion and removing pollutants"; and
- A program to address "widely understood problem areas" of erosion, including through assessment of vegetation subject to erosion.

District 7, among others, would benefit significantly from specific inclusion of these vegetation-based erosion control requirements in the Draft Permit.

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[96] *NRDC v. Caltrans*, Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist. Jan. 17, 2008) (attached). In addition, the Draft Permit should incorporate as appropriate District 7 Stipulation language with regard to "consideration of approved treatment BMPs whenever there are pollution control requirements, including but not limited to Basin Plan requirements, established [TMDLs], 303(d) listings, and numeric effluent limitations." *Id.* at 2. *See also NRDC v. Caltrans*, Stipulation Providing Clarifying Exhibits to Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist. July 2009) (attached).

[97] *See* http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/stormwater/susmp/susmp_rbfinal.pdf.

[98] Tentative Order, pp. 44-45.

[99] *NRDC et al v. Van Loben Sels, and U.S. v. Caltrans*, Consent Decree, pp. 21-22 (March 1998) (attached separately).

TMDL COMPLIANCE REQUIREMENTS MUST BE ENHANCED, AND ALL TMDLS MUST BE INCLUDED IN THE DRAFT PERMIT[100]

TMDLs and WLAs Must Be Included, and Enforceable, in NPDES Permits

A permit issued to regulate discharges into receiving waters must incorporate existing water quality standards and TMDL WLAs. "[O]nce a TMDL is developed, effluent limitations in NPDES permits must be consistent with the WLA's in the TMDL."[101]

TMDLs represent numerical calculations of the maximum amount of a pollutant that a water body impaired under section 303(d) of the CWA can receive and still meet water quality standards, and TMDLs allocate that amount of pollution to discharges from the pollutant's sources. TMDLs establish WLAs—or the maximum amount of a pollutant that each point source discharger may release into a particular waterway—which constitute a form of water quality-based effluent limitation.[102] Once a TMDL has been adopted, NPDES permits are required to include WLAs and contain effluent limitations and conditions consistent with the assumptions and requirements of the TMDL from which they are derived.[103]

The U.S. Environmental Protection Agency stated recently that a permit should "explicitly state that the wasteload allocations (WLAs) established by . . . TMDLs are intended to be enforceable permit effluent limitations and that compliance is a permit requirement."[104] The Draft Permit fails to meet this obligation. Tellingly, there are no findings in the Draft Permit and no evidence in the Fact Sheet to demonstrate that the Draft Permit's requirements will enable Caltrans to meet the requisite TMDLs at all.

The failure to properly implement TMDLs violates fundamental principles of the CWA designed to prevent the impairment of water bodies through the use of NPDES permits. Absent findings supported by evidence in the record to show that the draft Permit will achieve the TMDLs' requirements, adoption of the Permit as written would be arbitrary and capricious because it fails to require the necessary control measures that would move Caltrans toward compliance with water quality standards. The draft Permit must be revised both to include WLAs from the applicable TMDLs and to demonstrate that the Permit's provisions will ensure that Caltrans achieves the TMDLs' goals.

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[100] Tentative Order, Sec. E.4., pp. 51-52.

[101] *Communities for a Better Environment, supra,* 132 Cal.App.4th at p. 1322 (citing 40 C.F.R. § 122.44(d)(1)(vii)(B)) (NPDES permits must be "consistent with the assumptions and requirements of any available waste load allocation for the discharge prepared by the State and approved by the EPA"); *see also City of Arcadia v. State Water Resources Control Board* (2006) 135 Cal.App.4th 1392, 1404 (quoting *Communities for a Better Environment*, *supra*, 132 Cal. App.4th at p. 1322; *Dioxin/Organochloride Center v. Clarke* (9th Cir. 1995) 57 F.3d 1517, 1520 ("When a TMDL and specific wasteload allocations for point sources have been established, any NPDES permits issued to a point source must be consistent with the terms of the TMDL and WLA").

[102] See 33 U.S.C. 1313(d)(4)(A); 40 C.F.R. § 130.2.

[103] 40 C.F.R. § 122.44(d)(1)(vii)(B).

[104] Letter from Douglas E. Eberhardt, EPA, to Michael Adackapara, Santa Ana Regional Water Quality Control Board, at 3 (February 13, 2009). As an example, the Santa Monica Bay Beaches Wet Weather Bacteria TMDL establishes numeric targets for bacteria contamination and require permits to "incorporate the applicable waste load allocation(s) as a permit requirement," effectively establishing a numeric effluent limitation. Los Angeles Regional Water Quality Control Board (December 12, 2002) Attachment A to Resolution 2002-022, at 6.

In a 2002 Memorandum, EPA clarified its own regulatory requirements and provided guidance on establishing WLAs for stormwater discharges in TMDLs.[105] EPA specifically addressed implementation of WLA based conditions in NPDES permits in the 2002 Wayland Memorandum, unambiguously stating that it "expects TMDL authorities will make separate aggregate allocations to NPDES-regulated storm water discharges."[106]

EPA recently updated this 2002 Memorandum significantly with language referenced above, stating that "where the NPDES authority determines that MS4 discharges . . . . have the reasonable potential to cause or contribute to water quality standards excursions, permits for MS4s . . . should contain numeric effluent limitations where feasible to do so."[107] U.S. EPA further found that for adopted TMDLs that include wasteload allocations for stormwater discharges, "permits for . . . MS4 discharges *must c*ontain effluent limits and conditions consistent with the . . . WLAs in the TMDL."[108] EPA explained further that where the WLAs provide numeric pollutant loads or objectives, "the WLA should, where feasible, be translated into numeric WQBELs in the applicable stormwater permits."[109] Consistent with the EPA Memo, we strongly support the use of numeric effluent limitations as a means of ensuring compliance with WLAs or other applicable water quality standards, and call on the State Board to give greater attention to this approach in the draft Permit.[110]

In sum, the selection of BMPs, approach to selecting BMPs, or other approach to meeting WLAs in this regard is critical, as it can determine whether a permit complies with the requirements of the Clean Water Act to implement the TMDL under 40 C.F.R. § 122.44(d)(vii)(B). Once a TMDL has been established, NPDES stormwater permit conditions must be drafted such that they are consistent with the WLAs in each applicable TMDL.[111] This must include consideration of numeric effluent limitations. Use of numeric effluent limitations may constitute a necessary step to achieving compliance with a TMDL, for example, "[i]f BMPs alone" do not "adequately implement the WLAs."[112]

The Draft Permit Should Include TMDL-Specific Monitoring Requirements

That Draft Permit states that "[t]his Order does not contain TMDL-specific monitoring requirements." (Permit at 14). The Permit suggests that these will be dealt with at the regional level. TMDL requirements such as monitoring must be included in the Permit, as all requirements

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[105] Memorandum from Robert Wayland, Director of OWOW and James Hanlon, Director of OWM to Regional Water Division Directors, "Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs" (11/22/2002) ("2002 Wayland Memo"), *available at* http://www.epa.gov/npdes/pubs/final-wwtmdl.pdf.
[106] *Id.* at 3.
[107] Memorandum from James Hanlon, U.S. EPA Office of Wastewater Management and Denise Keehner, U.S. EPA Office of Wetlands, Oceans and Watersheds to Water Management Division Directors, Regions 1-10, "Revisions to the November 22, 2002 Memorandum 'Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs," p. 3 (Nov. 12, 2010) (EPA Memo), available at: http://www.epa.gov/npdes/pubs/establishingtmdlwla_revision.pdf.
[108] *Id.,* citing 40 CFR Sec. 122.44(d)(1)(vii)(B) (emphasis added).
[109] *Id.*
[110] *See* 40 CFR § 122.44(d)(4)(vii)(B) (effluent limits consistent with WLAs).
[111] 40 CFR 122.4(d)(vii)(B).
[112] *Id.* at 2.

are vital steps in ensuring that dischargers are on-track for ultimate compliance with the waste load allocations. The Permit is the regulatory mechanism that makes the TMDL and its requirements enforceable, thus it is critical to include all these requirements to ensure that they are actually undertaken by the discharger and that water quality standards are attained. It also helps to provide the public with a comprehensive overview of the full suite of discharger monitoring requirements all in one place.

The Draft Permit Should Clarify TMDL Compliance Determination

The Draft Permit states that "[c]ompliance [with the TMDL] may include, but is not limited to, implementation of BMPs and other measures identified in the respective TMDL implementation plan."[113] Simply the act of implementing a BMP does not equate to compliance with a numeric WLA. A WLA must be met for purposes of water quality standards attainment and is an enforceable limit. Thus, the statement above should be deleted, and the Permit must clarify that compliance is based on WLA and water quality standards attainment.

The Draft Permit Should Include *All* Adopted TMDLs

Appropriately, the Draft Permit "…requires the Department to comply with all TMDLs for which it has been assigned a WLA, where roads have been assigned a LA, or where the Department is specifically assigned actions to implement the TMDL, either individually or jointly."[114] Federal law clearly commands that the State Board and Regional Boards integrate adopted TMDLs into the effluent limitations of appropriate NPDES permits.

Similarly, TMDL implementation schedules and actions also must be reflected in the Draft Permit. Implementation schedules and actions included in TMDL Basin Plan Amendments adopted by the Regional Boards often require the discharger to complete various strategies before the final compliance deadline. For instance, schedules may require monitoring plan submittals or the demonstration of a wasteload reduction after a certain period of time. These actions are important steps in ensuring that dischargers are on-track for ultimate compliance with the waste load allocations, and should be included in the Draft Permit.

Despite these mandates, after reviewing the "Region 4" section of Appendix IV of the Draft Permit, we unfortunately have found that there are several TMDLs that are missing entirely from that Region alone, including Calleguas Creek Toxicity, Calleguas Creek Salts, Los Cerritos Metals (EPA), Machado Lake Toxics, Santa Clara River Reach 3 Chloride (EPA), San Gabriel River and Impaired Tributaries Metals and Selenium (EPA). In addition, many critical implementation actions are also absent. The State Board must ensure that *all* TMDLs and associated implementation schedules and actions are included in the Draft Permit. Please note that we have only closely reviewed TMDLs in Region 4; given the numerous discrepancies for that region alone, there may well be errors with the other regions that must also be addressed, and we urge the State Water Board to review the lists carefully. A summary of the Region 4 TMDLs and actions that should be specified in the Permit are outlined in Attachment 3 to this letter.

[113] Tentative Order, p. 51.
[114] *Id.* at 14.

The Draft Permit Should Include All TMDL Compliance Dates

The Draft Permit does not provide all TMDL compliance dates.[115] Reasoning is given that some of the dates are outside of the permit cycle. Consistent with the above discussion, the Permit should include all TMDL WLAs, LAs and compliance deadlines. This Permit renewal is six years overdue, as the current Caltrans NPDES permit was adopted in 1999. In the event that the next permit cycle again well surpasses the 5-year time frame, it is critical that all these dates are included. While we support the requirements that the Executive Director may revise the Permit to incorporate TMDL modifications or revisions, there is no guarantee that this will happen.

UPDATING AND EXPANSION OF ATTACHMENT V – "REGION SPECIFIC REQUIREMENTS" – IS NECESSARY TO INCLUDE ALL APPROPRIATE MANDATES

Attachment V of the Draft Permit incorporates region-specific requirements associated with Caltrans' operations. Based on our review of only Part 3, Los Angeles Region and Part 6, San Diego Region, it appears that significant work remains to be done to incorporate the mandates of the various consent decrees, stipulations and other legal judgments and agreements in Parts 3 and 6. Given these significant discrepancies, we urge the State Board to carefully review other important regional mandates and data – including but not limited to the U.S. EPA Order to Caltrans for its Northern California operations[116] - for the entire state, and ensure that all Parts of Attachment V are comprehensive and complete.

As one example, the language in Part 3, Los Angeles Region is quite dated, and surprisingly completely ignores the significant, comprehensive District 7 litigation mandates such as those discussed and references above.[117] Numerous, central mandates and areas of direction are ignored, including the stormwater discharge "treatment or reduction" requirement to 20% below 1994 levels, as called for in the District 7 Stipulation (attached). Other provisions of these agreements and stipulations, including but not limited to the corridor studies requirements that will inform the type and location of BMPs, should be specifically called out, and again integrated into the Draft Permit for statewide application.

Similarly, Part 6, San Diego Region should be expanded to include the Consent Decree's provisions with regard to addressing eroding slopes on operating highways, which also should be required statewide as discussed above. The Findings on page 15 of the Draft Permit are insufficient to address the range of litigation matters and associated consent decrees and stipulations that have arisen and are still in force since 1997. All applicable agreements, stipulations and mandates should be referenced specifically in Attachment V, and all applicable language (such as the eroding slopes provisions and the 20% treatment or reduction standard) pulled out and quoted.

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[115] "Attachment IV also contains a *partial* list of deliverables and action items with their associated due dates." Tentative Order at 51 (emphasis added).

[116] *In the Matter of State of California, Dep't of Transportation*, "Findings of Violation and Order for Compliance," Docket No. CWA-2009-2011-0001 (U.S. EPA Region 9, Oct. 26, 2010).

[117] *NRDC v. Caltrans*, Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist., Jan. 17, 2008) (attached).

* * *

In the 12 years that have passed since adoption of the current Caltrans stormwater permit, we have learned much about the constituents, fate, transport, impacts and control of stormwater pollution. While the proposed Draft Permit incorporates some of these "lessons learned," additional direction must be given to ensure that the Permit complies with the letter and intent of the law and protects the health of California's invaluable waterways.

Thank you for your attention to these comments. We look forward to working with you and your staff to ensure the swift adoption of a protective Caltrans stormwater permit.

Best regards,

Linda Sheehan
California Coastkeeper Alliance
lsheehan@cacoastkeeper.org

Kirsten James
Heal the Bay
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Attachments:

- *NRDC v. Caltrans*, Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist., Jan. 17, 2008)
- *NRDC v. Caltrans*, Stipulation Providing Clarifying Exhibits to Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist. July 2009)
- "Los Angeles RWQCB TMDLs Missing from Draft Permit"
- Horner, Dr. Richard, "Initial Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices for the San Francisco Bay Area" (2007)
- *NRDC et al v. Van Loben Sels, and U.S. v. Caltrans*, Consent Decree (March 1998)

ATTACHMENT 1

NRDC v. Caltrans, Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist., Jan. 17, 2008)

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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

NATURAL RESOURCES DEFENSE COUNCIL, SANTA MONICA BAYKEEPER, Plaintiffs, vs. CALIFORNIA DEPARTMENT OF TRANSPORTATION; JAMES W. VAN LOBEN SELS, Defendants.	Case No. 93-6073-ER (JRX) STIPULATION AND ~~[PROPOSED]~~ ORDER RE CORRIDOR STORMWATER PROGRAM

WHEREAS, on April 13, 2004, this Court entered the Stipulation and Order Re Dispute Re Retrofit Program and Design Guidelines (the "April 2004 Stipulation and Order");

WHEREAS, the April 2004 Stipulation and Order was intended, *inter alia*, to provide the parties with an opportunity to observe and assess whether Defendant's Project Planning and Design Guide ("PPDG") is being implemented in a manner that leads to appropriate consideration and installation of treatment Best Management Practices ("BMPs") in new and reconstruction projects in District 7 to prevent and control stormwater pollution and required reporting of analysis of BMPs to Plaintiffs through submission of Storm Water Data Reports ("SWDRs");

WHEREAS, Paragraph 1 of the April 2004 Stipulation and Order required Defendants to implement a revised PPDG Section 4, which, among other things, required consideration of approved treatment BMPs whenever there are pollution control requirements, including but not limited to Basin Plan requirements, established Total Maximum Daily Loadings ("TMDLs"), 303(d) listings, and numeric effluent limitations;

WHEREAS, Paragraph 1 of the April 2004 Stipulation and Order required Defendants to implement a revised PPDG Section 2, which, among other things, identified approved treatment BMPs and prescribed a selection process required to consider treatment BMPs for all projects identified pursuant to Section 4 of the PPDG;

WHEREAS, on October 17, 2005, this Court entered the Stipulation and Order Regarding Implementation of Retrofit Program and Design Guidelines (the "October 2005 Stipulation and Order");

WHEREAS, the October 2005 Stipulation and Order was intended to ensure that Defendants' PPDG is being implemented in a manner that leads to appropriate consideration and installation of treatment BMPs to prevent and control stormwater pollution in new and reconstruction projects in District 7 and required additional accounting and reporting of analysis of approved treatment BMPs to Plaintiffs;

WHEREAS, Paragraph 1 of the October 2005 Stipulation and Order required Defendants to provide Plaintiffs with a spreadsheet summary of projects, described in the District 7 SWDRs, which included brief several word summaries of the established pollution control requirements, including but not limited to Basin Plan requirements, established TMDLs, 303(d) listings, and numeric effluent limitations, and reference to SWDR section where they were discussed;

WHEREAS, as set forth in Plaintiffs' Notice of Dispute of March 30, 2006, Plaintiffs assert that Defendants are in violation of the April 2004 and October 2005 Stipulations and Orders, in that Defendant has:

(a) failed to implement PPDG Section 4, requiring consideration of treatment and infiltration BMPs on at least 111 SWDRs where there were acknowledged pollution control requirements;

(b) failed to implement PPDG Section 2, requiring a specific, prescribed analysis of treatment and infiltration BMPs for specific situations and projects;

(c) failed to provide Plaintiffs with a spreadsheet summary of projects that included description of applicable pollution control requirements;

WHEREAS, Defendants acknowledge that:

(a) Defendants failed to consider treatment BMPs on numerous projects where pollution requirements were applicable, as required in PPDG Section 4;

(b) there are numerous projects where differences exist between the parties as to whether the Defendants have performed the specific prescribed analysis of treatment and infiltration BMPs for specific situations and projects as provided in PPDG section 2;

(c) the spreadsheet summary of projects, provided by Defendants to Plaintiffs pursuant to the October 2005 Stipulation and Order, did not contain the required description of applicable pollution control requirements; and

WHEREAS, on July 19, 2006, this Court entered the Stipulation and Order re Dispute of March 30, 2006, which, *inter alia*, required Defendant to audit certain

SWDRs, to reaccomplish certain SWDRs in accordance with Section 2 of the PPDG and provided that the parties would meet and confer regarding any further steps to address the alleged violations;

WHEREAS, the parties have met and conferred regarding these matters and have agreed that Defendant will develop and implement a Corridor Stormwater Management Program, as more specifically defined herein;

WHEREFORE, the parties hereby stipulate as follows:

1. Defendant will prepare Corridor Stormwater Management Studies on its District 7 drainage system, situated in Los Angeles and Ventura Counties and consistent with the jurisdiction of the Los Angeles Regional Water Quality Control Board (LARWQCB), encompassing approximately 610 centerline miles of freeway and approximately 356 centerline miles of highway. The Corridor Stormwater Management Studies shall: (a) identify and evaluate preliminary opportunities for placement of BMPs, pursuant to the site selection methodology used in the Final I-5 North Corridor Storm Water Quality Master Study; and (b) contain an analysis to identify proposed BMP opportunities and sites; and (c) include a list of all BMP opportunities assessed, identification of BMPs selected and their preliminary locations, and water quality volumes treated; (d) and contain a presentation of how the proposed BMPs will or will not meet the Treatment Requirement stated in paragraph 3.
2. The Corridor Stormwater Management Studies, for freeways, as reflected in Exhibit C, shall be completed by September 30, 2011. The Corridor Studies for the high potential conventional highways, as reflected on Exhibit C, shall be completed by September 30, 2012. The Corridor Stormwater Management Studies for the median and low potential conventional highways, as reflected on Exhibit C, shall be completed by September 30, 2013. As the Defendant prepares the Corridor Stormwater Management Studies, Defendant shall prioritize preparation of the Corridor Stormwater Management Studies to ensure there is

sufficient time to allow for the inclusion of treatment BMPs within projects programmed for the corridor(s), as provided by the applicable plan(s) and available opportunities. The priorities, known to Defendant at the time of this Stipulation and Order, are noted on Exhibit C. The Plaintiffs understand these priorities may change. Reasons for the changes in priorities may include, but are not limited to: funding availability; changes in transportation plans by the regional transportation authority; and anticipated construction dates. Defendant agrees to notify the Plaintiffs of any changes made, to the priorities, within thirty (30) days of the decision to change the priorities. Defendant shall supply the Plaintiffs with an explanation of the change. Defendant shall make the final determination as to priorities. While making the changes to the priorities, the Defendant understands the changes do not reduce or eliminate the Defendant's obligation under Paragraph 3.

3. The Corridor Stormwater Management Studies will propose, by each designated corridor, the appropriate treatment BMPs to be placed, such that Defendant's stormwater discharges are treated or otherwise reduced to a level at least twenty (20) percent below 1994 levels, (calculated in accordance with Exhibit A hereto,) within each watershed situated within the jurisdiction of the LARWQCB. Exhibit A is hereby incorporated by reference.

4. Defendant will implement the BMPs in the Corridor Stormwater Management Studies to meet the Treatment Requirement set forth in Paragraph 3, infra, of this Stipulation and Order. Defendant will use its best efforts to have BMPs in place and operating no later than the time that the improvement is put into service. In those instances where such is not practical, Defendant will use its best efforts to have BMPs in place and operating as soon as is practical. In every instance Defendant will ensure that BMPs are in place and operating before the date of Construction Contract Acceptance (CCA) for the particular project. Implementation of a treatment BMP cannot be considered complete, as described

in Paragraph 13(b) of this Stipulation and Order, until it is in place and operating as required by the applicable management guidelines.

5. On April 1 of each year, the Defendant shall provide to the Plaintiffs, for review and comment, an Annual Report prepared in accordance with Exhibit D and documenting the completion of the Corridor Stormwater Management Studies finalized during the preceding calendar year. Plaintiffs will furnish comments to the Annual Report not later than June 30 of each year. Exhibit D is hereby incorporated by reference.

6. Compliance with the overall Treatment Requirement, reflected in Paragraph 3 of this Stipulation and Order, will be waived to the extent that compliance is excused because of the following factors:

(A) An act of war.

(B) An unanticipated, grave natural disaster or other natural phenomenon of an exceptional, inevitable, and irresistible character, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

(C) An intentional act of a third party, the effects of which could not have been prevented or avoided by the exercise of due care or foresight.

Defendant shall have the burden of proof to establish the applicability of any defense.

Defenses (A)-(C) above are listed in §13350(c) of the California Water Code, and are subject to interpretations, articulated in published opinions, effective on the date this Stipulation is ordered by the Court.

7. Any changes in technology, designated pollutants of concern, or regulatory changes dictated by the State Water Resources Control Board or the LARWQCB, may result in additions to the treatment BMPs listed in Table 1 of Exhibit A and as defined in Exhibit B. The percentage of treatment efficiencies, given to the added or improved BMPs, shall be supported by research and studies and presented by the Defendant to the Plaintiffs for discussion. The Plaintiffs will not unreasonably

delay recognizing the treatment efficiencies of the added BMPs or unreasonably delay inclusion of the added BMPs to Exhibit A, Table 1.

8. Not later than sixty (60) days after this Stipulation becomes legally binding upon the Defendant, the Deputy District Director of Design in District 7 shall issue a Directive to require the use of and implementation of Corridor Stormwater Management Studies necessary to meet the Treatment Requirement set forth in Paragraph 3, *infra,* of this Stipulation and Order.

9. If the parties are unable to resolve any issue(s) regarding compliance with the terms of this Stipulation and Order, then either party shall provide the other party with notice of the issue and the parties will arrange a prompt meeting, or phone call, as appropriate, between appropriate party representatives to attempt to resolve any issue in dispute. If the issue is not resolved within ten (10) business days of notice by either party, either party may file a motion in this court to resolve the issue(s). The Court retains jurisdiction to resolve such disputes.

10. Defendant is hereby relieved of all obligations in the April 2004 and October 2005 Stipulations, regarding submittal of Storm Water Data Reports to the Plaintiffs' for review and comment.

11. Provided Defendant has complied with the terms of this Stipulation, and no pending motion(s) is (are) on file disputing the adequacy of Defendants' compliance with the Permanent Injunction, the parties hereby agree that this case can and should be dismissed once the following has occurred: (a) Defendant has completed the Corridor Stormwater Management Studies for the twenty-seven (27) freeway corridors and seven high potential conventional highway corridors, as identified in Exhibit C which is hereby incorporated by reference; and (b) Defendant has completed implementation of treatment BMPs, in Corridor Stormwater Management Study corridors, necessary to fulfill at least twenty five (25) percent of the Treatment Requirement established in Paragraph 3, *supra.*

SO AGREED:

FOR PLAINTIFFS:

DAVID BECKMAN
EVERETT DELANO III
12-18-07
Date

FOR DEFENDANT:

DOUG FAILING, Director
Caltrans District 7
12/6/07
Date

WILL KEMPTON, Director
Caltrans
12/6/07
Date

ORDER

GOOD CAUSE APPEARING, THE STIPULATION IS GRANTED. IT IS SO ORDERED:

Judge of the U.S. District Court
Date 1/17/08

EXHIBIT A

CORRIDOR STORMWATER MANAGEMENT STUDY

TREATMENT REQUIREMENTASSESSMENT

A. BASIS

1. The procedure shall be based on treating the water quality volume (WQV) generated by the impervious surfaces located in the treatment requirement assessment areas. It is recognized that some best management practices (BMPs), (e.g., biofiltration swales and strips) are designed according to water quality flow (WQF) instead of WQV. WQF devices receive credit for treatment efficiencies as noted in Table 1 of this Attachment.

2. Corridor stormwater management studies shall be prepared to ensure that the Treatment Requirement, set forth in Paragraph 3 of the Stipulation and Order, is met on each highway corridor. In the event the Treatment Requirement cannot be met on a particular corridor, Caltrans shall increase treatment elsewhere through one or more of the following options sufficient to compensate on a 1:1 basis for the lack of treatment:

- Compensate by reducing the WQV released, without treatment, by more than 20 percent of the WQV, existing in 1994, on one or more other corridors in the watershed;
- Partner with jurisdiction in the same watershed to treat stormwater runoff from Caltrans facilities and operations. This could include having an existing treatment BMP maintained by an adjacent jurisdiction and accepting Caltrans stormwater runoff.
- Completion of treatment BMPs within the same watershed but not within the particular corridor stormwater management plan area; for example, installation of a treatment BMP to meet a TMDL in the same watershed, but not included in a corridor stormwater management plan, or a treatment BMP required to meet statewide stormwater management plan and permit requirements.

The watershed treatment requirement shall be met entirely by achieving reductions in WQV released without treatment on corridors in the same watershed, with two exceptions: (1) the portion of the Santa Ana River watershed within District 7 (this watershed treatment requirement can be met by treatment performed outside of the watershed and not credited toward the achievement of any other watershed treatment requirement); and (2) the Miscellaneous Ventura Coastal Watershed Management Area (this watershed treatment requirement can be met by treatment performed in any of the separated drainage basins that make up the watershed management area).

3. The runoff subject to the Treatment Requirement shall be the runoff quantity generated, from the impervious portion of the Treatment Requirement Assessment Areas, assuming a runoff coefficient of 1.0. The runoff generated from the pervious areas located in the Treatment Requirement Assessment Areas would also in some cases be collected for treatment, or would incidentally mingle with the flow from the impervious surfaces, and then would be treated by treatment BMPs placed to treat the runoff

from the impervious portions of the Treatment Requirement Assessment Areas. The treatment devices, placed to treat the runoff from the impervious Treatment Requirement Assessment Areas, will have sufficient capacity, according to the design manual, to treat the total flow that will arrive at the treatment site regardless of whether it originated from impervious or pervious surfaces with the Treatment Requirement Assessment Area.

4. Caltrans shall act to comply with the Treatment Requirement except as excused under Paragraph 6 of the Stipulation and Order.

5. All BMPs shall be regularly maintained in a condition of full effectiveness, according to the prevailing Maintenance Indicator Document, so long as they continue to be under the possession, ownership or control of Caltrans.

B. TREATMENT REQUIREMENT ASSESSMENT

1. Baseline WQV—Determine the WQV, represented by the corridors in December 1994, by using the impervious area that existed in 1994 as calculated by using the appropriate as-built plans (drawings).

2. Treatment Requirement—Multiply that WQV by 0.8.

3. Added WQV—Determine the increase to WQV, since December 1994, plus the increases to WQV from planned projects by using the increases in the impervious area as determined from appropriate as-built plans (drawings) or proposed project plans.

4. Total WQV—Sum Base WQV + Added WQV.

5. Decide if the entire corridor will be treated as a unit, represented by a single Total WQV and treatment credit, or if it will be broken into segments represented by Total WQVs and treatment credits for each segment. In determining credits for treatment, Caltrans may elect either a system based on the individual BMPs actually applied or, for more simplicity in accounting, one based on averaging efficiencies of BMPs when some of each BMP type in the group is used. However, the same protocol must be used within the same project as represented by an EA number.

6. Credits—

- Efficiency (E)—Determine the efficiency or efficiencies of the treatment or treatments selected from Table 1 below.

- Treatment effect (T)—Determine how treatment will affect release of pollutants of concern from $T = 1 - (E/100)$.

- Credit (C)—Determine the credit for treatment from C = Total WQV * T, where * is the times sign (use as Total WQV either the quantity for the entire corridor or for each segment; if the segmental approach is used, add up all individual C values to get a total credit).

7. Treatment Requirement evaluation—If C is less than or equal to the Treatment Requirement set in step B2, the Treatment Requirement is met; otherwise, the Treatment Requirement is not met and shall be met by some combination of options listed in Paragraph 3 above.

C. The Treatment Requirement assessment shall be based on the efficiencies given in the Table 1 column headed "Solids and/or Metals" for the following situations:

- The designated pollutant of concern is solids, as noted in footnote b on Table 1, not to include trash; or
- Any metal is designated as a pollutant of concern; or
- Caltrans has not been assigned a waste load allocation under a TMDL and/or has not been determined to be the source of 5 percent or more for one or more pollutants of concern in another column; or
- There is no designated pollutant of concern.

If Caltrans has been assigned a waste load allocation and/or has been determined to be the source of 5 percent or more for one or more pollutants of concern in another column, the assessment shall be based on solids and/or metals, and the other pollutant(s) of concern, all of which shall meet the Treatment Requirement.

Table 1. WQV Treatment Efficiencies For Corridor Stormwater Management Studies[a]

Pollutants of concern include:	Solids and/or Metals[b]	"Algae" or Phosphorus[c]	Ammonia[d]	"Algae" or Phosphorus and Ammonia[c, d]
Individual BMP efficiencies (%):				
Infiltration basins and trenches	100	100	100	100
Austin sand filter (SF)	87	80	76	73
Delaware sand filter	88	69	77	63
Unlined extended-detention basin (EDB)	79	75	72	70
Lined EDB	60	50	49	43
Wet basin	90	58	71	49
Biofiltration swale	82	66	74	63
Biofiltration strip	86	49	70	44
MCTT	90	77	72	65
LID extended-detention basin[e]	88	86	84	83
LID biofiltration swale[e]	94	89	91	88
LID biofiltration strip[e]	90	64	78	60
Mixed BMP group efficiencies (%)[f]:				
Conventional biofiltration	82	63	72	59

swales, strips, and unlined EDBs				
Austin SFs; conventional biofiltration swales, strips, and unlined EDBs	83	67	73	62
Conventional biofiltration swales, strips, and lined EDBs	76	55	64	50
Austin SFs; conventional biofiltration swales, strips, and lined EDBs	79	61	69	55
LID EDBs, biofiltration swales, and strips[e]	91	79	85	77
Austin SFs; LID EDBs, biofiltration swales, and strips[e]	90	79	82	76

[a] Pollutants of concern are those officially designated in some way (e.g., specified as responsible for listing a water body as impaired under section 303(d) of the Clean Water Act, or subject to a TMDL). The pollutants in this table represent those identified for the Los Angeles River watershed. Other pollutants have been identified in this watershed but are not subject to quantification (e.g., "odor," "scum"), are being addressed by a specialized BMP (trash), or have no Retrofit Pilot Study data adequate to compute credits (coliforms). The pollutant list may have to be expanded when other watersheds are considered.

[b] Efficiencies are based on average BMP performance in reducing mass loadings of total suspended solids and total recoverable copper and zinc. These pollutants, for which the Retrofit Pilot Study produced substantial data, are considered to be representative of the numerous pollutants negatively affecting the ocean, the ultimate receiving water. They therefore are taken as the basis for stormwater management whether or not officially designated as pollutants of concern in the watershed in question. Although the credits in this column were calculated based on copper and zinc only because of data availability, they apply to any metal listed as a pollutant of concern.

[c] When a freshwater 303(d) listing is given in terms of "algae," the pollutant of concern is considered to be phosphorus, which is generally the limiting nutrient controlling algal growth in freshwater. Credits are based on average BMP performance in reducing mass loadings of total suspended solids, total recoverable copper and zinc, and total phosphorus.

[d] When a 303(d) listing is given in terms of ammonia, the pollutant of concern is considered to be total Kjeldahl nitrogen, which is a combination of ammonia and organic nitrogen (ammonia itself was not measured in the Retrofit Pilot Study). Credits are based on average BMP performance in reducing mass loadings of total suspended solids, total recoverable copper and zinc, and total Kjeldahl nitrogen.

[e] Although low impact development embraces a broader array of practices, LID in this context signifies a BMP in which soil storage is enhanced by compost amendment, or an equivalent technique, to increase soil storage of runoff and improve infiltration and evapotranspiration. The criteria for obtaining LID credit shall be adherence to the soil preparation standards of the Puget Sound Action Team and Washington State University Pierce County Extension (2005), sections 6.1.2.3-6.1.2.4 and 6.2.2, or equivalent, and providing full cover of vegetation suitable for the location. The Puget Sound standards are similar to those published earlier by Prince George's County, MD (2000, 2002). While

these standards originate outside California, soil amendment strategies are common across the nation. These standards will be superseded if Caltrans adopts its own approved standards.

[f] Efficiencies are based on average performance of all BMPs in the group in reducing mass loadings of the pollutants in question.

REFERENCES

Prince George's County. 2000. Low-Impact Development Design Strategies: An Integrated Design Approach, EPA 841-B-00-003. U.S. Environmental Protection Agency, Washington, DC.

Prince George's County. 2002. Bioretention Manual. Prince George's County, Largo, MD.

Puget Sound Action Team and Washington State University Pierce County Extension. 2005. Low Impact Development: Technical Guidance Manual for Puget Sound. Puget Sound Action Team, Olympia, WA.

BMP Retrofit Pilot Program, Final Report, January 2004. Caltrans.

EXHIBIT B

Definition of Terms and Concepts

The following terms and concepts shall apply to explain the parties' agreement:

"Adjacent jurisdiction" means any governmental jurisdiction, with an MS4 NPDES permit for storm water, with land use control over property abutting the Caltrans' right of way.

"As-built plans": plans in the possession of CT reflecting the actual construction versus the original contract plan.

"Construction Contract Acceptance" occurs when the Resident Engineer has made the final inspection and determines that the contract work has been completed in all respects in accordance with the plans and specifications. At this time, the Engineer will recommend that the Director formally accept the contract, and immediately upon and after the acceptance by the Director, the Contractor will be relieved of the duty of maintaining and protecting the work as a whole, and the Contractor will not be required to perform any further work thereon; and the Contractor shall be relieved of the responsibility for injury to persons or property or damage to the work which occurs after the formal acceptance by the Director.

"Control of Access" means the condition where the right of owners or occupants of the abutting land, or other persons, to access in connection with a highway that is partially or totally controlled by a public authority.

"Conventional highway" means a highway where Caltrans does not control access by abutting landowners. It may or may not be divided and is generally without grade separations at intersections.

"Corridor" means the conventional highway or freeway, and property included in the definition of facilities in the Department of Transportation's Storm Water Management Plan, as they exist within the confines of the District 7 Caltrans drainage system situated within the jurisdiction of the Los Angeles Regional Water Quality Control Board.

"Designated pollutant of concern" means pollutants designated by regulatory agencies as causing the impairment of water quality standards, as reflected by the waterbody's listing under Section 303(d) of the Clean Water Act, in a particular Water of the United States.

"Easement" is a right to use or control the property of another for designated purposes.

"Freeway" means a divided highway where Caltrans has full control of access and it has grade separations at intersections.

"Impervious," solely for the purposes of this Exhibit, means paved.

"Pervious," solely for the purposes of this Exhibit, means unpaved or paved with porous materials.

"Practical" means capable of being effected, done or put into practice; feasible.

"State" means the California Department of Transportation.

"Treatment Requirement Assessment Area" is property, either owned in fee by the State or over which the State holds a highway easement, being used for State highway or freeway purposes. For the purposes of this Exhibit it also includes property owned by the State, not being used for highway or freeway purposes, but included in the definition of facilities in the Department of Transportation's Storm Water Management Plan. This would not include slope easements or other incidental easements, outside of the fenced area adjacent to the highway or freeway, where the State does not use the easements for highway or freeway purposes,

"Treatment BMP" means the following stormwater treatment methods:
Infiltration basins, detention basins, biofiltration strips and swales, traction sand traps, media filters, gross solid removal devices (GSRDs), multi-chamber treatment trains, wet basins, and dry weather flow diversions. Any treatment method approved in the future, by Caltrans, for use on the highway and freeway system will be included in this definition.

"Waste load allocation" means those waste load allocations assigned to Caltrans by regulating agencies, such as the State Water Resources Control Board and the Los Angeles Regional Water Quality Control Board, as a result of a formal amendment to the Regional Basin Plan in accordance with the Total Maximum Daily Loading program under Section 303(d)(1)(D) of the Clean Water Act.

"Watershed" means a drainage area specified by the Los Angeles Regional Water Quality Control Board at
http://www.swrcb.ca.gov/rwqcb4/html/programs/regional_programs.html#Watershed.

CORRECTION TO CORRIDOR STUDY EXHIBIT A

B. TARGET ASSESSMENT

1. Base WQV—Determine the WQV represented by the corridor in December 1994.

2. Added WQV—Determine the WQV that has been added since December 1994 plus the WQV that will be added by planned reconstruction and new construction.

3. Treatment requirement = Base WQV * 0.2 + Added WQV.

4. Total WQV—Sum Base WQV + Added WQV.

5. Decide if the entire corridor will be treated as a unit represented by a single Total WQV and treatment credit, or if it will be broken into segments represented by Total WQVs and treatment credits for each segment. In determining credits for treatment, Caltrans can elect either a system based on the individual BMPs actually applied (see Individual BMP efficiencies in Table 1) or, for more simplicity in accounting, one based on averaging pollutant reductions over a mixed group of BMPs when some of each BMP type in the group is used (see Mixed BMP group efficiencies in Table 1). However, the same schedule must be applied to an entire project represented by an EA number.

6. Credits—

    - Efficiency (E)—Determine the efficiency or efficiencies of the treatment or treatments selected from Table 1 below.

    - Treated WQV—Portion of the Total WQV that will receive treatment, as determined from the BMP analysis.

    - Credit (C)—Determine the credit for treatment from C = Treated WQV * E, where * is the times sign (use as Treated WQV either the quantity directed to treatment for the entire corridor or for each segment; if the segmental approach is used, add up all individual C values to get a total credit).

7. Target evaluation—If C is greater than or equal to the target set in step B3, the target is met; otherwise, the target is not met and shall be met by some combination of obtaining more credits in the corridor, compensating with additional credits from another corridor in the same watershed, or by treating storm runoff from another jurisdiction.

ATTACHMENT 2

NRDC v. Caltrans, Stipulation Providing Clarifying Exhibits to Stipulation and Order re Corridor Stormwater Program (U.S. Dist. Ct., Central Dist. July 2009)

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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

NATURAL RESOURCES DEFENSE COUNCIL, SANTA MONICA BAYKEEPER, Plaintiffs, vs. CALIFORNIA DEPARTMENT OF TRANSPORTATION; JAMES W. VAN LOBEN SELS, Defendants.	Case No. 93-6073-ER (JRX) STIPULATION PROVIDING CLARIFYING EXHIBITS TO STIPULATION AND ORDER RE CORRIDOR STORMWATER PROGRAM

WHEREAS, on January 17, 2008, this Court entered the Stipulation and Order Re Corridor Stormwater Program ("Stipulation and Order");

WHEREAS, the Stipulation and Order sets forth Defendant's commitments to develop and implement a comprehensive program to analyze, install and maintain polluted runoff treatment devices along almost 1,000 miles of freeways and highways in Los Angeles and Ventura Counties;

WHEREAS, the Stipulation and Order provides a specified "Treatment Requirement" – a reduction of stormwater pollution flowing from Defendant's system to a figure that is twenty percent (20%) less than the pollution that was flowing from Defendant's system when this case was litigated in 1994;

WHEREAS, the Stipulation and Order requires the development of Corridor Stormwater Management Studies, which will: (a) identify and evaluate preliminary opportunities for placement of BMPs; (b) contain an analysis to identify proposed BMP opportunities and sites; (c) include a list of all BMP opportunities assessed, identification of BMPs selected and their preliminary locations, and water quality volumes treated; (d) and contain a presentation of how the proposed BMPs will or will not meet the "Treatment Requirement";

WHEREAS, subsequent to entry of the Stipulation and Order the parties discovered certain typographical errors in Exhibits A, B and D to the Stipulation and Order;

WHEREAS, the parties have jointly revised those exhibits and desire to ensure that the Court has the corrected exhibits;

WHEREAS, these revised exhibits are not intended to provide any substantive change to the terms and conditions of the Stipulation and Order, but merely provide for certain clarifications as to the intended meaning of those terms and conditions;

WHEREFORE, the parties hereby stipulate as follows:

1. Exhibit A, attached hereto, shall be substituted to replace Exhibit A in the Stipulation and Order, as referenced in Paragraphs 3 and 7 of the Stipulation and Order.
2. Exhibit B, attached hereto, shall be substituted to replace Exhibit B in the Stipulation and Order, as referenced in Paragraph 7 of the Stipulation and Order.
3. Exhibit D, attached hereto, shall be substituted to replace Exhibit D in the Stipulation and Order, as referenced in Paragraph 5 of the Stipulation and Order.
4. All other terms and conditions of the Stipulation and Order shall remain in effect.

SO STIPULATED:

Respectfully Submitted,

Everett L. DeLano III — Date: July 7, 2009
LAW OFFICES OF EVERETT L. DeLANO III
Attorney for Plaintiffs

Donna Clark — Date
CALIFORNIA DEPARTMENT OF TRANSPORTATION
Attorney for Defendants

EXHIBIT A

CORRIDOR STORMWATER MANAGEMENT STUDY

TREATMENT REQUIREMENT ASSESSMENT

A. BASIS

1. The procedure shall be based on treating the water quality volume (WQV) generated by the impervious surfaces located in the treatment requirement assessment areas. It is recognized that some best management practices (BMPs), (e.g., biofiltration swales and strips) are designed according to water quality flow (WQF) instead of WQV. WQF devices receive credit for treatment efficiencies as noted in Table 1 of this Attachment.

2. Corridor stormwater management studies shall be prepared to ensure that the Treatment Requirement, as defined below in Section B.3, is met on each highway corridor. In the event the Treatment Requirement cannot be met on a particular corridor, Caltrans shall increase treatment elsewhere through one or more of the following options sufficient to compensate on a 1:1 basis for the lack of treatment:.

- Compensate by meeting the Treatment Requirement, as defined below in Section B.3, on one or more corridors in the same watershed;

- Partner with jurisdiction in the same watershed to treat stormwater runoff from Caltrans facilities and operations. This could include having an existing treatment BMP maintained by an adjacent jurisdiction and accepting Caltrans stormwater runoff.

- Completion of treatment BMPs within the same watershed but not within the particular corridor stormwater management plan area; for example, installation of a treatment BMP to meet a TMDL in the same watershed, but not included in a corridor stormwater management plan, or a treatment BMP required to meet statewide stormwater management plan and permit requirements.

The watershed treatment requirement shall be met entirely by achieving reductions in WQV released without treatment on corridors in the same watershed, with two exceptions: (1) the portion of the Santa Ana River watershed within District 7 (this watershed treatment requirement can be met by treatment performed outside of the watershed and not credited toward the achievement of any other watershed treatment requirement); and (2) the Miscellaneous Ventura Coastal Watershed Management Area (this watershed treatment requirement can be met by treatment performed in any of the separated drainage basins that make up the watershed management area).

3. The runoff subject to the Treatment Requirement shall be the runoff quantity generated, from the impervious portion of the Treatment Requirement Assessment Areas, assuming a runoff coefficient of 1.0. The runoff generated from the pervious areas located in the Treatment Requirement Assessment Areas would also in some cases be collected for treatment, or would incidentally mingle with the flow from the impervious surfaces, and then would be treated by treatment BMPs placed to treat the runoff

from the impervious portions of the Treatment Requirement Assessment Areas. The treatment devices, placed to treat the runoff from the impervious Treatment Requirement Assessment Areas, will have sufficient capacity, according to the design manual, to treat the total flow that will arrive at the treatment site regardless of whether it originated from impervious or pervious surfaces with the Treatment Requirement Assessment Area.

5. Caltrans shall act to comply with the Treatment Requirement except as excused under Paragraph 6 of the Stipulation and Order.

6. All BMPs shall be regularly maintained in a condition of full effectiveness, according to the prevailing Maintenance Indicator Document, so long as they continue to be under the possession, ownership or control of Caltrans.

B. TREATMENT REQUIREMENT ASSESSMENT

1. Base WQV—Determine the WQV, represented by the corridors in December 1994, by using the impervious area that existed in 1994 as calculated by using the appropriate as-built plans (drawings).

2. Added WQV—Determine the WQV that has been added since December 1994, plus the WQV that will be added by planned reconstruction and new construction.

3. Treatment Requirement= Base WQV * 0.2 + Added WQV.

4. Total WQV=Base WQV + Added WQV

5. Decide if the entire corridor will be treated as a unit, represented by a single Total WQV and treatment credit, or if it will be broken into segments represented by Total WQVs and treatment credits for each segment. In determining credits for treatment, Caltrans may elect either a system based on the individual BMPs actually applied (see Individual BMP efficiencies in Table 1) or, for more simplicity in accounting, one based on averaging pollutant reductions over a mixed group of BMPs when some of each BMP type in the group is used (see Mixed BMP group efficiencies in Table 1). However, the same protocol must be applied to an entire project represented by an EA number.

6. Credits—

- Efficiency (E)—Determine the efficiency or efficiencies of the treatment or treatments selected from Table 1 below.

- Treated WQV —Portion of the Total WQV that will receive treatment, as determined from the BMP analysis.

- Credit (C)—Determine the credit for treatment from C = Treated WQV * E, where * is the times sign (use as Treated WQV either the quantity directed to treatment for the entire corridor or for each segment; if the segmental approach is used, add up all individual C values to get a total credit.)

7. Treatment Requirement Evaluation—If C is greater than or equal to the Treatment Requirement set in step B3, the Treatment Requirement is met; otherwise, the Treatment Requirement is not met and shall be met by some combination of options listed in paragraph A2 above.

C. The Treatment Requirement assessment shall be based on the efficiencies given in the Table 1 column headed "Solids and/or Metals" for the following situations:

- The designated pollutant of concern is solids, as noted in footnote b on Table 1, not to include trash; or
- Any metal is designated as a pollutant of concern; or
- Caltrans has not been assigned a waste load allocation under a TMDL and/or has not been determined to be the source of 5 percent or more for one or more pollutants of concern in another column; or
- There is no designated pollutant of concern.

If Caltrans has been assigned a waste load allocation and/or has been determined to be the source of 5 percent or more for one or more pollutants of concern in another column, the assessment shall be based on solids and/or metals, and the other pollutant(s) of concern, all of which shall meet the Treatment Requirement.

Table 1. WQV Treatment Efficiencies For Corridor Stormwater Management Studies[a]

Pollutants of concern include:	Solids and/or Metals[b]	"Algae" or Phosphorus[c]	Ammonia[d]	"Algae" or Phosphorus and Ammonia[c, d]
Individual BMP efficiencies (%):				
Infiltration basins and trenches	100	100	100	100
Austin sand filter (SF)	87	80	76	73
Delaware sand filter	88	69	77	63
Unlined extended-detention basin (EDB)	79	75	72	70
Lined EDB	60	50	49	43
Wet basin	90	58	71	49
Biofiltration swale	82	66	74	63
Biofiltration strip	86	49	70	44
MCTT	90	77	72	65
LID extended-detention basin[e]	88	86	84	83
LID biofiltration swale[e]	94	89	91	88
LID biofiltration strip[e]	90	64	78	60
Mixed BMP group efficiencies (%)[f]:				
Conventional biofiltration swales, strips, and unlined EDBs	82	63	72	59
Austin SFs; conventional	83	67	73	62

biofiltration swales, strips, and unlined EDBs				
Conventional biofiltration swales, strips, and lined EDBs	76	55	64	50
Austin SFs; conventional biofiltration swales, strips, and lined EDBs	79	61	69	55
LID EDBs, biofiltration swales, and strips[e]	91	79	85	77
Austin SFs; LID EDBs, biofiltration swales, and strips[e]	90	79	82	76

[a] Pollutants of concern are those officially designated in some way (e.g., specified as responsible for listing a water body as impaired under section 303(d) of the Clean Water Act, or subject to a TMDL) The pollutants in this table represent those identified for the Los Angeles River watershed. Other pollutants have been identified in this watershed but are not subject to quantification (e.g., "odor," "scum"), are being addressed by a specialized BMP (trash), or have no Retrofit Pilot Study data adequate to compute credits (coliforms). The pollutant list may have to be expanded when other watersheds are considered.

[b] Efficiencies are based on average BMP performance in reducing mass loadings of total suspended solids and total recoverable copper and zinc. These pollutants, for which the Retrofit Pilot Study produced substantial data, are considered to be representative of the numerous pollutants negatively affecting the ocean, the ultimate receiving water. They therefore are taken as the basis for stormwater management whether or not officially designated as pollutants of concern in the watershed in question. Although the credits in this column were calculated based on copper and zinc only because of data availability, they apply to any metal listed as a pollutant of concern.

[c] When a freshwater 303(d) listing is given in terms of "algae," the pollutant of concern is considered to be phosphorus, which is generally the limiting nutrient controlling algal growth in freshwater. Credits are based on average BMP performance in reducing mass loadings of total suspended solids, total recoverable copper and zinc, and total phosphorus.

[d] When a 303(d) listing is given in terms of ammonia, the pollutant of concern is considered to be total Kjeldahl nitrogen, which is a combination of ammonia and organic nitrogen (ammonia itself was not measured in the Retrofit Pilot Study). Credits are based on average BMP performance in reducing mass loadings of total suspended solids, total recoverable copper and zinc, and total Kjeldahl nitrogen.

[e] Although low impact development embraces a broader array of practices, LID in this context signifies a BMP in which soil storage is enhanced by compost amendment, or an equivalent technique, to increase soil storage of runoff and improve infiltration and evapotranspiration. The criteria for obtaining LID credit shall be adherence to the soil preparation standards of the Puget Sound Action Team and Washington State University Pierce County Extension (2005), sections 6.1.2.3-6.1.2.4 and 6.2.2, or equivalent, and providing full cover of vegetation suitable for the location. The Puget Sound standards are similar to those published earlier by Prince George's County, MD (2000, 2002). While these standards originate outside California, soil amendment strategies are common across the nation. These standards will be superseded if Caltrans adopts its own approved standards.

[f] Efficiencies are based on average performance of all BMPs in the group in reducing mass loadings of the pollutants in question.

REFERENCES

Prince George's County. 2000. Low-Impact Development Design Strategies: An Integrated Design Approach, EPA 841-B-00-003. U.S. Environmental Protection Agency, Washington, DC.

Prince George's County. 2002. Bioretention Manual. Prince George's County, Largo, MD.

Puget Sound Action Team and Washington State University Pierce County Extension. 2005. Low Impact Development: Technical Guidance Manual for Puget Sound. Puget Sound Action Team, Olympia, WA.

BMP Retrofit Pilot Program, Final Report, January 2004. Caltrans.

EXHIBIT B

Definition of Terms and Concepts

The following terms and concepts shall apply to explain the parties' agreement:

"Adjacent jurisdiction means any governmental jurisdiction, with an MS4 NPDES permit for storm water, with land use control over property abutting the Caltrans' right of way.

"As-built plans": plans in the possession of CT reflecting the actual construction versus the original contract plan.

"Construction Contract Acceptance" occurs when the Resident Engineer has made the final inspection and determines that the contract work has been completed in all respects in accordance with the plans and specifications. At this time, the Engineer will recommend that the Director formally accept the contract, and immediately upon and after the acceptance by the Director, the Contractor will be relieved of the duty of maintaining and protecting the work as a whole, and the Contractor will not be required to perform any further work thereon; and the Contractor shall be relieved of the responsibility for injury to persons or property or damage to the work which occurs after the formal acceptance by the Director.

"Control of Access" means the condition where the right of owners or occupants of the abutting land, or other persons, to access in connection with a highway that is partially or totally controlled by a public authority.

"Conventional highway" means a highway where Caltrans does not control access by abutting landowners. It may or may not be divided and is generally without grade separations at intersections.

"Corridor" means the conventional highway or freeway, and property included in the definition of facilities in the Department of Transportation's Storm Water Management Plan, as they exist within the confines of the District 7 Caltrans drainage system situated within the jurisdiction of the Los Angeles Regional Water Quality Control Board.

"Designated pollutant of concern" means pollutants designated by regulatory agencies as causing the impairment of water quality standards, as reflected by the waterbody's listing under Section 303(d) of the Clean Water Act, in a particular Water of the United States.

"Easement" is a right to use or control the property of another for designated purposes.

"Freeway" means a divided highway where Caltrans has full control of access and it has grade separations at intersections.

"Impervious," solely for the purposes of this Exhibit, means paved.

"Pervious," solely for the purposes of this Exhibit, means unpaved or paved with porous materials.

"Practical" means capable of being effected, done or put into practice; feasible.

"State" means the California Department of Transportation.

"Treatment Requirement Assessment Area" is property, either owned in fee by the State or over which the State holds a highway easement, being used for State highway or freeway purposes. For the purposes of this Exhibit it also includes property owned by the State, not being used for highway or freeway purposes, but included in the definition of facilities in the Department of Transportation's Storm Water Management Plan. This would not include slope easements or other incidental easements, outside of the fenced area adjacent to the highway or freeway, where the State does not use the easements for highway or freeway purposes,

"Treatment BMP" means the following stormwater treatment methods:
Infiltration basins, detention basins, biofiltration strips and swales, traction sand traps, media filters, gross solid removal devices (GSRDs), multi-chamber treatment trains, wet basins, and dry weather flow diversions. Any treatment method approved in the future, by Caltrans, for use on the highway and freeway system will be included in this definition.

"Waste load allocation" means those waste load allocations assigned to Caltrans by regulating agencies, such as the State Water Resources Control Board and the Los Angeles Regional Water Quality Control Board, as a result of a formal amendment to the Regional Basin Plan in accordance with the Total Maximum Daily Loading program under Section 303(d)(1)(D) of the Clean Water Act.

"Watershed" means a drainage area specified by the Los Angeles Regional Water Quality Control Board at
http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/regional_program/index.shtml#Watershed

Exhibit D
Annual Report Outline

Corridor Stormwater Management Studies

Status of studies
- Studies completed
- Studies in progress
- Studies next in process

Summary of completed studies
- Preliminary opportunities for placement of BMPs
- A presentation of the analysis performed to identify proposed BMP opportunities and sites
- A list of all BMP opportunities assessed, identification of BMPs selected and their preliminary locations, and water quality volumes treated
- A presentation of how the proposed BMPs will or will not meet the Treatment Requirement for the corridor and the watershed as a whole

Summary of Completed Studies
- Percentage of Treated Water Identified
  - Corridor
  - Watershed

Construction Phase Status
- Projects using Studies

Changes and Adjustments

Completed/Online Status
- Projects using Studies
- Changes and Adjustments

- Implementation of corridor study results

Design phase status
- Projects using studies
- Changes and adjustments

Construction phase status
- Projects using studies
- Changes and adjustments

Completed/operating status
- Projects using studies
- Changes and adjustments

Maintenance summary

- Summary of Compliance

  Overall discussion relative to Stipulation paragraphs 3, 4 and 11.

ATTACHMENT 3

Los Angeles RWQCB TMDLs Missing from Draft Permit

Caltrans TMDLs- Region 4

Region 4 TMDLs included in Caltrans Appendix IV

Revolon Slough and Beardsley Wash Trash	Missing baseline trash reduction percentage goals and deadlines: 20% reduction of trash baseline 4 years after effective date (9/6/12) 40% reduction of trash baseline 5 years after effective date (9/6/13) 60% reduction of trash baseline 6 years after effective date (9/6/14) 80% reduction of trash baseline 7 years after effective date (9/6/15) 100% reduction of trash baseline 8 years after effective date (9/6/16)
Ventura River Estuary Trash	Missing baseline trash reduction percentage goals and deadlines: 20% reduction of trash baseline 4 years after effective date (3/6/12) 40% reduction of trash baseline 5 years after effective date (3/6/13) 60% reduction of trash baseline 6 years after effective date (3/6/14) 80% reduction of trash baseline 7 years after effective date (3/6/15) 100% reduction of trash baseline 8 years after effective date (3/6/16)
Machado Lake Trash	Missing baseline trash reduction percentage goals and deadlines: 20% reduction of trash baseline 4 years after effective date (3/6/12) 40% reduction of trash baseline 5 years after effective date (3/6/13) 60% reduction of trash baseline 6 years after effective date (3/6/14) 80% reduction of trash baseline 7 years after effective date (3/6/15) 100% reduction of trash baseline 8 years after effective date (3/6/16)
Legg Lake Trash	Missing baseline trash reduction percentage goals and deadlines: 20% reduction of trash baseline 4 years after effective date (3/6/12) 40% reduction of trash baseline 5 years after effective date (3/6/13) 60% reduction of trash baseline 6 years after effective date (3/6/14) 80% reduction of trash baseline 7 years after effective date (3/6/15) 100% reduction of trash baseline 8 years after effective date (3/6/16)
Malibu Creek Watershed Trash	Missing baseline trash reduction percentage goals and deadlines: 20% reduction of trash baseline 4 years after effective date (7/7/13) 40% reduction of trash baseline 5 years after effective date (7/7/14) 60% reduction of trash baseline 6 years after effective date (7/7/15) 80% reduction of trash baseline 7 years after effective date (7/7/16) 100% reduction of trash baseline 8 years after effective date (7/7/17) Dates listed in appendix don't coincide with effective date of BPA
Los Angeles River Trash	Erroneous baseline trash reduction percentage goals September 30, 2010. Should be 26,6626.4 lbs, not 22,626.4 lbs.
Ballona Creek, Ballona Estuary, and Sepulveda Channel Bacteria	Caltrans storm water permittees and copermittees are assigned waste load allocations (WLAs) expressed as the number of daily or weekly sample days that may exceed the single sample targets equal to the TMDLs established for the impaired reaches and Waste Load Allocations assigned to waters tributary to impaired reaches. The Draft Permit fails to include these objectives and merely states "WLAs are held jointly with other dischargers." Appendix IV does not include compliance date: 10 years after effective date of the TMDL or, if an Integrated Water Resources Approach is implemented, up to July 15, 2021.
Marina del Rey, Harbor Back Basins, Mother's Beach Bacteria	Caltrans is assigned waste load allocations (WLAs) expressed as the number of daily or weekly sample days that may exceed the single sample targets equal to the TMDLs established for the impaired reaches and Waste Load Allocations assigned to

	waters tributary to impaired reaches. Appendix IV fails to include these objectives and merely states "WLAs are held jointly with other dischargers." For each monitoring site, allowable exceedance days are set on an annual basis as well as for three time periods. These three periods are: 1. summer dry-weather (April 1 to October 31) 2. winter dry-weather (November 1 to March 31) 3. wet-weather days (defined as days of 0.1 inch of rain or more plus three days following the rain event). The appendix also doesn't specify the compliance date: This TMDL will be implemented in three phases over a ten-year period, unless an Integrated Water Resources Approach is implemented (in which case compliance must be achieved in the shortest time possible but not to exceed 18 years from the effective date
Santa Monica Bay Beaches during Dry Weather Bacteria	Caltrans is assigned waste load allocations (WLAs) expressed as the number of daily or weekly sample days that may exceed the single sample targets. Appendix IV fails to include these objectives and merely states "WLAs are held jointly with other dischargers." For each monitoring site, allowable exceedance days are set on an annual basis as well as for three time periods. These three periods are: 1. summer dry-weather (April 1 to October 31) 2. winter dry-weather (November 1 to March 31) The appendix also doesn't specify the compliance date: This TMDL will be implemented in three phases over a six-year period Must meet compliance with allowable dry-weather exceedance days after 3 years and wet-weather exceedance days 6 years after effective date.
Santa Monica Bay Beaches during Wet Weather Bacteria	Caltrans is assigned waste load allocations (WLAs) expressed as the number of daily or weekly sample days that may exceed the single sample targets. Appendix IV fails to include these objectives and merely states "WLAs are held jointly with other dischargers." The appendix also doesn't specify the compliance date: This TMDL will be implemented in three phases over a ten-year period, unless an Integrated Water Resources Approach is implemented (in which case compliance must be achieved in the shortest time possible but not to exceed 18 years from the effective date
Malibu Creek and Lagoon Bacteria	Appendix IV should include Waste Load Allocations (WLAs) expressed as the number of daily or weekly sample days that may exceed the single sample limits or 30-day geometric mean limits as identified under "Numeric Target." The allowable days of exceedance for the single sample limits differ depending on season, dry weather or wet-weather, and by sampling locations as described in Table 7-10.2, which should be included in the appendix. Zero days of exceedance are allowed for the 30-day geometric mean limits. For each monitoring site, allowable exceedance days are set on an annual basis as well as for three time periods. These three periods are: 1. summer dry-weather (April 1 to October 31) 2. winter dry-weather (November 1 to March 31) 3. wet-weather (defined as days of 0.1 inch of rain or more plus three days following the rain event).
Harbor Beaches of Ventura County (Kiddie Beach and Hobie Beach) Bacteria	Missing Implementation milestones: Meet interim WLAs (12-18-2008, effective date). Monitoring: Continue monitoring at stations VCEHD 36000 and VCEHD 37000, at a weekly monitoring frequency, and on a year-round basis. Extend the monitoring period for Hobie Beach to include winter months. Pilot Project: Submit a work plan piloting Structural BMPs, including but not limited

<table>
<tr><td></td><td>to enhanced circulation devices, for Executive Officer approval (optional). Dec 18, 2009 (Appendix IV erroneously lists July 28, 2010).</td></tr>
<tr><td>Ballona Creek Metals</td><td>Appendix IV should mention total compliance is to be achieved within 15 years.</td></tr>
<tr><td>Calleguas Creek and Its Tributaries and Mugu Lagoon Metals and Selenium</td><td>Appendix IV should list final and interim WLAs for Calleguas and Conejo Creek and Revolon Slough, regardless of WLAs being jointly assigned.
A. Interim Limits
<table>
<tr><th rowspan="2">Constituents</th><th colspan="3">Calleguas and Conejo Creek</th><th colspan="3">Revolon Slough</th></tr>
<tr><th>Dry Daily Maximum (ug/L)</th><th>Dry Monthly Average (ug/L)</th><th>Wet Daily Maximum (ug/L)</th><th>Dry Daily Maximum (ug/L)</th><th>Dry Monthly Average (ug/L)</th><th>Wet Daily Maximum (ug/L)</th></tr>
<tr><td>Copper</td><td>23</td><td>19</td><td>204</td><td>23</td><td>19</td><td>204</td></tr>
<tr><td>Nickel</td><td>15</td><td>13</td><td>(a)</td><td>15</td><td>13</td><td>(a)</td></tr>
<tr><td>Selenium</td><td>(b)</td><td>(b)</td><td>(b)</td><td>14 (c)</td><td>13 (c)</td><td>(a)</td></tr>
</table>
(a) The current loads do not exceed the TMDL under wet conditions, interim limits are not required.
(b) Selenium allocations have not been developed for this reach as it is not on the 303(d) list. Implementation actions includes consideration of watershed-wide selenium impacts.
(c) Attainment of interim limits will be evaluated in consideration of background loading data, if available.
B. Final WLAs
1. Dry-Weather WLAs in Water Column (lbs/day)
<table>
<tr><th rowspan="2">Flow Range</th><th colspan="3">Calleguas and Conejo Creek</th><th colspan="3">Revolon Slough</th></tr>
<tr><th>Low Flow</th><th>Average Flow</th><th>Elevated Flow</th><th>Low Flow</th><th>Average Flow</th><th>Elevated Flow</th></tr>
<tr><td>Copper*</td><td>0.04*WER
0.02</td><td>0.12*WER
0.02</td><td>0.18*WER
0.03</td><td>0.03*WER
- 0.01</td><td>0.06*WER
- 0.03</td><td>0.13*WER
0.02</td></tr>
<tr><td>Nickel</td><td>0.100</td><td>0.120</td><td>0.440</td><td>0.050</td><td>0.069</td><td>0.116</td></tr>
<tr><td>Selenium</td><td>(a)</td><td>(a)</td><td>(a)</td><td>0.004</td><td>0.003</td><td>0.004</td></tr>
</table>
* If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.
(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list. Implementation actions include consideration of the watershed-wide selenium impacts.
2. Wet-Weather WLAs in Water Column (lbs/day)
<table>
<tr><th>Constituent</th><th>Calleguas Creek</th><th>Revolon Slough</th></tr>
<tr><td>Copper*</td><td>(0.00054*Q^2*0.032*Q - 0.17)*WER - 0.06</td><td>(0.0002*Q2+0.0005*Q)*WER</td></tr>
<tr><td>Nickel**</td><td>0.014*Q^2+0.82*Q</td><td>0.027*Q^2+0.47*Q</td></tr>
<tr><td>Selenium**</td><td>(a)</td><td>0.027*Q^2+0.47*Q</td></tr>
</table>
* If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.
** Current loads do not exceed loading capacity during wet weather. Sum of all loads cannot exceed loads presented in the table
(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list. Implementation actions include consideration of the watershed-wide selenium impacts.
Q: Daily storm volume.
II. Interim Limits and Final WLAs for Mercury in Suspended Sediment (lbs/yr)
Final WLAs are set at 80% reduction from HSPF load estimates. Interim limits for mercury in suspended sediment are set equal to the highest annual load within each flow category, based on HSPF output for the years 1993-2003.
<table>
<tr><th rowspan="2">Flow Range</th><th colspan="2">Calleguas Creek</th><th colspan="2">Revolon Slough</th></tr>
<tr><th>Interim (lbs/yr)</th><th>Final (lbs/yr)</th><th>Interim (lbs/yr)</th><th>Final (lbs/yr)</th></tr>
<tr><td>0-15,000 MGY</td><td>3.3</td><td>0.4</td><td>1.7</td><td>0.1</td></tr>
<tr><td>15,000-25,000 MGY</td><td>10.5</td><td>1.6</td><td>4</td><td>0.7</td></tr>
<tr><td>Above 25,000 MGY</td><td>64.6</td><td>9.3</td><td>10.2</td><td>1.8</td></tr>
</table>
MGY: million gallons per year.</td></tr>
<tr><td>Los Angeles River Metals</td><td>Appendix IV states under Compliance Date “None Specified”, but total compliance</td></tr>
</table>

<table>
<tr>
<td></td>
<td>must be met by January 11, 2028
Appendix IV is also missing the following milestones:
<table>
<tr><td>January 11, 2012</td><td>Each jurisdictional group shall demonstrate that 50% of the group's total drainage area served by the storm drain system is effectively meeting the dry-weather waste load allocations and 25% of the group's total drainage area served by the storm drain system is effectively meeting the wet-weather waste load allocations.</td></tr>
<tr><td>January 11, 2020</td><td>Each jurisdictional group shall demonstrate that 75% of the group's total drainage area served by the storm drain system is effectively meeting the dry-weather WLAs.</td></tr>
<tr><td>January 11, 2024</td><td>Each jurisdictional group shall demonstrate that 100% of the group's total drainage area served by the storm drain system is effectively meeting the dry-weather WLAs and 50% of the group's total drainage area served by the storm drain system is effectively meeting the wet-weather WLAs.</td></tr>
<tr><td>January 11, 2028</td><td>Each jurisdictional group shall demonstrate that 100% of the group's total drainage area served by the storm drain system is effectively meeting both the dry-weather and wet-weather WLAs.</td></tr>
</table>
</td>
</tr>
<tr>
<td>Calleguas Creek, Its Tributaries, and Mugu Lagoon OC Pesticides and PCBs</td>
<td>Appendix IV should include the following interim and final WLAs for pollutants in sediment for Stormwater Permittees:
a) Interim WLAs (ng/g)
<table>
<tr><td>Constituent</td><td colspan="6">Subwatershed</td></tr>
<tr><td></td><td>Mugu Lagoon[1]</td><td>Calleguas Creek</td><td>Revolon Slough</td><td>Arroyo Las Posas</td><td>Arroyo Simi</td><td>Conejo Creek</td></tr>
<tr><td>Chlordane</td><td>25.0</td><td>17.0</td><td>48.0</td><td>3.3</td><td>3.3</td><td>3.4</td></tr>
<tr><td>4,4-DDD</td><td>69.0</td><td>66.0</td><td>400.0</td><td>290.0</td><td>14.0</td><td>5.3</td></tr>
<tr><td>4,4- DDE</td><td>300.0</td><td>470.0</td><td>1,600.0</td><td>950.0</td><td>170.0</td><td>20.0</td></tr>
<tr><td>4,4-DDT</td><td>39.0</td><td>110.0</td><td>690.0</td><td>670.0</td><td>25.0</td><td>2.0</td></tr>
<tr><td>Dieldrin</td><td>19.0</td><td>3.0</td><td>5.7</td><td>1.1</td><td>1.1</td><td>3.0</td></tr>
<tr><td>PCBs</td><td>180.0</td><td>3,800.0</td><td>7,600.0</td><td>25,700.0</td><td>25,700.0</td><td>3,800.0</td></tr>
<tr><td>Toxaphene</td><td>22,900.0</td><td>260.0</td><td>790.0</td><td>230.0</td><td>230.0</td><td>260.0</td></tr>
</table>
Compliance with sediment based WLAs is measured as an in-stream annual average at the base of each subwatershed where the discharges are located.

b) Final WLAs (ng/g)
<table>
<tr><td>Constituent</td><td colspan="6">Subwatershed</td></tr>
<tr><td></td><td>Mugu Lagoon[1]</td><td>Calleguas Creek</td><td>Revolon Slough</td><td>Arroyo Las Posas</td><td>Arroyo Simi</td><td>Conejo Creek</td></tr>
<tr><td>Chlordane</td><td>3.3</td><td>3.3</td><td>0.9</td><td>3.3</td><td>3.3</td><td>3.3</td></tr>
<tr><td>4,4-DDD</td><td>2.0</td><td>2.0</td><td>2.0</td><td>2.0</td><td>2.0</td><td>2.0</td></tr>
<tr><td>4,4- DDE</td><td>2.2</td><td>1.4</td><td>1.4</td><td>1.4</td><td>1.4</td><td>1.4</td></tr>
<tr><td>4,4-DDT</td><td>0.3</td><td>0.3</td><td>0.3</td><td>0.3</td><td>0.3</td><td>0.3</td></tr>
<tr><td>Dieldrin</td><td>4.3</td><td>0.2</td><td>0.1</td><td>0.2</td><td>0.2</td><td>0.2</td></tr>
<tr><td>PCBs</td><td>180.0</td><td>120.0</td><td>130.0</td><td>120.0</td><td>120.0</td><td>120.0</td></tr>
<tr><td>Toxaphene</td><td>360.0</td><td>0.6</td><td>1.0</td><td>0.6</td><td>0.6</td><td>0.6</td></tr>
</table>
[1] The Mugu Lagoon subwatershed includes Duck Pond/Agricultural Drain/Mugu/Oxnard Drain #2 .</td>
</tr>
<tr>
<td>Los Angeles River Nitrogen Compounds</td>
<td>Appendix IV should include the WLA, even though it held jointly with multiple dischargers.
a) Ammonia wasteload allocations (WLAs) for minor point sources are listed below by receiving waters:
Water Body
One-hour average WLA Thirty-day average WLA

Los Angeles River above Los Angeles-Glendale WRP (LAG)
One-hour average WLA 4.7 mg/L
Thirty-day average WLA 1.6 mg/L
Los Angeles River below LAG
One-hour average WLA 8.7 mg/L</td>
</tr>
</table>

	Thirty-day average WLA 2.4 mg/L Los AngelesTributaries One-hour average 10.1 mg/L Thirty-day average 2.3 mg/L b) WLAs for nitrate-nitrogen, nitrite-nitrogen, and nitrate-nitrogen plus nitrite-nitrogen for minor discharges are listed below: Constituent Thirty-day average WLA NO_3-N 8.0 mg/L NO_2-N 1.0 mg/L NO_3-N + NO_2-N 8.0 mg/L
Upper Santa Clara River Chloride	WLAs are 100 mg/l for point source, which is inappropriately omitted from the table in Appendix IV.

Region 4 TMDLs Completely Missing:

Calleguas Creek Toxicity	Toxicity limit of 1 TUc plus interim and final WLAs for clorpyrifos and diazinon included for minor point sources.
Calleguas Creek Salts	WLAs for NPDES permittees other than POTWs and MS4s.
Los Cerritos Metals (EPA)	WLAs for Caltrans (g/day) 0.070 * daily storm volume (L) * 10^{-6} 0.397 * daily storm volume (L) * 10^{-6} 0.680 * daily storm volume (L) * 10^{-6}
Machado Lake Toxics	Waste load allocations (WLAs) for contaminants associated with suspended sediment are assigned to stormwater dischargers (MS4, Caltrans, general construction and general industrial dischargers) in both wet and dry weather.
Santa Clara River Reach 3 Chloride (EPA)	WLAs are established for discharges of construction or industrial site runoff or CalTrans facility discharges to Santa Clara River Reach 3 or to any tributaries that discharge to Reach 3 that are regulated through the statewide Construction Activities Storm Water General Permit Order No. 99-08-DWQ, Industrial Activities Stormwater General Permit Order No. 97-03-DWQ, or CalTrans Permit Order No. 99-06-DWQ.
San Gabriel River and Impaired Tributaries Metals and Selenium (EPA)	Grouped dry-weather and wet-weather waste load allocations apply to the MS4 and Caltrans permits (Tables 6-1, 6-2, 6-3, 6-5, 6-6 and 6-7).

ATTACHMENT 4

Horner, Dr. Richard, "Initial Investigation of the Feasibility and Benefits
of Low-Impact Site Design Practices
for the San Francisco Bay Area" (2007)

INITIAL INVESTIGATION OF THE FEASIBILITY AND BENEFITS OF LOW-IMPACT SITE DESIGN PRACTICES ("LID") FOR THE SAN FRANCISCO BAY AREA

Richard R. Horner[†]

ABSTRACT

The Clean Water Act NPDES permit that regulates municipal separate storm sewer systems (MS4s) in the San Francisco Bay Area, California will be reissued in 2007. The draft permit includes general provisions related to low impact development practices (LID) for certain kinds of development and redevelopment projects. Using six representative development project case studies, based on California building records, the author investigated the practicability and relative benefits of LID options for the majority of the region having soils potentially suitable for infiltration either in their natural state or after amendment using well recognized LID techniques. The results showed that (1) LID site design and source control techniques are more effective than conventional best management practices (BMPs) in reducing runoff rates; and (2) in each of the case studies, LID methods would reduce site runoff volume and pollutant loading to zero in typical rainfall scenarios.

[†] Richard R. Horner, Ph.D., Research Associate Professor, University of Washington Departments of Civil and Environmental Engineering and Landscape Architecture; Adjunct Associate Professor, University of Washington Center for Urban Horticulture

INTRODUCTION

The Assessment in Relation to Municipal Permit Conditions

This purpose of this study is to investigate the relative water quality and water reuse benefits of three levels of storm water treatment best management practices (BMPs): (1) basic "treat-and-release" BMPs (e.g., drain inlet filters, CDS units), (2) commonly used BMPs that expose runoff to soils and vegetation (extended-detention basins and biofiltration swales and filter strips), and (3) low impact development (LID) practices. The factors considered in the investigation are runoff volume, pollutant loading, and the availability of water for infiltration or other reuse. In order to assess the differential impact of storm water reduction approaches on these factors, this study examines six case studies typical of development covered by the proposed Municipal Regional Urban Runoff Phase I NPDES Stormwater Permit (MRP).

This report covers locations in the Bay Area most amenable to soil infiltration of stormwater runoff, those areas having soils in Natural Resources Conservation Service (NRCS) Hydrologic Soil Groups A, B, or C as classified by the Natural Resources Conservation Service (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). Depending on site-specific conditions, A and B soils would generally effectively infiltrate water without modification, whereas C soils could require organic amendments according to now standard LID methods. This report does not cover locations with group D soils, which are generally not amenable to infiltration, again depending on the specific conditions on-site. A subsequent report will examine options in these locations, which include other LID techniques (e.g., roof runoff harvesting for irrigation or gray water supply) and state-of-the-art conventional stormwater

management practices. A minority but still substantial fraction of the Bay Area has group D soils (39.3, 68.0, 18.3, and 50.1 percent of the mapped areas of Alameda, Contra Costa, San Mateo, and Santa Clara Counties, respectively). Regarding any mapped soil type, it is important to keep in mind that soils vary considerably within small distances. Characteristics at specific locations can deviate greatly from those of the major mapped unit, making infiltration potential either more or less than may be expected from the mapping.

Low impact development methods reduce storm runoff and its contaminants by decreasing their generation at sources, infiltrating into the soil or evaporating storm flows before they can enter surface receiving waters, and treating flow remaining on the surface through contact with vegetation and soil, or a combination of these strategies. Soil-based LID practices often use soil enhancements such as compost, and thus improve upon the performance of more traditional basins and biofilters. The study encompassed vegetated swales (channels for conveyance at some depth and velocity), vegetated filter strips (surfaces for conveyance in thin sheet flow), and bioretention areas (shallow basins with a range of vegetation types in which runoff infiltrates through soil either to groundwater or a subdrain for eventual surface discharge). Application of these practices in a low impact site design mode requires either determination that existing site soils can support runoff reduction through infiltration or that soils will be amended using accepted LID techniques to attain this objective. Finally, the study further broadened implementation options to include water harvesting (collection and storage for use in, for example, irrigation or gray water systems), roof downspout infiltration trenches, and porous pavements.

The investigation also considered whether typical development patterns and local conditions in the Bay Area would enable LID implementation as required by a new standard proposed for the 2007 Ventura County Municipal Storm Water Permit. This standard requires management of effective impervious area (EIA), limiting it to 5%, as well as other impervious area (what might be termed Not-Connected Impervious Area, NCIA), and pervious areas.

Where treatment control BMPs are required to manage runoff from a site, Volume or Flow Hydraulic Design Bases commonly used in California were assumed to apply. The former basis applies to storage-type BMPs, like ponds, and requires capturing and treating either the runoff volume from the 85th percentile, 24-hour rainfall event for the location or the volume of annual runoff to achieve 80 percent or more volume treatment. The calculations in this analysis used the 85th percentile 24-hour rainfall event basis. The Flow basis applies to flow-through BMPs, like swales, and requires treating the runoff flow rate produced from a rain event equal to at least 0.2 inches per hour intensity (or one of two other approximately equivalent options).

Scope of the Assessment

With respect to each of the six development case studies, three assessments were undertaken: a baseline scenario incorporating no stormwater management controls; a second scenario employing conventional BMPs; and a third development scenario employing LID stormwater management strategies.

To establish a baseline for each case study, annual stormwater runoff volumes were estimated, as well as concentrations and mass loadings of four pollutants: (1) total suspended solids (TSS), (2) total recoverable copper (TCu), (3) total recoverable zinc (TZn), and (4) total phosphorus (TP). These baseline estimates were based on the anticipated land use and cover with no stormwater management efforts.

Two sets of calculations were then conducted using the parameters defined for the six case studies. The first group of calculations estimated the extent to which basic BMPs reduce runoff volumes and pollutant concentrations and loadings, and what impact, if any, such BMPs have on recharge rates or water retention on-site.

The second group of calculations estimated the extent to which commonly used soil-based BMPs and LID site design strategies ameliorate runoff volumes and pollutant concentrations and loadings, and the effect such techniques have on recharge rates. When evaluating LID strategies in the context of the EIA concept employed in the draft Ventura County MS4 permit, it was presumed that EIA would be limited to three percent. It was also assumed that pervious surfaces on a site receiving runoff from other areas on the site would be sized and prepared to manage (through infiltration or storage) the volume directed there in addition to precipitation falling directly on those areas. The assessment of basins, biofiltration, and low impact design practices analyzed the expected infiltration capacity of the case study sites. It also considered related LID techniques and practices, such as source reduction strategies, that could work in concert with infiltration to serve the goals of: (1) preventing increase in annual runoff volume from the pre- to the post-developed state, (2) preventing increase in annual pollutant mass loadings between the two development states, and (3) avoiding exceedances of the Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) criteria for copper and zinc.

The results of this analysis show that:

- A full-range of typical development categories common in the Bay Area, from single family residential to restaurants, housing developments, and commercial uses like office buildings, can feasibly implement standard LID techniques to achieve no stormwater discharge during rain events equal to, and in some cases greater than, design storm conditions. This conclusion is based on an analysis that used actual building records in California and annual rainfall records in two rainfall zones in the Bay Area to show that site conditions support this level of performance. In addition, site conditions typical at a wide range of development projects are more than sufficient to attain compliance with a three percent EIA limit, as is being contemplated in other MS4 re-issuance proceedings in California presently.

- Developments implementing no post-construction BMPs result in storm water runoff volume and pollutant loading that are substantially increased, and recharge rates that are substantially decreased, compared to pre-development conditions.

- Developments implementing basic post-construction treatment BMPs achieve reduced pollutant loading compared to developments with no BMPs, but stormwater runoff volume and recharge rates are similar to developments with no BMPs.

- Developments implementing traditional basins and biofilters, and even more so low impact post-construction BMPs, achieve significant reduction of pollutant loading and runoff volume as well as greatly enhanced recharge rates compared to both developments with no BMPs and developments with basic treatment BMPs.

This report covers the methods employed in the investigation, data sources, and references for both. It then presents the results, discusses their consequences, draws conclusions, and makes recommendations relative to the feasibility of utilizing low-impact development practices in Bay Area developments.

CASE STUDIES

Six case studies were selected to represent a range of urban development types considered to be representative of the Bay Area. These case studies involved: a multi-family residential complex (MFR), a relatively small-scale (23 homes) single-family residential development (Sm-SFR), a restaurant (REST), an office building (OFF), a relatively large (1000 homes) single-family residential development (Lg-SFR), and a single home (SINGLE).[1]

Parking spaces were estimated to be 176 sq ft in area, which corresponds to 8 ft width by 22 ft length dimensions. Code requirements vary by jurisdiction, with the tendency now to drop below the traditional 200 sq ft average. About 180 sq ft is common, but various standards for full- and compact-car spaces, and for the mix of the two, can raise or lower the average.[2] The 176 sq ft size is considered to be a reasonable value for conventional practice.

Roadways and walkways assume a wide variety of patterns. Exclusive of the two SFR cases, simple, square parking lots with roadways around the four sides and square buildings with walkways also around the four sides were assumed. Roadways and walkways were taken to be 20 ft and 6 ft wide, respectively.

Single-family residences were assumed each to have a driveway 20 ft wide and 30 ft long. It was further assumed that each would have a sidewalk along the front of the lot, which was calculated to be 5749 sq ft in area. Assuming a square lot, the front dimension would be 76 ft. A 40-ft walkway was included within the property. Sidewalks and walkways were taken to be 4 ft wide. For each case study the total area for all of these impervious features was subtracted from the total site area to estimate the pervious area, which was assumed to have conventional landscaping cover (grass, small herbaceous decorative plants, bushes, and a few trees).

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[1] Building permit records from the City of San Marcos in San Diego County provided data on total site areas for the first four case studies, including numbers of buildings, building footprint areas (including porch and garage for Sm-SFR), and numbers of parking spaces associated with the development projects. While the building permit records made no reference to features such as roadways, walkways, and landscaping normally associated with development projects, these features were taken into account in the case studies using assumptions described herein. Larger developments and redevelopment were not represented in the sampling of building permits from the San Marcos database. To take these types of projects into account in the subsequent analysis, the Lg-SFR scenario scaled up all land use estimates from the Sm-SFR case in the ratio of 1000:23. The single home case (SINGLE) was derived from Bay Area records obtained at http://www.ppic.org/content/other/706EHEP_web_only_appendix.pdf, which showed 8000 ft^2 as a rough average for a single home lot in the region. As with the other cases, these hypothetical developments were assumed to have roadways, walkways, and landscaping, as described herein.

[2] J. Gibbons, *Parking Lots*, NONPOINT EDUCATION FOR MUNICIPAL OFFICERS, Technical Paper No. 5 (1999) (http://nemo.uconn.edu/tools/publications/tech_papers/tech_paper_5.pdf).

Table 1 summarizes the characteristics of the six case studies. The table also provides the recorded or estimated areas in each land use and cover type.

Table 1. Case Study Characteristics and Land Use and Land Cover Areas

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
No. buildings	11	23	1	1	1000	1
Total area (ft^2)	476,982	132,227	33,669	92,612	5,749,000	8,000
Roof area (ft^2)	184,338	34,949	3,220	7,500	1,519,522	2114
No. parking spaces	438	-	33	37	-	-
Parking area (ft^2)	77,088	-	5808	6512	-	-
Access road area (ft^2)	22,212	-	6097	6456	-	-
Walkway area (ft^2)	33,960	10,656	1362	2078	463,289	518
Driveway area (ft^2)	-	13,800	-	-	600,000	835
Landscape area (ft^2)	159,384	72,822	17,182	70,066	3,166,190	4533

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single-family home

METHODS OF ANALYSIS

Annual Stormwater Runoff Volumes

Annual surface runoff volumes produced were estimated for both pre- and post-development conditions for each case study site. Runoff volume was computed as the product of annual precipitation, contributing drainage area, and a runoff coefficient (ratio of runoff produced to rainfall received). For impervious areas the following equation was used:

$$C = (0.009)\, I + 0.05$$

where I is the impervious percentage. This equation was derived by Schueler (1987) from Nationwide Urban Runoff Program data (U.S. Environmental Protection Agency 1983). With I = 100 percent for fully impervious surfaces, C is 0.95.

The basis for pervious area runoff coefficients was the Natural Resource Conservation Service's (NRCS) Urban Hydrology for Small Watersheds (NRCS 1986, as revised from the original 1975 edition). This model estimates storm event runoff as a function of precipitation and a variable representing land cover and soil, termed the curve number (CN). Larger events are forecast to produce a greater amount of runoff in relation to amount of rainfall because they more fully saturate the soil. Therefore, use of the model to estimate annual runoff requires selecting some event or group of events to represent the year. The 85th percentile, 24-hour rainfall event was used in the analysis here for the relative comparison between pre- and post-development and applied to deriving a runoff coefficient for annual estimates, recognizing that smaller storms would produce less and larger storms more runoff.

A memorandum titled Rainfall Data Analysis and Guidance for Sizing Treatment BMPs (http://www.cccleanwater.org/construction/Publications/CCCWPBasinSizingMemoFINAL_4-20-05.pdf) prepared for the Contra Costa Clean Water Program demonstrated a linear relationship between unit basin storage volume for 80 percent capture (which is related to the 85th

percentile event) and mean annual precipitation. Rainfall for Bay Area 85th percentile, 24-hour events could thus be determined from locations where events have been established in direct proportion to mean annual rainfall.

In order to obtain appropriate regional estimates of annual precipitation, rainfall records were obtained from a number of sites in the four counties, plus the city of Vallejo, covered by the permit.[3] The mean annual range is from 13.73 to 24.30 inches, with quantities close to either 14 or 20 inches predominating. The study was performed for both of these rainfall totals. These figures were used in conjunction with 85th percentile, 24-hour event amounts of 0.75 for Los Angeles and 0.92 for Santa Rosa (http://ci.santa-rosa.ca.us/pworks/other/SW/SRSWManualFinalDraft.pdf), respectively, and mean annual totals of 12 and 31 inches for the respective cities to estimate 85 percentile, 24-hour event quantities of 0.77 and 0.82 inch for the 14 and 20-inch Bay Area rainfall zones, respectively.

Pre- and post-development runoff quantities were computed with selected CN values and the 0.77- and 0.82-inch rainfalls. The CN choices based on tabulated data in NRCS (1986) and professional judgment were 83 before development and 86 after land modification. Estimate runoff amounts were then divided by the rainfall totals to obtain runoff coefficients. The results were about the same for the two rainfall zones at 0.07 and 0.12 before and after development, respectively. Finally, total annual runoff volumes were estimated based on the two average annual precipitation figures.

Stormwater Runoff Pollutant Discharges

Annual pollutant mass discharges were estimated as the product of annual runoff volumes produced by the various land use and cover types and pollutant concentrations typical of those areas. Again, the 0.75-inch precipitation event was used as a basis for volumes. Stormwater pollutant data have typically been measured and reported for general land use types (e.g., single-family residential, commercial). However, an investigation of low impact development practices of the type this study sought to conduct demands data on specific land coverages. The literature offers few data on this basis. Those available and used herein were assembled by a consultant to the City of Seattle for a project in which the author participated. They appear in Attachment A (Herrera Environmental Consultants, Inc. undated).

Pollutant concentrations expected to occur typically in the mixed runoff from the several land use and cover types making up a development were estimated by mass balance; i.e., the concentrations from the different areas of the sites were combined in proportion to their contribution to the total runoff.

The Effect of Conventional Treatment BMPs on Runoff Volume, Pollutant Discharges, and Recharge Rates

The first question in analyzing how BMPs reduce runoff volumes and pollutant discharges was, What BMPs are being employed in Bay Area developments under the permit now in force? These county permits provide regulated entities with a large number of choices and few fixed requirements regarding the selection of stormwater BMPs. (See Contra Costa County NPDES Municipal Stormwater Permit, Order No. 99-058; see also Santa Clara County NPDES Municipal Stormwater Permit, Order No. 01-024, at C.3.a.). Clean Water Program Available options presumably include manufactured BMPs, such as drain inlet inserts (DIIs) and continuous deflective separation (CDS) units. Developments may also select such non-

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[3] http://www.census.gov/stab/ccdb/cit7140a.txt, http://www.acwd.org/dms_docs/76d0b026b60d97830492079a48b1cb88.pdf, http://www.ci.berkely.ca.us/aboutberkeley/weather.html, http://www.usbr.gov/dataweb/dams/ca10168.htm, http://www.redwoodcity.org/about/weather.html.

proprietary devices as extended-detention basins (EDBs) and biofiltration swales and filter strips. EDBs hold water for two to three days for solids settlement before releasing whatever does not infiltrate or evaporate. Biofiltration treats runoff through various processes mediated by vegetation and soil. In a swale, runoff flows at some depth in a channel, whereas a filter strip is a broad surface over which water sheet flows. Each of these BMP types was applied to each case study, although it is not clear that these BMPs, in actuality, have been implemented consistently within the Bay Area to date.

The principal basis for the analysis of BMP performance was the California Department of Transportation's (CalTrans, 2004) BMP Retrofit Pilot Program, performed in San Diego and Los Angeles Counties. One important result of the program was that BMPs with a natural surface infiltrate and evaporate (probably, mostly infiltrate) a substantial amount of runoff, even if conditions do not appear to be favorable for an infiltration basin. On average, the EDBs, swales, and filter strips lost 40, 50 and 30 percent, respectively, of the entering flow before the discharge point. DIIs and CDS units do not contact runoff with a natural surface, and therefore do not reduce runoff volume.

The CalTrans program further determined that BMP effluent concentrations were usually a function of the influent concentrations, and equations were developed for the functional relationships in these cases. BMPs generally reduced influent concentrations proportionately more when they were high. In relatively few situations influent concentrations were constant at an "irreducible minimum" level regardless of inflow concentrations.

In analyzing the effects of BMPs on the case study runoff, the first step was to reduce the runoff volumes estimated with no BMPs by the fractions observed to be lost in the pilot study. The next task was estimating the effluent concentrations from the relationships in the CalTrans report. The final step was calculating discharge pollutant loadings as the product of the reduced volumes and predicted effluent concentrations. As before, typical pollutant concentrations in the mixed runoff were established by mass balance.

Estimating Infiltration Capacity of the Case Study Sites

Infiltrating sufficient runoff to maintain pre-development hydrologic characteristics and prevent pollutant transport is the most effective way to protect surface receiving waters. Successfully applying infiltration requires soils and hydrogeological conditions that will pass water sufficiently rapidly to avoid overly-lengthy ponding, while not allowing percolating water to reach ground-water before the soil column captures pollutants.

The study assumed that infiltration would occur in surface facilities and not in below-ground trenches. The use of trenches is certainly possible, and was judged to be an approved BMP by CalTrans after the pilot study. However, the intent of this investigation was to determine the ability of pervious areas to manage the site runoff. This was accomplished by determining the infiltration capability of the pervious areas in their original condition for each development case study, and further assessing the pervious areas' infiltration capabilities if soils were modified according to low impact development practices.

The chief basis for this aspect of the work was an assessment of infiltration capacity and benefits for Los Angeles' San Fernando Valley (Chralowicz et al. 2001). The Chralowicz study posited providing 0.1-0.5 acre for infiltration basins to serve each 5 acres of contributing drainage area. At 2-3 ft deep, it was estimated that such basins could infiltrate 0.90-1.87 acre-ft/year of runoff in San Fernando Valley conditions. Soils there are generally various loam textures with infiltration rates of approximately 0.5-2.0 inches/hour. Loams are also common formations in the portion of the Bay Area covered by this report, those areas with Hydrologic

Soil Groups A, B, and C,[4] thus making the conclusions of the San Fernando Valley study applicable for these purposes. This information was used to estimate how much of each case study site's annual runoff would be infiltratable, and if the pervious portion would provide sufficient area for infiltration. For instance, if sufficient area were available, the infiltration configuration would not have to be in basin form but could be shallower and larger in surface area. This study's analyses assumed the use of bioretention areas rather than traditional infiltration basins.

Volume and Pollutant Source Reduction Strategies

As mentioned above, the essence of low impact development is reducing runoff problems before they can develop, at their sources, or exploiting the infiltration and treatment abilities of soils and vegetation. If a site's existing infiltration and treatment capabilities are inadequate to preserve pre-development hydrology and prevent runoff from causing or contributing to violations of water quality standards, then LID-based source reduction strategies can be implemented, infiltration and treatment capabilities can be upgraded, or both.

Source reduction can be accomplished through various LID techniques. Soil can be upgraded to store runoff until it can infiltrate, evaporate, or transpire from plants through compost addition. Soil amendment, as this practice is known, is a standard LID technique.

Upgraded soils are used in bioretention cells that hold runoff and effect its transfer to the subsurface zone. This standard LID tool can be used where sufficient space is available. This study analyzed whether the six development case study sites would have sufficient space to effectively reduce runoff using bioretention cells, assuming the soils and vegetation could be amended and enhanced where necessary.

Conventional pavements can be converted to porous asphalt or concrete or replaced with concrete or plastic unit pavers or grid systems. For such approaches to be most effective, the soils must be capable of infiltrating the runoff passing through, and may require renovation.

Source reduction can be enhanced by the LID practice of water harvesting, in which water from impervious surfaces is captured and stored for reuse in irrigation or gray water systems. For example, runoff from roofs and parking lots can be harvested, with the former being somewhat easier because of the possibility of avoiding pumping to use the water and fewer pollutants. Harvesting is a standard technique for Leadership in Energy and Environmental Design (LEED) buildings.[5] Many successful systems of this type are in operation, such as the Natural Resources Defense Council office (Santa Monica, CA), the King County Administration Building (Seattle, WA), and two buildings on the Portland State University campus (Portland, OR). This investigation examined how water harvesting could contribute to stormwater management for case study sites where infiltration capacity, available space, or both appeared to be limited.

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[4] http://gis.ca.gov/catalog/BrowseCatalog.epl?id=108, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

[5] New Buildings Institute, Inc., *Advanced Buildings* (2005) (http://www.poweryourdesign.com/LEEDGuide.pdf).

RESULTS OF THE ANALYSIS

1. *"Base Case" Analysis: Development without Stormwater Controls*

Comparison of Pre- and Post-Development Runoff Volumes

Table 2 presents a comparison between the estimated runoff volumes generated by the respective case study sites in the pre- and post-development conditions, assuming implementation of no stormwater controls on the developed sites. On sites dominated by impervious land cover, most of the infiltration that would recharge groundwater in the undeveloped state is expected to be lost to surface runoff after development. This greatly increased surface flow would raise peak flow rates and volumes in receiving water courses, raise flooding risk, and transport pollutants. Only the office building, the plan for which retained substantial pervious area, would lose less than 40 percent of the site's pre-development recharge.

Table 2. Pre- and Post-Development without BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater (annual volume in acre-ft)

Distribution	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
Precipitation[b]	12.8	3.54	0.90	2.47	154	0.21
Pre-development runoff[c]	0.89	0.25	0.07	0.17	10	0.02
Pre-development recharge[d]	11.9	3.29	0.83	2.30	144	0.19
Post-development impervious runoff[c]	8.07	1.51	0.42	0.57	66	0.09
Post-development pervious runoff[c]	0.51	0.24	0.06	0.23	10	0.01
Post-development total runoff[c]	8.58	1.75	0.48	0.80	76	0.10
Post-development recharge[d]	4.22	1.79	0.42	1.67	78	0.11
Post-development recharge loss (% of pre-development)	7.68 (65%)	1.50 (46%)	0.41 (49%)	0.65 (27%)	66 (45%)	0.08 (41%)
20 Inches/Year Rainfall:						
Precipitation[b]	18.2	5.06	1.29	3.54	220	0.30
Pre-development runoff[c]	1.28	0.35	0.10	0.24	15	0.03
Pre-development recharge[d]	16.9	4.71	1.19	3.30	205	0.27
Post-development impervious runoff[c]	11.5	2.16	0.60	0.82	94	0.13
Post-development pervious runoff[c]	0.73	0.34	0.08	0.33	15	0.01
Post-development total runoff[c]	12.2	2.50	0.68	1.15	109	0.14
Post-development recharge[d]	6.0	2.56	0.61	2.39	111	0.16
Post-development recharge loss (% of pre-development)	10.9 (65%)	2.15 (46%)	0.58 (49%)	0.91 (27%)	94 (45%)	0.11 (41%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home
[b] Volume of precipitation on total project area
[c] Quantity of water discharged from the site on the surface
[d] Quantity of water infiltrating the soil; the difference between precipitation and runoff

Pollutant Concentrations and Loadings

Table 3 presents the pollutant concentrations from the literature and loadings calculated as described for the various land use and cover types represented by the case studies. Landscaped areas are expected to release the highest TSS concentration, although relatively low TSS mass loading because of the low runoff coefficient. The highest copper concentrations and loadings are expected from parking lots. Roofs, especially commercial roofs, top the list for both zinc concentrations and loadings. Landscaping would issue by far the highest phosphorus, although access roads and driveways would contribute the highest mass loadings. With expected concentrations being equal in the two rainfall zones, mass loadings in the 20 inches/year zone would be higher than those in the 14 inches/year zone in the same proportion as the ratio of rainfall quantities.

Table 3. Pollutant Concentrations and Loadings for Case Study Land Use and Cover Types

Land Use	Concentrations				Loadings			
	TSS (mg/L)	TCu (mg/L)	TZn (mg/L)	TP (mg/L)	Lbs. TSS/ acre-year	Lbs. TCu/ acre-year	Lbs. TZn/ acre-year	Lbs. TP/ acre-year
14 Inches/Year Rainfall:								
Residential roof	25	0.013	0.159	0.11	75	0.039	0.477	0.330
Commercial roof	18	0.014	0.281	0.14	54	0.042	0.844	0.420
Access road/driveway	120	0.022	0.118	0.66	360	0.066	0.354	1.981
Parking	75	0.036	0.097	0.14	225	0.108	0.291	0.420
Walkway	25	0.013	0.059	0.11	75	0.039	0.177	0.330
Landscaping	213	0.013	0.059	2.04	81	0.005	0.022	0.774
20 Inches/Year Rainfall:								
Residential roof	25	0.013	0.159	0.11	107	0.056	0.683	0.472
Commercial roof	18	0.014	0.281	0.14	77	0.060	1.207	0.601
Access road/driveway	120	0.022	0.118	0.66	515	0.094	0.507	2.834
Parking	75	0.036	0.097	0.14	322	0.155	0.417	0.601
Walkway	25	0.013	0.059	0.11	107	0.056	0.253	0.472
Landscaping	213	0.013	0.059	2.04	135	0.008	0.037	1.291

The Basin Plan freshwater acute criteria for copper and zinc are 0.013 mg/L and 0.120 mg/L, respectively (http://www.swrcb.ca.gov/rwqcb2/basinplan/web/BP_CH3.html). All developed land uses are expected to discharge copper at or above the criterion, based on the mass balance calculations using concentrations from Table 3. Any surface release from the case study sites would just meet or violate the criterion at the point of discharge, although dilution by the receiving water would lower the concentration below the criterion at some point. Even if copper mass loadings are reduced by BMPs, any surface discharge would equal or exceed the criterion initially, but it would be easier to dilute below that level. In contrast, runoff from land covers other than roofs would not violate the acute zinc criterion. Because of this difference, the evaluation considered whether or not the zinc criterion would be exceeded in each analysis, whereas there was no point in this analysis for copper. There are no equivalent water quality criteria for TSS and TP; hence, their concentrations were not further analyzed in the different scenarios.

Table 4 shows the overall loadings, as well as zinc concentrations, expected to be delivered from the case study developments should they not be fitted with any BMPs. As Table 4 shows, all cases are forecast to exceed the 0.120 mg/L acute zinc criterion. Because of its size, the large residential development dominates the mass loading emissions.

Table 4. Case Study Pollutant Concentration and Loading Estimates without BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/ Year Rainfall:						
TZn (mg/L)	0.127	0.123	0.128	0.133	0.123	0.121
Lbs. TSS/year	1254	328	119	230	14249	20
Lbs. TCu/year	0:44	0.070	0.030	0.043	3.04	0.004
Lbs. TZn/year	2.94	0.576	0.165	0.286	25.04	0.034
Lbs. TP/year	6.24	2.27	0.68	1.69	98.55	0.14
20 Inches/ Year Rainfall:						
TZn (mg/L)	0.127	0.123	0.128	0.133	0.123	0.121
Lbs. TSS/year	1864	501	180	360	21781	30
Lbs. TCu/year	0.63	0.102	0.043	0.063	4.44	0.006
Lbs. TZn/year	4.22	0.833	0.238	0.417	36.2	0.050
Lbs. TP/year	9.60	3.55	1.05	2.71	154	0.22

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single-family home

2. *"Conventional BMP" Analysis: Effect of Basic Treatment BMPs*

Effect of Basic Treatment BMPs on Post-Development Runoff Volumes

The current set of regional permits allows regulated parties to select from a range of BMPs in order to treat or infiltrate a given quantity of annual rainfall. The administrative draft of the proposed MRP is also non-specific regarding the role of LID in satisfying permit conditions. The range of BMPs includes drain inlet inserts, CDS units, and other manufactured BMPs, detention vaults, and sand filters, all of which isolate runoff from the soil; as well as basins and biofiltration BMPs built in soil and generally having vegetation. Treatment BMPs that do not permit any runoff contact with soils discharge as much stormwater runoff as equivalent sites with no BMPs, and hence yield zero savings in recharge. As mentioned above, the CalTrans (2004) study found that BMPs with a natural surface can reduce runoff by substantial margins (30-50 percent for extended-detention basins and biofiltration).

With such a wide range of BMPs in use, runoff reduction ranging from 0 to 50 percent, and a lack of clearly ascertainable requirements, it is not possible to make a single estimate of how much recharge savings are afforded by maximal implementation of the current permits or the Municipal Regional Permit (MRP), if issued as now proposed. We made the following assumptions regarding implementation of BMPs. Assuming natural-surface BMPs perform at the average of the three types tested by CalTrans (2004), i.e., 40 percent runoff reduction, the estimate can be bounded as shown in Table 5. The table demonstrates that allowing free choice of BMPs without regard to their ability to direct water into the ground forfeits substantial groundwater recharge benefits when hardened-surface BMPs are selected. Use of soil-based conventional BMPs could cut recharge losses from half or more of the full potential to about one-quarter to one-third or less, except with the highly impervious commercial development. This analysis shows the wisdom of draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way. But as subsequent analyses showed, soil amendment can gain considerably greater benefits.

Table 5. Pre- and Post-Development with Conventional BMPs: Distribution of Surface Runoff Versus Recharge to Groundwater (annual volume in acre-ft)

Distribution	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
Precipitation[b]	12.8	3.54	0.90	2.47	154	0.21
Pre-development runoff[c]	0.89	0.25	0.07	0.17	10	0.02
Pre-development recharge[d]	11.9	3.29	0.83	2.30	144	0.19
Post-development impervious runoff[e]	4.84-8.07	0.90-1.51	0.25-0.42	0.34-0.57	39-66	0.05-0.09
Post-development pervious runoff[e]	0.30-0.51	0.14-0.24	0.04-0.06	0.13-0.23	6.3-10	0.006-0.01
Post-development total runoff[e]	5.15-8.58	1.05-1.75	0.29-0.48	0.48-0.80	46-76	0.06-0.10
Post-development recharge[d, e]	4.22-7.60	1.79-2.49	0.42-0.62	1.67-2.00	78-108	0.11-0.15
Post-development recharge loss (% of pre-development)[e]	4.29-7.68 (36-65%)	0.80-1.50 (24-46%)	0.80-0.41 (26-49%)	0.30-0.65 (13-27%)	34-66 (24-45%)	0.05-0.08 (24-41%)
20 Inches/Year Rainfall:						
Precipitation[b]	18.2	5.06	1.29	3.54	220	0.30
Pre-development runoff[c]	1.28	0.35	0.10	0.24	15	0.03
Pre-development recharge[d]	16.9	4.71	1.19	3.30	205	0.27
Post-development impervious runoff[e]	6.92-11.5	1.29-2.16	0.35-0.60	0.49-0.82	56-94	0.08-0.13
Post-development pervious runoff[e]	0.44-0.73	0.20-0.34	0.05-0.08	0.19-0.33	9.0-15	0.006-0.01
Post-development total runoff[e]	7.36-12.2	1.50-2.50	0.41-0.68	0.68-1.15	65-109	0.08-0.14
Post-development recharge[d, e]	6.0-10.8	2.56-3.56	0.61-0.88	2.39-2.86	111-155	0.16-0.22
Post-development recharge loss (% of pre-development)[e]	6.1-10.9 (36-65%)	1.14-2.15 (24-46%)	0.31-0.58 (26-49%)	0.44-0.91 (13-27%)	49-94 (24-45%)	0.07-0.11 (24-41%)

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single-family home. Ranges represent 40 percent runoff volume reduction, with full site coverage by BMPs having a natural surface, to no reduction, with BMPs isolating runoff from soil.

[b] Volume of precipitation on total project area

[c] Quantity of water discharged from the site on the surface

[d] Quantity of water infiltrating the soil; the difference between precipitation and runoff [e] Ranging from the quantity with hardened bed BMPs to the quantity with soil-based BMPs

Effect of Basic Treatment BMPs on Pollutant Discharges

Table 6 presents estimates of zinc effluent concentrations and mass loadings of the various pollutants discharged from four types of conventional treatment BMPs. The loading reduction results show the CDS units always performing below 50 percent reduction for all pollutants analyzed, and most often in the vicinity of 20 percent, with zero copper reduction.

Table 6. Pollutant Concentration and Mass Loading Reduction Estimates with Conventional BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Effluent Concentrations:						
CDS TZn (mg/L)[a]	0.095	0.095	0.098	0.102	0.095	0.094
EDB TZn (mg/L)[a]	0.085	0.086	0.084	0.084	0.086	0.084
Swale TZn (mg/L)	0.055	0.054	0.055	0.056	0.054	0.053
Filter strip TZn (mg/L)	0.039	0.039	0.039	0.041	0.039	0.038
Mass Loading Reductions—14 Inches/Year Rainfall:						
CDS TSS reduction	15.7%	19.9%	22.0%	24.0%	19.9%	20.2%
CDS TCu reduction	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
CDS TZn reduction	22.7%	22.4%	22.9%	23.1%	22.4%	22.5%
CDS TP reduction	30.6%	41.5%	40.7%	45.9%	41.5%	42.0%
EDB TSS reduction	68.1%	73.7%	79.0%	81.1%	73.7%	74.3%
EDB TCu reduction	61.9%	55.7%	66.2%	63.0%	55.7%	55.8%
EDB TZn reduction	59.7%	59.6%	60.4%	61.9%	59.6%	59.8%
EDB TP reduction	61.9%	69.7%	69.1%	72.9%	69.7%	70.1%
Swale TSS reduction	68.8%	71.1%	73.1%	73.9%	71.1%	71.3%
Swale TCu reduction	72.5%	68.5%	78.2%	73.3%	68.5%	68.5%
Swale TZn reduction	78.4%	78.1%	84.3%	78.8%	78.1%	78.2%
Swale TP reduction	66.3%	70.7%	67.2%	76.2%	70.7%	71.1%
Filter strip TSS reduction	69.9%	75.4%	80.6%	82.6%	75.4%	76.0%
Filter strip TCu reduction	74.4%	69.1%	78.2%	75.4%	69.1%	69.1%
Filter strip TZn reduction	78.3%	77.9%	78.4%	78.7%	77.9%	78.1%
Filter strip TP reduction	48.4%	53.1%	63.7%	59.8%	53.1%	53.5%

Table 6 continued

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Mass Loading Reductions—20 Inches/Year Rainfall:						
CDS TSS reduction	18.8%	25.0%	26.3%	30.5%	25.0%	25.4%
CDS TCu reduction	0.7%	1.9%	1.1%	3.0%	1.9%	2.0%
CDS TZn reduction	23.1%	23.3%	23.6%	24.7%	23.3%	23.4%
CDS TP reduction	35.4%	46.6%	44.8%	51.8%	46.6%	47.1%
EDB TSS reduction	68.8%	74.6%	79.6%	81.6%	74.6%	75.1%
EDB TCu reduction	61.8%	55.6%	66.0%	62.7%	55.6%	55.7%
EDB TZn reduction	59.6%	59.3%	60.2%	61.5%	59.3%	59.6%
EDB TP reduction	63.0%	70.4%	69.7%	73.4%	70.4%	70.7%
Swale TSS reduction	69.1%	71.4%	73.6%	74.1%	71.4%	71.6%
Swale TCu reduction	72.5%	68.4%	77.9%	73.1%	68.4%	68.5%
Swale TZn reduction	78.3%	78.0%	84.1%	78.6%	78.0%	78.1%
Swale TP reduction	67.6%	71.9%	68.2%	77.1%	71.9%	72.3%
Filter strip TSS reduction	70.6%	76.3%	81.2%	83.1%	76.3%	76.8%
Filter strip TCu reduction	74.4%	69.0%	78.0%	75.1%	69.0%	69.1%
Filter strip TZn reduction	78.2%	77.8%	78.3%	78.5%	77.8%	77.9%
Filter strip TP reduction	49.9%	54.6%	66.3%	61.0%	54.6%	55.0%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home; CDS— continuous deflective separation unit; EDB—extended-detention basin

When treated with extended-detention basins, swales, or filter strips, effluents from each development case study site are expected to fall below the Basin Plan acute zinc criterion. These natural-surface BMPs, if fully implemented and well maintained, are predicted to prevent the pollutant masses generated on the six case study development sites from reaching a receiving water in both rainfall zones, which do not differ appreciably. Only total phosphorus reduction falls below 50 percent for three case studies. Otherwise, mass loading reductions range from about 60 to above 80 percent for the EDB, swale, and filter strip. These data indicate that draining impervious to pervious surfaces, even if those surfaces are not prepared in any special way, pays water quality as well as hydrologic dividends.

3. LID Analysis

(a) Hydrologic Analysis

The LID analysis repeats the analysis above, focusing here on the performance of LID techniques in reducing or eliminating runoff from the six development case studies. In addition to assessing the total runoff that would be expected, the analysis also considered whether LID techniques would be sufficient to attain compliance with a performance standard being

considered by the Los Angeles Regional Water Quality Control Board for Ventura County, California. This standard limits EIA (Effective Impervious Area) to five percent (but our analysis further assumed EIA would be ultimately reduced to three percent). All runoff from NCIA (Not-Connected Impervious Area) was assumed to drain to vegetated surfaces.

One goal of this exercise was to identify methods that reduce runoff production in the first place. It was hypothesized that implementation of source reduction techniques could allow all of the case study sites to infiltrate substantial proportions, or all, of the developed site runoff, advancing the hydromodification mitigation objective of the Draft Permit. When runoff is dispersed into the soil instead of being rapidly collected and conveyed away, it recharges groundwater, supplementing a resource that maintains dry season stream flow and wetlands. An increased water balance can be tapped by humans for potable, irrigation, and process water supply. Additionally, runoff volume reduction would commensurately decrease pollutant mass loadings.

Accordingly, the analysis considered the practicability of more than one scenario. In one option, all roof runoff is harvested and stored for some beneficial use. A second option disperses runoff into the soil via roof downspout infiltration trenches. The former option is probably best suited to cases like large commercial and office buildings, while distribution in the soil would fit best with residences and relatively small commercial developments. The analysis was repeated with the assumptions of harvesting OFF roof runoff for some beneficial use and dispersing roof runoff from the remaining four cases in roof downspout infiltration systems.

Expected Infiltration Capacities of the Case Study Sites

The first inquiry on this subject sought to determine how much of the total annual runoff each property is expected to infiltrate, since infiltration is a basic (although not exclusive) LID technique. Based on the findings of Chralowicz et al. (2001), it was assumed that an infiltration zone of 0.1-0.5 acres in area and 2-3 ft deep would serve a drainage catchment area in the size range 0-5 acres and infiltrate 0.9-1.9 acre-ft/year. The conclusions of Chralowicz et al. (2001) were extrapolated to conservatively assume that 0.5 acre would be required to serve each additional five acres of catchment, and would infiltrate an incremental 1.4 acre-ft/year (the midpoint of the 0.9-1.9 acre-ft/year range). According to these assumptions, the following schedule of estimates applies:

Pervious Area Available for Infiltration	Catchment Served acres	Infiltration Capacity
0.5 acres	0-5 acres	1.4 acre-ft/year
1.0 acres	5-10 acres	2.8 acre-ft/year
1.5 acres	10-15 acres	4.2 acre-ft/year
(Etc.)	...	...

As a formula, infiltration capacity ≈ 2.8 x available pervious area. To apply the formula conservatively, the available area was reduced to the next lower 0.5-acre increment before multiplying by 2.8.

As shown in Table 7, in both rainfall zones all six of the sites have adequate or greater capacity to infiltrate the full annual runoff volume expected from NCIA and pervious areas where EIA is limited to three percent of the total site area. Indeed, five of the six development types have sufficient pervious area to infiltrate *all* runoff, including runoff from EIA areas. These results are based on infiltrating in the native soils with no soil amendment. For any development project at which infiltration-oriented BMPs are considered, it is important that infiltration potential be carefully assessed using site-specific soils and hydrogeologic data. In the event such an investigation reveals a marginal condition (e.g., hydraulic conductivity, spacing to groundwater) for infiltration basins, soils could be enhanced to produce bioretention zones to assist infiltration. Notably, the five case studies with far greater than necessary infiltration capacity would offer substantial flexibility in designing infiltration, allowing ponding at less than 2-3 ft depth.

Table 7. Infiltration and Runoff Volume (With 3 Percent EIA and All NCIA Draining to Pervious Areas)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.36	0.10	0.03	0.07	4.4	0.01
NCIA + pervious area runoff (acre-ft/year)	**8.20**	**1.64**	**0.45**	**0.73**	**71.3**	**0.08**
Total runoff (acre-ft/year)	8.56	1.74	0.48	0.80	75.7	0.09
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration potential[c]	>100%	>100%	>100%	>100%	>100%	>100%
20 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.52	0.14	0.04	0.10	6.2	0.01
NCIA + pervious area runoff (acre-ft/year)	**11.7**	**2.34**	**0.64**	**1.04**	**101.7**	**0.14**
Total runoff (acre-ft/year)	12.2	2.48	0.68	1.14	108.0	0.15
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration potential[c]	84%	>100%	>100%	>100%	>100%	>100%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Compare runoff production from NCIA + pervious area (**row 3**) with estimated infiltration capacity (**row 6**)

As Table 7 shows, each of the six case study sites have the capacity to infiltrate *all* or substantially all of the runoff produced onsite annually by draining impervious surfaces to pervious areas on native soils or, in some soil regimes, soils amended with organic matter. If these sites were designed as envisioned in this analysis, no runoff discharge is expected in storms as large as, and probably larger than, the design storm event—using infiltration only. Discharge would be anticipated only with exceptionally intense, large, or prolonged rainfall that saturates the ground at a faster rate than water can infiltrate or evaporate. Even runoff from the area assumed to be EIA could be infiltrated in most cases based on the amount of pervious area available in typical development projects. Therefore, this analysis shows that the EIA performance standard being considered for Ventura County, California, or one more stringent, can be met readily in development projects occurring on A, B, and C soils in the San Francisco Bay Area.

Additional Source Reduction Capabilities of the Case Study Sites: Water Harvesting Example

As noted, infiltration is one of a wide variety of LID-based source reduction techniques. Where site conditions such as soil quality or available area limit a site's infiltration capacity, other source LID measures can enhance a site's runoff retention capability. For example, soil amendment, which improves infiltration, is a standard LID technique. Water harvesting is another. Such practices can also be used where infiltration capacity is adequate, but the developer desires greater flexibility for land use on-site. Table 8 shows the added LID implementation flexibility created by subtracting roof runoff by harvesting it or efficiently directing it into the soil through downspout dispersion systems, further demonstrating the feasibility and robust performance of LID options for reducing or eliminating runoff in most expected conditions. Specifically, all development types studied could readily infiltrate and/or retain all expected annual precipitation.

Table 8. Infiltration and Runoff Volume Reduction Analysis Including Roof Runoff Harvesting or Disposal in Infiltration Trenches (Assuming 3 Percent EIA and All NCIA Draining to Pervious Areas)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.36	0.10	0.03	0.07	4.4	0.01
Roof runoff (acre-ft/year)	4.68	0.89	0.08	0.19	38.5	0.05
Other NCIA + pervious area runoff (acre-ft/year)	**3.52**	**0.75**	**0.37**	**0.54**	**32.7**	**0.04**
Total runoff (acre-ft/year)	8.56	1.74	0.48	0.80	75.6	0.10
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration capacity[c]	>100%	>100%	>100%	>100%	>100%	>100%
20 Inches/Year Rainfall:						
EIA runoff (acre-ft/year)	0.52	0.14	0.04	0.10	6.2	0.01
Roof runoff (acre-ft/year)	6.67	1.27	0.12	0.28	55.1	0.08
Other NCIA + pervious area runoff (acre-ft/year)	**5.03**	**1.07**	**0.52**	**0.76**	**46.7**	**0.06**
Total runoff (acre-ft/year)	12.2	2.48	0.68	1.14	108.0	0.15
Pervious area available for infiltration (acres)	3.66	1.67	0.39	1.61	72.7	0.10

Table 8 continued

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Estimated infiltration capacity (acre-ft/year)[b]	**9.8**	**4.2**	**1.4**	**4.2**	**203**	**0.28**
Infiltration capacity[c]	>100%	>100%	>100%	>100%	>100%	>100%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—single family home;
[b] Based on Chralowicz et al. (2001) according to the schedule described above
[c] Comparison of runoff production from NCIA + pervious area (**row 3**) with estimated infiltration capacity (**row 6**)

Effect of Full LID Approach on Recharge

Table 9 shows the recharge benefits of preventing roofs from generating runoff and infiltrating as much as possible of the runoff from the remainder of the case study sites. The data show that LID methods offer significant benefits relative to the baseline (no stormwater controls) in all cases. These benefits are particularly impressive in developments with relatively high site imperviousness, such as in the MFR case.

Table 9. Comparison of Water Captured Annually (in acre-ft) from Development Sites for Beneficial Use with a Full LID Approach Compared to Development With No BMPs

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
Pre-development recharge[b] (acre-ft)	11.9	3.29	0.83	2.30	144	0.19
No BMPs—						
Post-development recharge[b] (acre-ft)	4.22	1.79	0.42	1.67	78	0.11
Post-development recharge lost (acre-ft)	7.68	1.50	0.41	0.65	66	0.08
Post-development % recharge lost	65%	46%	49%	27%	45%	41%
Full LID approach—						
Post-development runoff capture (acre-ft)[c]	11.9	3.29	0.83	2.30	144	0.19
Post-development recharge lost (acre-ft)	0	0	0	0	0	0
Post-development % recharge lost	0%	0%	0%	0%	0%	0%

Table 9 continued

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
20 Inches/Year Rainfall:						
Pre-development recharge[b] (acre-ft)	16.9	4.71	1.19	3.30	205	0.27
No BMPs—						
Post-development recharge[b] (acre-ft)	6.0	2.56	0.61	2.39	111	0.16
Post-development recharge lost (acre-ft)	10.9	2.15	0.58	0.91	94	0.11
Post-development % recharge lost	65%	46%	49%	27%	45%	41%
Full LID approach—						
Post-development runoff capture (acre-ft)[c]	16.9	4.71	1.19	3.30	205	0.27
Post-development recharge lost (acre-ft)	0	0	0	0	0	0
Post-development % recharge lost	0%	0%	0%	0%	0%	0%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—Single family home

[b] Quantity of water infiltrating the soil; the difference between precipitation and runoff

[c] Water either entirely infiltrated in BMPs and recharged to groundwater or partially harvested from roofs and partially infiltrated in BMPs. EIA was not distinguished from the remainder of the development, because these sites have the potential to capture all runoff.

(b) Water Quality Analysis

It was assumed that any site discharges would be subject to treatment control. For purposes of the analysis, treatment control was assumed to be provided by conventional sand filtration. This choice is appropriate for study purposes for two reasons. First, sand filters can be installed below grade, and land above can be put to other uses. Pervious area should be reserved for receiving NCIA drainage, and using sand filters would not draw land away from that service or other site uses. A second reason for the choice is that sand filter performance data equivalent to the data used in analyzing other conventional BMPs are available from the CalTrans (2004) work. Sand filters may or may not expose water to soil, depending on whether or not they have a hard bed. This analysis assumed a hard bed, meaning that no infiltration would occur and thus there would be no additional recharge in sand filters. Performance would be even better than shown in the analytical results if sand filters were built in earth.

Pollutant Discharge Reduction Through LID Techniques

The preceding analyses demonstrated that in each of the six case studies, *all* stormwater discharges could be eliminated at least under most meteorological conditions by dispersing runoff from impervious surfaces to pervious areas. Therefore, pollutant additions to receiving waters would also be eliminated.

SUMMARY AND CONCLUSIONS

This paper demonstrated that common Bay Area residential and commercial development types subject to the Municipal NPDES Permit are likely, without stormwater management, to reduce groundwater recharge from the pre-development state by approximately half in most cases to a much higher fraction with a large ratio of impervious to pervious area. With no treatment, runoff from these developments is expected to exceed Basin Plan acute copper and zinc criteria at the point of discharge and to deliver large pollutant mass loadings to receiving waters.

Conventional soil-based BMP solutions that promote and are component parts of low impact development approaches, by contrast, regain about 30-50 percent of the recharge lost in development without stormwater management in Bay Area locations having NRCS Hydrologic Soil Groups A, B, and C. It is expected the soil-based BMPs generally would release effluent that meets the acute zinc criterion at the point of discharge, although it would still exceed or just barely meet the copper limit. Excepting phosphorus, it was found that these BMPs would capture and prevent the movement to receiving waters of the majority of the pollutant loadings considered in the analysis.

It was found that by draining all site runoff to pervious areas with A, B, or C soil types, runoff can be eliminated entirely in most development categories. It follows that a three percent Effective Impervious Area standard can be met in typical developments, as well. This result was reached assuming the use of native soils or well recognized soil enhancement techniques (typically, with compost). Draining impervious surfaces onto these soils, in connection with limiting directly connected impervious area to three percent of the site total area, should eliminate storm runoff from some development types and greatly reduce it from more highly impervious types. Adding roof runoff elimination to the LID approach (by harvesting or directing it to downspout infiltration trenches) provides an additional tool, increasing flexibility and confidence that no discharge in most meteorological conditions is a feasible performance expectation. Even in the development scenarios involving the highest relative proportion of impervious surface, losses of rainfall capture for beneficial uses could be reduced from the untreated scenario when draining to pervious areas was supplemented with water harvesting. These results demonstrate the basic soundness of the concept of using LID techniques to reduce stormwater pollution in the Bay Area, and further show that limiting directly connected impervious area and draining the remainder over pervious surfaces, as contemplated by some Regional Water Boards in California, is also feasible.

REFERENCES

California Department of Transportation. 2004. BMP Retrofit Pilot Program Final Report. California Department of Transportation, Sacramento, CA.

Chralowicz, D., T. Goff, M. Mascali, and E. Taylor. 2001. Infiltration of Urban Stormwater Runoff to Recharge Groundwater Used for Drinking Water: A Study of the San Fernando Valley, California. Master of Environmental Science and Management Report, University of California at Santa Barbara, Santa Barbara, California.

Herrera Environmental Consultants, Inc. Undated. Pollutant Concentrations for Urban Source Areas, unpublished data table.

Natural Resource Conservation Service. 1986. Urban Hydrology for Small Watersheds, Technical Release-55. U.S. Department of Agriculture, Washington, D.C.

Schueler, T.R. 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments, Washington, D.C.

U.S. Environmental Protection Agency. 1983. Results of the Nationwide Urban Runoff Program: Volume 1 - Final Report, Report No. 832R83112. Office of Water, Washington, D.C.

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ATTACHMENT A

POLLUTANT CONCENTRATIONS FOR URBAN SOURCE AREAS (HERRERA ENVIRONMENTAL CONSULTANTS, INC. UNDATED)

Source Area	Study	Location	Sample Size (n)	TSS (mg/L)	TCu (ug/L)	TPb (ug/L)	TZn (ug/L)	TP (mg/L)	Notes
Roofs									
Residential	Steuer, et al. 1997	MI	12	36	7	25	201	0.06	2
Residential	Bannerman, et al. 1993	WI	~48	27	15	21	149	0.15	3
Residential	Waschbusch, et al. 2000	WI	25	15	n.a.	n.a.	n.a.	0.07	3
Residential	FAR 2003	NY		*19*	*20*	*21*	*312*	*0.11*	4
Residential	Gromaire, et al. 2001	France		*29*	*37*	*493*	*3422*	*n.a.*	5
Representative Residential Roof Values				**25**	**13**	**22**	**159**	**0.11**	
Commercial	Steuer, et al. 1997	MI	12	24	20	48	215	0.09	2
Commercial	Bannerman, et al. 1993	WI	~16	15	9	9	330	0.20	3
Commercial	Waschbusch, et al. 2000	WI	25	18	n.a.	n.a.	n.a.	0.13	3
Representative Commercial Roof Values				**18**	**14**	**26**	**281**	**0.14**	
Parking Areas									
Res. Driveways	Steuer, et al. 1997	MI	12	157	34	52	148	0.35	2
Res. Driveways	Bannerman, et al. 1993	WI	~32	173	17	17	107	1.16	3
Res. Driveways	Waschbusch, et al. 2000	WI	25	34	n.a.	n.a.	n.a.	0.18	3
Driveway	FAR 2003	NY		*173*	*17*		*107*	*0.56*	4
Representative Residential Driveway Values				**120**	**22**	**27**	**118**	**0.66**	
Comm./ Inst. Park. Areas	Pitt, et al. 1995	AL	16	110	116	46	110	n.a.	1
Comm. Park. Areas	Steuer, et al. 1997	MI	12	110	22	40	178	0.2	2
Com. Park. Lot	Bannerman, et al. 1993	WI	5	58	15	22	178	0.19	3
Parking Lot	Waschbusch, et al. 2000	WI	25	51	n.a.	n.a.	n.a.	0.1	3
Parking Lot	Tiefenthaler, et al. 2001	CA	5	36	28	45	293	n.a.	6
Loading Docks	Pitt, et al. 1995	AL	3	40	22	55	55	n.a.	1
Highway Rest Areas	CalTrans 2003	CA	53	*63*	*16*	*8*	*142*	*0.47*	7
Park and Ride Facilities	CalTrans 2003	CA	179	*69*	*17*	*10*	*154*	*0.33*	7
Comm./ Res. Parking	FAR 2003	NY		*27*	*51*	*28*	*139*	*0.15*	4
Representative Parking Area/Lot Values				**75**	**36**	**26**	**97**	**0.14**	

Landscaping/Lawns									
Landscaped Areas	Pitt, et al. 1995	AL	6	33	81	24	230	n.a.	1
Landscaping	FAR 2003	NY		*37*	*94*	*29*	*263*	n.a.	4
Representative Landscaping Values				**33**	**81**	**24**	**230**	**n.a.**	
Lawns - Residential	Steuer, et al. 1997	MI	12	262	n.a.	n.a.	n.a.	2.33	2
Lawns - Residential	Bannerman, et al. 1993	WI	~30	397	13	n.a.	59	2.67	3
Lawns	Waschbusch, et al. 2000	WI	25	59	n.a.	n.a.	n.a.	0.79	3
Lawns	Waschbusch, et al. 2000	WI	25	122	n.a.	n.a.	n.a.	1.61	3
Lawns - Fertilized	USGS 2002	WI	58	n.a.	n.a.	n.a.	n.a.	2.57	3
Lawns - Non-P Fertilized	USGS 2002	WI	38	n.a.	n.a.	n.a.	n.a.	1.89	3
Lawns - Unfertilized	USGS 2002	WI	19	n.a.	n.a.	n.a.	n.a.	1.73	3
Lawns	FAR 2003	NY	3	*602*	*17*	*17*	*50*	*2.1*	4
Representative Lawn Values				**213**	**13**	**n.a.**	**59**	**2.04**	

Notes:

Representative values are weighted means of collected data. Italicized values were omitted from these calculations.

1 - Grab samples from residential, commercial/institutional, and industrial rooftops. Values represent mean of DETECTED concentrations

2 - Flow-weighted composite samples, geometric mean concentrations

3 - Geometric mean concentrations

4 - Citation appears to be erroneous - original source of data is unknown. Not used to calculate representative value

5 - Median concentrations. Not used to calculate representative values due to site location and variation from other values.

6 - Mean concentrations from simulated rainfall study

7 - Mean concentrations. Not used to calculate representative values due to transportation nature of land use.

ATTACHMENT 5

NRDC et al v. Van Loben Sels, and U.S. v. Caltrans, Consent Decree (March 1998)

UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

NATURAL RESOURCES DEFENSE COUNCIL, SAN DIEGO BAYKEEPER, KENNETH J. MOSER,

Plaintiffs,

v.

JAMES W. VAN LOBEN SELS, Director of the California Department of Transportation,

Defendant.

Case No. 96-1440-IEG (POR)

Consent Decree

UNITED STATES OF AMERICA,

Plaintiff,

v.

CALIFORNIA DEPARTMENT OF TRANSPORTATION, a department within the Business, Transportation and Housing Agency, an agency of the State of California,

Defendant.

Case No. 97-0037-IEG (POR)
[consolidated with 96-1440-IEG (POR)]

Consent Decree

CV-96-1440
CV-97-0037

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UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

NATURAL RESOURCES DEFENSE COUNCIL, SAN DIEGO BAYKEEPER, KENNETH J. MOSER, Plaintiffs, v. JAMES W. VAN LOBEN SELS, Director of the California Department of Transportation, Defendant.	Case No. 96-1440-IEG (POR) Consent Decree
UNITED STATES OF AMERICA, Plaintiff, v. CALIFORNIA DEPARTMENT OF TRANSPORTATION, a department within the Business, Transportation and Housing Agency, an agency of the State of California, Defendant.	Case No. 97-0037-IEG (POR) Consent Decree

WHEREAS, the United States of America ("United States"), by authority of the Attorney General of the United States, acting at the request of the Administrator of the United States Environmental Protection Agency ("U.S. EPA"), has filed a Complaint alleging that the defendant, California Department of Transportation, a department within the Business, Transportation and Housing Agency, an agency of the State of California ("Caltrans") violated the Clean Water Act

("the Act");

WHEREAS Caltrans is a department created by or pursuant to the laws of the State of California and is within the Business, Transportation and Housing Agency which maintains, operates and is responsible for numerous construction activities, maintenance yards, miles of highways and other roads within San Diego County. It also owns and operates and is responsible for storm drains and storm drainage systems within those areas.

WHEREAS Caltrans District 11 is the subdivision of Caltrans responsible for Caltrans' activities in San Diego County.

WHEREAS Plaintiff Natural Resources Defense Council ("NRDC") is a not-for-profit membership corporation organized under the laws of the State of New York, with offices in Los Angeles, San Francisco, New York, and Washington, D.C. NRDC has 269,882 members throughout the United States, including 50,981 members in the State of California. NRDC is dedicated to the preservation, protection and defense of the environment, public health and natural resources, and actively pursues effective enforcement of the Clean Water Act on behalf of its members.

WHEREAS Plaintiff San Diego BayKeeper is a not-for-profit membership corporation organized under the laws of the Sate of California. San Diego BayKeeper has 327 members, most of whom reside in San Diego County. San Diego BayKeeper's mission is to monitor and protect the regions's waters, including local watersheds, marine sanctuaries, rivers, coastal estuaries, wetlands and bays from illegal dumping, hazardous spills, toxic sources and other pollution. When water quality violations or habitat destruction threaten the

[illegible] violates the Clean Water Act

region's waters, the San Diego BayKeeper pursues compliance efforts and remediation.

WHEREAS Plaintiff Kenneth J. Moser is the Executive Director of the San Diego BayKeeper, and he is officially known as the "BayKeeper." In this role, Plaintiff Moser regularly patrols and surveys the San Diego Bay and surrounding waters to monitor potential pollution problems. Plaintiff Moser regularly works and recreates in and around the receiving waters, including conducting sampling of local waters and educational activities aboard the BayKeeper boat, as well as fishing, scuba diving, swimming, and surfing.

NOW, THEREFORE, before the taking of any testimony, upon the pleadings, without adjudication or admission of any issue of fact or law except as provided in Section I, below, and upon consent and agreement of the parties, it is hereby ORDERED, DECREED, and ADJUDGED as follows:

I. JURISDICTION AND VENUE

1.1. This Court has jurisdiction over the subject matter of this consolidated action pursuant to sections 309(b) and 505(a)(1)(A) of the Act, 33 U.S.C. §§ 1319(b), 1365(a)(1)(A), and 28 U.S.C. §§ 1331, 1345 and 1355.

1.2. Venue is appropriate in this District pursuant to section 309(b) of the Act, 33 U.S.C. § 1319(b), and 28 U.S.C. §§ 1391 and 1395, because the violations alleged in this Complaint occurred at sources of pollution owned or operated by Caltrans which are located in this District.

1.3. Authority to bring this action is vested in the United States Department of Justice pursuant to 28 U.S.C. §§ 516 and 519 and

section 506 of the Act, 33 U.S.C. § 1366.

1.4. Authority to bring this action is vested in the Citizen Plaintiffs pursuant to section 505 of the Act, 33 U.S.C. § 1365.

1.5. Notice of the commencement of this action has been given to the State of California in accordance with section 309(b) of the Act, 33 U.S.C. § 1319(b).

II. APPLICABILITY

2.1. The provisions of this Consent Decree, after entry, shall apply to and be binding upon the United States, the Citizen Plaintiffs, and Caltrans, its officers, managers, directors, agents, trustees, employees, successors and assigns. The signatory for Caltrans represents that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to bind Caltrans legally. Before retaining any contractor or other person to perform any activity subject to or required after entry of this Consent Decree, Caltrans shall provide a copy of this Consent Decree to such contractor.

2.2. Defendant hereby agrees not to oppose entry of this Consent Decree by this Court or to challenge the validity of any provision of this Consent Decree.

III. DEFINITIONS

3.1. Unless otherwise defined herein, terms used in this Decree shall have the meaning given to those terms in the Clean Water Act, 33 U.S.C. § 1251 et seq., and the regulations promulgated thereunder at 40 C.F.R. Part 122.

a. "Caltrans" or "Defendant" means California

Department of Transportation, a department within the Business, Transportation and Housing Agency, an agency of the State of California;

b. "Caltrans' Maintenance Manual" or "Maintenance Manual" means California Department of Transportation Headquarters' Maintenance Storm Water Pollution Prevention Program, Highway Maintenance Manual (1996) prescribing policies, procedures and practices for maintaining Caltrans' facilities.

c. "Citizen Plaintiffs" means the Natural Resources Defense Counsel, San Diego BayKeeper, and Kenneth J. Moser.

d. "Citizen Plaintiff's Designated Representative" means the person selected by the Citizen Plaintiffs to receive all data, documents, and notices as provided in Section XVIII of this Consent Decree;

e. "Construction Activities" means the activities specified in 40 C.F.R. § 122.26(b)(14)(x).

f. "Defendant's Designated Representative" means the person selected by the Defendant to receive all data, documents, and notices as provided in Section XVIII of this Consent Decree;

g. "District 11" means that portion of the California Department of Transportation designated as "District 11" which falls within the County of San Diego.

h. "Facility Pollution Prevention Plan" or "FPPP" means the facility specific storm water compliance management plan developed based on the model FPPP as submitted to the Plaintiffs on August 15, 1997.

i. "Fiscal year" means Caltrans' fiscal year, which

runs from July 1 through June 30.

j. The "General Construction Permit" means the General Construction Activity Storm Water Permit No. CAS000002 issued by the California State Water Resources Control Board on September 8, 1992 and any reissuance of that permit in effect on the date in question.

k. "Handbook(s)" means the California Department of Transportation Headquarters issued handbooks prescribing policies, procedures and practices, including measures for managing storm water pollution, and specifically including: "Caltrans Storm Water Quality Handbooks, Construction Contractors' Guide and Specifications" (May 10, 1996); "Caltrans Storm Water Quality Handbooks, Construction Staff Guide"(May 10, 1996); and "Caltrans Storm Water Quality Handbooks, Planning and Design Staff Guide" (May 10, 1996).

l. "Municipal Activities" means those Caltrans' activities associated with owning and operating a public roadway system which are subject to the requirements of sections 402(p)(2)(C) and 402(p)(2)(D), 33 U.S.C. § 1342(p)(2)(C) and (D), including roads with drainage systems, catch basins, curbs, gutters, ditches, manmade channels or storm drains and which meet the definition in 40 C.F.R. § 122.26(b)(8).

m. "Non-Stormwater" means any water that is not included in the definition of "storm water" as set forth in 40 C.F.R. § 122.26(b)(13).

n. "Plaintiffs" means the United States of America and the Citizen Plaintiffs;

o. "Rainy Season" means October 1 through April 30.

This definition shall not affect the meaning of "winter season" as defined in Caltrans' Handbooks.

p. "Regional MS4 Permit" means NPDES Permit No. CAS029998 issued by the California Regional Water Quality Control Board - San Diego Region on March 12, 1997 as Order No. 97-08 or any reissuance of that permit.

q. "Standard Special Provisions" or "SSP" means the California Department of Transportation Headquarters issued specifications that are then applied to a particular Contract.

r. "Storm Water Pollution Prevention Plan" or "SWPPP" means a plan which meets the requirements set forth in Section A of the General Construction Permit.

s. "Water Pollution Control Program" or "WPCP" means the water quality management program required under California Department of Transportation Standard Specification section 7-1.01G.

t. "United States' Designated Representative" means the person selected by the United States to receive all data, documents, and notices as provided in Section XVIII of this Consent Decree;

u. "U. S. EPA" means the United States Environmental Protection Agency.

IV. STANDARD OF COMPLIANCE

4.1. In complying with the terms and conditions of this Consent Decree, Caltrans shall comply fully with the standards of compliance mandated by the Clean Water Act and applicable regulations. For its municipal activities, consistent with Section 402(p) of the Act, Caltrans shall develop and implement controls to

reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and systems, and design and engineering methods. For its construction activities, Caltrans shall meet all the applicable provisions of Sections 301 and 402(p) of the Act, including controls to reduce pollutants using Best Available Technology Economically Achievable for toxic pollutants and Best Conventional Pollutant Control Technology for conventional pollutants.

V. APPROVAL PROCEDURES

5.1. For any program or plan required by this Consent Decree to be submitted to the Plaintiffs for approval, the following procedures shall apply.

5.2. Caltrans shall submit the program or plan to the Plaintiffs' designated representatives so that it is received on or before the date required. The Plaintiffs shall review the program or plan and submit to Caltrans in writing either an approval or detailed comments explaining the reasons why they do not approve of the program or plan. Caltrans shall have thirty (30) days from the issuance of any written comments to submit a revised program or plan which fully addresses and responds to the Plaintiffs' comments unless a longer time period is agreed upon by all parties. Any failure to respond to each of the Plaintiffs' comments shall be a violation of this Consent Decree. The procedures in this paragraph shall also apply to any revised program or plan.

5.3. Upon approval by U.S. EPA and the Citizen Plaintiffs, Caltrans shall immediately implement the program or plan according to applicable schedules contained within the program or plan. Without

limitation, any violation of the approved program or plan or any violation of a deadline for submission(s) to the Plaintiffs shall constitute a violation of this Consent Decree.

VI. COMPLIANCE PROGRAM

A. SHORT TERM MEASURES

1. CONSTRUCTION ACTIVITIES

6.1. Caltrans shall immediately and completely comply with all requirements of the General Construction Permit for all applicable construction projects in San Diego County.

6.2. On all construction projects for which Caltrans publishes a notice of opportunity to bid after February 28, 1997, Caltrans shall immediately and completely include in all such contracts Standard Special Provisions 7.34 (Water Pollution Control Program (WPCP)) and 7.34.5 (Storm Water Pollution Prevention Plan (SWPPP)), dated May 14, 1996, as appropriate. Caltrans shall also take all reasonable and necessary steps to enforce compliance with these provisions. Caltrans may substitute updated or revised versions of the documents referenced in this paragraph upon written approval of the plaintiffs. Plaintiffs may not withhold their approval of such substitution(s) if the revised versions are equally or more protective of water quality and stormwater quality as the previously approved versions. Plaintiffs shall respond to any request for approval of substitution of documents within thirty (30) days of receipt of a written request for such approval, unless additional time is required to review the request, based on the volume or complexity of the updates or revisions.

6.3. On all current and ongoing construction projects that

are subject to the General Construction Permit, Caltrans shall immediately and completely require compliance with Paragraphs 30 through 32 of SSP 7.34.5, whether or not such provisions have been included in the current contract for such construction projects.

6.4. Caltrans shall not grant any waivers of either WPCP or SWPPP requirements.

6.5. Caltrans shall immediately and completely implement the following handbooks:

- Caltrans Storm Water Quality Handbooks. Planning and Design Staff Guide, 1996;
- Caltrans Storm Water Quality Handbooks. Construction Contractors Guide and Specifications, 1996; and
- Caltrans Storm Water Quality Handbooks. Construction Staff Guide, 1996.

6.6. Caltrans shall ensure that adequate erosion and sediment control BMPs are implemented at all construction projects in San Diego County at the completion of construction activities to reduce the transport of sediment to waters of the United States during the interim period between the completion of construction activities and the initiation of final landscaping or erosion control planting activities in the project area.

6.7. Caltrans shall immediately provide training in the requirements of the General Construction Permit to all Resident Engineers, Assistant Resident Engineers, Field Inspectors, and Construction Senior Engineers who did not receive such storm water training in 1996.

2. MUNICIPAL ACTIVITIES

a. Maintenance Activities and Facilities

6.8. Caltrans shall immediately and completely implement and comply with the procedures and requirements of Caltrans Headquarters' Maintenance Storm Water Pollution Prevention Program, Highway Maintenance Manual, Volume 1, Chapter C6, 1996, except that Caltrans shall make BMP implementation mandatory.

6.9. Caltrans shall immediately and completely implement and comply with the procedures and requirements of Caltrans District 11's existing Best Management Practices ("BMPs") for the Coronado Bridge Paint Operations, except that Caltrans shall make BMP implementation mandatory.

6.10. Caltrans shall immediately make available to the Plaintiffs all "as built" plans depicting all of Caltrans' existing drainage system within San Diego County, as well as an electronic tabular listing of all existing drainage system inlets.

6.11. Caltrans shall inspect all drainage system inlets that have not yet been inspected this fiscal year, and clean such drainage system inlets, as appropriate, according to Caltrans' current policies and specifications. Inspection and appropriate cleaning shall be performed on all drainage system inlets within all Caltrans rights-of-way in San Diego County.

b. Other Caltrans Right-of-Way Facilities (Park'n'ride, rest areas, leased areas, etc.)

6.12. Caltrans shall conduct an inventory of uses of leased spaces within all of its rights-of-way within San Diego County, and produce such inventory to the Plaintiffs. The inventory

shall, at a minimum, indicate the use of each leased parcel by primary Standard Industrial Classification ("SIC") code.

6.13. Caltrans shall inspect all leased spaces within all of its rights-of-way within San Diego County for illicit connection to its storm drainage system, including without limitation any connection that conveys an illicit discharge, as defined in 40 C.F.R. § 122.26(b)(2).

c. Monitoring

6.14. Caltrans shall immediately implement the following monitoring program:

- Sampling stations shall be established for the purpose of collecting storm water;
- two sampling stations shall be established so that the collected samples consist primarily of roadway runoff; and
- one sampling station shall be established so that the collected samples consist primarily of maintenance facility runoff.

Caltrans shall also implement Caltrans District 11 Roadway and Maintenance Facillities Storm Water Runoff Sampling Plan, dated July 1997.

6.15. In all cases, cross drains or culverts are not acceptable sampling locations unless the sampling station is installed so that the sample is collected before it reaches the cross drain or culvert.

6.16. A report shall be submitted to the Plaintiffs identifying the locations of the sampling stations that will be used for storm water monitoring and proposed methodologies for collecting samples of storm water runoff.

6.17. Storm water samples shall be collected at the sampling stations for at least two storm events in the fourth quarter of 1997 that are a minimum of 30 days apart. All samples shall be collected such that they will be representative of the discharge resulting from a storm event in which rainfall exceeds 0.1 inch and is at least 72 hours after any storm event with precipitation greater than 0.1 inch.

6.18. Automatic storm water samplers may be used to collect the samples provided that the samples are chilled in the field and are retrieved within 24 hours of the storm event.

6.19. Samples collected shall be analyzed for all the constituents listed in Table II (organic pollutants) and Table III (toxic metals, cyanide, and total phenols) of Appendix D of 40 C.F.R. § 122, and for the following constituents:

Total Suspended Solids (TSS)
Total Dissolved Solids (TDS)
Chemical Oxygen Demand (COD)
Biochemical Oxygen Demand (BOD)
Oil and Grease
Hydrogen Ion (pH)
Total Kjeldahl Nitrogen
Nitrate
Nitrite
Total Ammonia
Organic Nitrogen
Dissolved Phosphorus
Total Phosphorus

Chronic Toxicity

Acute Toxicity

6.20. For the above-referenced chronic toxicity testing, the following bioassay tests shall be performed: Fathead Minnow, Pimephales promelas, Larval Survival and Growth Test, Method 1000.0; and Daphnid, Ceriodaphnia dubia, Survival and Reproduction Test, Method 1002.0. These test methods are set out in U.S. EPA's Short term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Third Edition, EPA-600-4-91-002, July 1994. The procedures set out in the above-referenced document shall be followed except as provided below:

- All test water renewals required in conducting the bioassay tests shall be of storm water;
- Standard synthetic dilution water shall be used for dilution. The sensitivity of the test organism to a reference toxicant shall be determined concurrently with each bioassay and reported with the test results.
- Chronic toxicity shall be expressed and reported as toxic units (tu_c) where:

$$TU_c = 100/NOEL$$

and the No Observed Effect Level (NOEL) is expressed as the maximum percent effluent of test water that causes no observed effect on a test organism, as determined in a critical life stage toxicity test (indicated above).

- Acute toxicity shall be calculated from the results of the chronic toxicity test described above and shall be reported along with the results of each chronic test. Acute toxicity

shall be expressed as percent survival of test organism over a ninety-six hour period.

6.21. The collection, preservation, holding times and analysis of all samples shall be in accordance with U.S. Environmental Protection Agency approved procedures (40 C.F.R. Part 136). All analyses shall be conducted by a laboratory certified by the State Department of Health Services to perform the required analyses.

B. LONG TERM MEASURES

1. Storm Water Management Plan.

6.22. By January 1, 1998, Caltrans shall submit to U.S. EPA and Citizen Plaintiffs for approval a Storm Water Management Plan ("Plan"), as set forth at 40 C.F.R. § 122.26(d)(2) and in this section of this Consent Decree. The Plan shall include or describe procedures for implementing the following:

a. Program Management Structure

6.23. Description of the program management structure in sufficient detail to provide assurances for full implementation of the Plan including defining the program administration, responsibilities, functions, relationships, and lines of communication among functional offices and branches for implementing the Plan.

b. Legal Authority

6.24. Demonstration of adequate legal authority for control of storm water discharges and non-storm water discharges including, but not limited to, the establishment, or ability to establish, interagency agreements, contractor compliance

requirements, and appropriate inspection and enforcement authority.

c. Policy Implementation Procedures

6.25. Procedures needed to resolve conflicts between implementation of storm water controls and current standard practices and policies.

d. Inspection Program

6.26. An inspection program to ensure actions are implemented and facilities are constructed, operated, and maintained in accordance with this Consent Decree and the Plan. This program shall include training for inspection personnel, documentation for field activities, a reporting system that can be used to track effectiveness of control measures, enforcement procedures (or referral for enforcement) for non-compliance, and responsibilities and responsible personnel of all affected functional offices and branches. The inspection program shall include, but not be limited to, incorporating and actively using the results of the monitoring program required pursuant to Subsection VI.B.11. of this Section and appropriate inspection procedures for construction sites, maintenance facilities, roadside drainage facilities, and new storm water quantity and control facilities.

e. Fiscal Resources

6.27. Existing and planned funding mechanisms necessary for implementation of the Plan including adequate resources and staff.

f. Program Evaluation

6.28. Development of a program evaluation protocol that ensures that Caltrans' practices and procedures comply with

applicable state water quality standards by implementing BMPs to reduce and eliminate water pollution. The criteria for such a protocol shall include, but not be limited to, the following:

- Incorporating and actively using the results of the monitoring program required pursuant to Subsection VI.B.11. of this Section;
- establishing and enforcing compliance with program standards and other benchmarks;
- auditing construction site and maintenance facility records;
- staffing and qualifications of Caltrans staff;
- inspection occasions relative to rainfall events (such as inspecting prior to and during rainstorms);
- control measures taken in response to expected rainfall events (such as covering piles at maintenance facilities);
- evaluating staff performance;
- meeting targets consistent with schedules;
- procedures for exigent circumstances (such as heavy rainfall or problem compliance areas);
- year-to-year progress toward reductions in environmentally harmful substances (such as pesticides and herbicides);
- training, training attendance, and the use of course evaluations; and
- reporting of stop-work orders, sanctions or similar efforts against Caltrans' contractors (such as orders against construction contractors).

g. Reporting Procedures

6.29. Annual reporting to Caltrans' management and

supervisors, consistent with Caltrans' plans and procedures, to ensure that Caltrans staff and administration, as well as other interested parties, are provided adequate opportunities to review Caltrans' progress.

h. Training

6.30. A regular training program for appropriate Caltrans staff, contractors and other relevant personnel as follows:

(1) Caltrans' Contractors: Caltrans will make 15-minute presentations at information sessions as part of pre-bid meetings and pre-construction meetings covering NPDES requirements related to the project. Caltrans will make available for purchase its Contractor's Stormwater Quality Handbook. Effective January 1, 1998, Caltrans shall require contractors to have their personnel trained on general stormwater pollution control requirements, consistent with the Contractor's Stormwater Quality Handbook. Caltrans shall provide, as state-furnished material, one or more instructional video presentations (to be developed). The term "personnel," as used in this subparagraph, shall mean all management and field staff whose work has a potential impact on storm water runoff.

(2) Caltrans' personnel: Caltrans will ensure that Caltrans Stormwater Quality Handbooks and other stormwater guidance materials will be made available to all personnel whose work has a potential impact on stormwater runoff. Caltrans shall provide training to all personnel whose work has a potential impact on stormwater runoff, consistent with the Caltrans Stormwater Quality Handbooks.

2. Maintenance Operations

6.31. On or before April 1, 1998, Caltrans shall submit for approval by U.S. EPA and Citizen Plaintiffs, a plan for management of storm water from all maintenance activities and maintenance facilities ("Maintenance Plan"), including without limitation a maintenance activities BMP Program, to reduce pollutants in storm water discharges from all maintenance activities to the maximum extent practicable. The Maintenance Plan shall apply to, among other appropriate facilities and properties, Caltrans owned rights-of-way, which include but are not limited to, freeways, highways, roads, bridges and their storm water drainage systems, park and ride parking lots, rest areas, and on/off ramps. The Maintenance Plan shall include the following elements:

a. Maintenance Activities

(1) Identification and Prioritization of Maintenance Activities

6.32. Identification of all maintenance activities conducted in Caltrans owned rights-of-way including, without limitation, cleaning, repair, and maintenance of:

- highways, freeways, roads, and ramps (sweeping, painting, debris, removal, pavement cutting or replacement, etc.);
- bridges, including without limitation the Coronado Bay Bridge (paint application and removal, etc.);
- drainage structures (inlets, catch basins, pump houses, storm drains, and channels); and
- parking lots and rest areas (sweeping, washing, etc.).

The description shall identify responsibilities and responsible

parties, current practices and policies, types of equipment used, and maintenance frequencies, and shall prioritize all maintenance activities based on their threat to water quality.

(2) BMPs Required for Maintenance Activities

6.33. Describe Best Management Practices that Caltrans will implement, and require its contractors to implement, during maintenance activities conducted on Caltrans owned rights-of-way.

b. Storm Drain Inlet, Catch Basin, Storm Drain, and Channel Maintenance

6.34. A program to inspect all drainage structures and prioritize maintenance on such structures based on the threat to water quality. The initial maintenance activities shall be completed no later than October 1, 1997. In addition, Caltrans shall remove all waste from those structures that pose a significant threat to water quality on an annual basis prior to October 1 of each year. Drainage structures include, but are not limited to, storm drain inlets, catch basins, pump houses, storm drains, and channels.

6.35. All waste removed from drainage structures shall be managed in accordance with all applicable laws and regulation, including California Code of Regulations, Title 23, Division 3, Chapter 15 (Chapter 15). In determining the structures that pose a significant threat to water quality, Caltrans may use as guidance the waste classification system in Chapter 15, Article 2.

6.36. In determining which structures pose a significant threat to water quality, Caltrans shall, at a minimum, consider the following criteria:

- quantity of waste accumulated;

- waste classification criteria (as set forth in Chapter 15, Article 2);
- hydraulic proximity to receiving water; and
- sensitivity of receiving water.

6.37. Caltrans shall perform an initial inspection of all storm drain inlets in the San Diego County portion of District 11 by October 1, 1997. As part of this inspection program, Caltrans shall visually estimate the amount of material, and shall directly measure the amount of material where necessary.

6.38. By November 30, 1997, Caltrans shall clean the 25 percent of storm drain inlets in the San Diego County portion of District 11 which are determined to be the highest priority unless the parties agree in writing that the date of passage of a state budget makes compliance with this paragraph impracticable, but in no case later than December 31, 1997. The highest priority inlets to be cleaned will be selected based on the following:

- quantity of waste accumulated;
- hydraulic proximity to receiving water; and
- sensitivity of receiving water.

6.39. Caltrans shall maintain a log of the locations of the drain inlets inspected, and of those cleaned.

c. Vegetation Control

6.40. A Vegetation Enhancement and Maintenance Activities Plan containing the following:

- Vegetation Enhancement- A program to enhance the use of vegetation throughout all Caltrans rights-of ways for the purpose of preventing erosion and removing pollutants in storm

water and non-storm water runoff.

- Chemical Use Reduction- A description of best management practices to eliminate pollutant discharges associated with vegetation maintenance to the maximum extent practicable. The program shall address methods to eliminate or minimize the use of chemicals, such as herbicides, pesticides and fertilizers. Logs of all chemicals applied shall be maintained and shall list the chemical name, the reason for application, the amount of chemical applied, the specific areas where the chemicals were applied, and the dates of application. A summary of the logs shall be submitted to U.S. EPA and Citizen Plaintiffs along with other required annual reports. The program shall discuss aquatic toxicity data of all herbicides applied by Caltrans and shall include a description of how the herbicides are managed and applied to prevent toxicity of storm water discharges and receiving waters.

d. Sediment Source Control

6.41. Caltrans shall address erosion control and soil stabilization in the San Diego County portion of District 11, as follows:

- Caltrans shall conduct a survey to identify "widely understood problem areas," together with landslide areas that cannot feasiblely be remediated by means of surficial soil stabilization techniques.
- By April 1, 1998, Caltrans shall develop cost estimates and priorities to remediate identified "widely understood problem areas." Caltrans shall develop and implement a program to

accomplish the identified remediation actions. For the purposes of this paragraph, "widely understood problem areas" shall be determined through a survey of maintenance personnel throughout District 11. This survey will consist of a questionnaire in which the maintenance personnel shall be asked to identify from their experience the approximate boundaries of locations from which noticeable soil loss to the storm drainage system occurs. Where practicable, the identified erosion locations will be correlated with the drain inlets involved and prioritized, in conjunction with other appropriate factors, according to the observed amounts of solids that contribute to the inlets. The survey will also collect information from Caltrans' staff concerning seasonal variation in vegetation in right-of-way areas subject to erosion in order to distinguish locations that remain bare throughout the year from those that lose cover in the dry season but gain it back in winter.

e. Maintenance Facilities

6.42. A Maintenance Facilities BMP Program. This Program shall contain the following:

- Identification of Maintenance Facilities- Identity of all Caltrans maintenance facilities including, but not limited to, vehicle and equipment storage and maintenance yards and shops. The description shall identify responsibilities and responsible parties, types of activities conducted, current practices and policies, types of equipment used, and maintenance frequencies.
- Prioritization of Maintenance Facilities- Prioritization of all maintenance facilities based on their threat to water quality.
- Implementation of Facility Pollution Prevention Plan for

Maintenance Facilities- Development and implementation of a Facility Pollution Prevention Plan (FPPP) that applies to all Caltrans maintenance facilities in the San Diego Region. For each individual maintenance facility, the FPPP shall identify site-specific activities and corresponding BMPs. The FPPP must address the contact of rainfall and run-on with areas of fueling; vehicle maintenance; vehicle cleaning; materials storage and handling; waste storage and handling, including locations where road maintenance wastes are unloaded and stored; and truck parking.

6.43. Caltrans shall submit the proposed FPPP to U.S. EPA and Citizen Plaintiffs by August 15, 1997.

6.44. Caltrans shall audit its maintenance facilities annually to ensure compliance with the FPPP and shall by October 1 of each year report the results of this audit to U.S. EPA and Citizen Plaintiffs. At facilities at which the FPPP indicates that BMPs are not being implemented, Caltrans shall develop a compliance schedule.

3. Construction Activities

6.45. By April 1, 1998, Caltrans shall submit to U.S. EPA and Citizen Plaintiffs for approval, a plan for management of storm water from construction projects in San Diego county. The plan shall include a method to rank construction projects and construction activities based on their potential to adversely affect receiving water quality. The presumptive MEP standard for such program shall be the Caltrans Storm Water Quality Handbooks, Construction Guide and Specifications and Caltrans Storm Water Quality Handbooks, Construction Staff Guide prepared by Camp, Dresser & McKee, et al.

(May 10, 1996). Should it choose to develop and implement a different construction management program, Caltrans shall have the burden of establishing that its preferred program satisfies this MEP Standard. However, for construction activities which fall within the definition of industrial activity as set forth at 40 C.F.R. §122.26(b)(14)(x), all the requirements of section 301 of the Clean Water Act must be met, 33 U.S.C. § 1342(p)(3)(A), in addition to the MEP standard for the construction activities program developed for the municipal activities, 33 U.S.C. §1342(p)(4)(B)(iii). The plan shall include or describe procedures for implementing the following:

a. Compliance with the General Construction Permit

6.46. Compliance with the terms and conditions of the General Construction Permit and procedures for ensuring compliance with the terms and conditions of the General Construction Permit by all Caltrans' contractors, including appropriate enforcement mechanisms, including without limitation stop work orders, withholding payment, and other enforcement mechanisms identified in Caltrans' SSPs;

b. List of Construction Projects

6.47. An updated Caltrans construction status report shall be submitted to U.S. EPA and Citizen Plaintiffs monthly. The report shall identify each project by name and shall include the area of disturbed land, project location, expected startup and completion dates, responsible Resident Engineer, and contractor(s).

c. Inspections

6.48. Caltrans Internal Review Teams shall make unannounced visits to construction sites in San Diego County

beginning March 6, 1997. Such teams shall inspect each and every construction project subject to the General Construction Permit at least once during each annual rainy season. If such teams or other Caltrans personnel or contractors identify a violation of the requirements of the General Construction Permit at a construction project, the Review Team shall notify U.S. EPA and Citizen Plaintiffs, the Caltrans resident engineer and other appropriate Caltrans' employees. Caltrans shall take appropriate action to correct the identified violation. The Review Team shall make bimonthly status reports available to U.S. EPA and Citizen Plaintiffs noting compliance review findings and actions taken by Caltrans or its contractors in response to such findings on all major active construction projects in the District and identify any and all contractors who are not in compliance with the Act, its implementing regulations, or this Consent Decree. Caltrans will offer bimonthly briefing sessions to U.S. EPA and Citizen Plaintiffs.

d. Project Completion

6.49. Procedures to ensure that, at the completion of construction activity on projects in San Diego County, adequate erosion and sediment control BMPs are implemented to reduce the transport of sediment to waters of the United States during the interim period between the completion of construction activities and the establishment of final landscaping in the project area.

e. Environmentally Sensitive Resources

6.50. For any construction project where construction activities may affect Water-Related Environmentally Sensitive Resources, appropriate Best Management Practices to be employed in the construction activities shall be clearly set forth in the project specifications and reflected in the WPCP or SWPPP required of the contractor. For the purposes of this subsection, water-related environmentally sensitive resources means any construction project which has, or will require, a permit from either the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and/or the California Department of Fish and Game because of potential impacts related to water resources.

4. Planning, Design, and Operations

6.51. On or before April 1, 1998, Caltrans shall submit a Planning, Design, and Operations plan to U.S. EPA and the Citizen Plaintiffs for approval which shall set forth procedures for management of storm water from all new and reconstructed facilities. Such plan shall include implementation of an appropriate selection of structural and non-structural post-construction control measures to reduce, to the Maximum Extent Practicable, the total suspended solid and other pollutant loadings from the facilities once construction is completed. The presumptive MEP standard for such program shall be the Caltrans Storm Water Quality Handbooks, Planning and Design Staff Guide prepared by Camp, Dresser & McKee, et al. (May 10, 1996). Should it choose to develop and implement a different control measures program, Caltrans shall have the burden of establishing that its preferred program satisfies the MEP standard. Such plan shall

include or describe procedures for implementing the following:

a. List of Control Measures

6.52. A listing of appropriate control measures, including design, operation, and maintenance specifications, referenced by facility type, location, and other suitable factors. Suitable factors may include prevention and control of erosion and sedimentation, source control of potential pollutants, control and treatment of runoff, spill containment, and protection of wetlands and water quality resources.

b. Operation & Maintenance Program

6.53. An effective operation and maintenance program for permanent control measures.

c. Design Considerations

6.54. Consideration of pollution prevention and pollutant removal factors, including spill containment, and corresponding operation and maintenance requirements in the design of facility drainage structures and other features.

d. Upgrade Considerations

6.55. Consideration of pollution prevention and removal of pollutants in storm water discharges in determining the benefit cost of upgrading hydraulically inadequate facilities and other facilities which provide inadequate or no pollution prevention and pollutant removal benefit.

e. Landscape Design

6.56. Development and implementation of policies, programs, procedures, and standards to improve pollutant removal and water quality benefits of landscape design after construction is

completed.

f. Management of Control Measures

6.57. A description of how these control measures will be developed, constructed, and maintained by the Environmental Engineering, Project Development, Construction, and Maintenance and other affected functional offices and branches.

g. Highway Operations

6.58. By January 1, 1998, Caltrans shall submit a plan for approval by U.S. EPA and Citizen Plaintiffs which describes how reduction in pollutants in storm water discharges and improvements in storm water quality will be considered as part of highway operations and ongoing efforts to enhance traffic flow and to eliminate or reduce traffic congestion.

5. Retrofitting Program

6.59. By April 1, 1998, Caltrans shall submit for approval a plan for a Retrofit Pilot Program designed to determine the appropriateness of retrofitting at Caltrans' existing facilities and rights-of-way, which shall consist of the following:

- Before June 30, 1999, Caltrans shall complete construction of five (5) retrofit projects in a single watershed.
- These projects shall cost $2.5 million in aggregate construction costs, not including study costs or the costs of selecting the projects.
- Caltrans shall conduct both baseline and post-construction studies to assess the effectiveness and appropriateness of the retrofit projects.
- Caltrans shall make available to U.S. EPA and Citizen Plaintiffs

all information, data, and studies relating to its retrofit program, including without limitation any information, data, or studies which form the basis of its choice of programs.

- Caltrans shall allow U.S. EPA and Citizen Plaintiffs to participate in the selection of the projects, the methods of conducting any studies associated with its retrofit pilot program, and in the studies themselves.

In implementing the Retrofit Pilot Program, Caltrans shall fully and successfully complete construction and post-construction monitoring of each project set forth in the Program, regardless of any cost overruns, contractor disputes, or inaccurate cost estimates.

6.60. The Retrofit Pilot Program shall be designed and implemented with the purpose of determining whether and to what extent it is appropriate for Caltrans to implement structural BMPs (including without limitation, catch basins, vaults, extended-detention ponds, infiltration facilities, constructed wetlands, biofiltration (vegetated swales and surfaces), media filters, and oil/water separators) at all existing rights-of-way. Appropriateness shall be determined by considering the following criteria:

- hydraulic proximity to sensitive waters,
- potential for improvements in water quality, including without limitation water quantity effects,
- technical feasibility;
- integration with other scheduled activities; and
- cost reasonableness.

6.61. Within one year of completion of the minimum projects required under this subsection, and based upon information

derived from the retrofit pilot program and studies, Caltrans shall submit to the California State Water Resources Control Board or the Regional Water Quality Control Board, San Diego Region, whichever oversees Caltrans District 11's current stormwater permit (the "Permitting Board"), a request for modification of its stormwater permit, which shall contain a plan to address further retrofitting if "appropriate," as defined above. If the Permitting Board does consider Caltrans' permit modification to be a "minor modification," as defined in 40 C.F.R. Section 122.63, or if the Permitting Board fails to make a final decision regarding Caltrans' request for permit modification within ninety (90) days of Caltans' request, then the Court shall entertain a motion by the Plaintiff(s) for modification of this section of the Consent Decree to include a program for further retrofitting. If, however, the Permitting Board does not consider Caltrans' permit modification to be a "minor modification" and makes its final decision regarding Caltrans' request for modification within ninety (90) days of Caltrans' request, then the Parties agree not to seek modification of this section of the Consent Decree to require further retrofitting than is required by such permit modification.

6.62. For the purposes of this subsection, "Project" means an activity undertaken to implement structural and nonstructural controls at existing Caltrans rights-of-way and facilities in order to remove pollutants and otherwise improve the quality of storm water runoff.

6.63. Nothing in this subsection shall affect the requirements of any relevant permit for Caltrans to implement

structural and non-structural BMPs.

6. Non-Storm Water Discharges

6.64. Upon entry of this Consent Decree, Caltrans shall prohibit (through its contracting procedures, permitting authority, authority to prohibit and remove nuisances, and in concert with state and local regulatory authorities) non-storm water discharges into its storm water conveyance systems unless such discharges are either:

- authorized by a separate NPDES permit; or
- not prohibited in accordance with the following:

a. Lower Threat Discharges

6.65. Caltrans may, but need not, prohibit any non-storm water discharge or class of non-storm water discharges listed below from entering its storm water conveyance system, unless the discharge or discharge class is a source of pollutants to waters of the United States:

- diverted stream flows;
- uncontaminated ground water infiltration [as defined at 40 C.F.R. 35.2005(20)] to storm water conveyance systems;
- uncontaminated pumped ground water;
- rising ground water;
- foundation drains;
- water from crawl space pumps;
- footing drains;
- springs; and
- flows from riparian habitats and wetlands.

When a discharge or discharge class listed above is identified as a source of pollutants, Caltrans may either:

- prohibit the discharge or discharge class from entering its storm water conveyance system entirely; or
- elect not to prohibit the discharge or discharge class if Caltrans implements BMPs that reduce pollutants in the discharge to the maximum extent practicable.

b. Higher Threat Discharges

6.66. Caltrans may, but need not, prohibit any non-storm water discharge or class of non-storm water discharges listed below from entering its storm water conveyance system, unless the discharge or discharge class is a source of pollutants to waters of the United States:

- water line flushing;
- landscape irrigation (road medians/landscaped rights-of-way, etc.);
- discharges from potable water sources;
- air conditioner condensate;
- irrigation water;
- lawn watering; and
- street wash water.

When a discharge or discharge class listed above is identified as a source of pollutants, Caltrans may either:

- prohibit the discharge or discharge class from entering its storm water conveyance system entirely; or
- elect not to prohibit the discharge or discharge class if Caltrans implements BMPs that will reduce pollutants in the discharge to the maximum extent practicable.

For each higher threat discharge or discharge class that Caltrans

elects not to prohibit, Caltrans shall submit the information described below to the satisfaction of U.S. EPA and Citizen Plaintiffs:

- a description of the non-storm water discharge class listed above which Caltrans elects not to prohibit; and
- a description of the BMP(s) for each discharge class listed above which Caltrans will require, to prevent or reduce pollutants to the maximum extent practicable.

Caltrans shall examine all dry weather field screening results for the presence of elevated levels of pollutants which may be the result of one or more classes of non-prohibited non-storm water discharge(s) identified in this Paragraph (e.g., chlorine or surfactants). If such elevated levels of pollutants are commonly present, Caltrans shall conduct a follow-up investigation to identify the source of the elevated pollutants.

6.67. Where it is determined that elevated levels of pollutants are the result of one or more classes of nonprohibited non-storm water discharges (identified in Non-Storm Water Discharge Prohibition, Paragraph 6.66. above, Caltrans shall re-examine and change or augment the existing BMPs implemented for that particular class(es) of nonprohibited non-storm water discharge. Caltrans shall report such determination and the modified BMPs to the U.S. EPA and Citizen Plaintiffs in its next annual report. Caltrans shall periodically evaluate the effectiveness of the modified BMPs by examining dry weather field screening results and shall take any further action necessary to reduce such pollutant concentrations.

6.68. If necessary, Caltrans shall, on a case by case

basis, prohibit any individual, or class, of non-storm water discharge(s) listed in Non-Storm Water Discharge Prohibition, Paragraph 6.66., above, that is determined by Caltrans to be a significant source of pollutants to waters of the United States.

6.69. Discharges or flows from fire fighting activities shall be prohibited only when such flows are identified by Caltrans to be significant sources of pollutants to waters of the United States. It is not the intention of the U.S. EPA and Citizen Plaintiffs for Caltrans to prohibit, under any circumstances, the protection of life and public or private property through the use of water or other fire retardants that flow into storm water conveyance systems. However, there may be instances when specified best management practices are appropriate for fire fighting flows, such as controlled blazes.

7. Illicit Connection and Illegal Discharge Detection

6.70. Caltrans shall by May 1, 1998, in conjunction with its legal authority, implement the Illicit Connection and Illegal Discharge ("IC/ID") Detection Program described below:

- Detection of IC/IDs- Caltrans shall develop and submit for U.S. EPA and Citizen Plaintiffs approval by July 1, 1997 procedures for the detection and reporting of IC/IDs by (1) Caltrans field personnel; (2) dry weather field screening results; (3) follow-up on public complaints; and (4) other means.
- Follow up investigation of each IC/ID- Caltrans shall develop procedures to conduct follow-up investigations of every IC/ID to identify its source. These procedures may include further field screening (observations and field analyses), collection and

laboratory analysis of samples (upstream and downstream), smoke or dye tests, video taping with a remote control camera, or other appropriate means. The IC/ID follow-up investigation procedures shall acknowledge that investigations will also be conducted when elevated levels of pollutants which may result from "nonprohibited non-storm water discharges" are detected.

- Elimination of IC/IDs- Caltrans shall eliminate all identified IC/IDs as expeditiously as possible.
- Accidental Discharges- Caltrans shall develop and implement mechanisms for responding to accidental discharges including identifying responsible parties for initiating immediate cleanup actions, establishing cleanup procedures, notifying appropriate agencies, training employees to identify and react to accidental discharge situations, ensuring that properly credentialed contractors are hired for cleanup, and establishing procedures for monitoring, record management, and reports;
- Other Discharges- Caltrans shall develop and implement a program for identification and description of other discharges associated with maintenance activities, maintenance facilities, or construction activities, including vehicle and equipment washwater discharges and discharges associated with waste disposal, discharges associated with cutting (saw-cut slurry), repair, and replacement of paved surfaces, and an implementation schedule for their elimination and prevention or effective management.

8. Lessee Activities

6.71. By January 1, 1998, Caltrans shall submit a plan for

approval by U.S. EPA and Citizen Plaintiffs for management of storm water from activities on property leased within Caltrans-owned rights-of-way. This plan shall include, at a minimum, a description of structural and source control measures to reduce pollutants from runoff from commercial areas that discharge to the Caltrans-owned storm drainage system. This paragraph shall not require Caltrans to develop site-specific plans.

9. Local Agencies

6.72. By January 1, 1998, Caltrans shall submit a plan for approval by U.S. EPA and Citizen Plaintiffs which establishes a program of communication, coordination, cooperation, and collaboration of Caltrans' storm water management and other pertinent activities with municipal storm water management programs, including establishment of agreements or policies with municipalities, flood control departments, or districts as necessary or appropriate.

10. Public Information

6.73. By April 1, 1998, Caltrans shall develop and implement a Public Information Program that provides for education of the general public, Caltrans' employees and contractors, and commercial and industrial entities whose actions may impair storm water quality discharged from Caltrans rights-of-way and facilities. Such program shall address, among other areas of information, prevention of illegal discharges and the water quality benefits of minimizing or reducing traffic congestion through increased use of high occupancy vehicle lanes and alternative modes of transportation.

11. Monitoring Program

6.74. By August 15, 1997, Caltrans shall submit to U.S.

EPA and Citizen Plaintiffs for approval a monitoring program plan to assess the effectiveness of its Storm Water Management Plan. Such program shall, without limitation, achieve the following objectives:

- Characterization of storm water discharges, including pollutant concentrations and mass loadings, from locations representative of Caltrans-owned rights-of-way and facilities within the County;
- Evaluation of effectiveness of construction erosion control BMPs;
- Evaluation of effectiveness of permanent control BMPs;
- Evaluation of effectiveness of maintenance activities BMPs;
- Evaluation of effectiveness of maintenance Facility Pollution Prevention Plans; and
- Evaluation of effectiveness of highway operation control measures.

The monitoring program plan shall identify and justify sampling locations, frequencies, and methods, the suite of pollutants to be analyzed, analytical methods to be used, and quality assurance procedures. The monitoring program and its results shall be incorporated into the inspection program and program evaluation protocol required pursuant to Paragraphs 6.26 and 6.28 (Subsections d. and f. of Subsection VI.B.1), above, respectively.

12. Annual Reports

6.75. Caltrans shall submit an Annual Program Report to U.S. EPA and Citizen Plaintiffs by April 1 of each year, beginning April 1, 1998. The report shall include a detailed discussion on the implementation of Caltrans' Storm Water and Non-storm Water

Management Program. The annual report shall provide an overall evaluation of the Program and set forth plans and schedule of implementation for the upcoming year. The annual report may also include proposed modifications or revisions to the Program. The report shall, at a minimum, address the following:

(a) Nonprohibited Non-Storm Water Discharges

6.76. Each nonprohibited class of non-storm water discharges in Paragraph 6.66., above, containing the following information:

- identification of the non-storm water discharge class(es);
- identification of the BMPs which have been, or will be, implemented to prevent or reduce pollutant discharges from the Nonprohibited class of non-storm water discharges; and
- a summary describing the number and nature of enforcement actions, inspections, and public education related to these non-storm water discharge classes.

(b) Legal Authority

6.77. Provide confirmation of continuing adequate legal authority.

(c) Illicit Connection/Illegal Discharge Detection Program

6.78. Report on all IC/ID detection activities including the number of IC/IDs detected and reported by Caltrans staff, contractors, the public, dry weather field screening or other means. Field screening data shall include a frequency distribution of data to identify stations at which elevated levels of pollutants are consistently found. Report on all IC/ID elimination activities

describing number of IC/IDs eliminated and the number of enforcement actions taken.

(d) Best Management Practices Program

6.79. Provide a status report on the implementation of each of the following BMP programs:

- BMP Program — Maintenance Activities;
- BMP Program —Storm drain Inlet, Catch Basin, Storm Drain, and Channel Maintenance;
- BMP Program — Maintenance Facilities;
- BMP Program — Planning Design and Operations
- BMP Program -- Construction Activities.

(e) Education and Training

6.80. Provide a status report on the implementation of the education component and training component.

(f) Assessment of Management Program Effectiveness

6.81. Using direct and indirect or other measures selected as long term indicators of management program effectiveness, provide an assessment of overall program effectiveness occurring during the past year, attributable to implementation of the Storm Water and Non-storm Water Management Program. Provide a summary describing the number and nature of enforcement actions, inspections, public education programs, and identification of water quality improvements or degradation.

(g) Fiscal Analysis

6.82. Update the projected fiscal analysis required in this Consent Decree, if necessary. Documentation should be submitted demonstrating that sufficient financial resources have been

appropriated for the upcoming fiscal year to implement the conditions of this Consent Decree. Also include a description of the annual expenditures for the previous fiscal year.

VII. COMPLIANCE REPORTING

7.1. Caltrans shall submit compliance status reports to Plaintiffs as follows:

7.2. For the first two full calendar years after entry of this Decree Caltrans shall submit reports on a quarterly basis, with reports on each quarter's activities due within 45 days of the end of the quarter.

7.3. After the first two full calendar years after entry of this Decree and until termination of the Consent Decree Caltrans shall submit reports on a semiannual basis, with reports due each August 15 and February 15, for the six month periods ending June 30 and December 31, respectively.

7.4. In all compliance status reports Caltrans shall discuss all efforts Caltrans has employed during the specified time period to comply with this Consent Decree and the status of those efforts, including at a minimum discussions of the following:

- Caltrans' efforts to comply with the following elements:
  - (1) the drain inlet cleaning program in Subsection VI.B.2.b. (Paragraphs 6.34-6.39);
  - (2) the retrofit pilot program in Subsection VI.B.5. (Paragraphs 6.59-6.63);
  - (3) the sediment source control program in Subsection VI.B.2.d. (Paragraph 6.41); and
  - (4) Caltrans employee and construction contractor training in

Subsection VI.B.1.h. (Paragraphs 6.29-6.31).

- Any noncompliance with the requirements regarding construction activities of either this Consent Decree or the applicable NPDES permit. This discussion shall, at a minimum, include:
  (1) identify each instance of noncompliance;
  (2) how Caltrans was made aware of each noncompliance;
  (3) what activities Caltrans has undertaken to correct each noncompliance, including the date by which the noncompliance was corrected; and
  (4) what activities Caltrans has taken to prevent a re-occurrence of each noncompliance.
- Any other noncompliance with requirements of either this Decree or the applicable NPDES permit. This discussion shall, at a minimum, include:
  (1) identify each instance of noncompliance;
  (2) how Caltrans was made aware of each noncompliance;
  (3) what activities Caltrans has undertaken to correct each noncompliance, including the date by which the noncompliance was corrected; and
  (4) what activities Caltrans has taken to prevent a re-occurrence of each noncompliance

VIII. DISPUTE RESOLUTION

8.1. The dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree, except that this Section shall not apply to any disputes arising under Section XIII. "Attorneys' Fees". However, the procedures set forth in this Section shall not

apply to actions by the Plaintiffs to enforce obligations of Defendant that have not been disputed in accordance with this Section.

8.2. Any dispute which arises under or with respect to this Consent Decree shall in the first instance be the subject of informal negotiations between the parties to the dispute. The period for informal negotiations shall not exceed twenty (20) days from the time the dispute arises, unless it is modified by written agreement of the parties to the dispute. The dispute shall be considered to have arisen when one party receives a written Notice of Dispute from the other.

8.3. In the event that the parties to the dispute cannot resolve a dispute by informal negotiations under the preceding paragraph, then the position advanced by the United States shall be considered binding unless, within ten (10) days after the conclusion of the informal negotiation period, Defendant or Citizen Plaintiffs invoke the formal dispute resolution procedures of this Section by serving on all parties a written Statement of Position on the matter in dispute, including, but not limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by the party invoking formal dispute resolution procedures.

8.4. Within fourteen (14) days after receipt of a written Statement of Position as required in Paragraph 8.3. above, the United States will serve on all parties its Statement of Position, including, but not limited to, any factual data, analysis, or opinion supporting that position and any supporting documentation.

8.5. Following receipt of all Statements of Position submitted pursuant to paragraph 8.4. above, the U.S. EPA-Region IX Water Division Director will issue a final decision resolving the dispute. The Water Division Director's decision shall be binding unless, within ten (10) days of receipt of the decision, Defendant or Citizen Plaintiffs files with the Court and serves on all parties a notice of judicial appeal setting forth the matter in dispute, the efforts made by the parties to resolve it, the relief requested, and the schedule, if any, within which the dispute must be resolved to ensure orderly implementation of the Consent Decree. The United States or other party may file a response to any such notice of judicial appeal. On appeal, the Court shall review the administrative record only. The Defendant or Citizen Plaintiffs shall have the burden of demonstrating that the decision by the Water Division Director is not in accordance with law. The Court shall give due deference to the decision of the Water Division Director and EPA, in accordance with Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc., 467 U.S. 837 (1984).

8.6. The invocation of dispute resolution procedures under this Section shall not extend, postpone or affect in any way any obligation of Defendant under this Consent Decree not directly in dispute, unless the United States and Citizen Plaintiffs agree otherwise. Any Stipulated Penalties with respect to the disputed matter which become due pursuant to Section XI. shall continue to accrue but payment shall be stayed pending resolution of the dispute as provided in paragraph 8.5. Notwithstanding the stay of payment, Stipulated Penalties shall accrue from the first day of noncompliance

with any applicable provision of this Consent Decree. In the event that Defendant does not prevail on a disputed issue, Stipulated Penalties shall be assessed and paid as provided in Section VIII (Stipulated Penalties).

IX. CIVIL PENALTIES

9.1. In settlement of the civil claims of the United States for the violations alleged in the complaint in this action, Defendant shall pay to the United States a civil penalty in the amount of $430,000 within thirty (30) days of entry of this Consent Decree. Payments shall be made by Electronic Funds Transfer ("EFT" or wire transfer) to the United States Department of Justice lock box bank, referencing DOJ #90-5-1-1-4364 and USAO File No. 96V0551. Payment shall be made in accordance with instructions provided by the United States to the Defendant upon entry of the Consent Decree. EFTs must be received at the U.S. DOJ lock box bank by 11:00 A.M. (eastern time) in order to be credited on that day. A copy of the transmittal notice shall be mailed to each party identified in Section XVIII (Notice and Submissions).

X. SUPPLEMENTAL ENVIRONMENTAL PROJECT

10.1. Caltrans shall implement the Supplemental Environmental Project ("SEP") set forth in Attachment A to this Consent Decree, which is hereby incorporated by reference, and the terms, conditions, requirements, and deadlines of Attachment A shall be binding on Caltrans as if set forth in the body of this Consent Decree.

10.2. If Caltrans determines that the SEP set forth in Attachment A will cost more than $380,000 and it so informs the

Plaintiffs in writing on or before November 24, 1997, it may elect to seek an alternative SEP. Caltrans shall have forty-five (45) days from the date it informs the Plaintiffs in writing of its intention to seek an alternative SEP to propose, in detail, such alternative SEP to the Plaintiffs. Any alternative SEP proposed by Caltrans shall comply fully with EPA's Interim Revised Supplemental Environmental Project Policy (May 3, 1995) and shall be intended to restore or replace wetland or riparian resources or habitat within San Diego County. If the Parties agree to an alternative SEP within sixty (60) days of the date Caltrans informs the Plaintiffs of its intention to seek an alternative SEP, this Consent Decree shall be modified to substitute an acceptably detailed workplan for such alternative SEP in substitution for Attachment A, and it shall be enforceable through this Consent Decree as Attachment A. Any substitute SEP shall cost Caltrans at least $380,000, or Caltrans shall pay stipulated penalties pursuant to Section XI. The decision of the Plaintiffs regarding approval of any alternative SEP under this Paragraph shall be final and shall not be subject to the Dispute Resolution procedures of Section VIII.

10.3. By March 31, 2002, Caltrans shall submit a Final SEP Report, including the total cost of implementing the SEP. EPA shall notify Caltrans in writing within 120 days of receipt of the Final SEP Report if the United States contends that any amount claimed by Caltrans is not an actual cost of the SEP such that the total cost to Caltrans of implementing the SEP is less than $380,000. If the cost to Caltrans of implementing the SEP is less than $380,000 (including any tax savings or deductions), EPA shall notify Caltrans in writing

within 120 days of the receipt of the Final SEP Report, and Caltrans shall pay stipulated penalties to the United States as set forth in Section XI.

10.4. Caltrans shall not reference the purchase, construction, or implementation of the SEP under this Consent Decree in any representation to the public, including but not limited to, advertisements or promotions, or any annual or quarterly report, without explicitly stating in any such representation to the public or report that it undertook the implementation of the SEP in response to an enforcement action brought by the Citizen Plaintiffs and the United States on behalf of EPA.

10.5. Caltrans hereby certifies that implementation of the SEP is not required under any state, local, or federal law or regulation; that the SEP is not being implemented pursuant to the terms of any other agreement to which Caltrans is a party; that Caltrans had not committed to implement the SEP prior to entering into this Consent Decree; and that Caltrans will not receive any reimbursement in any way from any person not a party to this Consent Decree for costs of implementing the SEP, except as set forth in Attachment A.

XI. STIPULATED PENALTIES

11.1. Caltrans shall pay Stipulated Penalties as follows:

a. If Caltrans fails to fully comply with any of the requirements of or deadlines for submission to the Plaintiffs of any reports, plans, data, or any other information required by this Consent Decree, or if such submissions are incomplete or fail to address any of the elements required by this Consent Decree,

including without limitation the following:

- Storm Water Management Plan,
- Maintenance Activities Plan,
- Maintenance Facilities BMP Program,
- Construction Activity Plan,
- Planning, Design, and Operations Plan,
- Retrofit Pilot Program Plan,
- Non-Stormwater Discharges Plan,
- Lessee Activities Plan,
- Local Agencies Plan,
- Public Information Program,
- Monitoring Program,
- Annual Compliance Reports,
- Compliance Status Reports, or
- SEP reports required in Section X or Attachment A

Caltrans shall pay a stipulated penalty of $2000 per day for each required submission that is past due or is incomplete until the complete submission is received by the Plaintiffs.

b. If Caltrans submits a Plan or Program to the Plaintiffs for approval as required by this Consent Decree which is not approved by the Plaintiffs and Caltrans fails to fully address and respond to Plaintiffs' comments in a timely manner, Caltrans shall pay a stipulated penalty of $2000 per day for each such failure to address and respond to Plaintiffs' comments in accordance with Section V. (Approval Procedures) above, until the properly responsive Plan or Program is received by the Plaintiffs.

c. If Caltrans fails to implement and comply with

any of the provisions of its approved:

- drain inlet cleaning program as set forth in Section VI.B.2.b;
- retrofit program as set forth at Section VI.B.5.;
- monitoring requirements as set forth in Sections VI.A.2.c. and VI.B.11; or

fails to conduct stormwater training as required in Section VI.B.1.h., Caltrans shall pay a stipulated penalty of $5000 per day for each violation.

d. If Caltrans fails to implement any of the BMPs required by the approved programs in this Consent Decree and that failure threatens the quality of the storm water discharge, Caltrans shall pay a stipulated penalty of $5,000 per day for each violation. Caltrans shall not be required to pay a stipulated penalty for any violation under this subsection if it corrects the violation within ten (10) days of the discovery of the violation (by Caltrans or its contractors or subcontractors) or before the next storm in which rainfall exceeds 0.1 inch following discovery of the event, whichever period is shorter, although stipulated penalties shall accrue during this period. If Caltrans establishes that it is impossible to correct a violation before the next storm event, it shall not be required to pay a stipulated penalty for any violation under this subsection if it corrects the violation as soon as possible, but in no case shall this period exceed ten (10) days. For purposes of the preceding sentence, the term "impossible" shall be limited to physical impossibility that is out of the control of Caltrans, its contractors, or its subcontractors.

e. If Caltrans fails to fully implement all of the

requirements of the SEP, as set forth in Section X and Attachment A, Caltrans shall pay a stipulated penalty of $380,000. If Caltrans fails to meet the deadlines for implementation of any of the requirements of the SEP which does not result in a failure to fully implement the SEP, including any deadlines set forth in Attachment A, Caltrans shall pay a stipulated penalty of $2,000 per day for each violation.

f. If Caltrans fully implements the SEP as set forth in Section X and Attachment A, but Caltrans' total costs incurred in implementing the SEP (including any tax savings or deductions derived therefrom) are less than $380,000, Caltrans shall pay a stipulated penalty equal to the difference between the costs incurred and $380,000.

11.2. Stipulated Penalties shall accrue on the first business day after complete performance is due or the day on which a violation occurs. For Stipulated Penalties which can accrue on a per day basis, the penalties shall continue to accrue through the final day of correction of the noncompliance.

11.3. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Consent Decree.

11.4. The payment of Stipulated Penalties shall not alter in any way Defendant's obligations under this Consent Decree and nothing in the Consent Decree shall preclude Plaintiffs from seeking any additional legal or equitable relief, including, but not limited to, injunctive relief, civil penalties, and civil or criminal contempt sanctions, for any violation of the Clean Water Act other

than those violations which are the subject of this action.

11.5. Any Stipulated Penalty shall be mailed within thirty (30) days of the violation, subject to the provisions of Section VIII of this Decree (Dispute Resolution). Payment shall be by certified check referencing DOJ# 90-5-1-1-4364 and USAO File No. 96V0551, made payable to the "Treasurer, United States of America" and tendered to:

United States Attorney's Office
Southern District of California
880 Front Street, Room 6293
San Diego, CA 92101-8893

The payment shall be accompanied by a brief description of the violation(s) being addressed by such payment.

11.6. Defendant shall pay interest at the rate established by the Secretary of the Treasury pursuant to 28 U.S.C. § 1961 for any late payment of a Stipulated Penalty. The rate shall be that in effect on the date of entry of this Consent Decree. Defendant shall submit a statement with each payment setting forth its interest calculation, if any.

11.7. Interest accrued and owing to the United States shall be calculated from the date on which a violation giving rise to a Stipulated Penalty occurs, through the date of payment, unless the Stipulated Penalty is paid in full within the time period set forth in Paragraph 11.5. Payment of interest accrued on Stipulated Penalties shall be made at the same time as the payment of the Stipulated Penalty upon which the interest has accrued. Payments of interest made under this paragraph shall be in addition to such other remedies or sanctions available to the Plaintiffs by virtue of Defendant's failure to make timely payments under this Section.

XII. FAILURE OF COMPLIANCE

12.1. The Plaintiffs do not, by their consent to the entry of this Decree, warrant or aver in any manner that Defendant's compliance with this Decree will result in compliance with the Act or any permits issued under the Act.

XIII. ATTORNEYS' FEES

13.1. Within six (6) weeks of the date this Consent Decree is lodged with the Court, Caltrans shall pay $201,728.00 to Citizen Plaintiffs in full settlement of Citizen Plaintiffs' attorneys' fees and costs, including experts' fees, associated with this action and this Consent Decree. Caltrans shall pay by check or money order payable to Natural Resources Defense Council, 6310 San Vicente Boulevard, Suite 250, Los Angeles, California 90048, and shall be sent to the attention of Joel R. Reynolds, Esq. Payment pursuant to this Paragraph shall compensate Citizen Plaintiffs in full for all attorneys' fees and costs, including expert fees, in connection with this action and this Consent Decree (except as provided in paragraph 13.2, below), provided, however, that nothing in this Consent Decree shall preclude it from applying to the Court, pursuant to Section 505(d) of the Act, 33 U.S.C. § 1365(d), for the payment of costs, including attorneys' fees and expert witness fees, in connection with enforcing compliance with this Consent Decree, which may be awarded, pursuant to Section 505(d) of the Act, 33 U.S.C. § 1365(d), when the Court determines it is appropriate.

13.2. Caltrans shall reimburse Citizen Plaintiffs' designated experts for all reasonable work performed pursuant to this Consent Decree, at a rate not to exceed $150.00 per hour. The expert

designated by Citizen Plaintiffs is Dr. Richard Horner. Citizen Plaintiffs may designate other qualified expert(s) whenever they choose. Caltrans shall not object to reasonable designations by Citizen Plaintiffs. The total of such payments to such experts (and to any substitute expert or experts designated by Citizen Plaintiffs and approved by Caltrans) shall not exceed the sum of $200,000. Caltrans shall reimburse Citizen Plaintiffs' experts pursuant to this paragraph within thirty (30) days from receipt of an itemized invoice from the Citizen Plaintiffs. Caltrans shall not, however, be required under this paragraph to reimburse Citizen Plaintiffs' experts for work performed by such experts in support of or in opposition to any motion filed by any party pursuant to Paragraph 13.1. above. Nothing in this Paragraph shall preclude Citizen Plaintiffs from applying to the Court, pursuant to Section 505(d) of the Act, 33 U.S.C. § 1365(d), for payment for work performed by their experts in support of or in opposition to any such motion filed by any party pursuant to Paragraph 13.1. above.

13.3. Dispute Resolution for Disputes Arising Under this Section: If, in the opinion of either Citizen Plaintiffs or Caltrans, there is a dispute concerning payment to Citizen Plaintiffs' expert(s), that party shall send a written notice to the other Parties outlining the nature of the dispute and requesting informal negotiations to resolve the dispute. The Party receiving such notice (other than the United States) shall respond or cure within forty-five (45) days from the date the notice was sent, unless the Parties (other than the United States) agree otherwise in writing. The parties shall make every effort to resolve disputes under this

Section informally. If informal negotiations are unsuccessful, following the forty-five day negotiation period, either Citizen Plaintiffs or Caltrans may file a motion with the Court to consider the matter at issue and resolve the dispute. In resolving any dispute, the Court may look to relevant case and statutory authority, expert opinion, and any other relevant authority. The Citizen Plaintiffs and Caltrans acknowledge that this Paragraph provides for dispute resolution that is the sole and exclusive remedy for disputes arising under this Section of the Consent Decree, provided, however, that nothing in this Paragraph shall preclude Citizen Plaintiffs from applying directly to the Court, pursuant to Section 505(d) of the Act, 33 U.S.C. § 1365(d), as discussed above.

XIV. RIGHT OF ENTRY

14.1. U.S. EPA or its representatives, contractors, and consultants, and attorneys for the United States shall have the authority to enter upon Caltrans' facilities or highway operations at all times upon proper presentation of credentials to the manager or supervisors of Caltrans' facilities or highway operations, or, in the manager's or supervisor's absence, to the highest ranking employee present at the facility or highway operations, for the purposes of

- monitoring the progress of activities required by this Consent Decree;
- verifying any data or information submitted to U.S. EPA in accordance with the terms of this Consent Decree;
- obtaining samples, and, upon request, splits of any samples taken by Caltrans or its consultants; and
- assessing Caltrans compliance with this Consent Decree, any

applicable permits issued pursuant to the Act, and the Act.

14.2. Notwithstanding any provision of this Consent Decree, the United States retains all of its access authorities and rights, including enforcement authorities related thereto, under the Clean Water Act and any other applicable statute or regulations.

14.3. During the term of this Consent Decree, Caltrans shall allow the Citizen Plaintiffs to conduct inspections of its ongoing construction, planning and design, and maintenance activities for the purposes of

- monitoring the progress of activities required by this Consent Decree;
- verifying any data or information submitted to U.S. EPA in accordance with the terms of this Consent Decree;
- obtaining samples, and, upon request, splits of any samples taken by Caltrans or its consultants; and
- assessing Caltrans compliance with this Consent Decree, any applicable permits issued pursuant to the Act, and the Act.

Citizen Plaintiffs shall not conduct more than one inspection per activity per month. Prior to any inspection conducted under this section, Citizen Plaintiffs shall provide Caltrans notice by 2:00 p.m. on the day prior to any inspection. Such notice shall be given to the District NPDES Coordinator by telephone or by hand delivered letter. The notice shall include the specific location of the inspection, the time the inspection is to begin, and the number of representatives of the Citizen Plaintiffs planning to attend.

XV. DOCUMENT RETENTION

15.1. Defendant shall preserve, during the term of this

Consent Decree and for a minimum of five (5) years after their creation, at least one legible copy of all records and documents, prepared subsequent to the entry of this Consent Decree; that relate to the violations alleged in the Complaint, and the performance of Defendant's obligations under this Consent Decree, including, but not limited to, computer records and documents embodying or relating to the results of any sampling, tests, or other data or information generated or acquired by Defendant, or on Defendant's behalf, which are in Defendant's possession, custody, or control.

XVI. GENERAL PROVISIONS

16.1. The execution of this Consent Decree is not an admission of liability by Defendant, nor is it an admission or denial of the factual allegations arising out of the transactions or occurrences alleged in the Complaint, nor shall it be deemed a waiver of any rights or defenses not specifically waived by this Consent Decree.

16.2. The Defendant enters into this Consent Decree without admitting any liability or factual contentions contained herein or arising out of the transactions or occurrences alleged in the Complaint and resolved by the Consent Decree in this matter.

16.3. The parties agree that nothing contained herein shall be admissible in evidence or for the purpose of impeachment in any judicial or administrative proceeding except in an action to enforce this Consent Decree.

16.4. This Consent Decree does not limit or affect the rights of the Plaintiffs or Defendant as against any parties other than the Plaintiffs or Defendant.

16.5. Nothing in this Consent Decree shall affect Defendant's responsibility for achieving and maintaining complete compliance with all applicable federal, state, and local laws, regulations and permits. Compliance with this Consent Decree shall not be a defense to any action commenced pursuant to said laws, regulations or permits.

16.6. Except as provided in this Consent Decree, Plaintiffs reserve any and all legal and equitable remedies available to enforce the provisions of this Consent Decree.

16.7. Defendant and U.S. EPA each shall bear its own costs and attorney's fees in this action.

16.8. No requirement or provision of this Consent Decree shall be modified for any reason except upon consent of all parties to the Decree or by order of the Court. No provisions of this Consent Decree shall be modified orally or altered in any way by the performance or conduct of the parties.

16.9. This agreement shall resolve all civil claims of the Plaintiffs against Defendant for the violations alleged in the Complaint in this action through the date of lodging of this Consent Decree.

16.10. Except as expressly provided for herein, or other applicable law, this Consent Decree is without prejudice to and shall not be construed as a waiver or limitation of any rights, remedies, powers, or authorities, whether statutory or regulatory, legal or equitable, civil or criminal, administrative or judicial, that the parties have pertaining to Defendant's compliance with any of the requirements of this Consent Decree, or any of the requirements of

the Clean Water Act, the Clean Air Act, CERCLA, RCRA, EPCRA, or any other statutory, regulatory, or common law authority or permit condition.

16.11. Nothing in this Consent Decree shall limit the authority of the Plaintiffs to take any action against Defendant in response to conditions which may present an imminent and substantial endangerment to the public health, welfare, or the environment, or to limit application of Section 504 of the Clean Water Act, 33 U.S.C. § 1364.

16.12. Nothing in this Consent Decree shall act as a bar, adjudication or resolution of any claims of the Plaintiffs other than for the claims asserted in the Complaint and, in any subsequent proceeding concerning such claims, Defendant shall not assert any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States or Citizen Plaintiffs in any subsequent proceeding were or should have been brought in the instant action.

16.13. This agreement represents the entire agreement of the parties.

XVII. RETENTION OF JURISDICTION

17.1. The Court shall retain jurisdiction over this action until termination of this Consent Decree, in order to enforce or interpret the rights and obligations of the parties to the Consent Decree and to resolve disputes arising hereunder.

XVIII. NOTICES AND SUBMISSIONS

18.1. Whenever under the terms of this Consent Decree

notice is required to be given, or a report or other document is required to be submitted by one party to another, it shall be directed to the following individuals at the addresses specified below, unless any of those individuals, their successors or their attorneys give notice of a change to other Parties in writing. Any such correspondence or submission shall include a reference to the case caption and civil number of this court action.

As to the United States:

Chief, Environmental Enforcement Section
Environment & Natural Resources Division
United States Department of Justice
P.O. Box 7611, Franklin Station
Washington, DC 20044
Re: DOJ No. 90-5-1-1-4214

Chief, Clean Water Act Compliance Office (WTR-7)
Water Division
U. S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, CA 94105
Facsimile No.: (415) 744-1873

As to Citizen Plaintiffs:

Everett L. DeLano
Senior Project Attorney
Natural Resources Defense Council
P.O. Box 9000-652
Carlsbad, CA 92018
Facsimile No.: (760) 931-1512

As to Caltrans:

Gary Gallegos
District Director
Caltrans District 11
2829 Juan Street
San Diego, CA 92110
Facsimile No.: (619) 688-3122

XIX. FORCE MAJEURE

19.1. "Force majeure," for purposes of this Consent

Decree, is defined as any event arising from causes beyond the control of Caltrans, the State of California, or of any entity controlled by Caltrans or the State of California, including, but not limited to, their contractors and subcontractors, that delays or prevents the performance of any obligation under this Consent Decree despite Caltrans' best efforts to fulfill the obligation. The requirement that Caltrans exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. "Force Majeure" does not include financial inability to complete the work or a failure to attain the performance standards.

19.2. If any event occurs or has occurred that may delay the performance of any obligation under this Consent Decree, whether or not caused by a force majeure event, Caltrans shall notify orally the Plaintiffs' designated representatives within forty-eight (48) hours of when Caltrans first knows or should have known that the event might cause a delay. Within five (5) days thereafter, Caltrans shall provide in writing to the Plaintiffs an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Caltrans' rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to

whether, in the opinion of Caltrans, such event may cause or contribute to an endangerment to public health, welfare or the environment. Caltrans shall include with any notice all available documentation supporting their claim that the delay was attributable to a force majeure. Failure to comply with the above requirements shall preclude Caltrans from asserting any claim of force majeure for that event. Caltrans shall be deemed to have knowledge of any circumstance or event which Caltrans, the State of California, any entity controlled by Caltrans or the State of California, or of Caltrans' contractors or subcontractors knew or should have known.

19.3. If both Plaintiffs agree that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Consent Decree that are affected by the force majeure event will be extended by the Plaintiffs for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If one or both of the Plaintiffs do not agree that the delay or anticipated delay has been or will be caused by a force majeure event, the Plaintiffs will notify Caltrans in writing of their decision. If both Plaintiffs agree that the delay is attributable to a force majeure event, the Plaintiffs will notify Caltrans in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

19.4. If Caltrans elects to invoke the dispute resolution procedures set forth in Section VIII (Dispute Resolution) with regard

to the Plaintiffs' decisions to agree or disagree with Caltrans efforts to invoke these Force Majeure provisions, they shall do so no later than 15 days after receipt of the Plaintiffs' notice. In any such proceeding, Caltrans shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure event, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that best efforts were exercised to avoid and mitigate the effects of the delay, and that Caltrans complied with the requirements of this section. If Caltrans carries this burden, the delay at issue shall be deemed not to be a violation by Caltrans of the affected obligation of this Consent Decree identified to the Plaintiffs and the Court.

XX. TERMINATION

20.1. The parties agree that four years after entry of this Consent Decree they shall submit a joint motion to the Court requesting that this Consent Decree be terminated if Caltrans establishes the following:

- Caltrans has completed all injunctive relief required by this Consent Decree;
- Caltrans has paid all penalties, including stipulated penalties, and fees required pursuant to this Consent Decree; and
- Caltrans has completely and fully implemented the SEP, including monitoring, maintenance, and submission and approval of all reports to the Plaintiffs, as set forth in Section X and Attachment A.

In order to establish compliance with the conditions set forth in

this Paragraph, Caltrans shall submit to the Plaintiffs a Certification of Compliance. The Plaintiffs shall notify Caltrans within sixty (60) days of receipt of the Certification of Compliance if they contend that Caltrans has not fully complied with any of the conditions set forth in this Paragraph and, therefore, will not agree to file such a joint motion. If the Plaintiffs, individually or collectively, so notify Caltrans, it shall be considered a dispute which shall be resolved through the Dispute Resolution provisions of this Consent Decree (Section VII). If, after the conclusion of the dispute resolution procedures, the parties do not agree to move to terminate the Consent Decree, Caltrans may move individually for the termination of this Consent Decree, and the Plaintiffs may oppose such a motion. For purposes of a motion filed under the preceding sentence, the court may make an independent review of whether Caltrans has complied with the conditions set forth in this Paragraph and termination is appropriate.

20.2. Termination of this Consent Decree shall release Defendant from all obligations under this Consent Decree.

XXI. PUBLIC COMMENT

21.1. The parties agree and acknowledge that final approval by the United States and entry of this Consent Decree is subject to the requirements of 28 C.F.R. § 50.7, which provides for the notice of the lodging of this Consent Decree in the Federal Register, an opportunity for public comment, and consideration of any comment. The United States reserves the right to withdraw its consent to this Decree if comments from the public disclose facts or considerations that indicate the proposed settlement is

inappropriate, improper, or inadequate.

Entered this 10th day of March, 1998 ~~1997~~

Irma E. Gonzalez
UNITED STATES JUDGE

FOR THE UNITED STATES OF AMERICA,

Date: 12/4/97

LOIS J. SCHIFFER
Assistant Attorney General
Environment and Natural Resources Division
United States Department of Justice
10th and Constitution Avenues, N.W.
Washington, D.C. 20044

Date: 12/16/97

PETER E. JAFFE
Trial Attorney
Environmental Enforcement Section
Environment and Natural Resources Division
United States Department of Justice
10th and Constitution Avenues, N.W.
Washington, D.C. 20044

Date: 12/9/97

STEVEN A. HERMAN
Assistant Administrator
Enforcement and Compliance Assurance
United States EPA

Date: 12/1/97

FELICIA MARCUS
Regional Administrator
United States EPA
Region 9
75 Hawthorne Street
San Francisco, CA 94105

Of Counsel:
LAURIE KERMISH
Assistant Regional Counsel
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FOR NATURAL RESOURCES DEFENSE COUNCIL

Everett L. Delano III Date: December 9, 1997

EVERETT L. DELANO
Senior Project Attorney
Natural Resources Defense Council
P.O. Box 9000-652
Carlsbad, CA 92018

FOR SAN DIEGO BAYKEEPER AND KENNETH J. MOSER,

Date: 12.9.97

KENNETH J. MOSER
Executive Director
San Diego BayKeeper
1450 Harbor Island Drive, Suite 207
San Diego, CA 92101

FOR THE CALIFORNIA DEPARTMENT OF TRANSPORTATION,

Gary J Gallegos

Date: 12-16-97

GARY GALLEGOS
District Director
Caltrans District 11
2829 Juan Street
San Diego, CA 92110

Date: _____

ALAN HENDRIX
Deputy Director, Planning
Caltrans
2829 Juan Street
San Diego, CA 92110

FOR THE CALIFORNIA DEPARTMENT OF TRANSPORTATION,

_____ Date: _____

GARY GALLEGOS
District Director
Caltrans District 11
2829 Juan Street
San Diego, CA 92110

Allan H. Hendrix Date: 12/16/97

ALLAN H. HENDRIX
Deputy Director, Planning
Caltrans
1120 N Street
Sacramento, CA 95814

CalTrans
Legal Division
5/18/93

UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

UNITED STATES OF AMERICA, Plaintiff, v. CALIFORNIA DEPARTMENT OF TRANSPORTATION, a department within the Business Transportation and Housing Agency, an agency of the State of California, Defendant.	Civil No. 96-1440-IEG(POR) **CERTIFICATE OF SERVICE BY MAIL**

STATE OF CALIFORNIA)
) ss.
COUNTY OF SAN DIEGO)

IT IS HEREBY CERTIFIED that:

I, Barbara J. Lytle, am a citizen of the United States over the age of eighteen years and a resident of San Diego County, California; my business address is Office of the U.S. Attorney, Federal Office Building, 880 Front Street, Room 6293, San Diego, California 92101-8893; I am not a party to the above-entitled action; and

On December 17, 1997, I caused to be deposited in the United States mail at San Diego, California, in the above-entitled action, in an envelope bearing the requisite postage, a copy of: **CONSENT DECREE** addressed to: **Jeffrey Joseph, Legal Division, State of California, Department of Transportation, 610 West Ash Street, Suite 805, San Diego, CA 92101-3346 and Everett L. DeLano, Senior Project Attorney, San Diego BayKeeper/Natural Resources Defense Council, 1450 Harbor Island Drive, Suite 207, San Diego, CA 92101,** the last known address at which place there is delivery service of mail from the United States Postal Service.

I declare under penalty of perjury that the foregoing is true and correct.

Executed in San Diego, California on December 17, 1997.

Barbara J. Lytle

BARBARA J. LYTLE

ATTACHMENT A

CALTRANS' SUPPLEMENTAL ENVIRONMENTAL PROJECT

SCOPE OF WORK

I. Summary and Description

This Supplemental Environmental Project ("SEP") requires the purchase and restoration of a 1.25 acre parcel of land (the "Napolitano Property" or the "Site"), Parcel No. 632-040-18, Imperial Beach, California, located adjacent to the Tijuana River Estuary. Prior to being filled, the Napolitano Property was, at least in part, a tidal wetland. The purpose of this SEP is to restore the Napolitano Property in its entirety to a tidal wetland, including its functions for purposes of water filtration, biofiltration, plant habitat, and animal habitat. As a tidal wetland the Site will serve to replace tidal wetlands and habitats adversely impacted, in part or in whole, by Caltrans' stormwater practices.

Caltrans intends to undertake this SEP in cooperation with the California Coastal Conservancy and the County of San Diego (collectively, the "Donors"), which have committed partial funding to this project ($150,000 and $355,000, respectively). Regardless of any failure of such funding or any increased costs to Caltrans based upon the actions or inaction of either the Donors, the Plaintiffs, or any other party, Caltrans agrees to and shall ensure that the SEP is fully and successfully completed.

II. Activities

A. Site Acquisition

1. On or before December 15, 1997, Caltrans shall execute written and binding agreements or memoranda of understanding, as appropriate, with the Coastal Conservancy and the County of San Diego providing for the following:

   a. Joint participation in the purchase of the Napolitano Property;

   b. Caltrans holding title to the Napolitano Property from the time of purchase until it is donated to a government agency or trustee, as provided in Paragraph III.B, below;

   c. Funding necessary for the purchase of the Napolitano Property, including Caltrans' agreement to pay at least $200,000 toward the purchase of the Site; and

   d. Caltrans shall be liable for the payment of any and all costs and

fees required for the purchase of the Napolitano Property not agreed to be paid by the Donors, including, but not limited to, recording fees, wire transfer fees, escrow fees, title fees, loan costs, interest payments, and any other transaction costs.

2. On or before January 16, 1998, Caltrans shall execute all necessary agreements, including escrow agreements, with the lawful owner of the Napolitano Property (or its agent), the Donors, and any necessary escrow accounts to purchase the Napolitano Property. Such agreements shall require that upon entering into such agreement Caltrans and the Donors shall transfer the funds necessary for completion of the purchase into an escrow account held at a federally insured bank. The escrow agreement shall stipulate that the funds deposited therein shall be transferred to the lawful owner of the Napolitano Property within two weeks of entry of this Consent Decree, unless the signatory to that agreement is determined not to hold clear and lawful title to the Napolitano Property based upon a title search or other commonly used mechanism for determining lawful ownership.

B. Restoration

1. On or before July 15, 1998, Caltrans shall submit to Plaintiffs for approval a Removal/ Restoration Plan ("RRP") for the Napolitano Property. The RRP shall be prepared by a contractor(s) or employee(s) that has the requisite expertise in engineering, hydrology, and aquatic biology to prepare and implement the RRP. The RRP shall include the following elements:

a. *Historical Site Analysis:* To ensure adequate and feasible restoration of the biologic and hydrologic functions at the Site, a thorough assessment of pre-fill conditions at the Site must first be conducted. To the extent practicable, the RRP shall discuss and map in detail the historic topography and fluvial geomorphology of the Site relative to its geographic location within the Tijuana Estuary prior to fill being placed on the Site. This component shall assess and discuss in detail the historic tidal influence at the Site. Such an analysis will require a thorough review of current and historic aerial photography. Also utilizing historical information, the RRP shall discuss in detail historic biological conditions (i.e., occurrence, abundance, and distribution of plant and animal species, macrohabitat and microhabitat features, etc.) that existed at and adjacent to the Site prior to it being filled.

b. *Reference Conditions:* The RRP shall designate and assess one or more reference sites within the Tijuana Estuary for purposes of establishing biologic and hydrologic "Success Criteria" relative to the restoration of the Site. Such criteria shall reflect those biologic and hydrologic parameters which currently exist within the local

ecosystem and represent ecological conditions free from anthropogenic impact(s) (to the extent possible). These Success Criteria shall be presented in the RRP so that biologic and hydrologic restoration goals at the Site can be realistically proposed, measured, and ultimately met.

c. *Assessment of Fill Constituents and Volume*: To the extent practicable, the RRP shall assess and describe the volume, nature, and source of all fill materials (i.e, concrete, bricks, fill dirt, any hazardous substances present, and other materials) used at the Site to bring it into its current condition. Such an analysis shall include a determination of the requirements, both legal and practical, for removing such material, including methods for disposal and disposal facility requirements.

d. *Removal Component*: The primary objective of the removal component is to restore the fluvial geomorphology of the Napolitano Property to its pre-fill condition as a tidal wetland and to restore its local hydrologic conditions to its pre-fill state. The removal component of the RRP shall: (1) analyze all legal requirements for removal of the fill, including an analysis of applicable federal, state, and local statutes and regulations applicable to disposal of the fill materials; (2) include a workplan for removal of the fill material, including designation of equipment and proposed access routes to the Site for such equipment; (3) include a workplan for grading the Site, including detailed discussion of and topographical contour maps, schematic drawings, or other graphical representations showing pre- and post-removal conditions at the Site (including proposed slopes, re-establishment of tidal and freshwater channels, and other geomorphic features); and (4) establish compliance with all legal requirements set forth in response to subparagraph (1) of this Paragraph. Prior to implementation, Caltrans shall designate appropriate off-site disposal facilities and shall provide to the Plaintiffs documentation of all necessary written authorizations and agreements with the facilities accepting disposal of the fill materials. The removal component shall also document through photographs the nature of all fill materials removed from the Site.

e. *Restoration Component*: The restoration component of the RRP shall provide for revegetation at the Site consistent with its functioning as a tidal wetland and its location in the Tijuana Estuary. Revegetation of the Site shall be done in consideration of the following goals: (1) erosion and sedimentation control; (2) native plant and animal habitat; and (3) restoration of the biological

functions and values of the Site to its pre-fill conditions. This component shall provide for revegetation with native plant species associated with the Tijuana Estuary and its ecological setting. Schematic drawings of proposed planting areas/locations and planting zones shall be presented in the RRP. This component shall propose the palette and source(s) of native plant species designated for the revegetation effort and the irrigation systems, designs, locations, and water application rates to be used for revegetation.

f. At no time during the conduct of the removal and restoration components of the RRP shall fill be discharged to waters of the United States.

g. *Monitoring/Maintenance Component*: The RRP shall include (1) parameters for "Construction Monitoring" during fill removal and revegetation to ensure that specific removal and revegetation goals are met; (2) a three year biological monitoring program, including specific success criteria, to periodically measure faunal and floral parameters; and (3) specific methods for data acquisition and analysis for the biological monitoring component. Caltrans shall, by January 15 of each year, prepare and submit to the Plaintiffs annual reports setting forth the data, analysis, and other results from the long term biological monitoring program collected or produced over the preceding calendar year. The RRP shall also include a three year maintenance plan, concurrent with the term of the long term monitoring component, to provide an appropriate level of replacement of plants to allow for expected plant mortality. The maintenance plan shall also provide for the periodic assessment and removal (including description of the methods of removal) of invasive, non-native plant species, as well as for maintenance of the irrigation system, if appropriate.

h. Caltrans shall pay at least $180,000 toward developing and implementing the RRP.

i. Regardless of the availability of other funds pledged to the SEP by the Donors or any other party and regardless of the actions or inaction of the Donors, the Plaintiffs, or any other party, Caltrans shall be responsible for the development RRP and its and the full and complete implementation.

2. Schedule and Deadlines: Caltrans shall develop and implement the RRP in accordance with the deadlines set forth above and the following deadlines:

a. On or before July 15, 1998, Caltrans shall submit the completed RRP to Plaintiffs for approval;

b. Caltrans or its contractors shall begin the Removal Component of RRP no later than February 15, 1999.

c. Caltrans shall complete the Removal Component of RRP, including Completion of the final grading of the Site no later than March 12, 1999.

d. Caltrans shall complete the Restoration Component of RRP no later than April 30, 1999.

III. Completion

A. Final Report

On or before March 31, 2002, Caltrans shall submit to the Plaintiffs for approval a Final Report on implementation and completion of the SEP. This report shall include all costs incurred by Caltrans in purchasing the Napolitano Property, development of the RRP, and implementation of the RRP. The Final Report shall include references to the annual monitoring reports where appropriate, as well as an assessment of the success of reaching the Success Criteria. The Final Report shall include a plan for donation of the Site to a governmental agency or trustee, as set forth in Paragraph III.B., below, including identification of the donee, and copies of fully executed agreements or memoranda of understanding, as necessary, with the donee.

B. Donation of the Site

Upon completion of the SEP, as set forth herein, full implementation of the RRP (including the monitoring and maintenance requirements set forth in Section II.B.1.g, above), and approval of the Final Report by the Plaintiffs, Caltrans shall donate the restored Napolitano Property (at no cost to the donee) to an agency of the United States, such as the U.S. Fish and Wildlife Service, that agrees to own and maintain the Napolitano Property in its restored state as a tidal wetland. If no agency of the United States agrees to take the Napolitano Property upon these conditions, Caltrans shall donate the property to an agency of the State of California upon the same conditions, or if no State agency agrees to take the property under these conditions, to a non-profit organization upon the same conditions. If Caltrans cannot find a donee to take the Napolitano Property upon the conditions set forth herein, it shall retain ownership and maintain the Napolitano Property pursuant to the these conditions.

ASSESSMENT OF HYDROLOGIC AND WATER QUALITY IMPLICATIONS OF STORMWATER MANAGEMENT UNDER PROVISIONS OF THE SAN FRANCISCO BAY REGION MUNICIPAL REGIONAL STORMWATER NPDES PERMIT

RICHARD R. HORNER

BACKGROUND

During the development of the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit, the author prepared a report titled Initial Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for the San Francisco Bay Area (Horner 2007a). Using six representative development project case studies, based on California building records, the report investigated the practicability and relative benefits of LID options for the majority of the region having soils potentially suitable for infiltration either in their natural state or after amendment using well recognized LID techniques (hydrologic group A, B, and C soils). The results demonstrated that: (1) LID site design and source control techniques would be more effective than conventional best management practices (BMPs) in reducing runoff rates; and (2) in each of the case studies, LID methods, including water harvesting for reuse along with infiltrative methods, would reduce site runoff volume and pollutant loading to zero in typical rainfall scenarios. The author prepared a subsequent report covering the remainder of the region, where hydrologic group D soils predominate (Horner 2007b). This report showed that combining LID techniques with conventional BMPs where infiltration opportunities are limited would: (1) reduce annual runoff volumes by almost half to more than 3/4, depending on land use characteristics, with much of the water saved being available for a beneficial use; and (2) decrease mass loadings of pollutants to receiving waters by 63 to over 90 percent, depending on pollutant and land use.

A tentative draft of the permit was issued in 2009 with provisions encouraging but not requiring LID practices. In section C.3.c.i.(2) it presents a hierarchy starting with these fully or highly water retentive methods but proceeding on to less retentive vegetation- and soil-based techniques, then to conventional surface BMPs, and finally to vault-type systems. In each case, practice specification proceeds to the next step in the hierarchy after the preceding step has been exercised "... as much ... as practicable", a standard that is not defined.

METHODS OF ANALYSIS

The same analytical techniques described in the initial report were applied to investigate the implications, regarding the discharge of runoff and the pollutants it conveys, of utilizing stormwater management strategies lower on the hierarchy, in comparison to the full LID approach outlined by Horner (2007a). Two scenarios were defined and applied to the original six case studies set in the more infiltrative soils regime and two rainfall zones typifying the San Francisco Bay Region. The first scenario assumes a mixed strategy, with 35 percent of each site's runoff managed by the full-LID approach, consistent with permit provisions C.3.c.i.(2)(d) and (e); 15 percent by the types of practices represented by provision C.3.c.i.(2)(f) (e.g., bioretention with underdrains); 30 percent by conventional surface BMPs, according to provision C.3.c.i.(2)(g); and the remaining 20 percent by wet vaults, as provided by provision C.3.c.i.(2)(h). The second scenario assumes treatment of 51 percent of the site runoff by conventional surface BMPs and 49 percent by wet vaults. This split represents near the maximum vault treatment allowed by the permit without special permission, per paragraph C.3.c.i.(6).

In addition to the methods described by Horner (2007a), the analysis relied on several other procedures. The amount of water retained, and not discharged, by conventional surface BMPs was estimated as the average measured for extended-detention basins and conventional biofiltration swales and filter strips in the California Department of Transportation's (Caltrans, 2004) BMP Retrofit Pilot Program, 40 percent. The fraction of retention by bioretention with underdrains was taken as the average obtained by Davis

(2008) in research on these BMPs, namely 59 percent. With the lack of any opportunity for infiltration and extremely limited evaporation, vault discharge was taken to be equal to the influent volume.

To assess water quality, pollutant mass loading reduction efficiencies afforded by conventional surface BMPs over an extended period of time, representing multiple storms, were based on Caltrans' (2004) results for extended-detention basins (EDBs), which were generally intermediate between two other common BMPs of this type, conventional biofiltration swales and filter strips: 69 percent for total suspended solids (TSS), 62 percent for total recoverable copper (TCu), 60 percent for total recoverable zinc (TZn), and 63 percent for total phosphorus. These efficiencies are functions of the 40 percent volume decrease occurring in EDBs plus extraction of pollutants in the basins, which lowers their concentrations. Davis (2007) provided equivalent efficiencies for bioretention cells with underdrains: 57 percent for TSS, 80 percent for TCu, 62 percent for TZn, and 78 percent for TP. There has been little research on wet vaults. The performance of these devices is limited by the lack of light, soil, and vegetation, which mediate a number of the pollutant removal mechanisms in surface BMPs, as well as by virtually no volume reduction. Shapiro and Associates, Inc. (1999) measured the water quality of discharge from a wet vault serving as pretreatment for a sand filter in Bellevue, WA. This study found reductions of 36 percent for TSS, 13 percent for TCu, 26 percent for TZn, and 7 percent for TP.

RESULTS

Table 1 presents the hydrologic comparisons for the various management scenarios assessed. In the full LID case defined by Horner (2007a) all of the water estimated to recharge groundwater in the pre-development situation can be captured either by infiltration or harvest in all six land use case studies and both rainfall zones. A mixed strategy of LID BMPs with and without underdrains, conventional surface BMPs, and vaults results in some loss of water for beneficial purposes, from 8 to 24 percent depending on land use. Resorting to just conventional BMPs and vaults more than doubles those losses in every case.

Table 1. Water Captured Annually (in acre-ft) from Development Sites for Beneficial Use with a Full LID Approach In Comparison to Capture from Developments Served Entirely or Largely with Conventional BMPs Allowed by the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall:						
Pre-development recharge[b] (acre-ft)	11.9	3.29	0.83	2.30	144	0.19
***Full LID case*[c]—**						
Post-development runoff capture (acre-ft)	11.9	3.29	0.83	2.30	144	0.19
Post-development recharge lost (acre-ft)	0	0	0	0	0	0
Post-development % recharge lost	0%	0%	0%	0%	0%	0%
***Mixed LID and conventional BMP case*[d]—**						
Post-development recharge[b] (acre-ft)	8.95	2.76	0.69	2.12	120	0.17

Table 1 (continued)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Post-development recharge lost (acre-ft)	2.89	0.52	0.15	0.18	22.7	0.03
Post-development % recharge lost	24%	16%	18%	8%	16%	16%
Conventional surface BMP and vault case[e]**—**						
Post-development recharge[b] (acre-ft)	5.92	2.15	0.52	1.84	93.3	0.13
Post-development recharge lost (acre-ft)	5.93	1.14	0.31	0.46	49.5	0.07
Post-development % recharge lost	50%	35%	37%	20%	34%	37%
20 Inches/Year Rainfall:						
Pre-development recharge[b] (acre-ft)	16.9	4.71	1.19	3.30	205	0.27
Full LID case[c]**—**						
Post-development runoff capture (acre-ft)	16.9	4.71	1.19	3.30	205	0.27
Post-development recharge lost (acre-ft)	0	0	0	0	0	0
Post-development % recharge lost	0%	0%	0%	0%	0%	0%
Mixed LID and conventional BMP case[d]**—**						
Post-development recharge[b] (acre-ft)	12.8	3.94	0.98	3.03	171	0.24
Post-development recharge lost (acre-ft)	4.12	0.74	0.21	0.25	32.3	0.04
Post-development % recharge lost	24%	16%	18%	8%	16%	15%
Conventional surface BMP and vault case[e]**—**						
Post-development recharge[b] (acre-ft)	8.44	3.06	0.75	2.62	133	0.19

Table 1 (continued)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Post-development recharge lost (acre-ft)	8.46	1.62	0.45	0.66	70.6	0.10
Post-development % recharge lost	50%	34%	38%	20%	34%	37%

[a] MFR—multi-family residential; Sm-SFR—small-scale single-family residential; REST—restaurant; OFF—office building; Lg-SFR—large-scale single-family residential; SINGLE—Single family home.

[b] Quantity of water infiltrating the soil; the difference between precipitation and runoff.

[c] Assuming all runoff managed by BMPs consistent with permit provisions C.3.c.i.(2)(d) and (e) [BMPs retaining runoff through infiltration, evapotranspiration or harvesting for reuse, assuming full retention as demonstrated by Horner (2007)].

[d] Assuming runoff managed as follows: 35% by BMPs consistent with permit provisions C.3.c.i.(2)(d) and (e); 15% by BMPs consistent with permit provision C.3.c.i.(2)(f) [BMPs treating runoff through vegetation and soil contact but conveying it via underdrains for surface discharge]; 30% by BMPs consistent with permit provision C.3.c.i.(2)(g) [conventional surface BMPs]; and 20% by BMPs consistent with permit provision C.3.c.i.(2)(h) [subsurface vaults].

[e] Assuming runoff managed as follows: 51% by BMPs consistent with permit provision C.3.c.i.(2)(g); and 49% by BMPs consistent with permit provision C.3.c.i.(2)(h).

Table 2 presents the water quality comparisons for the respective development cases and stormwater management scenarios. Because the full LID approach would discharge no surface runoff, all pollutant discharges would be reduced to zero. The mixed case would reduce loadings by approximately two-thirds to three-quarters. Not taking advantage of the full capabilities of LID would still produce, for example, 6670 lbs. of TSS and 1.77 lbs. of copper, a metal of great concern in San Francisco Bay, in discharges from just these six developments in the 20-inch/year rainfall zone each year. Using only conventional surface BMPs and vaults would attenuate just slightly over half of the TSS, 40 percent of the TZn, and one-third of the TCu and TP. In this scenario the total TSS and copper discharges would grow to 10,990 and 3.42 lbs./year, respectively, an approximate doubling of the copper relative to the mixed BMP scenario. Compounded over the whole region, these discharges would substantially add to the pollutant burden in receiving waters, unnecessarily in that practical, economical LID techniques exist to replace less effective traditional practices.

Table 2. Comparison of Pollutant Mass Loading Reduction Estimates in Runoff from Development Sites with a Full LID Approach Versus Development Cases Based on Conventional BMPs Allowed by the San Francisco Bay Region Municipal Regional Stormwater NPDES Permit

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
14 Inches/Year Rainfall[b]:						
No treatment case—						
Lbs. TSS discharged/year	1254	328	119	230	14249	20
Lbs. TCu discharged/year	0.44	0.070	0.030	0.043	3.04	0.0041
Lbs. TZn discharged/year	2.94	0.576	0.165	0.286	25.04	0.034
Lbs. TP discharged/year	6.24	2.27	0.68	1.69	98.55	0.14
Full LID case[c]—						
TSS reduction	100%	100%	100%	100%	100%	100%
TCu reduction	100%	100%	100%	100%	100%	100%
TZn reduction	100%	100%	100%	100%	100%	100%
TP reduction	100%	100%	100%	100%	100%	100%

Table 2 (continued)

	MFR[a]	Sm-SFR[a]	REST[a]	OFF[a]	Lg-SFR[a]	SINGLE[a]
Mixed LID and conventional BMP case[d]—						
TSS reduction	71.2%	72.9%	74.4%	75.1%	72.9%	73.0%
TCu reduction	68.2%	66.3%	69.5%	68.5%	66.3%	66.3%
TZn reduction	67.4%	67.4%	67.6%	68.1%	67.4%	67.4%
TP reduction	66.7%	69.0%	68.8%	70.0%	69.0%	69.1%
Conventional surface BMP and vault case[e]—						
TSS reduction	52.4%	55.3%	57.9%	59.0%	55.3%	55.5%
TCu reduction	37.9%	34.8%	40.1%	38.5%	34.8%	34.8%
TZn reduction	43.2%	43.1%	43.5%	44.3%	43.1%	43.2%
TP reduction	35.0%	39.0%	38.7%	40.6%	39.0%	39.2%
20 Inches/Year Rainfall:						
No treatment case—						
Lbs. TSS discharged/year	1864	501	180	360	21781	30
Lbs. TCu discharged/year	0.63	0.10	0.043	0.063	4.44	0.006
Lbs. TZn discharged/year	4.22	0.83	0.24	0.42	36.2	0.050
Lbs. TP discharged/year	9.60	3.55	1.05	2.71	154.4	0.22
Full LID case[c]—						
TSS reduction	100%	100%	100%	100%	100%	100%
TCu reduction	100%	100%	100%	100%	100%	100%
TZn reduction	100%	100%	100%	100%	100%	100%
TP reduction	100%	100%	100%	100%	100%	100%
Mixed LID and conventional BMP case[d]—						
TSS reduction	71.4%	73.1%	74.6%	75.2%	73.1%	73.3%
TCu reduction	68.1%	66.3%	69.4%	68.4%	66.3%	66.3%
TZn reduction	67.4%	67.3%	67.6%	67.9%	67.3%	67.4%
TP reduction	67.0%	69.2%	69.0%	70.1%	69.2%	69.3%
Conventional surface BMP and vault case[e]—						
TSS reduction	52.7%	55.7%	58.2%	59.3%	55.7%	55.9%
TCu reduction	37.9%	34.7%	40.0%	38.3%	34.7%	34.8%
TZn reduction	43.1%	43.0%	43.4%	44.1%	43.0%	43.1%
TP reduction	35.6%	39.3%	39.0%	40.9%	39.3%	39.5%

[a] See Table 1 footnote a.

[b] TSS—total suspended solids; TCu—total recoverable copper; TZn—total recoverable zinc; TP—total phosphorus.

[c, d, e] See Table 1 footnotes a, b, and c.

CONCLUSIONS AND RECOMMENDATIONS

Conventional surface and subsurface stormwater management practices lose as much as half of the rainfall that could be captured to supplement the San Francisco Bay Region's water supply, simultaneously draining into the region's water bodies the majority of harmful contaminants like heavy metals and nutrients picked up while flowing over urban lands. Substituting low impact development practices for these traditional methods saves water and pollution in relation to how much LID is utilized.

Making maximum use of such practices available today and proven in practicability can save all of the rainfall for some beneficial purpose and, concomitantly, avoid any further degradation of water bodies by urban pollutants.

The permit should be restructured to require the use of these practices at new developments and redevelopments. Clear performance metrics should be included that calibrate the amount of rainfall that must be retained through LID practices to match the technical capability that I have verified in my investigations. Furthermore, the permit should set thorough, objective criteria that a project proponent must use to demonstrate inability to satisfy the full water quality and hydromodification requirements of the permit on-site. For those cases where such a demonstration can be convincingly made, the permit should require and provide for installing compensating, equivalent LID works off-site, so as to assure that the relative water quality and quantity benefits identified herein are realized on a watershed basis when not realized on-site .

REFERENCES

California Department of Transportation. 2004. BMP Retrofit Pilot Program Final Report. California Department of Transportation, Sacramento, CA.

Davis, A.P. 2007. Field Performance of Bioretention: Water Quality. *Environmental Engineering Science* 24(8):1048-1064.

Davis, A.P. 2008. Field Performance of Bioretention: Hydrology Impacts. *Journal of Hydrologic Engineering* 13(2):90-95.

Horner, R.R. 2007a. Initial Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for the San Francisco Bay Area. Report prepared for Natural Resources Defense Council, Santa Monica, CA.

Horner, R.R. 2007b. Supplementary Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices ("LID") for the San Francisco Bay Area. Report prepared for Natural Resources Defense Council, Santa Monica, CA.

Shapiro and Associates, Inc. 1999. Lakemont Stormwater Treatment Facility Monitoring Program. Draft Final Report, July 1999.