CALIFORNIA STATE WATER RESOURCES CONTROL BOARD
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FACT SHEET
FOR
NPDES PERMIT and WASTE DISCHARGE REQUIREMENTS for
State of California
Department of Transportation
NPDES Permit No. CAS000003

ORDER No. 2011-XX-DWQ

This Fact Sheet contains information regarding the waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) permit for the California State Department of Transportation (Department) for discharges of storm water and certain types of non-storm water. This Fact Sheet describes the factual, legal, and methodological basis for the permit conditions, provides supporting documentation, and explains the rationale and assumptions used in deriving the limits and requirements.

BACKGROUND

In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act (CWA)) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful, unless the discharge is in compliance with an NPDES permit. The 1987 amendments to the CWA added section 402(p), which directs that storm water discharges are point source discharges, and establishes a framework for regulating municipal and industrial storm water discharges under the NPDES program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) promulgated final regulations that establish the storm water permit requirements.

Pursuant to these regulations, storm water permits are required for discharges from a municipal separate storm sewer system (MS4) serving a population of 100,000 or more. USEPA defines an MS4 as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) owned or operated by a State (40 CFR 122.26(b)(8)). The regulations also require storm water permits for 11 categories of industry, including construction activities where the construction activity: (1) disturbs more than 1 acre of land; (2) is part of a larger common plan of development; and/or (3) is found to be a significant threat to water quality.

Before July 1999, storm water discharges from Department storm water systems were regulated by individual NPDES permits issued by Regional Water Boards. On July 15, 1999, the State Water Board issued a statewide permit (Order No. 99-06-DWQ), which regulated all storm water discharges from Department owned MS4s, maintenance

facilities and construction activities. The existing permit (Order No. 99-06-DWQ) will be superseded by adoption of a new permit.

Industrial activities are covered by two General Permits that have been adopted by the State Water Resources Control Board (State Water Board). The Department's construction activities are subject to the requirements under the NPDES General Permit for Construction Activities (Construction General Permit) for construction activities that are equal to or greater than 1 acre. The exception to this is in the Lake Tahoe area, where the Lahontan Regional Water Board adopted its own construction general permit (NPDES Permit No. CAG616002). The Department's industrial facility activities are subject to the requirements of the NPDES General Permit for Industrial Activities (NPDES Permit No. CAS000001).

The Department is responsible for the design, construction, management, and maintenance of the State highway system, including freeways, bridges, tunnels, the Department's facilities, and related properties. The Department's discharges consist of storm water and non-storm water discharges from State owned rights-of-way.

CWA section 402(p) and 40 CFR 122.26 (a)(v) give the State authority to regulate discharges from an MS4 on a system-wide or jurisdiction-wide basis. The State Water Board considers all storm water discharges from all MS4s and activities under the Department's jurisdiction as one system. Therefore, this Order is intended to cover all of the Department's municipal storm water activities.

This Order will be implemented by the Department and enforced by the State Water Board and nine Regional Water Boards.

The State Water Board and Regional Water Boards have issued NPDES Permits to local municipalities (primarily cities) where federal storm water regulations require NPDES permit coverage. The Department operates highways and highway-related properties and facilities that cross through these municipalities. Some storm water discharges from the Department's MS4 enter the MS4s owned and managed by these local municipalities. This Order does not supersede the authority of local agencies to prohibit, restrict, or control storm water discharges and conditionally exempt non-storm water discharges to storm drain systems or other watercourses within their jurisdiction as allowed by State and federal law. The Department is expected to comply with the lawful requirements of municipalities and other local, regional, and/or state agencies regarding discharges of storm water to separate storm sewer systems or other watercourses under the agencies' jurisdictions.

GENERAL DISCHARGE PROHIBITIONS

This Order authorizes storm water and conditionally exempt non-storm water discharges from the Department's properties, facilities and activities. This Order prohibits the discharge of material other than storm water, unless specifically authorized in this Order.

The Department owns and operates highway systems that are located adjacent to and discharge into many areas of special biological significance (ASBS). This Order also prohibits waste discharges to ASBS unless the State Water Board has granted an exception. Since 1983, the California Ocean Plan (Ocean Plan), a water quality control plan, has prohibited waste discharges to ASBS. This permit condition is included because State departments, including the Department, must comply with water quality control plans (Water Code § 13247). The existing permit (Order No. 99-06-DWQ) also subjects the Department to the Ocean Plan's discharge prohibition (See State Water Board Order WQ 2001-0008).

NON-STORM WATER

Non-storm water discharges that are not specifically or conditionally exempted by this Order are subject to the existing regulations for point source discharges. Conditionally exempt non-storm water discharges that are found to be significant sources of pollution are prohibited.

The Department (2007a) indicated in its Non-Storm Water Report that agricultural irrigation water return flows carrying pollutants passes under the Department's right-of-way in many locations and enters its MS4. Such discharges are conditionally exempt under this Order if they are regulated by a separate NPDES permit, WDRs or a conditional waiver of WDRs, and if the Department provides reasonable support to the monitoring activities of the regulated discharger.

There are several reasons for taking this approach for irrigation water return flows. The approach is consistent the federal regulations. The regulations conditionally exempt MS4s from the requirement to effectively prohibit "irrigation water" discharges to the MS4. The regulations also completely exempt MS4s from addressing non-storm water discharges (also called "illicit discharges") if they are regulated by an NPDES permit. 40 CFR §§ 122.26(b)(2); 122.26(d)(2)(iv)(B). See also, 55 Fed. Reg. 47990, 48036-37. However, the CWA exempts agricultural irrigation water return flows from the NPDES program. The flows can, however, be regulated pursuant to WDRs or a conditional waiver to WDRs, which must be consistent with Basin Plans. If the flows to the Department's MS4 are regulated in that manner, the regulatory oversight is analogous to being subject to an NPDES permit.

Because these flows cannot be regulated by an NPDES permit, it is unclear whether they could ever be considered "illicit discharges" under the federal regulations. It is less likely that the flows would be considered "illicit" if they were being regulated in a manner analogous to under the NPDES program. As long as the Department is providing reasonable support to the monitoring requirements of these regulated flows, the Department will be considered in compliance with its requirement to effectively prohibit illicit discharges to the MS4.

Slope lateral drainage is a type of foundation drainage that may contain pollutants from diverse sources. The water quality of slope lateral drains has not been characterized.

The Department is required to conduct characterization monitoring of slope lateral drainage in order to determine whether slope lateral drainage is a source of pollutants to receiving waters.

EFFLUENT LIMITS

The State of California Nonpoint Source Program Five-Year Implementation Plan (SWRCB, 2003) (the Plan) describes a variety of pollutants in urban storm water and non-storm water that are carried in MS4 discharges to receiving waters. These include oil, sand, de-icing chemicals, litter, bacteria, nutrients, toxic materials and general debris from urban and suburban areas. The Plan identifies construction as a major source of sediment erosion and automobiles as primary sources of petroleum hydrocarbons.

The Natural Resources Defense Council (NRDC) also identified two main causes of storm water pollution in urban areas (NRDC, 1999). Both identified causes are directly related to development in urban and urbanizing areas:

1. Increased volume and velocity of surface runoff. There are three types of human-made impervious cover that increase the volume and velocity of runoff: (i) rooftops, (ii) transportation imperviousness, and (iii) non-porous (impervious) surfaces. As these impervious surfaces increase, infiltration will decrease, forcing more water to run off the surface, picking up speed and pollutants.

2. The concentration of pollutants in the runoff. Certain industrial, commercial, residential and construction activities are large contributors of pollutant concentrations in urban runoff. As human population density increases, it brings with it proportionately higher levels of car emissions, car maintenance wastes, municipal sewage, pesticides, household hazardous wastes, pet wastes, trash, etc.

As a result of these two causes, runoff leaving developed urban areas is significantly greater in volume, velocity, and pollutant load than pre-development runoff from the same area.

NPDES storm water permits must meet all applicable provisions of sections 301 and 402 of the CWA. These provisions require control of pollutants to the maximum extent practicable (MEP) for discharges from MS4s, and to the standard of Best Available Technology Economically Feasible/Best Conventional Pollutant Control Technology (BAT/BCT) for construction and industrial discharges. It also allows States to require dischargers to implement more stringent controls, if necessary, to meet water quality standards. In Order WQ 2001-15, the State Water Board issued a precedential order stating that municipal storm water permits should require compliance with water quality standards. The order did not require strict compliance through effluent limitations, but established an expectation that compliance could be achieved over time through an iterative process of “timely improvement of BMPs.”

MEP is the technology-based standard established by Congress in CWA section 402(p)(3)(B)(iii) that municipal dischargers of storm water must meet. Technology-based

standards establish the level of pollutant reductions that dischargers must achieve. MEP is generally achieved by emphasizing pollution prevention and source control BMPs as the first lines of defense in combination with structural and treatment methods where appropriate. The MEP approach is an ever evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. The individual and collective activities required by this Order and contained in the Department's Storm Water Management Plan (SWMP) meet the MEP standard.

Blue Ribbon Panel of Experts and Feasibility of Numeric Effluent Limitations
In 2005, The State Water Board assembled a blue ribbon panel to address the feasibility of including numeric effluent limits as part of NPDES municipal, industrial, and construction storm water permits. The panel issued a report dated June 19, 2006, which included recommendations as to the feasibility of including numeric limits in storm water permits, how such limits should be established, and what data should be required (SWRCB, 2006).

The report concluded that "It is not feasible at this time to set enforceable numeric effluent criteria for municipal BMPs and in particular urban discharges. However, it is possible to select and design them much more rigorously with respect to the physical, chemical and/or biological processes that take place within them, providing more confidence that the estimated mean concentrations of constituents in the effluents will be close to the design target."

These conclusions are consistent with State Water Board Water Quality Orders No. WQ 91-03 and WQ 91-04. Therefore, this Order allows the Department to implement Best Management Practices (BMPs) to comply with the requirements of this Order.

RECEIVING WATER LIMITATIONS

In Order WQ 98-01, the State Water Board prescribed specific precedent setting Receiving Water Limitations language to be included in all future MS4 permits. This language specifically requires that MS4 dischargers meet water quality standards or water quality objectives (collectively, WQS) and allows for the use of BMPs (increasing in stringency and implemented in an iterative process) as the mechanism by which water quality standards can be met.

In Order WQ 99-05, the State Water Board modified the receiving water limitations language in Order WQ-98-01 to meet specific objections by the US EPA (the modifications resulted in stricter compliance with water quality standards). State Water Board Order WQ 99-05 states, "the following receiving water limitations language shall be included in future municipal storm water permits."

This Order meets the requirements of Order WQ 99-005. The Order prohibits storm water discharges that cause or contribute to a violation of an applicable water quality standard. If receiving water quality standards are exceeded, the Department is required

to submit a written report providing additional BMPs or other measures that will be implemented to achieve water quality standards through an iterative approach.

OTHER PROVISIONS OF THIS ORDER

Storm Water Management Plan (SWMP)

Many of the requirements in this Order are addressed in the Department's Storm Water Management Plan (Department, 2003b). The SWMP is an integral and enforceable component of this Order. The Department will submit, on an annual basis, an analysis of the adequacy of the SWMP to control pollutants to meet the applicable standards, and propose any changes needed to correct any inadequacies.

The Department references various policies, manuals, and other guidance related to storm water in the SWMP. These documents are intended to facilitate implementation of the SWMP and must be consistent with all requirements of the Order.

The SWMP has been amended to address concerns and inadequacies identified during the last permit cycle. This revised SWMP has been presented to the State Water Board and approved. As discussed below, any future revisions to the SWMP will be incorporated into the permit pursuant to the federal regulations for NPDES permit modification found in 40 CFR §122.62 and 40 CFR §124.

In addition to the annual submittal of the proposed SWMP revisions, this Order also requires the Department to submit workplans that explain how the program will be implemented in each District. The purpose of the workplans is to bring the proposed statewide program of the SWMP to the practical and implementable level at the District, watershed, and water body level.

Legal Authority
The Department has submitted a certification of adequate legal authority to implement the program. Through implementation of the storm water program, the Department may find that the legal authority is, in fact, not adequate. This Order requires the Department to reevaluate the legal authority each year and recertify that it is adequate. The Department is required to submit the Certification of the Adequacy of Legal Authority as part of the Annual Report each year. If it becomes clear that the legal authority is not adequate to fully implement the SWMP and the requirements of this Order, the Department must seek the authority necessary for implementation of the program.

Public Participation Requirements for SWMP Revisions

In ruling upon the adequacy of federal regulations for discharges from small municipal storm sewer systems, the court in *Environmental Defense Center v. United States EPA* (9th Cir. 2003) 344 F.2d 832 held that NPDES "notices of intent" that required the inclusion of a proposed storm water management program (SWMP) are subject to the public participation requirements of the federal Clean Water Act because they are functionally equivalent to NPDES permit applications and because they contain

"substantive information" about how the operator will reduce its discharges to the maximum extent practicable. By implication, the public participation requirements of the Clean Water Act may also apply to proposals to revise the Department's SWMP.

This Order provides for public participation in the SWMP revision process. However, because there may be a need for numerous revisions to the SWMP during the term of this Order, a more streamlined approach to SWMP revisions is needed to provide opportunities for public hearings while preserving the State Water Board's ability to effectively administer its NPDES storm water permitting program. (See *Costle v. Pacific Legal Foundation* (1980) 445 U.S. 198, 216-221, *Natural Resources Defense Council v. Costle* (9th Cir. 1977) 568 F.2d 1369, 1382.)

This Order establishes the following public participation process: Upon receipt of a proposed SWMP revision requiring approval of the State Water Board's Executive Director, and except as otherwise specified, the proposal will be publicly noticed for thirty days on the State Water Board's website. During the public notice period, a member of the public may submit a written comment or request that a public hearing be conducted. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing. Upon review of the request or requests for a public hearing, the Executive Director may, in its discretion, schedule a public hearing to take place before approval of the SWMP revision. The Executive Director shall schedule a hearing if there is a significant degree of public interest in the proposed revision. If no public hearing is conducted, the Executive Director may approve the SWMP revision if it meets the conditions set forth in this Order. Any SWMP revision approved by the Executive Director will be posted on the State Water Board's website. Significant changes to the SWMP will be brought to the State Water Board for approval.

SWMP Implementation Requirements

Management and Organization

The Department must maintain adequate funding to implement an effective storm water program and must submit an analysis of the funding each year. This includes a report on the funding that is dedicated to storm water as well as an estimate of the funding that has been allocated to various program elements that are not included in the storm water program funding. An example of this would be to estimate the funding that has been made available to the Maintenance Program to implement the development of Maintenance Facility Pollution Prevention Plans (FPPP) and to implement the BMPs that are necessary for water quality.

The Department's facilities and rights-of-way may cross or overlap other MS4s. The Department is required to coordinate their activities with other municipalities and local governments that have responsibility for storm water runoff. This Order requires the Department to prepare a Municipal Coordination Plan describing the approach that the Department will take in establishing communication, coordination, cooperation and collaboration with other storm water management programs.

Discharge Monitoring and Reporting Program

Since 1998, the Department has conducted monitoring of runoff from representative transportation facilities throughout California. The key objectives of the characterization monitoring were to achieve NPDES Permit compliance, produce scientifically credible data on runoff from the Department's facilities, and to provide useful information in designing effective storm water management strategies. Between 2000-2003, the Department conducted a three-year characterization monitoring study (Department, 2003a). The study included monitoring of over 60,000 data points from over 180 monitoring sites. Results were compared with California Toxics Rule (CTR) objectives and other relevant receiving water quality objectives (USEPA, 2000b). Copper, lead, and zinc were estimated to exceed the CTR objectives for dissolved and total fractions in greater than 50% of samples. Diazinon and chlorpyrifos were also found to exceed the California Department of Fish and Game recommended chronic criteria in a majority of samples.

A comprehensive water quality monitoring program is needed to ensure progress toward achievement of water quality standards and compliance with this Order. The Order requires the Department to designate a pool of 1,000 candidate effluent sampling sites for the Monitoring and Reporting Program that are representative of the diverse conditions in the State. A minimum of 100 sites from the pool must be sampled each year. Sites with pollutant levels below specified criteria need not be sampled in the following year. Sites with toxicity or elevated pollutant levels must have corrective actions and further monitoring.

It is the intent of this Order that the Department conduct an on-going compliance monitoring effort to identify and mitigate priority discharges. It is possible that a large number of sites will require further monitoring until the pollutant levels at those sites are brought below the monitoring criteria. To assure that new sites are monitored each season, this Order will require that a minimum of 50 new sites from the pool be monitored each year, regardless of the number of sites requiring further monitoring. A hypothetical example of a five-year sampling schedule is presented in Table 1. Years 3 and 4 require more than the minimum 100 sites because of the high number of sites needing continued monitoring. Year 5 indicates that discharges at a sufficient number of sites were brought under the monitoring criteria and do not need further monitoring.

Table 1. Hypothetical Example of a Five-Year Sampling Schedule

	Pre-Monitoring Season			Monitoring Results	
Year	Pool[1]	Sites Needing Further Monitoring[2]	Total	Sites Above Monitoring Criteria	Sites Below Monitoring Criteria
1	100	0	100	40	60
2	60	40	100	60	40
3	50	60	110	65	45
4	50	65	115	50	65
5	50	50	100	0	100

[1] Number of new sites chosen out of the candidate pool to replace sites from the previous season
[2] Sites from the previous season requiring further monitoring.

Monitoring constituents to be analyzed were chosen by the State Water Board from the results of the Department's comprehensive, multi-component storm water characterization monitoring program conducted in 2002 and 2003 and various other characterization studies.

The Monitoring and Reporting Program requires acute and chronic toxicity testing. Toxicity in storm water discharges from the Department's rights-of-way has been reported in a number of studies. A 2005 report prepared for the Department by the University of California at Davis "Toxicity of Storm Water from Caltrans Facilities" reported significant occurrences of acute and chronic toxicity (Department, 2005). Toxicity Identification Evaluations showed toxicity from a number of compounds, including heavy metals, organic compounds, pesticides and surfactants.

Toxicity is commonly evaluated in terms of both acute toxicity and chronic toxicity. "Acute toxicity concentration" can be expressed in Toxic Units Acute (TUa). "Chronic toxicity concentration" can be expressed in Toxic Units Chronic (TUc).

Elevated concentrations of pollutants in the Department's discharge may indicate impacts to receiving waters. Receiving water monitoring is required where the Department's effluent exceeds water quality standards or shows acute toxicity. Receiving water monitoring may be limited to the constituents with elevated concentrations, and may be limited further by a Regional Water Board. Receiving water monitoring must be comparable[1] with the Surface Water Ambient Monitoring Program (SWAMP), (SWAMP, 2010).

[1] USEPA defines comparability as the measure of confidence with which one data set, element, or method can be considered as similar to another. Functionally, SWAMP comparability is defined as adherence to the SWAMP Quality Assurance Program Plan and the Surface Water Ambient Monitoring Program Information Management Plan.

In addition to the monitoring needed to assess compliance with water quality standards and the requirements of this Order, an on-going monitoring program at fixed locations is needed to assess long-term trends in storm water quality. The Department is required under this Order to develop in year 1 and implement in year 2 a long-term monitoring program. Sites selected for long-term monitoring, as for compliance monitoring, should be representative of the diverse physical, geographic, and climatologic features of the state as well as the diversity of the Department's facilities and operations. The Department may utilize sites from which data have been collected under previous monitoring efforts.

Incident Reporting - Non-Compliance and Potential/Threatened Non-Compliance
The Department may at times be out of compliance with the requirements of this Order. Incidents of non-compliance and potential or threatened non-compliance must be reported to the State and Regional Water Boards. This Order identifies the conditions under which non-compliance reporting will be required. This Order distinguishes between emergency, field, and administrative (procedural) incidents that require notification to the State and Regional Water Boards, and requires that a summary of non-compliance incidents and the subsequent actions taken by the Department to reduce, eliminate and prevent the reoccurrence of the non-compliance be included in the Annual Report.

Emergency, field and administrative incidents are defined in Attachment I and have separate reporting requirements. Generally, failure to meet any permit requirement that is local or regional in nature will be reported to the Regional Water Boards. Failure to meet any requirement applicable on a statewide basis would be reported to the State Water Board. Thus, field and emergency non-compliance will generally be reported to the Regional Water Boards. Administrative non-compliance will be reported to the Regional Water Board or State Water Board depending on the nature of the non-compliance. For example, failure to submit a plan or information to a Regional Water Board as required in Attachment III would be reported to the Regional Water Board. Failure to submit an Annual Report would be reported to the State Water Board.

Project Planning and Design
In Order WQ 2000-11, the State Water Board considered Standard Urban Storm Water Mitigation Plans (SUSMPs) related to new development and redevelopment. The SUSMPs include a list of BMPs for specific development categories, and a numeric design standard for structural or treatment control BMPs. The numeric design standard created objective and measurable criteria for the amount of runoff that must be treated or infiltrated by BMPs. While this Order does not regulate construction activities, it does regulate the post-construction storm water runoff pursuant to municipal storm water regulations. SUSMPs are addressed in this Order through the numeric sizing criteria that apply to treatment BMPs at specified new and redevelopment projects and through requirements to implement Low Impact Development through principles of source control, site design, and storm water treatment and infiltration.

The Order provides the Department with an alternative compliance method for complying with the Treatment Control BMP numeric sizing criteria for projects where on-site treatment is infeasible. Under that method, the Department may comply with the

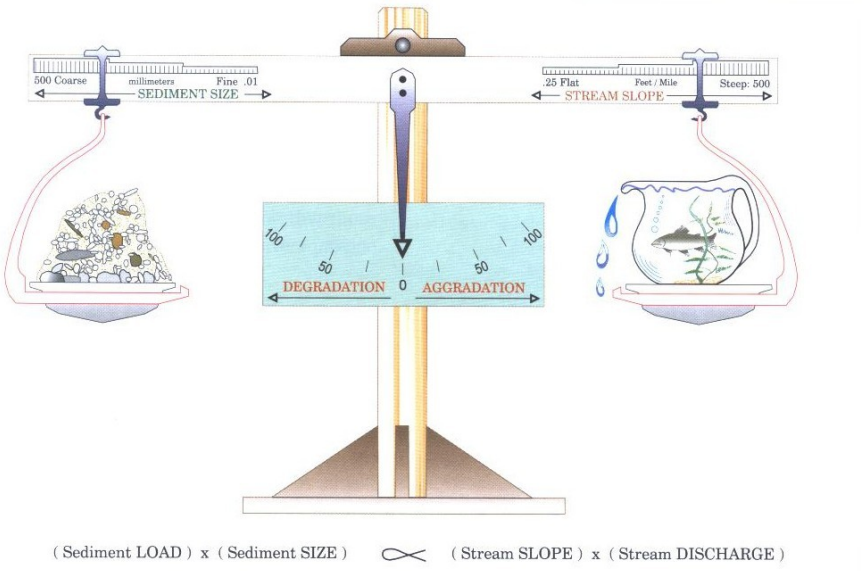
requirements by installing and maintaining equivalent treatment BMPs at an offsite location within the watershed, or by contributing funds to achieve the same amount of treatment at a regional project within the watershed. This compliance method will provide some flexibility to the Department in meeting the treatment control requirements while implementing the recommendation in Order WQ 2000-11 that municipal storm water permits encourage regional solutions that can provide cost-savings for the discharger while ensuring the same amount of treatment levels when cumulatively compared to smaller scale projects.

Hydromodification and Channel Protection

Department development and redevelopment projects have the potential to negatively impact stream channels and downstream receiving waters. The potential impacts of hydromodification by Department projects must be assessed in the project planning and design stage, and measures taken to mitigate them. This section describes the rationale and approach for the hydromodification and channel protection requirements.

A dominant paradigm in fluvial geomorphology holds that streams adjust their channel dimensions (width and depth) in response to long-term changes in sediment supply and bankfull discharge. The bankfull stage corresponds to the discharge at which channel maintenance is the most effective, that is, the discharge at which the moving sediment, forming or removing bars, and forming or changing bends and meanders, are doing work that results in the average morphologic characteristics of channels (Finkenbine, 2000). A.W. Lane showed the generalized relationship between sediment load, sediment size, stream discharge and stream slope, as shown in Figure 2, (Rosgen, 1996). A change in any one of these variables sets up a series of mutual adjustments in the companion variables resulting in a direct change in the physical characteristics of the stream channel.

Figure 2 - Schematic of the Lane Relationship



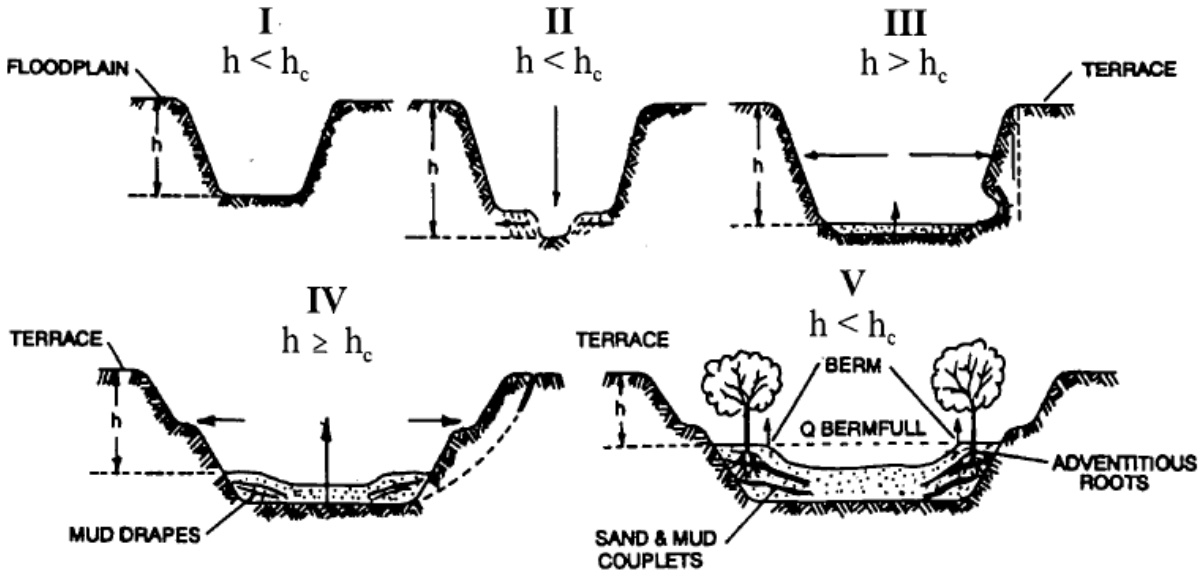
After Lane (1955) as cited in Rosgen (1996)

Stream slope times stream discharge (the right side of the scale) is an approximation of stream power, a unifying concept in fluvial geomorphology (Bledsoe, 1999). Urbanization generally increases stream power and affects the resisting forces in a channel (represented as sediment load and sediment size on the left side of the scale).

During construction, sediment loads can increase from 2 to 40,000 times over pre-construction levels (Goldman, 1986). Most of this sediment is delivered to stream channels during large, episodic rain events (Wolman, 2001). This increased sediment load leads to an initial aggradation phase where stream depths may decrease as sediment fills the channel, leading to a decrease in channel capacity and an increase in flooding and overbank deposition. A degradation phase initiates after construction is completed.

Schumm et al (Schumm, 1984) developed a channel evolution model that describes the series of adjustments from initial downcutting, to widening, to establishing new floodplains at lower elevations (Figure 3).

Figure 3 - Channel Changes Associated with Urbanization



h = bank height
hc = critical bank height (the bank is susceptible to failure when bank heights are greater than critical bank height. Stable banks have low angles and heights)

After Incised Channel Evolution Sequence in Schumm et. al 1984

Channel incision (Stage II) and widening (Stages III and to a lesser degree, Stage IV) are due to a number of fundamental changes on the landscape. Connected impervious area and compaction of pervious surfaces increase the frequency and volume of bankfull discharges (Stein, 2005; Booth, 1997), resulting in an increase in stream power. Increased drainage density (miles of stream length per square mile of watershed) also affects receiving channels (May, 1998; SCVURPPP, 2002). Increased drainage density and hydraulic efficiency leads to an increase in the frequency and volume of bankfull discharges because the time of concentration is shortened. Flows from engineered pipes and channels are also often "sediment starved" and seek to replenish their sediment supply from the channel.

Encroachment of stream channels can also lead to an increase in stream slope, which leads to an increase in stream power. In addition, watershed sediment loads and sediment size (with size generally represented as the median bed and bank particle size, or d_{50}) decrease during urbanization (Finkenbine, 2000; Pizzuto, 2000). This means that even if pre- and post- development stream power are the same, more erosion will occur in the post-development stage because the smaller particles are less resistant.

As shown in Stages II and III, the channel deepens and widens to accommodate the increased stream power (Hammer, 1973; Booth, 1990) and decrease in sediment load and sediment size. Channels may actually narrow as entrained sediment from incision is deposited laterally in the channel (Trimble, 1997). After incised channels begin to migrate laterally (Stage III), bank erosion begins, which leads to general channel widening (Trimble, 1997). At this point, a majority of the sediment that leaves a drainage area comes from within the channel, as opposed to the background and construction related hillslope contribution (Trimble, 1997). Stage IV is characterized by more aggradation and localized bank instability. Stage V represents a new quasi-equilibrium channel morphology in balance with the new flow and sediment supply regime. In other words, stream power is in balance with sediment load and sediment size.

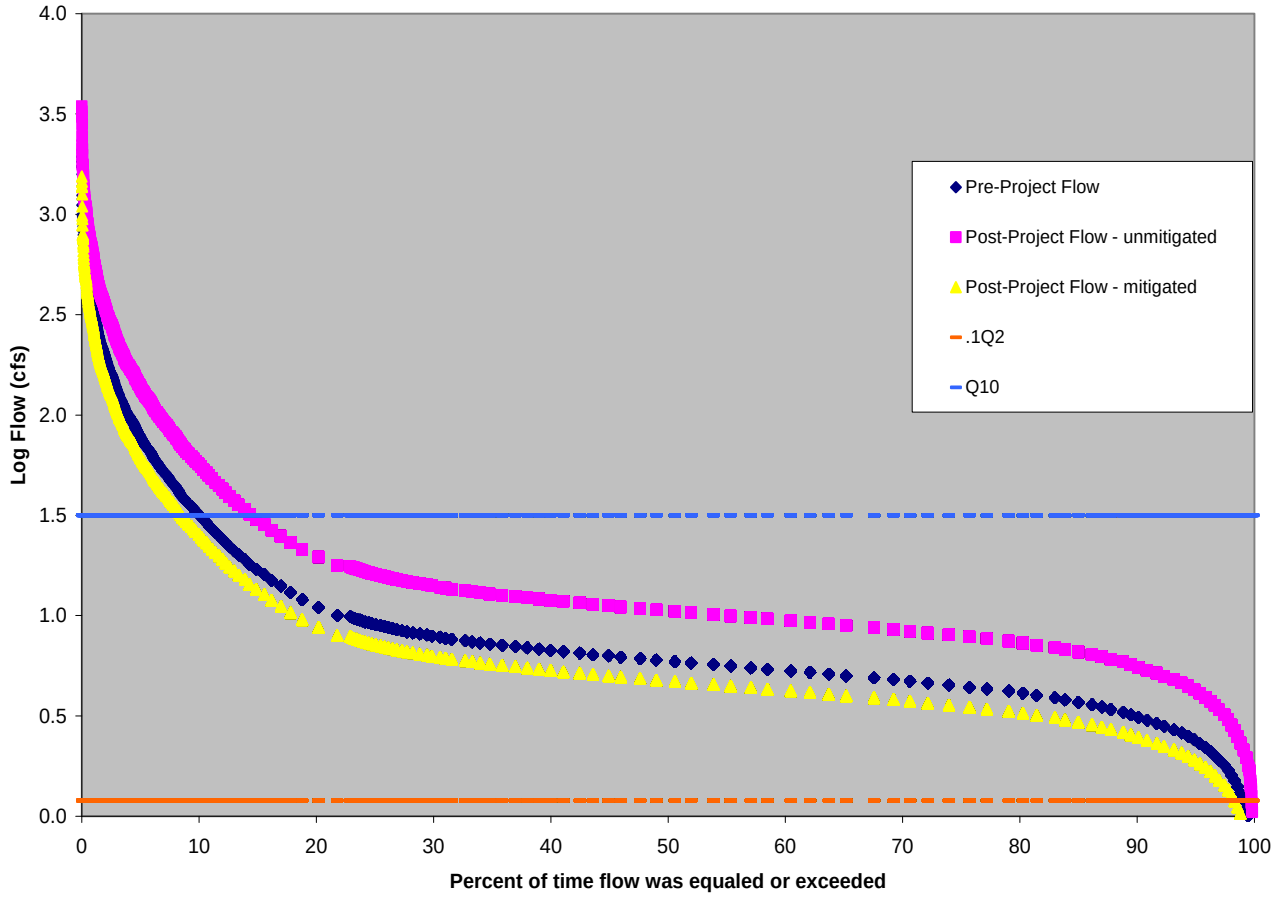
The magnitude of the channel morphology changes discussed above varies along a stream network as well as with the age of development, slope, geology (sand-bedded channels may cycle through the evolution sequence in a matter of decades whereas clay-dominated channels may take much longer), watershed sediment load and size, type of urbanization, and land use history. It is also dependent on a channel's stage in the channel evolution sequence when urbanization occurs. Management strategies must take into account a channel's stage of adjustment and account for future changes in the evolution of channel form (Stein, 2005).

The hydromodification requirements in this Order are based on established Federal Highway Administration procedures for assessing stream stability at highway crossings. These procedures are geomorphically based and have historically been used to inform bridge and culvert design and to ensure that these structures are not impacted by decreased lateral and vertical stability (FHWA, 2001; FHWA, 2006). Maintaining lateral and vertical stability will not only protect highway structures but will serve the broader interest of maintaining stable stream form and function.

These hydromodification requirements are risk based and reflect the concept that stable channels (as determined from a Level 1 rapid analysis) do not have to undergo any further analysis and that hydrology-based performance standards are protective.

Projects must meet a hydrology-based runoff curve number and time of concentration performance standards, which is a simplified version of the one contained in the CGP. If projects cannot meet the standard, projects must demonstrate that they will match pre-project discharge rates and durations for 10% of the 2-year flow ($.1Q_2$) up to and including the 10-year flow (Q_{10}). Figure 4 illustrates a flow duration curve for Morrison Creek in Sacramento County for 48 years of flow data (USGS, 2009). The $.1Q_2$ and Q_{10} flows are shown as hypothetical post-project scenarios (mitigated and unmitigated). Mitigated flows rely on flow duration control basins, low impact development techniques, or a combination of the two. Under the mitigated scenario, the project is in compliance because project-related discharge rates and durations are below pre-project levels for all flows from $1Q_2$ up to and including Q_{10}. Projects with unmitigated flows (i.e., flows from projects with traditional flood control facilities designed to meet a peak flow standard) would be out of compliance.

Figure 4- Flow Duration Curve (log intervals for Morrison Creek, Sacramento County (Water Years 1960 – 2008)



In practice, a continuous simulation model (e.g., HEC-HMS using the Soil Moisture Accounting Methodology, Hydrologic Simulation Program Fortran (HSPF), etc) would be used with a long term (i.e., 30-years or more) rainfall record to generate pre- and post-project flow duration curves for a specific project.

If stream channels are determined to be laterally and or vertically unstable, the analysis procedures are much more rigorous and the mitigation measures are potentially more extensive. There is support in the literature for the type of tiered, risk-based approach taken in this Order (Booth, 1990; Watson, 2002; Bledsoe, 2002; Bledsoe et al., 2008).

Low Impact Development (LID)
On January 20, 2005, the State Water Board adopted sustainability as a core value for all California Water Boards' activities and programs, and directed State Water Board staff to consider sustainability in all future policies, guidelines, and regulatory actions. Sustainability can be achieved through appropriate implementation of the LID techniques required by this Order.

The 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 (USEPA, 2007). Further, properly implemented LID techniques reduce the volume of runoff leaving a newly developed or re-developed area thereby lowering the peak rate of runoff, and thus minimizing the adverse affects of hydromodification on stream habitat (SWRCB, 2007). The requirements of this Order facilitate the implementation of LID strategies to protect water quality, reduce runoff volume, and to promote sustainability.

Unlike traditional storm water management, which collects and conveys storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID takes a different approach by using site design and storm water management to maintain the site's pre-development runoff rates and volumes. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall. LID has been a proven approach in other parts of the country and is seen in California as an alternative to conventional storm water management.

LID is a tool that can be used to better manage natural resources and limit the pollution delivered to waterways. To achieve optimal benefits, LID needs to be integrated with watershed planning and appropriate land use programs. LID by itself will not deliver all the water quality outcomes desired; however, it does provide enhanced storm water treatment and mitigates increased volume and flow rates (SWRCB, 2007).

This Order approaches LID through source control design principles, site design principles and storm water treatment and infiltration principles. Source control and site design principles are required as applicable to provide enough flexibility such that projects are not forced to include inappropriate or impractical measures. Not all of the storm water treatment and infiltration principles identified in the Order are required to be implemented

but are listed in order of preference with the most environmentally protective and effective alternatives listed first.

BMP Development and Implementation
As part of the SWMP, the Department has developed a BMP program for control of pollutants from existing facilities and for new and reconstructed facilities. This BMP program includes development, construction, maintenance and evaluation of BMPs, and investigation of new BMPs. The goal of BMP implementation is to control the discharge of pollutants to the applicable standards.

While erosion control BMPs are typically used on construction sites, some are used as permanent, post-construction BMPS. Typical erosion control BMPs involve use of straw or fiber rolls and mats. These rolls and mats are often held together by synthetic mesh or netting. Synthetic materials are persistent in the environment and have been found to be a source of pollutants, trash (Brzozowski, 2009), and hazard to wildlife through entrapment (Brzozowski, 2009; Barton and Kinkead, 2005; Walley et al, 2005; Stuart et al, 2001). For erosion control products used as permanent, post-construction BMPs, this Order requires the use of biodegradable materials, and the removal of any temporary erosion control products containing synthetic materials when they are no longer needed. Biodegradable materials are required in erosion control products used by the Departments of Transportation in the states of Delaware and Iowa (Brzozowski, 2009). Use of synthetic (plastic) materials is also prohibited through a Standard Condition in Streambed Alteration Agreements by the California Department of Fish and Game, Region 1 (Van Hattem, personal communication, 2009).

Construction
The Department's construction activities were previously regulated under the MS4 permit (Order 99-06-DWQ), which required the Department to comply with the substantive provisions of the CGP but not the requirement to file separate notices of intent for each construction project. Some Regional Water Boards have had difficulty enforcing the provisions of the CGP when enrollment under that permit is not required. This Order requires the Department to file for separate coverage for each construction project under the CGP. This change is expected to increase the Department's accountability for discharges from construction sites and improve the ability of the Regional Water Boards to take enforcement actions as necessary.

Though discharges from construction activities are not regulated under this Order, any discharges from a site occurring after completion of construction (i.e. post-construction discharges) are fully subject to the requirements of this Order.

Some Department construction-related activities such as roadway and parking lot repaving and resurfacing may mobilize pollutants, even though they may not trigger coverage under the CGP. Such activity may discharge pollutants to the environment, however. BMPs for the control of such discharges are specified in the Department's Project Planning and Design Guide and in the CASQA California Stormwater BMP Handbook (Department, 2007; CASQA, 2009). The Department is required to implement BMPs to control such discharges.

Because some Department construction projects may not involve grading or land disturbance of one acre or more, these smaller projects do not trigger requirements to enroll under the Construction General Permit. This Order requires the Department to implement BMPs to control discharges from such projects to the MEP. Failure to implement appropriate BMPs is a violation of this Order.

Maintenance Program Activities
Preservation of vegetation is an effective method for the control of pollutants in runoff; however the Department must control vegetation in its rights-of-way for purposes of traffic safety and nuisance. The Department currently implements a vegetation control program with a stated purpose of minimizing the use of agricultural chemicals and maximizing the use of appropriate native and adapted vegetation for erosion control, filtering of runoff, and velocity control.

Notwithstanding the Department's commitment to reduce the use of agricultural chemicals, the Department reported a total amount of 208,549 pounds of herbicide used in the 2008-2009 Storm Water Management Program Annual Report (Department (2010); CTSW-RT-10-182-32.1). Reported reasons for increased herbicide usage included:

1. Local weather conditions, such as increased rainfall, leading to increased weed production.
2. The need to address new mandates for fire suppression (fuel abatement) adjacent to roadways.
3. Requests from local cities and counties.
4. Increase in or outbreaks of noxious weeds in areas adjacent to farmland.

This Order contains detailed requirements for the control of vegetation and reporting requirements for the use of agricultural chemicals.

The Department's maintenance facilities discharge pollutants to the MS4. This Order requires the Department to prepare Facility Pollution Prevention Plans (FPPPs) for all maintenance facilities. The Department is also required to implement BMP programs at each facility as necessary and periodically inspect each facility.

Spill cleanup is part of the Department's maintenance program. This Order requires the Department to ensure that spills on its rights-of-way are fully and appropriately cleaned up, and to provide appropriate notifications to local municipalities which may be affected by the spill. The Department is also required to notify the appropriate Regional Water Board of any spill with the potential to impact receiving waters.

This Order requires the Department to monitor and clean storm drain inlets. For storm water structures that are found to contain excessive material on a regular basis, the Department must perform an Illegal Connection/Illicit Discharge (IC/ID) investigation, and determine if an enhanced BMP program is required.

This Order requires the Department to implement the BMPs and other requirements of the SWMP and this Order to reduce and eliminate IC/IDs. It also requires the Department to prepare a Storm Drain System Survey Plan and an Illegal Dumping Response Plan.

Facilities Operations
There is potential for the discharge of pollutants from Department facilities during rain events. The discharge of pollutants from facilities not covered by the Industrial General Permit will be reduced controlled to the MEP through the appropriate implementation of BMPs.

This Order requires the Department to file an NOI for coverage under the Industrial General Permit for industrial facilities as specified in Attachment 1 of the Industrial General Permit. This requirement is expected to increase the Department's accountability for discharges from industrial facilities and improve the ability of the Regional Water Boards to take enforcement actions as necessary.

Department Activities Outside the Department's Right-of-Way
Facilities and operations outside the Department's right-of-way may support various Department activities. Facilities may include concrete or asphalt batch plants, staging areas, concrete slurry processing or other material recycling operations, equipment and material storage yards, material borrow areas, and access roads. Facilities may be operated by the Department or by a third party. The Department is responsible for inspecting and ensuring that appropriate pollution prevention control measures are implemented at such facilities when these facilities are active for the primary purpose of accommodating Department activities.

Non-Department Projects and Activities
Non-Department projects and activities include construction projects or other activities conducted by a third party within the Department's right-of-way. The Department is responsible for runoff from all non-department projects and activities in its rights-of-way unless a separate permit is issued to the other entity. At times, local municipalities or private developers may undertake construction projects or other activities within the Department's right-of-way. The Department may exercise control or oversight over these third party projects or activities through encroachment permits or other means. This Order sets project planning and design requirements for non-Department projects.

Management Activities for Non-Storm Water Discharges
Non-storm water discharges are dry weather flows that do not originate from precipitation events. Non-storm water discharges are illicit discharges and are prohibited by the federal regulations (40 CFR 122.26 (d)(2)(iv)(B)(*1*)) unless exempted or separately permitted. Procedures for prohibiting illicit discharges and illegal connections, and for responding to illegal dumping and spills are needed to prevent environmental damage and must be described in the SWMP.

Training and Public Education

Education is an important element of municipal storm water runoff management programs. USEPA (2005) finds that "An informed and knowledgeable community is crucial to the success of a storm water management program since it helps ensure the following: Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important, [and] greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters."

USEPA also states "The public education program should use a mix of appropriate local strategies to address the viewpoints and concerns of a variety of audiences and communities, including minority and disadvantaged communities, as well as children."

This Order requires the Department to implement a Training and Public Education program. The Training and Public Education program focuses on three audiences: Department employees, Department contractors, and the general public. The Department must implement programs for all three audiences. The Training and Public Education program is considered a BMP and an analysis of its effectiveness is needed.

Program Evaluation
This Order requires the Department to evaluate the effectiveness and adequacy of the storm water program on an annual basis. This includes both water quality monitoring and a self-audit of the program. The audit is intended to determine the effectiveness of the storm water and non-storm water programs through the evaluation of factors and program components such as:

1. Storm water and non-storm water discharges, including pollutant concentrations from locations representative of the Department's properties, facilities, and activities;
2. Maintenance activity control measures;
3. Facility pollution prevention plans;
4. Permanent control measures; and
5. Highway operation control measures.

In addition to water quality monitoring and the self-audit, the Department must perform an Overall Program Effectiveness Evaluation each year to determine the effectiveness of the program in achieving environmental and water quality objectives. The scope of the evaluation is expected to increase each year in response to the continuing collection of environmental monitoring data.

Reporting
Comprehensive reporting is needed to determine compliance with this Order and to track the effectiveness of the Department's storm water program over time. A summary of the reports required from the Department is presented in Attachment III of the Order. The State Water Board and Regional Water Boards have the authority under various sections of the California Water Code to request additional information as needed.

The Department must track, assess and report on program implementation to ensure its effectiveness. In addition to the individual reports referenced above, the Department is required to submit an annual report to the State Water Board by October 01 of each year. The Annual Report must evaluate compliance with permit conditions, evaluate and assess the effectiveness of BMPs, summarize the results of the monitoring program, summarize the activities planned for the next reporting cycle, and, if necessary, propose changes to the SWMP.

Total Maximum Daily Load (TMDL)

Section 303(d) of the CWA requires States to identify waters ("impaired" water bodies) that do not meet water quality standards after applying certain required technology-based effluent limits. States are required to compile this information in a list and submit the list to the USEPA for review and approval. This list is known as the Section 303(d) list of impaired waters.

As part of the listing process, States are required to prioritize waters/watersheds for future development of TMDLs. A TMDL is defined as the sum of the individual waste load allocations (WLAs) for point sources of pollution, plus the load allocations (LAs) for nonpoint sources of pollution, plus the contribution from background sources of pollution and a margin of safety. The State Water Board and Regional Water Boards have ongoing efforts to monitor and assess water quality, to prepare the Section 303(d) list, and to subsequently develop TMDLs.

TMDLs are developed by either the Regional Boards or USEPA in response to Section 303(d) listings. TMDLs developed by Regional Boards include implementation provisions and can be incorporated as Basin Plan amendments. TMDLs developed by USEPA typically contain the total load and load allocations required by Section 303(d), but do not contain comprehensive implementation provisions. Subsequent steps after Regional Board TMDL development are: approval by the State Water Board, approval by the Office of Administrative Law, and ultimately, approval by USEPA.

The Department has been assigned mass based and concentration based WLAs for constituents contributing to a TMDL in specific regions. The Department is subject to TMDLs in the North Coast, San Francisco Bay, Central Coast, Los Angeles, Central Valley, Lahontan, Santa Ana, and San Diego Regions. These TMDLs are summarized in Table 2.

Table 2. Department Statewide TMDLs

Water Body	Pollutant	USEPA Approved/Established
North Coast Region		
Shasta River	Dissolved Oxygen & Temperature	January 26, 2007
Klamath River	Temperature, Dissolved Oxygen, Nutrient, & Microcystin	December 28, 2010

Water Body	Pollutant	USEPA Approved/Established
Lost River	Nitrogen and Biochemical Oxygen Demand	December 30, 2008
Scott River	Sediment	August 11, 2006
Albion River	Sediment	December 2001 & November 20, 2004
Big River	Sediment	November 29, 2004
Eel River, Lower HA	Sediment	November 29 , 2004
Eel River, Middle Fork, Eden Valley and Round Valley HSAs	Sediment	November 29, 2004
Eel River, Middle Main HA	Sediment	November 29, 2004
Eel River, North Fork HA	Sediment	November 29, 2004
Eel River, South Fork HA	Sediment	November 29, 2004
Eel River, Upper Main HA	Sediment	November 29, 2004
Garcia River	Sediment	January 3, 2002
Gualala River	Sediment	November 29, 2004
Mad River	Sediment	December 21, 2007
Mattole River	Sediment	November 29, 2004
Navarro River	Sediment	November 29, 2004
Noyo River	Sediment	November 29, 2004
Redwood Creek	Sediment	November 29, 2004
Ten Mile River	Sediment	November 29, 2004
Trinity River, Lower and Middle and Upper HAS	Sediment	November 29, 2004
Trinity River, South Fork HA	Sediment	November 29, 2004
Van Duzen River	Sediment	November 29, 2004
San Francisco Bay Region		
San Francisco Bay	PCBs	March 29, 2010
San Francisco Bay	Mercury	February 12, 2008
Urban Creek	Diazinon & Pesticide Toxicity	May 16, 2008
Sonoma Creek	Sediment	September 8, 2010
Napa River	Sediment	Pending
Central Coast Region		
San Lorenzo River (*includes Carbonera*	Sediment	February 19, 2004

Water Body	Pollutant	USEPA Approved/Established
Lompico, Shingle Mill Creeks)		
Morro Bay *(includes Chorro Creek, Los Osos Creek, and the Morro Bay Estuary)*	Sediment	January 20, 2004
Santa Maria River Watershed	Pesticides	Pending
Los Angeles Region		
Ballona Creek	Trash	August 1, 2002 & February 8, 2005
Revolon Slough and Beardsley Wash	Trash	February 27, 2008
Ventura River Estuary	Trash	February 27, 2008
Machado Lake	Trash	February 27, 2008
Legg Lake	Trash	February 27, 2008
Malibu Creek Watershed	Trash	June 26, 2009
Los Angeles River	Trash	July 24, 2008
Ballona Creek, Ballona Estuary, and Sepulveda Channel	Bacteria	March 26, 2007
Marina del Rey, Harbor Back Basins, Mother's Beach	Bacteria	March 18, 2004
Santa Monica Bay Beaches during Dry Weather	Bacteria	June 19, 2003
Santa Monica Bay Beaches during Wet Weather	Bacteria	June 19, 2003
Malibu Creek and Lagoon	Bacteria	January 10, 2006
Harbor Beaches of Ventura County (Kiddie Beach and Hobie Beach)	Bacteria	December 18, 2008
Ballona Creek	Metals	December 22, 2005 and reaffirmed on October 29, 2005
Calleguas Creek and its Tributaries and Mugu Lagoon	Metals and Selenium	March 26, 2007
Los Angeles River	Metals	October 29, 2008
Ballona Creek Estuary	Toxic Pollutants	December 22, 2005
Marina del Rey Harbor	Toxic Pollutants	March 16, 2006

Water Body	Pollutant	USEPA Approved/Established
Calleguas Creek it Tributaries and Mugu Lagoon	Organochlorine Pesticides, Polychlorinated Biphenyls, and Siltation	March 14, 2006
Los Angeles River	Nitrogen Compounds	March 18, 2004
Machado Lake	Eutrophic, Algae, Ammonia, and Odors (Nutrient)	March 11, 2009
Upper Santa Clara River	Chloride	April 6, 2010
Santa Clara River	Nitrogen Compounds	March 18, 2004
Central Valley Region		
Cache Creek, Bear Creek, Sulphur Creek and Harley Gulch	Mercury	February 7, 2007
Clear Lake	Nutrients	September 21, 2007
Sacramento – San Joaquin Delta	Methylmercury	Pending
Lahontan Region		
Truckee River	Sediment	September 16, 2009
Colorado River Basin Region		
Coachella Valley Storm Water Channel	Bacterial Indicators	Pending
Santa Ana Region		
Lake Elsinore and Canyon Lake	Nutrients	September 30, 2005
Big Bear Lake	Nutrients for Hydrological Conditions	September 25, 2007
San Diego Creek and Upper & Lower Newport Bay	Organochlorine Compounds	Pending
San Diego Creek	Selenium	June 14, 2002
Newport Bay and San Diego Creek	Metals	June 14, 2002
Rhine Channel (Newport Bay)	Chromium and Mercury	June 14, 2002
Newport Bay, San Diego Creek,	Organochlorine (DDT, Chlordane, Dieldrin, PCBs, and Toxaphene)	June 14, 2002
San Diego Region		
Chollas Creek	Diazinon	November 3, 2003
Rainbow Creek	Total Nitrogen and Total Phosphorus	March 22, 2006
Chollas Creek	Dissolved Copper, Lead, and Zinc	December 18, 2008
Project 1 – Revised Twenty Beaches and Creek in the San Diego Region (Including Tecolote Creek)	Indicator Bacteria	Pending

Water Body	Pollutant	USEPA Approved/Established
Tijuana River and Estuary	Trash & Sediment	Pending
Los Penasquitos Lagoon	Sedimentation	Pending

Pursuant to 40 CFR 122.44(d)(1)(vii)(B), the effluent limitations for NPDES permits must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. This Order requires the Department to comply with all effective[2] TMDLs for which it has been assigned a WLA, where roads have been assigned a WLA or load allocation (LA), or where the Department is specifically assigned actions to implement the TMDL. Many of these requirements originate from the TMDL implementation plans. These implementation plans reflect the "assumptions" of the WLAs or LAs assigned to the Department. As required by 40 CFR 122.44(d)(1)(vii)(B), this Order assigns requirements as necessary to be consistent with the underlying TMDL implementation plans. This Order requires the Department to conduct monitoring as provided in the adopted and approved TMDLs and requires the Department to prepare a TMDL Status Review report.

The requirements of this Order, including the requirement to implement BMPs contained in the TMDL implementation plans, are expected to be sufficient to implement the WLAs in each TMDL for which the Department has been assigned a WLA.

Because the TMDL-based requirements of this Order have been imposed to comply with 40 CFR 122.44(d)(1)(vii)(B), the requirements are not subject to the MEP standard. The Department must implement all controls necessary to meet the WLAs or LAs included with the TMDL, or where the Department is specifically assigned actions to implement the TMDL. Implementation requirements for each TMDL are contained in the Regional Water Board Basin Plans and adopted orders and are incorporated into this Order by reference (see Attachment IV). TMDLs approved during the term of this Order will be incorporated into this Order through the same public participation process prescribed for revisions to the SWMP.

This Order may be reopened by the State Water Board as necessary to incorporate new TMDLs, revisions to existing TMDLs, and specific implementation requirements for existing TMDLs developed by a Regional Board for inclusion in this Order.

Implementation requirements for certain TMDLs[3] in watersheds under the jurisdiction of the San Francisco Bay Regional Water Board are not explicit in the Basin Plan and adopted orders and resolutions. Facts supporting the inclusion of these requirements in Attachment IV are stated below.

[2] TMDL effective dates vary depending on the specific language for each TMDL.
[3] San Francisco Bay PCBs, San Francisco Bay Mercury, Sonoma Creek Sediment and Napa River Sediment. See Attachment IV.

San Francisco Bay PCBs TMDL
The TMDL includes a WLA of 2 kg/yr for storm water runoff that applies to all storm water management agencies including the Department. The TMDL Implementation Plan calls for implementation of the allocation through NPDES permit requirements based on a permit-term assessment of controls to reduce PCBs to the MEP. Since specific PCB control strategies are relatively untested, the TMDL Implementation Plan calls for implementation of control measures on a pilot scale in this first five-year permit term to determine their effectiveness and technical feasibility. Subsequent permits will include requirements and a schedule to implement technically feasible, effective and cost efficient control measures to attain allocations.

The pilot projects called for in this Order are consistent with those required to be implemented by municipal storm water management agencies covered by the San Francisco Bay Municipal Regional Stormwater Permit issued by the San Francisco Bay Water Board in October 2009 (Order No. R2-2009-0074, NPDES Permit No. CAS612008). The required pilot projects in that permit were based on an evaluation of control measures that included stakeholder participation and scientific review ("Regional Stormwater Monitoring and Urban BMP evaluation: A Stakeholder-driven partnership to reduce Contaminant Loadings," http://www.sfei.org/urbanstormwaterBMPs).

The TMDL Implementation Plan also calls for storm water permittees to develop and implement a monitoring system to quantify PCBs urban storm water runoff loads and the load reductions achieved through treatment, source control and other actions.

San Francisco Bay Mercury TMDL
The TMDL includes a WLA of 82 kg/yr for urban storm water runoff that applies to all urban runoff management agencies including the Department. The TMDL Implementation Plan calls for the Department to develop an equitable allocation-sharing scheme that reflects the Department's load reduction responsibility in consultation with urban runoff management agencies and report the details to the Regional Water Board. Alternatively, the Department may choose to implement load reduction actions on a watershed or regionwide basis in lieu of sharing a portion of an urban runoff management agency's allocation.

Similar to the San Francisco Bay PCBs TMDL, the San Francisco Bay mercury TMDL Implementation Plan calls for implementation of the allocation through NPDES permit requirements based on a permit-term assessment of controls to reduce mercury to the MEP and to develop and implement a monitoring system to quantify mercury loads or loads reduced through control actions. Mercury and PCBs tend to be sediment-bound in storm water runoff and as such, control measures that reduce PCBs should also reduce mercury. Therefore, the first permit term requirements for implementing the mercury TMDL allocation are the same as the PCBs requirements.

Sonoma Creek Sediment TMDL
The Sonoma Creek Sediment TMDL includes a WLA of 100 metric tons/year that applies to storm water runoff discharges from Department roadways and facilities associated with

construction and/or maintenance activities. It also includes a LA of 2,100 metric tons/year that applies to a roads and streams crossings source category that the Department shares with other entities.

The WLA was based on estimated sediment loadings from the Department's maintenance and construction activities assuming compliance with the maintenance activities and construction related requirements in the Department's previous permit. The maintenance activities requirements in this new permit, which are consistent with and not less stringent than those in the previous permit, and the requirements of the new Statewide Construction General Permit, which are also no less stringent than those in the previous permit, should be sufficient to implement the WLA.

To implement the roads and stream crossings allocation, the TMDL Implementation Plan establishes a performance standard for roads to design, construct, and maintain rural roads to minimize road-related sediment delivery to streams, and calls on entities responsible for paved roads, such as the Department, to conduct a survey of stream-crossings associated with paved public roadways and develop a prioritized implementation plan for repair and/or replacement of high priority crossings/culverts to reduce road related erosion and protect stream-riparian habitat conditions.

Napa River Sediment TMDL

The Napa River Sediment TMDL includes a WLA of 600 metric tons/year that applies to storm water runoff discharges from Department roadways and facilities associated with construction and/or maintenance activities. It also includes a LA of 27,000 metric tons/year that applies to a roads and streams crossings source category that the Department shares with other entities.

The WLA was based on estimated sediment loadings from the Department's maintenance and construction activities assuming compliance with the maintenance activities and construction related requirements in the Department's previous permit. The maintenance activities requirements in this new permit, which are consistent with and not less stringent than those in the previous permit, and the requirements of the new Statewide Construction General Permit, which are also no less stringent than those in the previous permit, should be sufficient to implement the WLA.

To implement the roads and stream crossings allocation, the TMDL Implementation Plan establishes a performance standard for roads as follows: road-related sediment delivery to channels should be ≤ 500 cubic yards per mile per 20 year period. The TMDL Implementation Plan also calls on entities responsible for paved roads, such as the Department, to conduct a survey of stream crossings associated with paved public roadways and develop a prioritized implementation plan for repair and/or replacement of high priority crossings/culverts to reduce road related erosion and protect stream-riparian habitat conditions.

Region Specific Requirements

The Regional Water Boards have identified specific areas within their Regions requiring special conditions (Attachment V). These special conditions are needed to account for the unique value of the resource(s) within the Region, special pollutant or pollution control issues within the Region, or storm water management and compliance issues applicable to the Region. These special requirements need not be applied statewide but are applicable only to the Regions as specified in Attachment V. Region-specific requirements are included for the North Coast, San Francisco Bay, Los Angeles, Central Valley, Lahontan, and San Diego Regional Water Boards.

In connection with a Consent Decree entered to resolve litigation in United States v. California Department of Transportation (No. 97-0037-EIG), the Department agreed to implement certain retrofit and permanent post-construction treatment controls in watersheds under the jurisdiction of the San Diego Regional Water Board. Specifically, in a Certificate of Compliance submitted to USEPA on July 1, 2008, and in subsequent written correspondence dated August 12, 2008, October 3, 2008, and January 7, 2009, the Department represented that it would meet the requirements of paragraph 6.61 of the Consent Decree with a retrofit program as proposed at Table 5-3 of its proposed 2004 permit reapplication/SWMP, setting out a list of Approved Treatment BMPs, as supplemented by the list of controls identified in Table 2-5 of the Department's May 2007 Project Planning and Design Guide, at page 2-12. The foregoing information is part of the administrative record for this Order, and the terms of this Order are consistent with the understandings and agreements reached in the Consent Decree, the Certificate of Compliance, and the referenced subsequent written correspondence.

Regional Water Board Authorities

Regional Water Quality Control Boards and their staff will oversee implementation and compliance with this Order. As appropriate, they will review reports, conduct inspections, and take enforcement actions on violations of this Order.

Cost of Compliance and Other MEP Considerations

The Department will incur incremental costs in implementing this Order, such as the cost of complying with the Order's storm water treatment BMP, post-construction, hydromodification, Low Impact Development, and monitoring and reporting requirements. The Department will also incur additional costs in following the iterative process as required by the Order. The cost of complying with TMDL waste load allocations is not considered since TMDLs are not subject to the MEP standard.

In adopting Order WQ 2000-11, the State Water Board found that cost is a relevant factor, among others such as feasibility and public acceptance, that should be considered in determining MEP. The State Water Board considered the costs in preparing this Order and has determined that the costs reflect the MEP standard. The State Water Board further found in adopting Order WQ 2000-11 that in considering the cost of compliance, it is also important to consider the costs of impairment; that is, the negative impact of

pollution on the economy and the positive impact of improved water quality. So, while it is appropriate and necessary to consider the cost of compliance, it is also important to consider the larger economic impacts of implementation of the storm water management program.

It is very difficult to precisely determine the true cost of implementation of the Department's storm water management program as affected by this Order. A study by the Los Angeles Regional Water Board reported wide variability in the cost of compliance among municipal permit holders which was not easily explained (LARWQCB, 2003). Due to the extensive, distributed nature of the Department's MS4, the uncertainty of the extent of needed improvements and the difficulty in isolating program costs attributable to permit compliance, the true cost of implementation can only be discussed in a general way.

Many studies have been undertaken to assess the cost of compliance with storm water permits. Most studies have focused on municipal programs as opposed to "linear MS4s" or Departments of Transportation.

In 1999, United States Environmental Protection Agency (USEPA) reported on multiple studies it conducted to determine the cost of urban runoff management programs. A study of Phase II municipalities determined that the annual cost of the Phase II program was expected to be $9.16 per household. USEPA also studied 35 Phase I municipalities, finding costs to be similar to those anticipated for Phase II municipalities, at $9.08 per household annually (USEPA, 1999a).

A program cost study was also conducted by the Los Angeles Regional Water Board, where program costs reported in the municipalities' annual reports were assessed. The Water Board estimated the average per household cost to implement the MS4 program in Los Angeles County was $12.50.

The State Water Board also commissioned a study by California State University, Sacramento to assess costs of the Phase I MS4 program. This study is current and includes an assessment of costs incurred by the City of Encinitas in implementing its program. Annual cost per household ranged from $18-46, with the City of Encinitas representing the upper end of the range (SWRCB, 2005). The cost of the City of Encinitas' program is understandable, given the city's coastal location, reliance on tourism, and additional costs resulting from a consent decree with environmental groups regarding its program. For these reasons, as well as the general recognition the city receives for implementing a superior program, the city's program cost can be considered as the high end of the spectrum for municipal storm water management program costs.

The California Department of Finance (Finance, 2003) conducted a comprehensive review of the Department's storm water program. Finance noted widely divergent compliance cost estimates produced by regulators and environmental organizations versus consultant's estimates. Finance also had difficulty identifying compliance costs because of the way storm water activities are integrated with other functions and allocated among the different divisions within the Department, and because they are funded from different sources. Finance made three findings related to cost:

1. The projected costs of compliance are escalating.
2. Storm water compliance costs are integrated into many of the Department's business processes and are not accurately tracked.
3. As storm water compliance costs increase, the amount of funding available for highway projects decreases, which reduces the number of projects that can be constructed.

The review concluded that balancing costs and benefits is a difficult policy decision and there should be a recognition of the trade-offs associated with resource allocation decisions given the Department's limited resources.

It is important to note that storm water program costs are not all attributable to compliance with MS4 permits. Many program components and their associated costs existed before any MS4 permits were issued. For example, for the Department, storm drain maintenance, street sweeping and trash/litter collection costs cannot be solely or even principally attributable to MS4 permit compliance since these practices have long been implemented before the MS4 permit was issued. Even many structural BMPs (erosion protection, energy dissipation devices, detention basins etc.) are standard engineering practice for many projects and are not implemented solely to comply with permit provisions. Therefore, the true cost resulting from MS4 permit requirements is some fraction of the cost to operate and maintain the highway system.

The California State University, Sacramento study found that only 38% of program costs are new costs fully attributable to MS4 permits. The remainder of program costs was either pre-existing or resulted from enhancement of pre-exiting programs (SWRCB, 2005). The County of Orange found that even lesser amounts of program costs are solely attributable to MS4 permit compliance, reporting that the amount attributable to implement its Drainage Area Management Plan is less than 20% of the total budget. The remaining 80% is attributable to pre-existing programs (County of Orange, 2007). Any increase in cost to the Department by the requirements of this Order will be incremental in nature.

Storm water management programs cannot be considered solely in terms of their costs. The programs must also be viewed in terms of their value to the public. For example, household willingness to pay for improvements in fresh water quality for fishing and boating has been estimated by USEPA to be $158-210 per household (USEPA, 1999a). This estimate can be considered conservative, since it does not include important considerations such as marine waters benefits, wildlife benefits, or flood control benefits. The California State University, Sacramento study corroborates USEPA's estimates, reporting annual household willingness to pay for statewide clean water to be $180 (SWRCB, 2005). Though these costs may be assessed differently at the state level (for the Department) than at the municipal level, the results indicate that there is public support for storm water management programs and that costs incurred by the Department to implement its storm water management program remain reasonable.

It is also important to consider the cost of not implementing a storm water management program. Urban runoff in southern California has been found to cause illness in people bathing near storm drains (Haile et al.,1996). A study of south Huntington Beach and north Newport Beach found that an illness rate of about 0.8% among bathers at those beaches resulted in about $3 million annually in health-related expenses (Lin, 2005). Extrapolation of such numbers to the beaches and other water contact recreation areas in the state would increase these numbers significantly.

Storm water runoff and its impact on receiving waters also impacts the tourism industry. The California Travel and Tourism Commission (2009) estimated that in 2008 direct travel spending in California was $97.6 billion directly supporting 924,000 jobs, with earnings of $30.6 billion. Travel spending in 2008 generated $1.6 billion in local taxes and $2.8 billion in state taxes. Impacts on tourism from storm water runoff (e.g. beach closures) can have a significant impact on the economy. The experience of Huntington Beach provides an example of the potential economic impact of poor water quality. Approximately 8 miles of Huntington Beach were closed for two months in the middle of summer of 1999, impacting beach visitation and the local economy.