EXECUTIVE SUMMARY

The federal Clean Water Act requires that discharges from large and medium municipal separate storm sewer systems (MS4) be in compliance with National Pollutant Discharge Elimination System (NPDES) permits. The Clean Water Act further requires that the discharge of pollutants from the MS4 is to be reduced to the "maximum extent practicable" (MEP). The NPDES permits for MS4s, adopted by the Regional Water Quality Control Boards (Regional Water Boards) require the municipalities to implement various programmatic elements that have the goal of reducing the pollutants in the storm water discharges.

One of the challenges that the Regional Water Boards, municipalities implementing storm water programs, and the public have faced when reviewing program implementation, is assessing whether or not the programs are in fact improving water quality. Assessment of a program as a whole and linking activities conducted with water quality improvement are difficult tasks. It may not be possible to immediately assess a program as a whole, but it is possible to begin developing assessment tools that use a system of tiers or levels that eventually lead to an assessment of the program as a whole.

While the determination of whether or not water quality is improving as a result of storm water program implementation may take years, efforts need to be taken now in order to begin the process of evaluating the storm water program implementation as a whole in order to better understand the relationships between implementation and water quality.

This paper lays out a framework for assessing the effectiveness of MS4 program implementation as a whole, rather than looking at the individual programmatic elements.

Guidance for Assessing the Effectiveness of Municipal Storm Water Programs and Permits

I. Purpose of this Guidance Document

The purpose of this guidance document is to assist the State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Board) (collectively, Water Boards) in assessing the effectiveness of the storm water programs being implemented by local agencies in compliance with NPDES permits issued for discharges from municipal separate storm sewer systems (MS4). It establishes standardized concepts and terminology, presents a general framework for conducting assessments, and identifies issues to be considered in exploring and adopting specific permit conditions for assessment. This document does not, and is not intended to provide guidance on substantive implementation requirements to be included in municipal storm water permits. Such guidance would be beyond the scope of this document. In accordance with the requirements of Water Code section 13383.7 (added by Assembly Bill 739, Chapter 610 of the Statutes of 2007 [Attachment A]), this document promotes the use of quantifiable measures for evaluating the effectiveness of municipal storm water programs and provides for the evaluation of all of the following:

- "Compliance with storm water permitting requirements;
- "Reduction of pollutant loads from pollution sources;
- "Reductions of pollutants or stream erosion due to storm water discharge; and
- "Improvements in the quality of receiving water in accordance with water quality standards."

While the primary purpose of this document is to provide Water Board staff with the tools needed to assess effectiveness, storm water program managers within local agencies can also use the principles found in this document to assess the effectiveness of their program implementation.

II. Introduction

In California, there are currently 21 municipal storm water permits for large and medium MS4s (Phase I MS4 permits). Collectively, the Phase I MS4 permits address the storm water discharges from approximately 300 cities, counties and special districts. In 2003, the State Water Board adopted a general storm water permit for small municipal storm sewer systems (Phase II MS4 permit), which addresses municipal areas with populations less than 100,000 that are either located within a census-defined "urbanized area" or designated as subject to permit pursuant to the terms of the Phase II MS4 permit**.**

The MS4 permits require the implementation of programs that have many substantive elements, including, but not limited to: public education and outreach; commercial, industrial and construction activities inspection; illegal connection/illicit discharge detection and elimination; and post-construction storm water controls. The Water Boards generally presume that the effective implementation of these programs will result in improved water quality. However, making the connection between program implementation and water quality improvement has been a challenge for regulators and

permittees. Water Board staff often evaluate program implementation activities and are not always able to link program implementation with measureable water quality improvements.

Many of the Phase I MS4 permits require permittees to conduct an effectiveness assessment. Because the requirements vary from permit to permit and to date, the Regional Water Board staff have not had a consistent means of conducing an effectiveness assessment evaluation, it has been difficult to conduct regionwide comparisons of permittees' programs. Likewise, permittees generally do not conduct regionwide or statewide comparisons of programs. Having a consistent statewide framework for effectiveness assessments will be critical to determining the water quality benefits of these programs.

The California Stormwater Quality Association (CASQA) described "effectiveness assessment" in a 2005 white paper titled "An Introduction to Stormwater Program Effectiveness Assessment" as follows:

> *Effectiveness assessment is a fundamental and necessary component of developing and implementing successful programs. It begins with the establishment of goals, objectives, and desired outcomes during program planning, and continues throughout subsequent implementation and review stages. A well-executed assessment element can provide managers the feedback necessary to determine whether their programs are achieving intended outcomes (complying with permit requirements, increasing public awareness, changing behaviors, etc.), and ultimately whether continued implementation will result in water quality and/or habitat improvement.*
>
> *Storm water managers currently find themselves at an important crossroads. Faced with a continually increasing need to demonstrate measurability and accountability, they must have a reasonable expectation of success before committing resources toward specific activities. Therefore, good effectiveness assessment tools are critical. Managers have historically relied on a combination of programmatic or implementation evaluations and direct water quality evaluations to determine whether their efforts are effective in achieving intended outcomes. In addition, some program managers are still in need of basic information on useful assessment methods.*

Many of the assessments conducted in the early phases of program implementation focused on measuring the success of education and outreach efforts and whether or not increased knowledge has led to behavioral changes. While these are important, it is also important to assess both permit compliance and whether the program implementation is resulting in improved water quality.

While there have been efforts to develop tools for conducting effectiveness assessments of MS4 programs (Attachment C provides a non-exhaustive list), none has met the specific requirements of Water Code section 13383.7.

As outlined in Water Code section 13383.7, "…after holding public workshops and soliciting public comments, the State Board shall develop a comprehensive guidance document for evaluating and measuring the effectiveness of municipal storm water management programs undertaken, and permits issued, in accordance with Section 402(p) of the Clean Water Act and this division …. The state board and the regional boards shall refer to the guidance document…when establishing requirements in municipal storm water programs and permits." As specified in Government Code section 11352, subdivision (c), "the development, issuance, and use" of this guidance document is not subject to the administrative rulemaking provisions of the California Administrative Procedures Act.

This effectiveness assessment guidance is largely the result of the collective work of a sub-group of the Storm Water Advisory Task Force appointed by the State Water Board pursuant to Water Code section 13383.8 (added by AB 739). While it used the *Municipal Storm water Program Effectiveness Assessment Guidance* (CASQA, May 2007) as the foundation for this guidance, the sub-group relied upon its own expertise to adapt the broad concepts of the CASQA Guidance and other effectiveness guidance documents to meet the requirements of the statute.

Because effectiveness assessment is a developing discipline, users are encouraged to consult the references listed in Attachment C for more detailed information. In several instances, the terminology and content presented in this guidance document are slightly modified from the CASQA Guidance and other references primarily because of new hydromodification requirements that have been added to many MS4 permits.

III. Overview of General Concepts

Effectiveness assessment is the process that managers use to evaluate whether their programs are resulting in desired outcomes, and how the achievement of outcomes in programs and implementing populations is related to MS4 discharges and receiving water conditions. This section introduces the main elements of effectiveness assessment and introduces standardized concepts and terminology.

A. Assessment Outcomes

Outcomes are end results associated with the implementation of storm water control measures, program activities or elements, or overall programs. Outcomes are essential to effectiveness assessment because they define specific measurement points to which storm water programs can be targeted, evaluated, and periodically modified. Outcomes can be broadly categorized according to six levels as described below and shown in **Figure 1**.

☑ **Outcome Level 1: Storm Water Program Activities.** Many program activities are either required by or necessary to meet the requirements of storm water permits. For example, MS4 permittees are required to provide education and outreach, to inspect industrial facilities, and to enforce discharge prohibitions. Level 1 Outcomes provide a means of evaluating whether or not program activities are being implemented in accordance with permit requirements. They are essential to the effectiveness

assessment process because they represent the means by which MS4 permittees influence or control other Outcome Levels.

- ☑ **Outcome Level 2: Knowledge and Awareness.** An important goal of storm water programs is to increase the knowledge and awareness of target audiences such as residents, businesses, and municipal employees. Increasing awareness and changing attitudes about storm water pollution and control measures is generally assumed to be necessary as a basis for achieving targeted behavioral changes. Level 2 Outcomes provide a means of gauging whether outreach, training, or other facilitation activities are achieving progress toward these changes.
- ☑ **Outcome Level 3: Behavior.** Level 3 Outcomes measure the effectiveness of programs in effecting changes in the behavior of target populations. A wide variety of behaviors are addressed by municipal storm water programs. For example as a result of education and outreach, residents may pick up after their pets, or reduce pesticide use in their gardens. Likewise, municipal employees may be required to modify road maintenance practices, or to install and maintain permanent post-construction structural BMPs.
- ☑ **Outcome Level 4: Source Load Reductions.** Source load reductions are changes in the amounts of pollutants associated with specific sources before and after a BMP or other control strategy is employed. Reductions can be measured in terms of a pollutant load or in the volume of water that is being discharged. Because these reductions can directly impact the quality and quantity of MS4 discharges (Outcome Level 5) to receiving waters (Outcome Level 6), many storm water program activities are intended to reduce pollutant loadings from targeted sources or reduce/eliminate flows associated with non-storm water discharges.
- ☑ **Outcome Level 5: MS4 Discharge Quality & Hydrology.** Pursuant to the Clean Water Act (Section 402(p)) the discharge of pollutants to surface waters from an MS4 must be reduced to the maximum extent practicable. Consequently, storm water must be effectively managed and non-storm water discharges must be effectively prohibited to ensure that these discharges do not cause or contribute to violations of water quality standards in receiving waters. In addition to improvements in storm water quality, the runoff being generated by a given sized storm and the rate at which it is discharged to and from the MS4 are factors that need to be considered in order to protect the receiving waters from stream erosion and other harm. Level 5 Outcomes are a critical expression of successful program implementation because they can provide a direct linkage between the sources regulated by storm water programs and the receiving waters they are intended to protect.
- ☑ **Outcome Level 6: Receiving Water Conditions.** The overriding objective of storm water management programs is to protect the water bodies receiving discharges from MS4s. Changes to receiving water and environmental quality may be expressed through a variety of outcomes such as compliance with water quality standards, protection of biological integrity, and beneficial use attainment. Level 6 assessments may be complicated by the fact that receiving water conditions may reflect pollutants and flows discharged from sources other than MS4s.

Figure 1: Overview of Assessment Outcomes and Elements

Assessment Elements	Implementation Assessment	Target Audience & Pollutant Source Reduction Assessment			MS4 Discharge Effluent & Receiving Water Assessment	
	Integrated Assessment					
Outcome Levels and Types	**Outcome Level 1** **Storm water Program Activities**	**Outcome Level 2** **Knowledge & Awareness**	**Outcome Level 3** **Behavior**	**Outcome Level 4** **Source Load Reduction**	**Outcome Level 5** **MS4 Discharge Quality & Hydrology**	**Outcome Level 6** **Receiving Water Conditions**
						
	▪ Program administration ▪ Facilitation activities ▪ Feedback activities	▪ Knowledge ▪ Awareness	▪ Information seeking ▪ Pollution reporting ▪ Participation and involvement ▪ Administrative and procedural behaviors ▪ Implementation of control measures ▪ Regulatory compliance	▪ Pollutant loads ▪ Reduction in runoff volumes	▪ MS4 Discharge quality ▪ MS4 Discharge hydrology	▪ Receiving water quality ▪ Hydromodification impacts ▪ Beneficial use protection

B. Assessment Elements

As shown in Figure 1 above, a comprehensive assessment strategy will address four broad assessment elements – Implementation Assessment, Target Audience and Pollutant Source Reduction Assessment, MS4 Discharge Effluent and Receiving Water Assessment and an Integrated Assessment. These four elements take into account the six (6) outcome levels described above.

☑ **Implementation Assessment (Outcome Level 1)** is the analysis of the effectiveness of storm water programs in meeting required or targeted implementation objectives (completion of inspections, etc.). See Section IV.A for additional detail on Implementation Assessment.

☑ **Target Audience and Pollutant Source Load Reductions Assessment (Outcome Levels 2-4)** is the analysis of changes in the individuals, populations, and sites or sources to which program activities are directed. Examples of changes include increased knowledge, behavioral changes of target populations and best management practice (BMP) implementation. See Section IV.B for additional detail on Target Audience and Pollution Source Assessment. In addition, data gathered through direct measurement or estimated indirectly may be analyzed in order to determine the existence of trends relative to pollutant source loads and any reductions occurring due to the implementation of best management practices. See Section IV.C for additional detail on Pollution Source Load Reduction Assessment.

☑ **MS4 Discharge Effluent and Receiving Water Assessment (Outcome Levels 5 and 6))** is the use of environmental data and related information to characterize the hydrologic and water quality characteristics of storm water discharges. See Section IV.D for additional information on MS4 Discharge Reduction in Pollutants and Reduction in Stream Erosion. See Section IV.F for information on Monitoring Program Design considerations. Environmental data is used to characterize the water quality and stream health (associated with hydromodification) characteristics of receiving waters subject to MS4 discharges. See Section IV.E for additional information on Receiving Water Monitoring Assessment and Section IV.F for information on Monitoring Program Design considerations.

☑ **Integrated Assessment (Outcome Levels 1-6)** is the evaluation of relationships between Outcomes and Outcome Levels. Considered most broadly, Integrated Assessment is intended to address the relationship between program implementation and receiving water conditions. It can also include numerous other, more narrowly-defined objectives (e.g., the relationship of targeted behaviors to source pollutant load reductions, or that of MS4 discharge quality to receiving water conditions). See Section IV.D for additional detail on Integrated Assessment. See Section IV.G for additional information on Integrated Assessment.

C. Assessment Measures and Methods

For Effectiveness Assessment to be successful, it is critical that specific measures and methods be established and consistently utilized for each identified Assessment Outcome.

☑ **Assessment Measures** are established to determine whether or how successfully an Outcome has been achieved. Measures may be qualitative (e.g., yes / no) or quantitative (% of targeted

audience reached, % reduction in a constituent level, etc.). All priority Outcomes should have at least one Assessment Measure associated with them, but some may have more than one.

☑ **Assessment Methods** are the specific activities, actions, or processes used to obtain and evaluate assessment data or information. Depending on the particular outcome in question, numerous assessment methods may be possible. Reasons for selecting a particular method include cost, ease of use, need for statistical rigor, applicability, and clarity in communicating progress to the general public. Assessment Methods are a critical consideration during the design of the feedback strategies discussed in Section IV, which provides an overview of the methods that should typically be used by storm water programs to gather data and information.

D. Targeting Assessment Outcomes

An important consideration in establishing Assessment Outcomes is the selection of measurable targets, performance standards, or other metrics that can be used in assessing the effectiveness of the programs being implemented.

Targets can be taken from the permit requirements or Storm Water Management Programs. These would include activities such as establishment of a complaint response program, measurable goal commitments made by Phase II MS4 permittees, or the implementation plans for permittees assigned with total maximum daily load (TMDL) waste load allocations.

Performance standards can also be taken from the permit requirements. In some instances the permit will specify the level of effort on an activity level (e.g., inspect 25% of high priority industrial facilities annually).

As the assessment moves from activities to water quality improvements, the outcomes will likewise shift from counting completed activities to quantifying reductions in pollutant loading or improvements in water quality, both effluent and receiving water.

IV. Guidance for Evaluating the Effectiveness of MS4 Programs

A comprehensive effectiveness assessment strategy will ideally address four distinct types of assessment activity, each of which is described below. The degree to which each element can be incorporated in individual effectiveness assessments will vary depending on the details of the storm water management program, the assessment objectives, and the timeframe of analysis. It is critical that appropriate timeframes be established and considered in setting requirements for and evaluating effectiveness assessments. In particular, it is unlikely that Integrated Assessment methods and principles are sufficiently evolved to allow their incorporation into effectiveness assessments at this time.

This guidance document encourages the use of checklists for assessing the effectiveness of program elements. Attachment C provides sample questions and checklists, organized by outcome levels that can be used by Regional Water Boards in assessing the effectiveness of MS4 programs.

A. Implementation Assessment (Outcome Level 1)

1. Overview

Implementation Assessment is the analysis of how well MS4s are meeting required, targeted, or desired implementation objectives (completion of inspections, etc.). In this context, the term "storm water programs" should be broadly interpreted to include all aspects of storm water program management, including those focused on non-storm water discharges. Implementation Assessment addresses three primary objectives:

- Objective 1: Determine whether program implementation is achieving required, targeted, or desired outcomes.
- Objective 2: Characterize changes in program implementation results over time.
- Objective 3: Establish a basis for addressing Integrated Assessment Elements 1 and 3

A comprehensive Implementation Assessment strategy will ideally address three levels of analysis: (1) the overall storm water management program; (2) the elements that comprise the program (public education and outreach; illegal connection/illicit discharge detection and elimination; commercial, industrial and construction runoff controls; municipal operations; and post-construction storm water controls, etc.); and (3) the specific activities that are conducted within individual program elements (inspections, street sweeping, debris collection, or implementation of best management practices). Depending on the intended objectives at each level, assessment approaches will vary. The assessment approaches may range in complexity from verifying the completion of activities to more sophisticated techniques such as assessing the probable or actual locations of sources and activities and the significance of their spatial distribution.

Elements of the storm water program that should be considered in Implementation Assessment include, but are not limited to:

- Land Use Planning and Land Development Activities (including planning, construction, and post-construction phases)
- Residential Areas and Sources
- Industrial and Commercial Sources (including stationary and mobile)
- Municipal Sources and Operations
- Public Education and Outreach (including adults and schoolchildren)
- Public Participation
- Illegal Connection / Illicit Discharge Detection and Elimination

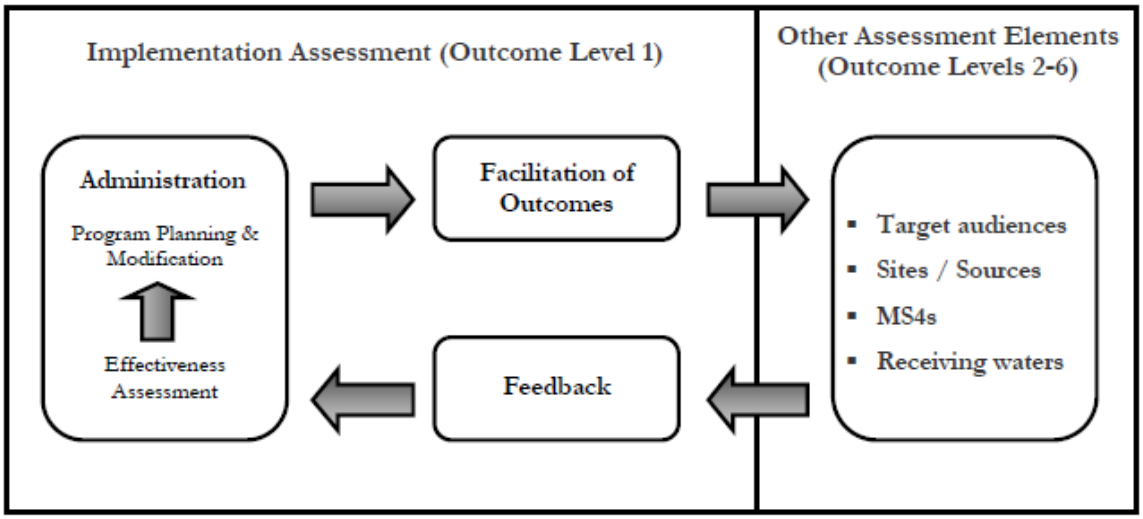
Each of these elements can be further broken down into the various activities that are conducted pursuant to the requirements contained in the permit and/or storm water management program (SWMP).

Within each of these elements, it is convenient to consider program activities according to three broad categories:

- Administration
- Facilitation, and
- Feedback

Figure 2 illustrates how these categories of activity are related as part of an ongoing adaptive management process, each continuously informing the next in an iterative cycle of feedback and improvement. To be successful, Effectiveness Assessment must not only begin during program planning, but key measures and metrics must be tracked during implementation and routinely evaluated as part of an ongoing assessment process. This enables MS4 Permittees to identify and implement needed program modifications to ensure continuous program improvement. Currently, much of the effectiveness assessment is focused on Outcome level 1. However, over time, the effectiveness assessments will begin to address Outcome levels 2 – 6 as shown in Figure 2.

Figure 2: Implementation Assessment as Part of an Iterative Program Approach



Administrative Activities support the effective operation or management of the storm water program. These activities typically include reviewing and updating program implementation strategies and other supporting program elements such as source inventories and program documentation. They are focused solely on the program itself. Many administrative activities are explicitly required by storm water permits, and therefore must be assessed and reported to maintain regulatory compliance; others are implicitly required, or simply necessary to assure the ongoing implementation of a quality program.

Facilitation Activities assist, encourage, or require changes in the knowledge or behaviors of the individuals and populations to which program activities are directed. To be successful, Storm water Management Programs must bring about (or "facilitate") changes in target populations (municipal staff, contractors, or the public) that will in turn result in the protection of receiving water conditions.

Table 1 describes Facilitation Activities that are typical of Storm Water Management Programs. As shown, MS4 programs can employ a considerable number of options to facilitate intended outcomes. Not all need to be tracked or assessed. Because the strategy for achieving a given targeted outcome (or set of outcomes) often includes multiple facilitation activities (e.g., permitting, industry outreach, partnerships, etc.), the importance of assessing each is usually directly related to its importance in that overall strategy. For example, if an MS4 Permittee relies primarily on the permitting or inspection process to ensure BMP implementation on construction sites, industry workshops might be a minor emphasis, or not included at all, when conducting assessments. As such, MS4 Permittees should be encouraged to propose, with justification, specific facilitation activities to be measured and included in their assessment strategies.

Table1– Examples of Activities to Facilitate Outcomes

Activity Type	Description
Agreements	Formal agreements such as contracts, leases, and maintenance agreements are often used to require contractors or other regulated parties to implement required control measures.
Licenses and Permits	Licenses (pesticide use, etc.) or permits (grading, hazardous materials, statewide Construction General Permit, etc.) may be used to require regulated parties to implement required control measures.
Plan Requirements	A number of different plans (grading, storm water pollution prevention plan [SWPPP], etc.) may be used to require regulated parties to implement required control measures. Plans are often required as a condition of the issuance of a license or permit.
Educational Outreach	Various outreach methods can be used to bring about changes in knowledge or awareness in target populations. Outreach is often embedded in inspection or other regulatory processes, but may also be approached independently through a variety of means such as workshops, trainings, mass media, field trips, and distribution of brochures.
Partnerships	MS4 permittees can often extend the reach of their programs by partnering with other parties such as professional and industry organizations. Partners may develop or print materials, conduct outreach or training for their members, or conduct a variety of other activities that support the MS4 permittee's objectives.
Incentives	Incentives can be used to motivate, reward, or recognize municipal staff (time off, bonuses, etc.) or external audiences (prizes, reductions in permit fees, etc.).
Waste Collection and Recycling Services	Waste collection and recycling services are often used to assist residents and businesses in properly disposing of wastes. Common examples include: • Household hazardous waste collection • Used motor oil collection • Trash collection
Enforcement / Disciplinary Action	Whether formal or informal, enforcement actions can be used to encourage or require compliance with applicable legal requirements. Disciplinary actions are commonly used in an analogous role for municipal staff.

Feedback Activities are conducted to determine whether and to what degree targeted Level 1, 2, 3, or 4 outcomes have occurred in implementing populations, or to evaluate Level 5 and 6

outcomes. **Table 2** presents and describes examples of Feedback Activities that are typical of many programs.

Table 2 – Examples of Feedback Activities

Activity Type	Description
Internal Tracking by Storm Water Program	Internal tracking and evaluation of data is the primary means by which outcome Level 1 activities can be assessed.
Reporting to Storm Water Program	Various types of program data or information may be reported to the storm water program either by regulated parties or other municipal staff who are not part of the storm water program. In some instances, regulated parties must periodically certify compliance with specific requirements (e.g., maintenance of structural treatment controls).
Site Investigations	Site inspections and audits are among the most common tools used to verify compliance or gather additional data and information. Inspections typically consist of observations, record reviews, and sampling as needed. Complaint investigations are similar to site inspections except that they are in response to reports of potential violations (e.g., through complaints or staff referrals).
Surveying and Testing	Surveys, tests, and quizzes are important for assessing Level 2 and 3 outcomes in target populations. Surveys are generally focused on entire populations (e.g., all residents) or sub-populations (e.g., used oil recyclers), and tests and quizzes administered to individuals (e.g., municipal staff, schoolchildren, etc.). Tests and quizzes are fundamentally different in that surveys generally focus on understanding the prevalence or distribution of attitudes, knowledge, or behaviors within a population, whereas tests and quizzes focus on "correct" knowledge, i.e., respondents' understanding of specific facts.
Monitoring and Sampling	Monitoring or sampling of MS4 discharges and receiving water quality may be required by the MS4 permit, or may occur as part of routine programs (e.g., dry weather field investigations) or in response to conditions identified during other investigations. Sampling may be focused on MS4 discharges, receiving waters, or the sources discharging to them.

2. Outcomes, Measures, and Methods

The most basic means of assessing measuring Level 1 Outcomes is to determine compliance with activity-based permit requirements. Level 1 Outcome measures may therefore take the form of a simple yes/no answer. They may also be quantified, counted, or tracked over time to demonstrate effort or progress.

B. Target Audience and Source Assessment (Outcome Levels 2 to 3)

1. Overview

Target Audience and Source Assessment is the analysis of changes in the individuals, populations, and sites or sources to which program activities are directed. Examples of changes include increased knowledge and increased BMP implementation. Knowledge and behavior are intimately related. Changes in behavior must be accompanied or preceded by corresponding changes in knowledge or awareness. However, increases in knowledge will not necessarily bring

about desired behavioral changes. Moreover, knowledge and awareness may often be considered beneficial whether or not they lead to quantifiable behavioral changes.

By focusing on changes in implementing populations, Level 2 and 3 Outcomes provide an important bridge between program activity and pollutant load reductions. In some cases, measuring Level 2 and 3 Outcomes is appropriate; in others, measuring Level 2 Outcomes can demonstrate progress toward behavioral change.

Assessments should provide an effective mix of these measures for all major program elements. Target Audience and Source Assessment addresses five primary objectives:

- Objective 1: Characterize the existing knowledge and awareness of target populations (i.e. establish baseline).
- Objective 2: Characterize changes in the knowledge and awareness of target populations over time.
- Objective 3: Characterize the existing behaviors of target populations (i.e. establish baseline).
- Objective 4: Characterize changes in the behaviors of target populations over time.
- Objective 5: Establish a basis for addressing Integrated Assessment Objectives 2 and 3.

2. Outcomes, Measures, and Methods

Various methods and tools, both quantitative and qualitative, are currently utilized to measure knowledge and awareness. These generally take the form of surveys and quizzes. Knowledge and awareness may also be inferred by tracking levels of public involvement (e.g., through complaints or requests for information received via storm water hotlines).

Methods used to measure Level 3 Outcomes (behavioral changes) include those described above for Level 2 Outcomes (knowledge and awareness), as well as direct observation via site visits and reporting by dischargers or third parties.

C. Source Load Reductions Assessment (Outcome Level 4)

1. Overview

Source Load Reductions are most valuable for making broad comparisons or for helping managers to distinguish where resource allocations are likely to be most useful. They also help to determine whether permittees are reducing the discharge of pollutants to "the maximum extent practicable." Developing a baseline of data and information to support source load reduction estimates is key to their application. Development of such a baseline, as well as approaches for incorporating direct measurement, is expected to allow a significant expansion of the use of source load reduction estimates.

The assessment of Source Load Reductions can generally be considered to address three primary objectives:

- Objective 1: Characterize pollutant loads from actual or potential sources.
- Objective 2: Characterize changes in pollutant loads from sources.
- Objective 3: Establish a basis for addressing Integrated Assessment Elements 2 and 3 (see Section IV.G).

One of the challenges in estimating source load reductions is the number of factors that affect the quality of the discharge. These factors would include the timing of the storm (first of the season, last of the season, etc.), how many dry days occurred before the storm, the intensity of the storm, the rainfall amount, etc. In many instances, estimates of loads are made from a snapshot in time.

2. Outcomes, Measures and Methods

Various methods are available to determine source load reductions. However they are reliant upon the permittees' characterization of the sources of pollutants in storm water. Once the characterization studies have been conducted, the permittees can measure the amounts of pollutants that are being removed through the implementation of BMPs (both structural and non-structural) or calculate the amounts of pollutants being removed based upon accepted performance of structural BMPs. There will need to be a tracking mechanism relative to the placement and types of structural BMPs that are put in place, matched with the pollutant(s) that are being targeted. Over time, the efficacy of the structural BMPs can be monitored in order to refine the estimated pollutants being removed.

Source load reductions are generally measured in three different ways: (1) directly measured, (2) monitored, and (3) calculated.

- Directly Measured Reductions are the result of activities such as, street sweeping or waste collection where it is possible to directly measure pollutants captured. In these activities, measurements such as the cubic yards of material swept up from the streets or the amount of waste collected via the various recycling programs can be quantified. In this instance, permittees may presume that the source load reduction is comparable to the directly measured quantity.
- Monitored Reductions would occur in those places where structural controls, site storm water controls, basins, etc. have been implemented. The quality of runoff that goes into a treatment device would be measured and compared to the quality of the treated runoff. Likewise, the volume of runoff could be measured both before and after the installation of controls.
- Calculated Reductions are those that can be inferred from known or assumed parameters such as the pollutant removal efficiency of a BMP and the concentration of the target pollutant in the flow being treated by the BMP. For additional considerations in calculating reductions based on BMP performance, see "Design Standards for Structural Controls" below.

- Reductions in pollutant loadings can also be inferred from survey results (i.e. are there more people who claim to pick up after their dogs over a given period of time?) and from compliance activities (is the municipality using more pet waste bags at the dog parks or parkways over time?).
- Combined Approaches
  A combined approach would compare the calculated reductions for a given device with monitoring to determine if in fact the reductions were as anticipated.

Design Standards for Structural Controls

Where structural control BMPs are required, criteria should be established for the reporting of the control devices' design performance. This provides consistency in comparing the effectiveness of the device chosen and ensures to a degree that the device selected will in fact be effective. Factors that the criteria should report include the applicable pollutant(s) of concern to be treated, drainage area to be treated, volume and/or rate of runoff to be treated.

Permits should require those permittees using structural controls to compare the design performance of the structural control with specified BMP performance criteria for storm water pollutants of concern (see Table 3 below as an example). For these structural control BMPs, permittees should be required to report the performance of the BMP relative to the median water quality performance for the 85th percentile design storm. BMPs installed in watersheds with 303(d) listed water bodies where storm water has been determined to be a contributor to the impairement or a history of water quality standards exceedances associated with storm water discharges should be reported in a separate category. Expected BMP pollutant removal performance for effluent quality can be found at the WERF-ASCE/ U.S. EPA International BMP Database (http://www.bmpdatabase.org). Permittees should report the performance of structural BMPs based on the primary class of pollutants likely to be discharged from the site/facility (e.g. metals from an auto repair shop).

To evaluate program effectiveness, Regional Water Boards may consider whether permittees have developed guidance for the use of structural BMPs that is based on BMP performance. The guidance should apply to expected project types and receiving water conditions. Where structural controls are being used for the treatment of pollutants causing a water quality impairment, permittees should be required to report on the BMP selection process. This report would include a comparison of the performance of the selected BMP with other BMPs that target the same pollutant(s) and provide a rationale for the selection.

Table 3 Example Structural BMP Performance Values
Effluent Concentrations as Median Values

BMP Category	TSS mg/L	Total Nitrate-N mg/L	Total Cu, ug/L	Total Pb, ug/L	Total Zn, ug/L
Detention Pond	27	0.48	15.9	14.6	58.7
Wet Pond	10	0.2	5.8	3.4	21.6
Wetland Basin	13	0.13	3.3	2.5	29.2
Biofilter	18	0.36	9.6	5.4	27.9
Media Filter	11	0.66	7.6	2.6	32.2

Hydrodynamic Device	23	0.29	11.8	5	75.1

Hydrology and Stream Erosion

Urbanization changes the timing and intensity of stream flows. The changes in stream hydrology are associated with the impervious surfaces that are created when urbanization takes place. These changes to the hydrologic characteristics of a creek or stream include more frequent flooding, destabilized stream banks, armoring of stream banks with riprap and concrete, loss of streamside trees and vegetation, destruction of stream habitat, discharge of pollutants to surface water bodies, and other adverse impacts to beneficial uses of the waters of the State.

The increased volumes and velocities of storm water associated with impervious areas can be substantially reduced by providing facilities and features that detain and infiltrate storm water. To most closely replicate natural hydrology, the facilities and features are kept small-scale and distributed as much as possible throughout a development site or watershed. Schueler (1995) proposed imperviousness as a "unifying theme" for the efforts of planners, engineers, landscape architects, scientists, and local officials concerned with urban watershed protection. Schueler argued that (1) imperviousness is a useful indicator linking urban land development to the degradation of aquatic ecosystems, and (2) imperviousness can be quantified, managed, and controlled during land development.

A concept popularly known as "Low Impact Development" (LID) uses site design for infiltration, onsite use and/or evapotranspiration of runoff. This is accomplished by minimizing impervious area; using pervious pavements and green roofs; dispersing runoff to landscaped areas; capturing the water for subsequent use; and routing runoff to rain gardens, cisterns, swales and other small-scale facilities distributed throughout a site. In practical terms, the capability of a storm water program to ensure that LID features and facilities are thoroughly incorporated in the early planning of development and re-development projects and are properly designed and constructed is of great consequence to this aspect of the program's overall effectiveness.

D. MS4 Discharge Monitoring (Outcome Level 5)

1. Overview

The assessment of MS4 discharges (Level 5) relative to the reduction in pollutants discharged and/or the impacts these discharges have on the physical characteristics of the receiving waters (stream erosion) uses data, monitored and observed, to characterize the quality of non-storm water or storm water discharges and measure the physical characteristics of the receiving creeks, streams, and rivers.

Level 5 assessments can generally be considered to address five primary objectives:

- Objective 1: Characterize the baseline quality of discharges from the MS4.
- Objective 2: Characterize changes in the quality of discharges from the MS4.

- Objective 3: Characterize the baseline hydrology of storm water discharges in the urban environment.
- Objective 4: Characterize changes in the hydrology of storm water discharges in the urban environment and their effects on stream erosion.
- Objective 5: Establish a basis for addressing Integrated Assessment Elements 2 and 3.

Objectives 1 and 2 – Monitoring and Characterizing MS4 Discharge Quality

A standard provision applicable to most MS4 permittees is a prohibition against discharges that cause or contribute to exceedances of water quality standards. In order to determine whether storm water discharges cause or contribute to exceedances of water quality standards in receiving waters and assess pollutant concentrations over time, permittees need a well-designed discharge quality monitoring program. A well designed discharge quality monitoring program is one where the purpose of the monitoring has been well defined. Asking a series of questions can help define the purpose. Restating the the objectives as questions is a starting point:

What is the quality of the discharge from the MS4?
Is it changing?

The data/information that is gathered through the monitoring program should answer the questions being asked.

Objectives 3 and 4 – Monitoring and Characterizing Hydrology and Stream Erosion.

A well designed hydrology and stream erosion monitoring program is one where the purpose of the monitoring has been well defined. Asking a series of questions can help define the purpose. Key questions are:

What are the hydrologic characteristics of the MS4 discharge in the urban environment?
How are they changing?

2. Outcomes, Measures and Methods

Measurements and Methods for MS4 Discharge Monitoring

Through a well-developed program to monitor the discharges from the MS4, the effectiveness of the on-ground program implementation can be assessed. Monitoring would also lend itself to comparing similar land uses where there are differences in the types of BMPs (structural and non-structural) that are being used. However, it should be noted that monitoring to determine trends in the amounts of pollutants being discharged may take a long period of time. Monitoring programs that evaluate the quality of the discharge from the MS4 should take into account the land uses of the area monitored and should include monitoring during both wet weather and dry weather. See Attachment D Monitoring Program Design for additional considerations in developing and implementing a discharge monitoring program.

a. Considerations for MS4 Discharge Monitoring

i. Outfall Monitoring - A representative set of outfalls should be monitored to estimate the annual pollutant load. Permittees should conduct monitoring at these outfalls each year during storm events and the dry season. Samples from each outfall monitoring station should be analyzed for pollutants of concern related to the questions used to define the purpose of the monitoring.

ii. Toxicity Monitoring - Toxicity testing can be a "safety net" for any NPDES monitoring program. A representative set of outfalls should be monitored for chronic and acute toxicity each year during storm events and the dry season.

b. Measurements and Methods for Monitoring and Characterizing Hydrology and Stream Erosion

There are many effective ways to measure efforts to minimize changes to the timing and intensity of stream flows. The most direct way is to gauge rainfall and stream flows for many years. The objective is often to measure whether a watershed maintains or restores, as nearly as possible, the pre-project relationship between rainfall and storm water runoff for a wide range of rainfall intensities and durations. In practice, however, the long time scale for watershed urbanization and the limited frequency of rainfall events make it difficult to evaluate success based on empirical data.

An indirect way is to establish a watershed model, which may be a simple computation with a few variables, or a complex computer program that simulates storm water runoff at hourly time steps over a period of decades.

A general measure of the program's control of runoff volume, velocity or duration is the extent the program limits imperviousness. Imperviousness is typically measured at the scale of individual development projects, including private development projects and public works projects such as new roads and facilities. The relationship of outcomes at the site scale to benefits at the watershed scale is inferred and varies significantly from place to place, depending on the relative size of the project to the watershed, location within the watershed, slopes, susceptibility of the receiving waters to erosion, and other factors.

Finally, another measure of the program's control of runoff volume, velocity or duration is the extent the program implements elements that address the increased volumes and velocities that accompany the use of impervious surfaces in the urban environment. Elements can include large scale basins that infiltrate runoff that has been conveyed via the storm sewer system or programs that effectively implement LID techniques.

As mentioned above, the effectiveness of a program to limit changes in runoff volume, velocity, or duration may be measured by its implementation of LID. The most direct and quantifiable way of measuring the implementation of LID is to review the planning, design, and construction

of recently approved land development and re-development projects early in the design process and calculate the effective impervious areas for each development and re-development project.

An indirect measurement is to monitor key characteristics associated with effective implementation of LID. Some of these characteristics are:

- Clear guidance to applicants for development approvals regarding LID requirements.
- Ongoing outreach, such as workshops, to educate the land development community about LID.
- Policies and administrative mechanisms ensure that LID features and facilities are incorporated into site designs prior to consideration by design review boards, planning commissions or other elected or appointed bodies.
- Engineering review that quantifies impervious areas and determines whether runoff from impervious areas is directed to LID features and facilities, and whether those features and facilities are adequately sized.
- Development review engineers and construction inspectors certified to understand the proper design and construction of LID features and facilities.
- Policies that prioritize the implementation of LID for storm water treatment and restrict the use of non-LID facilities to special circumstances.
- Ongoing operation and maintenance verification of LID facilities.

E. Receiving Water Monitoring (Outcome Level 6)

1. Overview

Receiving water monitoring is critical for assessing water quality standards attainment. Because MS4 discharge monitoring does not cover every outfall, receiving water monitoring is especially important for understanding MS4 impacts.

Receiving Water Assessment can generally be considered to address three primary objectives:

- Objective 1: Characterize receiving water conditions.
- Objective 2: Characterize changes in receiving water conditions.
- Objective 3: Determine whether receiving water conditions are protective of beneficial uses.

Like the discharge monitoring program an effective receiving water monitoring program will be one will be one where the purposes of the monitoring have been well defined. This can come about through a series of questions. These objectives, when restated in the form of a question, provide the basis for designing monitoring program for receiving waters that has a well defined purpose.

2. Outcomes, Measures and Methods

Receiving water monitoring programs are often required to assess pollutant concentrations over time and determine whether storm water discharges are causing or contributing to violations of water quality standards and or whether beneficial uses are being protected. The following elements, in whole or in part, are commonly used, in whole or in part, to measure and assess receiving water conditions:

1) **Mass Emission Monitoring.** The purpose of mass emission monitoring is to identify pollutant loads to receiving waters and identify long- term trends in pollutant concentrations. Mass Emission sites are located in the lower reaches of major watersheds.

2) **Receiving Water Monitoring.** Receiving water monitoring is designed to characterize the quality of receiving waters rather than discharges to the receiving waters. This type of monitoring evaluates the water quality of smaller water bodies tributary to main river systems. Monitoring a localized section of the watershed allows the storm water monitoring program to better examine the impact of storm water on the watershed than mass emission monitoring.

3) **Bioassessment Monitoring** Bioassessment is a cost-effective biological monitoring tool that utilizes measures of the stream's benthic macroinvertebrate (BMI) community and its physical/habitat structure. Because they are ubiquitous and sensitive in varying degrees to anthropogenic pollutants and other stressors, BMIs can provide considerable information regarding the biological condition of water bodies. (Resh and Jackson 1993, Karr and Chu 1999, Davis and Simon 1995).

4) **Toxicity Monitoring**. Toxicity monitoring is a process of using live organisms to determine whether a chemical or effluent is toxic. A toxicity test measures the degree of the effect of a specific chemical or effluent on exposed test organisms. (EPA Region 9 and 10 Toxicity Training Tool, November 2007; Denton DL, Miller JM, Stuber RA. 2007. EPA Regions 9 and 10 toxicity training tool (TTT). November 2007. San Francisco, CA.)

5) **Beach Water Quality Monitoring**. **(Does not apply to all municipalities)** Beach water quality monitoring is the monitoring of the receiving waters adjacent to beaches that have a high number of daily users. This monitoring focuses on bacteria and pathogens and is important because this monitoring is used for Health Department postings at the beaches.

Over time, the monitoring program should provide the data needed to determine if the pollutant reduction programs that are being implemented are having an effect on the receiving waters. For additional considerations in setting receiving water assessment requirements, see Section IV.F (MS4 Monitoring Program Design) below.

G. Integrated Assessment

1. Overview

Integrated Assessment (Levels 1-6) is the process of exploring and understanding the interrelationships among Outcomes and Outcome Levels, together with their cumulative relationship to improved water quality. As shown in Table 4, this process should be ongoing during program implementation. Because of the number and variety of BMPs and control programs being implemented at any given time, and because many factors external to storm water programs affect water quality, establishing these relationships is difficult, but no less important. Efforts to date have included hypothetical exercises aimed at better understanding likely program outcomes and potential relationships to water quality. Quantitative "cause and effect" relationships should increasingly be sought in the future.

Implementation assessment is, in many cases, simpler and less costly than MS4 discharge and receiving water assessment, due in part to the shorter time frame needed to see measurable results. Over time the long term, however, correlating water quality improvement to implementation results will assist storm water managers in identifying the more efficient and cost-effective approaches to storm water management.

3. Outcomes, Measures and Methods

Integrated Assessment can generally be considered to address the three objectives described below.

Objective 1: Relating Program Implementation to Target Populations and Sources

a. How is Storm Water Program Implementation related to Knowledge and Awareness, or Behavior?

b. How are Knowledge and Awareness related to Behavior?

c. How is Behavior related to Source Reductions?

Objective 2: Relating Source Reductions to MS4 discharge and Receiving Water Conditions

a. How are Source Reductions related to the Quality of the Discharge from the MS4 or Hydrology?

b. How are the Quality of the Discharge from the MS4 and Hydrology related to Receiving Water Conditions?

Objective 3: Relating Program Implementation to Receiving Water Conditions

How do all of the above elements combine to address the relationship of Storm Water Program Implementation to Receiving Water Conditions?

600 **Table 4 -- Key Questions and Objectives to be addressed by Storm water Program Effectiveness Assessments**

Level 1 Storm water Programs	Level 2 Knowledge and Awareness	Level 3 Behavior	Level 4 Source Reductions	Level 5 MS4 Discharge Quality and Hydrology	Level 6 Receiving Water Conditions
1. Implementation Assessment	**3. Source & Target Population Assessment**			**2. MS4 Discharge and Receiving Water Assessment**	
Are **Targeted Program Outcomes** being achieved?	What is the **Knowledge or Awareness** of implementing populations?	What are the **Behaviors** of implementing populations?	What are the **Source Pollutant Loads?** What are the **Site / Source Hydrologic Characteristics**?	What is the **Quality of the MS4 Discharge**? What are the **Hydrologic Characteristics of Discharges** in the Urban Environment?	What are the **Receiving Water Conditions**? Are conditions protective of **Beneficial Uses**?
3. Integrated Assessment					
Objective 1: Relating Program Implementation to Target Populations and Sources					
a. How is **Storm water Program Implementation** related to **Knowledge, Awareness,** or **Behavior**?					
	b. How are **Knowledge** and **Awareness** related to **Behavior**?				
		c. How is **Behavior** related to **Source Reductions**?			
			Objective 2: Relating Source Reductions to MS4 Discharges and Receiving Water Conditions		
			a. How are **Source Reductions** related to **MS4 Discharge Quality or Hydrology**?		
				b. How are **MS4 Discharge Quality / Hydrology** related to **Receiving Water Conditions**?	
Objective 3: Relating Program Implementation to Receiving Water Conditions					
How do all of the above elements combine to address the relationship of **Storm water Program Implementation** to **Receiving Water Conditions**?					

Attachment A

AB 739

AB 739, Laird. Stormwater discharge.

Under existing law, the State Water Resources Control Board and the California regional water quality control boards prescribe waste discharge requirements for the discharge of stormwater in accordance with the national pollutant discharge elimination system (NPDES) permit program established by the federal Clean Water Act and the Porter-Cologne Water Quality Control Act (state act).

The Safe Drinking Water, Water Quality and Supply, Flood Control, River, and Coastal Protection Bond Act of 2006 (initiative bond act) authorizes the issuance of bonds in the amount of $5,388,000,000. The Disaster Preparedness and Flood Prevention Bond Act of 2006 authorizes the issuance of bonds in the amount of $4,090,000,000 for the purposes of financing a disaster preparedness and flood prevention program.

This bill would require the Department of Water Resources to develop project selection and evaluation guidelines to implement a specified stormwater flood management grant program financed by the Disaster Preparedness and Flood Prevention Bond Act of 2006. The bill would provide that the design and construction of projects for combined municipal sewer and stormwater systems are eligible for financing under that grant program. The bill would require the state board to develop project selection and evaluation guidelines for the allocation of funds made available by the initiative bond act for a stormwater contamination prevention and reduction program. The bill would provide for the expenditure of those funds, upon appropriation, for specified projects. Grant recipients would be required to assess and report on project effectiveness. The bill would require the state board and the department to consult with each other, as necessary, with regard to the development of project selection and evaluation guidelines for various programs involving stormwater management that are financed by the initiative bond act or the Disaster Preparedness and Flood Prevention Bond Act of 2006. The state board would be required, no later than July 1, 2009, and after holding public workshops and soliciting public comments, to develop a comprehensive guidance document for evaluating and measuring the effectiveness of municipal stormwater management programs undertaken, and permits issued, in accordance with the NPDES permit program and the state act. The state board and the regional boards would be required to refer to the guidance document when establishing requirements in municipal stormwater programs and permits for evaluation and reporting on program effectiveness. The bill would require the state board to appoint a stormwater management task force comprised of public agencies, representatives of the regulated community, and nonprofit organizations, and to submit a specified report on polluted runoff control to the Ocean Protection Council no later than January 1, 2009.

THE PEOPLE OF THE STATE OF CALIFORNIA DO ENACT AS FOLLOWS:

SECTION 1. The Legislature finds and declares all of the following:

(a) The federal Clean Water Act requires the regulation of stormwater discharges under the national pollutant discharge elimination system (NPDES) permit program. The State Water Resources Control Board and the California regional water quality control boards have been designated by the United States Environmental Protection Agency to implement the NPDES stormwater program.

(b) Polluted runoff, including stormwater discharges, is generated by runoff from land and impervious areas such as paved streets, parking lots, and building rooftops during both dry and wet months. Stormwater discharges often contain pollutants in quantities that could adversely affect water quality. Stormwater discharges can also accelerate stream erosion, causing increased sedimentation downstream, loss of flood conveyance capacity, and increased flood damage risk.

(c) The State Water Resources Control Board and the California regional water quality control boards, in their 2001 strategic plan, indicate that polluted runoff is the leading cause of water quality problems in the state. The United States Environmental Protection Agency considers urban stormwater pollution a serious source of pollution in the waters of the United States.

(d) The State Water Resources Control Board's Resolution No. 2000-0006, dated January 2005, which adopted sustainability as a core value for all activities and programs, supports sustainable practices related to water quality and water supply, including, but not limited to, low-impact development that seeks to maintain predevelopment runoff rates and volumes. Low-impact development includes specific techniques such as reducing the amount of impermeable surfaces and increasing infiltration.

(e) The State Water Resources Control Board and the Department of Water Resources should coordinate applicable financial assistance programs to maximize public benefits and leverage local and federal funding.

(f) The State Water Resources Control Board should provide state oversight regarding the NPDES stormwater program, including guidance, priorities, policy direction, technical assistance, and evaluation of program effectiveness.

SEC. 1.5. Section 11352 of the Government Code is amended to read:

11352. The following actions are not subject to this chapter: (a) The issuance, denial, or waiver of any water quality certification as authorized under Section 13160 of the Water Code.

(b) The issuance, denial, or revocation of waste discharge requirements and permits pursuant to Sections 13263 and 13377 of the Water Code and waivers issued pursuant to Section 13269 of the Water Code.

(c) The development, issuance, and use of the guidance document pursuant to Section 13383.7 of the Water Code.

SEC. 2. Section 5096.827.2 is added to the Public Resources Code, to read:

5096.827.2. (a) The department shall develop project selection and evaluation guidelines to implement Section 5096.827. The State Water Resources Control Board shall advise the department on the water quality portions of the guidelines, relying as

appropriate on the stormwater guidelines developed by the State Water Resources Control Board pursuant to Section 75050.2.

(b) The guidelines shall include a provision that gives preference to a project that reduces flood damages for which one or both of the following applies:

(1) The project is not receiving state funding for flood control or flood prevention projects pursuant to Section 5096.824 or Section 75034.

(2) The project provides multiple benefits, including, but not limited to, water quality improvements, ecosystem benefits, reduction of instream erosion and sedimentation, and groundwater recharge.

SEC. 3. Section 5096.827.3 is added to the Public Resources Code, to read:

5096.827.3. Consistent with the requirements of Sections 5096.827 and 5096.827.2, the design and construction of projects for combined municipal sewer and stormwater systems are eligible for financing under Section 5096.827.

SEC. 4. Section 75050.2 is added to the Public Resources Code, to read:

75050.2. (a) The state board shall develop project selection and evaluation guidelines for the allocation of funds made available pursuant to subdivision (m) of Section 75050. Upon appropriation, the funds shall be available for matching grants to local public agencies, not to exceed five million dollars ($5,000,000) per project, for projects to achieve any of the following purposes in accordance with the requirements of that subdivision:

(1) Complying with total maximum daily load requirements established pursuant to Section 303(d) of the Clean Water Act (33 U.S.C. Sec. 1313(d)) and this division where pollutant loads have been allocated to stormwater, including, but not limited to, metals, pathogens, and trash pollutants.

(2) Assistance in implementing low-impact development and other onsite and regional practices, on public and private lands, that seek to maintain predevelopment hydrology for existing and new development and redevelopment projects. Projects funded pursuant to this paragraph shall be designed to infiltrate, filter, store, evaporate, or retain runoff in close proximity to the source of water.

(3) Implementing treatment and source control practices to meet design and performance standard requirements for new development.

(4) Treating and recycling stormwater discharge.

(5) Implementing improvements to combined municipal sewer and stormwater systems.

(6) Implementing best management practices, and other measures, required by municipal stormwater permits issued by a California regional water quality control board or the state board.

(7) Assessing project effectiveness, including, but not limited to, monitoring receiving water quality, determining pollutant load reductions, and assessing improvements in stormwater discharge water quality.

(b) (1) For the purpose of implementing subdivision (a), the state board shall give preference to a project that does one or more of the following:

(A) Supports sustained, long-term water quality improvements.

(B) Is coordinated or consistent with any applicable integrated regional water management plan.

(2) The allocation of funds pursuant to this section shall be consistent with water quality control plans and Section 75072.

(c) The state board shall require grant recipients for projects described in subdivision (a) to assess and report on project effectiveness, which may include monitoring receiving water quality, determining pollutant load reductions, and assessing improvements in stormwater discharge water quality resulting from project implementation.

SEC. 5. Section 75050.4 is added to the Public Resources Code, to read:

75050.4. The state board and the department shall consult with each other, as necessary, with regard to the development of project selection and evaluation guidelines for the following financial assistance programs that are directed, in whole or in part, for municipal stormwater management, to avoid duplication and maximize water quality benefits:

(a) Section 5096.827.

(b) Subdivision (a) of Section 75026.

(c) Subdivision (m) of Section 75050.

(d) Subdivision (a) of Section 75060.

SEC. 6. Section 13383.7 is added to the Water Code, to read:

13383.7. (a) No later than July 1, 2009, and after holding public workshops and soliciting public comments, the state board shall develop a comprehensive guidance document for evaluating and measuring the effectiveness of municipal stormwater management programs undertaken, and permits issued, in accordance with Section 402(p) of the Clean Water Act (33 U.S.C. Sec. 1342(p)) and this division.

(b) For the purpose of implementing subdivision (a), the state board shall promote the use of quantifiable measures for evaluating the effectiveness of municipal stormwater management programs and provide for the evaluation of, at a minimum, all of the following:

(1) Compliance with stormwater permitting requirements, including all of the following:

(A) Inspection programs.

(B) Construction controls.

(C) Elimination of unlawful discharges.

(D) Public education programs.

(E) New development and redevelopment requirements.

(2) Reduction of pollutant loads from pollution sources.

(3) Reduction of pollutants or stream erosion due to stormwater discharge.

(4) Improvements in the quality of receiving water in accordance with water quality standards.

(c) The state board and the regional boards shall refer to the guidance document developed pursuant to subdivision (a) when establishing requirements in municipal stormwater programs and permits.

SEC. 7. Section 13383.8 is added to the Water Code, to read:

13383.8. (a) The state board shall appoint a stormwater management task force comprised of public agencies, representatives of the regulated community, and nonprofit organizations with expertise in water quality and stormwater management. The task force shall provide advice to the state board on its stormwater management program that may include, but is not limited to, program priorities, funding criteria, project selection, and interagency coordination of state programs that address stormwater management.

(b) The state board shall submit a report, including, but not limited to, stormwater and other polluted runoff control information, to the Ocean Protection Council no later than January 1, 2009, on the way in which the state board is implementing the priority goals and objectives of the council's strategic plan.

Attachment C

Recommended Resources

Municipal Separate Storm Sewer System (MS4) Program Evaluation Guidance (EPA-833-R-07-003), published 01/01/2007 (U.S. Environmental Protection Agency)[Guidance on Assessing Outcome Level 1]

The California Stormwater Quality Association (CASQA): Municipal Stormwater Program Effectiveness Assessment Guidance, published May 2007. [Guidance on Assessing Outcome Levels 1-6]

A Framework for Assessing the Effectiveness of Jurisdictional Urban Runoff Management Programs (San Diego Stormwater Copermittees, October 2003). [Guidance on Outcome Levels 1-6]. Note: This document served as a basis for much of the CASQA Assessment Guidance, and has since been superseded in its use by that document.

Monitoring to Demonstrate Environmental Results: Guidance to Develop Local Storm Water Monitoring Studies Using Six Example Study Designs, published 12/18/2008 (Center for Watershed Protection)[Guidance on Assessing Outcome Levels 5-6]

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Attachment D

Sample Checklists for Effectiveness Assessment

Level 1 - Permit Requirements (Note, this is not an exhaustive lists)

Legal Authority ___Yes _____Code Citation

____No

Industrial/Commercial Discharges Program

Inventory of facilities ___Yes ___No

How many or what percentage of facilities does the permit require to be inspected each year?

_____Number to be inspected ____Percentage to be inspected

How many or what percentage were actually inspected?

___Actual number inspected ____Actual percentage inspected

Construction Discharges Program

Complete Inventory of construction sites ___Yes ___ No

How many or what percentage of construction sites does the permit require to be inspected each year?

_____Number to be inspected ____Percentage to be inspected

How many or what percentage were actually inspected?

___Actual number inspected ____Actual percentage inspected

New Development and Redevelopment Requirements (including Post-Construction Requirements)

Is there a Planning and Plan Check process in place?

___Yes ___No

Is there a mechanism to track requirements

___Yes ___No

Illegal Connection / Illicit Discharge Requirements

Telephone Hotline? ___Yes ___No

___ Number of call-outs for illegal connections or illicit discharges.

Public Education Programs

___Number of Impressions required by permit

___Actual number of impressions

___Number of training events required by permit

___Actual number of training events conducted

Level 2 – Changes in Awareness/Knowledge

Target audience(s) identified

What is the baseline awareness/knowledge of the target audience?

_____

_____

Outreach to audience

What is the message?

_____

_____

How was the message delivered?

_____

_____

Did Baseline awareness/knowledge change? ___Yes ___No

How was this measured?

_____

_____

If multiple formats or media were used, can it be determined which was most effective and why?

_____

_____

Are there future plans for outreach and education?

___Yes What the plans?

_____

_____

___No Why not?

_____

_____

Level 3 – Changes in Behavior

What behavior does the program seek to change?

_____

_____

What is the current baseline?

_____

_____

If education/outreach was determined to be effective, did this translate to changes in behavior? ___Yes ___No

How is this measured?

_____

_____

What are the future plans for measuring changes in behavior?

_____

_____

Level 4 – Reductions in Loads

What is the pollutant(s) that is being measured?

_____

_____

Was a baseline pollutant load determined and if so how?

_____

_____

How are pollutant load reduction measured? By direct measurement or estimated using BMP performance data?

_____

_____

Do the results represent snapshots in time or trends?

_____

_____

Level 5 – Improvements in Runoff Quality

Are effluent discharges being monitored? ___Yes ___No

If yes, is this required by the permit and what is the frequency of monitoring?

_____

_____

Has baseline effluent quality been established? ___Yes ___No

What are the data needs to determine trends in the effluent quality?

_____

_____

Is the data needed to determine trends being collected?

_____

_____

If enough data has been collected to determine trends, what do the trends show?

_____

_____

Is there any correlation between the trends and program implementation?

_____

_____

Level 6 – Improvements in Receiving Water Quality

Does the permit require monitoring the receiving waters? ___Yes ___No

Have baseline conditions in the receiving waters been established? __Yes __No

If so, how was this determined?

_____

_____

Are sufficient samples being taken and locations being monitored to ensure enough data is being collected to determine trends in receiving water quality.

___Yes ___No

If effluent quality is being improved, can this improvement be linked to improvements in receiving water quality? ___Yes ___No

Are watershed activities that could affect receiving water quality being tracked

Attachment D

MS4 Monitoring Program Design

As required by Water Code section 13383.5(d) (Added by SB72, 2001), Phase I MS4 permits should include the minimum monitoring requirements required by the State Water Board pursuant to the statute. Below is monitoring program guidance that the Regional Water Boards should consider when setting monitoring requirements in MS4 permits. In establishing the guidance, the State Water Board has considered the goals and provisions of Water Code section 13383.5.

1. General Considerations

a. As discussed in Sections IV.D and IV.E monitoring programs should be designed such that they are well defined and the monitoring results will answer a series of questions that can be used to inform the overall storm water program.

b. For the purposes of determining constituents to be sampled for and sampling frequencies, to be included in a municipal storm water permit monitoring program, the regional board should consider the following information, as the regional board determines to be applicable:

(1) Discharge characterization monitoring data.
(2) Water quality data collected through the permit monitoring program.
(3) Applicable water quality data collected, analyzed, and reported by federal, state, and local agencies, and other public and private entities.
(4) Any applicable listing under Section 303(d) of the Clean Water Act (33 U.S.C. Sec. 1313).
(5) Applicable water quality objectives and criteria established in accordance with the regional board basin plans, statewide plans, and federal regulations.
(6) Reports and studies regarding source contribution of pollutants in storm water not based on direct water quality measurements.

c. To ensure sufficient data are collected and are comparable, the monitoring program required by the MS4 permit should include, but not be limited to, all of the following:

(1) Standardized methods for collection of storm water samples.
(2) Standardized methods for analysis of storm water samples.
(3) A requirement that every sample analysis under the program be completed by a state certified laboratory or by the regulated municipality in the field in accordance with quality assurance and quality control protocols.
(4) A standardized reporting format.
(5) Standard sampling and analysis programs for quality assurance and quality control.
(6) Minimum detection limits.
(7) Annual reporting requirements for regulated municipalities.

3. Considerations for Receiving Water Assessment

a. Mass Emission Monitoring - Mass emissions stations are critical for assessing both trends over time and exceedances of water quality objectives in the receiving water. Monitoring should occur each year at mass emission stations during storm events and the dry season. Samples from each mass emission station should be analyzed for pollutants of concern related to the question(s) used to define the purpose of the monitoring. Typically located at the bottom of the watershed, these locations are static and monitor receiving water quality where there have been a number of inputs.

b. Receiving Water Monitoring - Monitoring should occur each year at receiving water monitoring locations during storm events and the dry season. Samples from each receiving water monitoring station should be analyzed for pollutants of concern related to the question(s) used to define the purpose of the monitoring. These monitoring stations differ from the mass emissions stations in that they may or may not be fixed with the water quality monitoring being associated with a much smaller drainage area with fewer inputs.

c. Bioassessment Monitoring - Bioassessment monitoring is critical for assessing the full impacts of the discharge and should be performed at least once per year. Bioassessment should be performed at fixed sites throughout each watershed impacted by the MS4. An index of biological integrity should be calculated from the data set and reported to the Regional Water Board.

d. Toxicity Monitoring - Toxicity testing can be a “safety net” for any NPDES monitoring program. Receiving water monitoring locations should be monitored for chronic and acute toxicity each year during storm events and the dry season.

e. Beach Water Quality Monitoring (Does not apply to all municipalities) - For those municipalities with storm water discharges to beach locations, beach bacteria indicator monitoring should be conducted at beaches with storm water outfalls on a frequency and schedule determined by the Regional Water Board. In many cases, local health agencies already conduct this monitoring, so the MS4 should coordinate with local agencies and utilize any existing datasets.