CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

Draft Staff Report for Standard Urban Storm Water Mitigation Plans and Numerical Sizing Criteria for Best Management Practices

1.0 Introduction

Orange County and Cities implement municipal storm water programs to reduce storm water and urban runoff pollution under the requirements of their municipal storm water permit, Regional Board Order No. 96-03. This municipal storm water permit is to be reissued in the near future. Pursuant to Federal NPDES regulations, the tentative municipal storm water permit will require the Copermittees to utilize "planning procedures including a master plan to develop, implement, and enforce controls to reduce the discharge of pollutants from municipal separate storm sewers which receive discharges from areas of new development and significant redevelopment. Such plan shall address controls to reduce pollutants in discharges from municipal separate storm sewers after construction is completed" (40 CFR 122.26(d)(2)(iv)(2)).

To help achieve this, the tentative municipal storm water permit includes a requirement for the Copermittees to develop Standard Urban Storm Water Mitigation Plans (SUSMPs) for broad categories of new development and significant redevelopment. The purpose of the SUSMPs is to reduce the negative impacts to receiving waters resulting from urban runoff from development. The SUSMPs, as developed by the Copermittees, will require developers to implement post-construction best management practices (BMPs) to reduce storm water flows and the associated pollutant loads generated from their project site. These BMPs include both source control BMPs and structural treatment BMPs. The tentative municipal permit also includes a requirement for post-construction BMPs to meet a numeric sizing criteria. This would require post-construction BMPs to treat, infiltrate, or filter a specific volume or flow of water, helping to ensure the effectiveness of the BMPs in reducing storm water flows and pollutant loads.

In an effort to maintain accuracy, this staff report occasionally contains technical terms and concepts. A glossary has been included as Attachment E.

2.0 Background/Statement of the Problem

The SUSMP requirement to be included in the municipal storm water permit is designed to minimize the impacts to receiving waters resulting from continuing urbanization. The water quality impacts of urbanization and urban storm water discharges have been summarized by several recent USEPA reports (USEPA, 1999a, and USEPA, 1999b). Urbanization generally results in an increase in pollutant sources and impervious surfaces. The increase in pollutant sources leads to an increase in pollutant loads found in storm water, while the increase in impervious surfaces prevents natural processes from reducing those pollutant loads. The impervious surfaces associated with urbanization prevent storm water from infiltrating into the soil. Natural vegetation and soil are prevented from filtering urban runoff, resulting in storm water flows that are higher in volume and pollutant loads. This causes the quality of receiving waters to be adversely impacted and beneficial uses to be impaired.

Studies have revealed that the level of imperviousness resulting from urbanization is strongly correlated with the water quality impairment of nearby receiving waters (USEPA, 1999c). Urbanization creates new sources of pollutants and provides for their rapid transport to receiving waters through storm water conveyance systems. The 1996 National Water Quality Inventory (USEPA, 1998) found urban runoff/discharges from storm sewers to be a major source of water quality impairment nationwide. Urban runoff/storm sewers were found to be a source of pollution in 13% of impaired rivers; 21% of impaired lakes, ponds, and reservoirs; and 45% of impaired estuaries. Frequent contaminants of concern in urban runoff include total suspended solids, nutrients, chemical oxygen demand, oil and grease, heavy metals, and total and fecal coliform (USEPA, 1983).

Significantly for the San Diego Region, urban runoff was also found by the 1996 Inventory to be the leading cause of ocean impairment nationwide. This was further exhibited when urban storm water runoff, sanitary sewer overflows, and combined sewer overflows were identified as the largest causes of beach closings in the United States in recent years (USEPA, 1999c). Urban runoff discharges to the ocean not only impact the aquatic environment, but also pose a threat to public health. The Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay (Haile, et. al., 1996) concluded that there is a 57% higher rate of illness in swimmers who swim adjacent to storm drains than in swimmers who swim more than 400 yards away from storm drains.

Urbanization also adversely impacts receiving waters through changes it causes to local hydrology. Increases in population density and imperviousness stemming from urbanization result in changes to stream hydrology, including:

1. increased peak discharges compared to predevelopment levels;
2. increased volume of storm water runoff with each storm compared to pre-development levels;
3. decreased travel time to reach receiving water;
4. increased frequency and severity of floods;
5. increased runoff velocity during storms due to a combination of effects of higher discharge peaks, rapid time of concentration, and smoother hydraulic surfaces from channelization; and
6. decreased infiltration and diminished groundwater recharge.

In many cases the impacts on receiving waters due to changes in hydrology can be more significant than those attributable to the contaminants found in storm water discharges (USEPA, 1999b). These impacts include stream bank erosion (increased sediment load and subsequent deposition), benthic habitat degradation, and decreased diversity of macroinvertebrates.

The 2000 Orange County Co-Permittee NPDES Storm Water Monitoring Program Annual Report reflects the water quality issues resulting from urban runoff that have been observed on the nationwide level. Monitoring efforts indicate that instream concentrations of pathogen indicators (coliform bacteria) and heavy metals (such as cadmium, chromium, nickel, copper, lead, and zinc) exceed state and federal water quality criteria (County of Orange, 2000)

As the monitoring program results indicate, urban runoff is identified as a primary source of receiving water quality impairment within the Region. The Region's Clean Water Act Section 303(d) list, which identifies water bodies with impaired beneficial uses within the Region, also indicates that the impacts of urban runoff are significant. Many of the impaired water bodies on the 303(d) list are impaired by constituents which have been found at high levels within urban runoff by the regional storm water monitoring program. Examples of constituents frequently responsible for beneficial use impairment include total and fecal coliform, heavy metals, and sediment; these constituents have been found at high levels in urban runoff both regionally and nationwide.

Urbanization is not only a source of these pollutants, but also provides for the transport of the pollutants to receiving waters. Storm water picks up the pollutants at their source and carries them to streams, lagoons, and the ocean. Urbanization increases the amount of storm water flowing to receiving waters, increasing the transport mechanism for the pollutants. Increased pollutant loads and storm water flows resulting from urbanization together cause the increased adverse impacts on receiving waters from pollutant loading.

To address pollutants in urban runoff, BMPs must be implemented. Municipal storm water regulations at 40 CFR 122.26 require that pollutants in storm water be reduced to the maximum extent practicable (MEP). The State Water Resources Control Board (SWRCB) has found that BMP implementation is an effective means to achieve this (SWRCB, 1998). A wide array of studies have been conducted to determine the effectiveness of structural BMPs in reducing pollutant loads in storm water. When coupled with source control BMPs, structural BMPs have been found to be very effective in reducing pollutants loads in storm water.

USEPA compiled and summarized data from many studies on BMP performance (USEPA, 1999b). The summary provides the performance ranges of various types of structural BMPs for removing suspended solids, nutrients, pathogens, and metals from storm water flows. These pollutants are in general the pollutants of most concern in storm water in the San Diego Region. For suspended solids, the least effective structural BMP type was found to remove 30-65% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For nutrients, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For pathogens, the least effective structural BMP type was found to remove <30% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. For metals, the least effective structural BMP type was found to remove 15-45% of the pollutant load, while the most effective was found to remove 65-100% of the pollutant load. As this data exhibits, by choosing the most effective and adequately sized structural BMP, high levels of pollutant removal performance can be achieved.

USEPA finds that the structural BMPs discussed above must be adequately sized to be widely effective. The numeric sizing criteria proposed for inclusion in the SUSMP attempts to address this issue. Further, it is recommended that storm water BMPs be designed to manage both flows and water quality for best performance. It is also important that treatment BMPs once implemented be routinely maintained in perpetuity.

The definition of MEP has generally been applied to mean implementation of economically achievable management practices. Including plans for BMP implementation during the design phase of new development and significant redevelopment offers the most cost effective strategy to reduce pollutant loads to surface waters (USEPA, 1999c). Retrofit of existing development will be expensive and may be considered on a targeted basis. Studies on the economic impacts of watershed protection indicate that storm water quality management has a positive or at least neutral economic effect while greatly improving the quality of surface waters (Schueler, 1999).

Financing the municipal separate storm sewer system (MS4) program (including SUSMPs with numeric sizing criteria) offers a considerable challenge for municipalities. Continued efforts to identify new funding sources is needed. One proven successful financing mechanism is the establishment of a storm water utility (USEPA, 1999b). Utility fees, which are assessed on the property owner based on some estimate of storm water runoff generated for the site, are a predictable and dedicated source of funding. Utility fees can also provide a mechanism to provide incentives to commercial and industrial property owners to reduce impervious surface areas. Such incentives offer flexibility to property owners to choose the better economic option – paying more fees or improvements to reduce runoff from the site.

3.0 Description of SUSMPs and Numeric Sizing Criteria

The categories of new development and significant redevelopment the SUSMPs are to address include:

1. Home subdivisions of 100 housing units or more.
2. Home subdivisions of 10-99 housing units or more.
3. Commercial developments greater than 100,000 square feet.
4. Automotive repair shops.
5. Restaurants
6. All hillside development greater than 5,000 square feet.
7. Environmentally Sensitive Areas
8. Parking lots 5,000 square feet or more or with 15 or more parking spaces and potentially exposed to urban runoff.
9. Street, roads, highways, and freeways.
10. Retail Gasoline Outlets.

The SUSMPs developed by the Copermittees will likely be similar to the December 7, 1999 Final Tentative Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County (Attachment A). The SUSMPs will be required to include provisions which will reduce the negative impacts to receiving waters resulting from storm water from new development and significant redevelopment. Examples of these provisions include requirements to control of peak flow rates and velocities to maintain downstream erosion, conserve natural areas where feasible, and minimize, minimize directly connected impervious areas where feasible. Provisions specifically applicable to particular categories of new development and significant redevelopment should also be included in the SUSMPs.

The SUSMPs will require a developer to identify and implement appropriate post-construction source control and structural treatment BMPs for the various categories of development and significant redevelopment. Structural treatment BMPs include vegetated swales/strips, extended/dry detention basins, infiltration basins, infiltration trenches, wet ponds, constructed wetlands, oil/water separators, storm drain inserts, and media filters.

SUSMPs contain numeric sizing criteria to ensure that structural treatment BMPs are effective sized to remove pollutants of concern. All structural treatment BMPs must comply with either volume or flow based numeric sizing criteria:

<u>Volume</u>

Volume-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The volume of runoff produced from a 24-hour 85th percentile storm event, as determined from the local historical rainfall record (0.8 inch approximate average for the Orange County area); or
ii. The volume of runoff produced by the 85th percentile 24-hour rainfall event, determined as the maximized capture storm water volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998); or
iii. The volume of annual runoff based on unit basin storage volume, to achieve 90% or more volume treatment by the method recommended in California Stormwater Best Management Practices Handbook – Industrial/Commercial, (1993); or
iv. The volume of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile 24-hour runoff event;

<u>Flow</u>

Flow-based BMPs shall be designed to mitigate (infiltrate, filter, or treat) either:

i. The maximum flow rate of runoff produced from a rainfall intensity of 0.2 inch of rainfall per hour; or
ii. The maximum flow rate of runoff produced by the 85th percentile hourly rainfall intensity, as determined from the local historical rainfall record, multiplied by a factor of two; or
iii. The maximum flow rate of runoff, as determined from the local historical rainfall record, that achieves approximately the same reduction in pollutant loads and flows as achieved by mitigation of the 85th percentile hourly rainfall intensity multiplied by a factor of two.

The Copermittees may develop equivalent numeric sizing criteria or performance-based standard for post-construction BMPs for Regional Board approval.

Inclusion of a waiver provision in the SUSMPs may be considered. The waiver provision could be used to enable municipalities to afford developers and builders the option of in lieu fees where “impracticability” of storm water treatment can be established. Recognized situations of “impracticability” include (1) extreme limitations of space for treatment; (2) unfavorable or unstable soil conditions for infiltration; and (3) presumptive risk of groundwater contamination because an underground drinking water source or potential drinking water source is less than ten feet from soil surface. It should be noted that waiving SUSMP requirements due to "impracticability" will only be considered when all BMP options have been exhausted and the developer or municipality is able to prove the infeasibility of implementation of the SUSMP requirements. The purpose of the waiver is to provide an alternative for individual projects where storm water treatment is infeasible, while ensuring that storm water pollution control efforts are not obviated by the grant of waiver. If a waiver is approved for a given project, the project's proponents must pay in lieu fees to be applied to another storm water project within the watershed.

The SUSMP should explicitly recognize that in some circumstances, infiltration BMPs may not be appropriate because of the risk of contamination of groundwater resources. It should identify the factors that determine potential for groundwater contamination. These are (1) pollutant mobility; (2) pollutant abundance in storm water, and (3) soluble fraction of pollutant.

The SUSMP could also include a provision that authorizes municipalities, in lieu of conducting a detailed plan review, to accept a signed certification by a registered engineer or a licensed architect that the urban storm water mitigation plan submitted by the project proponent meets BMP criteria described in the SUSMP. The purpose of the provision would be to provide an option for municipalities to limit resource demands on planning departments, without reducing the storm water quality protection objective of the SUSMP.

4.0 Review of Standards for Development Planning

Numeric design standards for new development and significant redevelopment post-construction BMPs have been widely implemented throughout the state and nation. Often the numeric design standards implemented elsewhere have been more stringent than those proposed for the San Diego Region. A discussion of some of the numeric design standards applied elsewhere follows. It should be noted that this is not a complete listing of the application of numeric design standards in the U.S.

The American Society of Civil Engineers (ASCE) and the Water Environment Federation (WEF) have recommended a numerical BMP sizing criteria for storm water that is designed to both maximize treatment of runoff volume for water quality (based on rainfall/ runoff statistics) and be economically sound (ASCE/ WEF 1998). The maximized treatment volume for a BMP is the point at which diminishing returns in the number of runoff events captured begin to occur. For example, increasing BMP capacity beyond the maximized treatment volume results in an insignificant increase in the average annual runoff volume captured and an insignificant increase in the average annual removal of total suspended solids. On the basis of this equation, the maximized runoff volume for 85 percent treatment of annual runoff volumes in California can range from 0.08 to 0.86 inches of rainfall, depending on the imperviousness of the watershed area and the mean rainfall (Roesner, 1998).

Other methods of establishing numerical BMP design standards include: (1) Percent treatment of the annual runoff; (2) Full treatment of runoff from rainfall event equal to or less than a predetermined size; (3) Percent reduction in runoff based on a rainfall event of standard size (Brashear, 1999). These numerical design standards have been applied individually to development planning in Puget Sound, WA; Alexandria, VA; Montgomery County, MD; Denver, CO; Orlando, FL; and Austin, TX.

The City of Seattle requires that where new development coverage is 750 square feet or more, storm water detention be provided based on a 25 year storm frequency and a peak discharge rate not to exceed 0.2 cubic foot per second (City of Seattle Municipal Code). Additionally, for projects that add more than 9,000 square feet in developmental coverage, the peak drainage water discharge rate is limited to 0.15 cubic feet per second per acre for a two-year storm. The City of Denver requires new residential, commercial, and industrial developments to capture and treat the 80th percentile runoff event. This capture and proper treatment is estimated to remove 80 to 90 percent of the annual TSS load, which is a surrogate measure for heavy metal and petroleum hydrocarbon pollutants (Denver Urban Drainage and Flood Control District, 1999).

In Southern California, the San Diego and Los Angeles Regional Water Quality Control Boards have recently approved numeric sizing criteria for post-construction BMPs for broad categories of new development and significant redevelopment within the San Diego and Los Angeles region. The numeric sizing criteria essentially requires municipalities to ensure that post-construction BMPs treat, infiltrate, or filter storm water generated for all storms up to 0.6 inches (San Diego) and 0.75 inches (Los Angeles) in size. This size storm event is equivalent to the maximized treatment volume as defined by the WEF BMP sizing method, and represents the BMP capacity beyond which diminishing returns are experienced.

Numerical mitigation measures are also in use or have been proposed by a small number of municipalities in Southern California. The County of Los Angeles requires that development projects that meet the threshold criteria in the unincorporated area select treatment BMPs that mitigate “runoff generated from each and every storm event of up to and including 0.75 inch rainfall.” The point of diminishing returns for rainfall treatment for Los Angeles County (Civic Center rainfall record) and the coastal Los Angeles (LAX rainfall records) coincide roughly with 0.75 and 1.4 inches of rainfall. The City of Santa Monica requires that development projects reduce 20 percent of the projected runoff from a one-inch 24-hour storm using impervious factors based on Los Angeles County flood control benefit assessment (City of Santa Monica, 1995). All new parking lots are required to have the capability to treat one inch of precipitation that falls in a 24 hour period. Developers are given the option to pay in lieu fees, to be used for other water quality projects by the City, should the standard be impossible to meet because of limiting considerations.

A few States have already established or are in the process of finalizing numerical standards for sizing storm water post-construction BMPs for new development and significant redevelopment. The State of Maryland has established storm water numerical criteria for water quality addressing storm sizes of 0.9 to 1 inch and BMP design standards in a unified approach combining water quality, stream erosion potential reduction, groundwater recharge, and flood control objectives (Maryland Department of the Environment, 1998). The State of Florida has used numerical criteria to require treatment of storm water from new development since 1982 including BMPs sized for 80 percent (95 percent for impaired waters) reduction in annual total suspended solids load derived from the 90 percent (or greater for impaired waters) annual runoff treatment volume method for water quality (Florida Department of Environmental Protection). The State of Washington has proposed at least six different approaches of establishing storm water numerical mitigation criteria for new development which add 10,000 square feet of impervious surface or more for residential development and 5,000 square feet of impervious surface or more for other types of development (Washington Department of

Ecology, 1999). The mitigation criteria options include the 90th percentile 24-hour rainfall event and the six month 24 hour rainfall event.

On a national level, the USEPA is planning to standardize minimum BMP design and performance criteria for post-construction BMPs under Title III of the Clean Water Act, and will likely build from the experience of effective state and local programs to establish national criteria (USEPA, 1999a). The USEPA, based on the National Urban Runoff Program, supports the first half-inch of rainfall as generating first flush runoff (Terene Institute and USEPA Region 5, 1996). First flush runoff is associated with the highest pollutant concentrations, and not pollutant load. The USEPA considers the first flush treatment method, the rainfall volume method, and the runoff capture volume method as common approaches for sizing of water quality BMPs.

5.0 Sample Application of the Numeric Sizing Criteria

Once the Regional Board approves the tentative municipal storm water permit with the SUSMP provision, the municipalities will be expected to develop a model SUSMP. Based on this model, each municipality will develop its own equivalent SUSMP. The municipalities will then implement urban storm water mitigation plan approval programs based on their individual SUSMPs. The municipalities must require that new development and significant redevelopment projects which fall into the broad categories established in the permit and SUSMP prepare and submit an Urban Storm Water Mitigation Plan for approval. Project proponents must identify in the Plan post-construction treatment control BMPs for implementation. The treatment control BMP(s) must be sized or designed to treat the volume or flow of storm water produced by rainfall events up to and including the design storm (numeric sizing criteria).

The project proponent would be required to select source control and treatment control BMP(s) from the list included in the model SUSMP. For example, for a 100+ home sub-division project, these may include swales (for the parkway); infiltration basin at the end of swale; biofilters (around parking lots); green belts (between rear yards); detention basin (as a lake); and catch-basin basket inserts (for trash). In combination, these treatment control BMPs must be sufficiently sized, i.e., designed and constructed, to treat, infiltrate, or filter the first 0.6 inches of storm water runoff from a storm or a storm event. The urban storm water mitigation plan will specify the treatment control BMPs and other source control BMPs that will be built into the project.

The municipality could then review the Urban Storm Water Mitigation Plan to make sure that it meets the requirements of the SUSMP for the project type. If the SUSMP requirements are met, the municipality may approve the project to proceed. As an alternative, the municipality, may in lieu of detailed plan checking, accept signed certification by a registered engineer or a licensed architect. The municipality may require that the certifying person provide evidence of undergoing training for BMP water quality sizing and other plan requirements. For example, training conducted by institutions with BMP water quality design expertise, within two years of the plan signature date, may be considered qualifying.

Attachments B and D exhibit calculations for various structural BMPs for a new development project recently planned in Los Angeles County. The calculations show the volume required of the various BMPs to meet the numeric sizing criteria, in addition to cost estimates of the various BMPs. In addition, the different methods of calculating

BMP capacity are used. The project considered is a 5.51 acre development, with a warehouse and associated parking area planned for the site. The cost of the development is $6.5 million. The structural BMPs considered for the project include a detention basin, an infiltration trench, catchbasin inserts, and an infiltration field/basin. A detention basin for the site would need dimensions of approximately 40'L x 30'W x 11.5'D to meet the proposed numeric sizing criteria. An infiltration trench would need to be sized approximately 3'W x 4'D x 68'L. The infiltration field/basin would need to be sized approximately 100'L x 67'W x 2'D. Catchbasins would require minimal area.

Cost estimates were also calculated for the various structural BMPs. Costs considered included construction cost, land cost, and maintenance cost. Cost estimates were developed using costs provided by Los Angeles City and County. While these costs may not be identical to those in Orange County, they should be similar enough to suffice for planning purposes. The most expensive structural BMP to construct would be the detention basin, at approximately $40,912. The least expensive BMP was found to be the catchbasin inserts, at approximately $1,000. It should be noted that annual maintenance for the detention basin was relatively less costly (approximately $25) than annual maintenance for the catchbasin inserts (approximately $285). In summary, the cost estimates indicate that the capital and maintenance costs associated with treatment BMPs sized to meet the numerical sizing criteria are reasonable and amount to less than 0.7% of the project cost.

6.0 Legal and Regulatory Basis for SUSMP and Numeric Sizing Criteria

The Regional Board has the authority to require the proposed SUSMP and numerical sizing criteria for new development and significant redevelopment post-construction BMPs. The proposed SUSMP would require that (a) post-construction treatment control BMPs be required for ten categories of development and (b) the BMPs be designed to mitigate (treat, filter, or infiltrate) the runoff from all storms up to 0.8 inch of rainfall for 24-hour period or equivalent runoff volume. These requirements are based upon application of provisions of the Clean Water Act (CWA), section 402(p) and the 1987 Amendments to the CWA. The federal provisions require that a municipal storm water program:

> "…
>
> (ii) Shall include a requirement to effectively prohibit non-storm water discharges into storm sewers; and
>
> (iii) Shall require controls to reduce the discharge of pollutants to the maximum extent practicable, including management practices, control techniques and system, design and engineering methods, <u>and such other provisions as the Administrator or the State determines appropriate for the control of such pollutants."</u> [Section 402(p)(3)(B), USC Section 1342(p)(3)(B), emphasis added.]

The proposal is an effort to meet the CWA requirements. In a 1992 decision, the U.S. Court of Appeals for the Ninth Circuit (<u>NRDC *v.* U.S. U.S. EPA</u>, 966 F.2d 1292) interpreted the above language as providing the Administrator or the State with a substantial amount of discretion:

> "[t]he language in (iii), above, requires the Administrator or the State to design controls. Congress did not mandate a minimum standards approach or specify that U.S. EPA develop minimal performance requirements…we must defer to U.S. EPA on matters such as this, where U.S. EPA has supplied a reasoned explanation of its choices."

The decision, sometimes referred to as "NRDC II," stands for the proposition that the U.S. EPA and the States are authorized to require implementation of storm water control activities that, upon "reasoned explanation," accomplish the goals of Section 402(p).

In a recent decision, the Ninth circuit Court of Appeals reinforced the U.S. EPA's and the State's authority in this area. In Defenders of Wildlife *v*. Browner (1999) Case No. 98-71080, the Ninth Circuit Court of Appeals reviewed an action of the U.S. U.S. EPA to adopt a Storm Water Management Program in the State of Arizona. That program included best management practices such as storm water detention basins, retention basins, and infiltration ponds. The question was whether the U.S. EPA may require numeric limitations to ensure strict compliance with the state water-quality standards. The Court concluded that the CWA does not require strict compliance; however, citing the language of (iii), above, it stated: "[t]hat provision gives the U.S. EPA discretion to determine what pollution controls are appropriate. As this court stated in NRDC II, 'Congress gave the administrator discretion to determine what controls are necessary…[cites omitted] (at page 11687).

In addition, the Regional Board has legal authority to require numeric sizing criteria for the regulation of storm water flow. The U.S. Supreme Court has held in PUD No. 1 v. Washington Department of Ecology, 511 U.S. 700 (1994) that regulation of flow to protect beneficial uses is within the authority of the Clean Water Act.

In a precendential decision (Order No. 2000-11), SWRCB found that the SUSMP provision constitute MEP for addressing pollutant discharges resulting from new development and significant redevelopment. The SUSMP proposal is an effort to meet the CWA Section 402(p) requirements and the staff has provided a "reasoned explanation of its choices" in the staff report and the accompanying materials. Accordingly, the proposed SUSMP requirements are well within the Regional Board's authority and discretion.

References

ASCE/WEF, 1998. Urban Runoff Quality Management. WEF Manual of Practice No. 23, ASCE Manual and Report on Engineering Practice No. 87.

Brashear, R. A., 1999. Sizing and Design Criteria for Stormwater Quality Infrastructure, Presentation at California Regional Water Quality Control Board Workshop on Standard Urban Storm Water Mitigation Plans, August 10, 1999 Alhambra, CA. Camp Dresser McKee.

County of Orange, 2000. Orange County Co-Permittee NPDES Storm Water Monitoring Program Annual Report.

City of Santa Monica, 1995. Municipal Code, Chapter 7.10 – Urban Runoff Pollution.

City of Seattle Municipal Code. Chapter 22.802.015. Stormwater, Drainage and Erosion Control Requirements.

Denver Urban Drainage and Flood Control District, 1999. Urban Storm Drainage, Criteria Manual – Volume 3, Best Management Practices.

Florida Department of Environmental Protection, 19xx. Florida Development Manual: A Guide to Sound Land and Water Management.

Haile, R.W., et. al., 1996. An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay. Final Report prepared for the Santa Monica Bay Restoration Project.

Maryland Department of the Environment, 1998. Maryland Storm Water Design Manual - Draft.

Roesner, L. A., 1998. Sizing and Design Criteria for Storm Water Treatment Controls, Presentation to California Storm Water Quality Task Force, Nov. 13, 1998. Sacramento, CA. Camp Dresser McKee.

Schueler, T., 1999. The Economics of Watershed Protection. Center for Watershed Protection, Endicott, MD.

State Water Resources Control Board, 1998. SWRCB WQ Order No. 98-01.

Terene Institute and USEPA Region 5, 1996. A Watershed Approach to Urban Runoff: Handbook for Decisionmakers.

USEPA, 1983. Results of the Nationwide Urban Runoff Program, Volume 1 – Final Report. Office of Water. Washington D.C.

USEPA, 1998. The National Water Quality Inventory, 1996 Report to Congress. EPA 841-R-97-008. Office of Water. Washington D.C.

USEPA, 1999a. Report to Congress on the Phase II Storm Water Regulations.

USEPA, 1999b. Preliminary Data Summary of Urban Storm Water Best Management Practices.

USEPA, 1999c. 40 CFR Parts 9, 122, 123, and 124 National Pollutant Discharge Elimination System – Regulations for Revision of the Water Pollution Control Program Addressing Storm Water Discharges; Final Rule.

Washington Department of Ecology, 1999. Storm Water Management in Washington State Volumes 1 – 5. Public Review Draft.

Attachment A

STANDARD URBAN STORM WATER MITIGATION PLAN
FOR
LOS ANGELES COUNTY AND CITIES IN LOS ANGELES COUNTY

LOS ANGELES COUNTY URBAN RUNOFF AND STORM WATER NPDES PERMIT

STANDARD URBAN STORM WATER MITIGATION PLAN

BACKGROUND

The municipal storm water National Pollutant Discharge Elimination System (NPDES) permit (Permit) issued to Los Angeles County and 85 cities (Permittees) by the Los Angeles Regional Water Quality Control Board (Regional Board) on July 15, 1996, requires the development and implementation of a program addressing storm water pollution issues in development planning for private projects. The same requirements are applicable to the City of Long Beach under its separate municipal storm water permit, which was issued on June 30, 1999.

The requirement to implement a program for development planning is based on, federal and state statutes including: Section 402 (p) of the Clean Water Act, Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 ("CZARA"), and the California Water Code. The Clean Water Act amendments of 1987 established a framework for regulating storm water discharges from municipal, industrial, and construction activities under the NPDES program. The primary objectives of the municipal storm water program requirements are to:

- Effectively prohibit non-storm water discharges, and
- Reduce the discharge of pollutants from storm water conveyance systems to the Maximum Extent Practicable.

The Standard Urban Storm Water Mitigation Plan (SUSMP) was developed as part of the municipal storm water program to address storm water pollution from new development and significant redevelopment by the private sector. This SUSMP contains a list of the minimum required Best Management Practices (BMPs) that must be used for a designated project. Additional BMPs may be required by ordinance or code adopted by the Permittee and applied generally or on a case by case basis. This SUSMP applies to projects that are Priority Projects (Discretionary Projects) as defined by the NPDES Permit. The Permittees are required to use this SUSMP to develop their own citywide SUSMP. Developers must incorporate appropriate SUSMP requirements into their project plans. Each Permittee will approve an Urban Storm Water Mitigation Plan as part of the development process and prior to issuing building and grading permits for the projects covered by the SUSMP requirements.

Discretionary projects, that fall into one of seven categories are identified in the NPDES Permit as requiring SUSMPs. These categories are:

Single-Family Hillside Residences
100,000 Square Foot Commercial Developments
Automotive Repair Shops
Retail Gasoline Outlets
Restaurants
Home Subdivisions with >10 housing units*

* (Note: this category is two separate categories in the NPDES Permit)

The Regional Board Executive Officer has designated two additional categories subject to SUSMP requirements. These categories are:

Location adjacent to or discharging to an environmentally sensitive area, and
Parking lot 5,000 square feet or more or with 25 or more parking spaces and potentially exposed to storm water runoff

DEFINITIONS

"Greater than (>) 9 unit home subdivision" means any subdivision being developed for 10 or more 10 single-family or multi-family dwelling units.

"100,000 Square Foot Commercial Development" means Developments based on total impermeable area, including parking areas, as opposed to lot size or building footprint.

"Retail Gasoline Outlet" means a facility primarily engaged in selling gasoline and lubricating oils. These establishments frequently sell other merchandise, such as tires, batteries, and automobile parts. Frequently, these establishments also perform minor automotive repair work. Gasoline stations combined with other activities, such as grocery stores, convenience stores, or car wash facilities, are classified according to the primary activity.

"Hillside" means property located in an area with known erosive soil conditions, where the development contemplates grading on any natural slope and where grading contemplates cut or fill slopes .

"Automotive Repair Shop" means a facility that is categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. Exceptions do apply for SIC codes 5013, 5014, and 5541. For SIC code 5013, if the business has no outside storage of any recycled oil or other hazardous substances, it is not included. For SIC code 5014, if the business does not engage in any repair work, it is not included. For SIC code 5541, if the business does not engage in any onsite repair work, it is not included.

"Restaurant" means a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption. (SIC code 5812)

“Parking Lot” means land area or facility for the parking of commercial or business or private motor vehicles.

“Environmentally Sensitive Area” means an area designated as an Area of Special Biological Significance by the State Water Resources Control Board or an area designated as a Significant Natural Area by the California Resources Agency or an area designated as an area of Ecological Significance by the County of Los Angeles.

“Best Management Practice (BMP)” means any program, technology, process, siting criteria, operational methods or measures, or engineered systems, which when implemented prevent, control, remove, or reduce pollution.

“Source Control BMP” means any schedules of activities, prohibitions of practices, maintenance procedures, managerial practices or operational practices that aim to prevent storm water pollution by reducing the potential for contamination at the source of pollution.

“Treatment Control BMP” means any engineered system designed to remove pollutants by simple gravity settling of particulate pollutants, filtration, biological uptake, media adsorption or any other physical, biological, or chemical process.

“Structural BMP” means any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution (e.g. canopy, structural enclosure). The category may include both treatment control BMPs and source control BMPs.

“Treatment” means the application of engineered systems that use physical, chemical, or biological processes to remove pollutants. Such processes include, but are not limited to, filtration, gravity settling, media adsorption, biodegradation, biological uptake, chemical oxidation and UV radiation.

“Infiltration” means the downward entry of water into the surface of the soil.

“Directly Connected Impervious Area (DCIA)” means the area covered by pavement, building and other impervious surfaces which drain directly into the storm drain without first flowing across pervious areas (e.g. lawns).

“New Development” means land disturbing activities; structural development, including construction or installation of a building or structure, creation of impervious surfaces; and land subdivision.

Redevelopment” means, on an already developed site, the creation or addition of impervious surfaces; the expansion of a building footprint or addition or replacement of a structure; structural development including an increase in gross floor area and/ or exterior construction or remodeling; replacement of impervious surface that is not part of a routine maintenance activity; land disturbing activities related with structural or impervious surfaces .

"Discretionary Project" means a project which requires the exercise of judgement or deliberation when the public agency or public body decides to approve or disapprove a particular activity, as distinguished from situations where the public agency or body merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

CONFLICTS WITH LOCAL PRACTICES

Where provisions of the SUSMP requirements conflict with established local codes, (e.g., specific language of signage used on storm drain stenciling), the Permittee may continue the local practice and modify the SUSMPs contained herein to be consistent with the code, except where those practices would defeat or circumvent the intent of the SUSMP requirements.

SUSMP PROVISIONS APPLICABLE TO ALL CATEGORIES

REQUIREMENTS

1. PEAK STORM WATER RUNOFF DISCHARGE RATES

Post-development peak storm water runoff discharge rates shall not exceed estimated pre-development levels for developments where an increased peak storm water discharge rate may result in a foreseeable increased potential for downstream erosion.

2. CONSERVE NATURAL AREAS

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Every effort shall be made to concentrate or cluster development on portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants. Wherever practical, promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

3. MINIMIZE STORM WATER POLLUTANTS OF CONCERN

Storm water runoff from a site has the potential to contribute oil and grease, suspended solids, metals, gasoline, pesticides, and pathogens to the stormwater conveyance system. The development must be designed so as to minimize, to the maximum extent practicable , the introduction of pollutants of concern that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system as approved by the building official. Pollutants of concern, as defined by the Permit, consist of any pollutants that exhibit one or more of the following characteristics: current loadings or historic deposits of the pollutant are impacting the beneficial uses of a receiving water, elevated levels of the pollutant are found in sediments of a receiving water and/or have the potential to bioaccumulate in organisms therein, or the detectable inputs of the pollutant are at a level high enough to be considered potentially toxic to humans and/or flora and fauna.

In meeting this specific requirement, “minimization of the pollutants of concern” will require the incorporation of a BMP or combination of BMPs best suited to maximize the reduction of pollutant loadings in that runoff to the Maximum Extent Practicable. Those BMPs best suited for that purpose are those listed in the *California Storm Water Best Management Practices Handbooks*; *Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide*; *Manual for Storm Water Management in Washington State*; *The Maryland Stormwater Design Manual*; *Florida Development Manual: A Guide to Sound Land and Water Management*; and *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* , USEPA Report No. EPA-840-B-92-002, as “likely to have significant impact” beneficial to water quality for targeted pollutants that are of concern at the site in question..

Examples of BMPs that can be used for minimizing the introduction of pollutants of concern generated from site runoff are identified in Table 2. Any BMP not specifically approved by the Regional Board in Resolution No. 99-03, “Approving Best Management Practices for Municipal Storm Water and Urban Runoff Programs in Los Angeles County”, for development planning may be used if they have been recommended in one of the above references.

4. PROTECT SLOPES AND CHANNELS

If applicable, project plans must include BMPs consistent with local codes and ordinances to decrease the potential of slopes and/or channels from eroding and impacting storm water runoff:

- Convey runoff safely from the tops of slopes and stabilize disturbed slopes.
- Stabilize permanent channel crossings.
- Vegetate slopes with native or drought tolerant vegetation.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion, with the approval of all agencies with jurisdiction, e.g., the U.S. Army Corps of Engineers and the California Department of Fish and Game

5. PROVIDE STORM DRAIN SYSTEM STENCILING AND SIGNAGE

Storm drain stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets. The stencil contains a brief statement that prohibits the dumping of improper materials into the stormwater conveyance system. Graphical icons, either illustrating anti-dumping symbols or images of receiving water fauna, are effective supplements to the anti-dumping message.

- All storm drain inlets and catch basins within the project area must be stenciled with prohibitive language (such as: "NO DUMPING – DRAINS TO OCEAN") and/or graphical icons to discourage illegal dumping.
- Signs and prohibitive language and/or graphical icons discouraging illegal dumping must be posted at public access points along channels and creeks within the project area.
- Legibility of stencils and signs must be maintained.

6. PROPERLY DESIGN OUTDOOR MATERIAL STORAGE AREAS

Outdoor material storage areas refer to storage areas or storage facilities solely for the storage of materials.
Improper storage of materials outdoors may provide an opportunity for toxic compounds, oil and grease, heavy metals, nutrients, suspended solids, and other pollutants to enter the stormwater conveyance system. Where proposed project plans include outdoor areas for storage of materials that may contribute pollutants to the stormwater conveyance system, the following *structural* BMPs are required:

- Areas where materials are to be stored must be: (1) placed in an enclosure such as, but not limited to, a cabinet, shed, or similar structure that prevents contact with runoff or spillage to the storm water conveyance system; or (2) protected by secondary containment structures such as berms, dikes, or curbs.
- The storage area must be paved and sufficiently impervious to contain leaks and spills.
- Where feasible, the storage area should have a roof or awning to minimize collection of stormwater within the secondary containment area.

7. PROPERLY DESIGN TRASH STORAGE AREAS

A trash storage area refers to an area where a trash receptacle or receptacles are located for use as a repository for solid wastes.
Loose trash and debris can be easily transported by the forces of water or wind into nearby storm drain inlets, channels, and/or creeks. All trash container areas must meet the following *structural BMP* requirements:

- Trash container areas must have drainage from adjoining roofs and pavement diverted around the area(s).
- Trash container areas must be screened or walled to prevent off-site transport of trash.

8. PROVIDE PROOF OF ONGOING BMP MAINTENANCE

Improper maintenance is one of the most common reasons why water quality controls will not function as designed or which may cause the system to fail entirely. It is important to consider who will be responsible for maintenance of a permanent BMP, and what equipment is required to perform the maintenance properly. As part of project review, if a project applicant has included, or is required to include, treatment control BMPs in project plans, the Permittee shall require that the applicant provide verification of maintenance provisions through such means as may be appropriate, including, but not limited to legal agreements, covenants, CEQA mitigation requirements and/or Conditional Use Permits.

For all properties, this verification will include the developer's signed statement, as part of its project application, accepting responsibility for all structural BMP maintenance until the time the property is transferred and, where applicable, a signed agreement from the public entity assuming responsibility for structural BMP maintenance. This transfer of property must have conditions requiring the recipient to assume responsibility for maintenance of any treatment control BMPs to be included in the sales or lease agreement for that property, and will be the owner's responsibility. For residential properties where the treatment control BMPs are located within a common area which will be maintained by a homeowner's association, language regarding the responsibility for maintenance must be included in the projects conditions, covenants and restrictions (CC&R's). Printed educational materials will be required to accompany the first deed transfer to highlight the existence of the requirement and to provide information on what stormwater management facilities are present, signs that maintenance is needed, how the necessary maintenance can be performed, and assistance that the Permittee can provide. It will also encourage the transfer of this information with subsequent sale of the property.

If treatment control BMPs are located within a public area proposed for transfer, they will be the responsibility of the developer until they are accepted for transfer by the County or other appropriate public agency. Treatment control BMPs proposed for transfer must meet design standards adopted by the public entity for the BMP installed and should be approved by the County or other appropriate public agency prior to its installation.

9. DESIGN STANDARDS FOR TREATMENT CONTROL BMPS

Treatment control BMPs selected for use at any project covered by this SUSMP shall meet the design standards of this Section unless specifically exempted.

a. Post-construction Treatment Control BMPs shall be designed to:

A. mitigate (infiltrate or treat) storm water runoff from either:

1. each runoff event up to and including the 85th percentile 24-hour runoff event determined as the maximized capture storm water volume for the area, from the formula recommended in *Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998*), or

2. the volume of annual runoff based on unit basin storage water quality volume, to achieve 85 percent or more volume treatment by the method recommended in *California Stormwater Best Management Practices Handbook – Industrial/ Commercial*, (1993), or

3. the volume of runoff produced from each and every storm event up to and including 0.75 inch of rainfall, prior to its discharge to a storm water conveyance system, or

4. the volume of runoff produced from each and every storm event up to and including a historical-record based reference 24-hour rainfall criterion for “treatment” (0.75 inch average for the Los Angeles County area) that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event,

AND

B. control peak flow discharge to provide stream channel and over bank flood protection, based on flow design criteria selected by the local agency.

The area of roofing surfaces may be excluded from the total area for calculation of rainfall or runoff volume to be treated provided:

a. the roofing materials will not be a source of pollutants of concern in storm water, and

b. storm water from the roofing surfaces is diverted directly to a storm water conveyance system, and

c. roof based exhaust systems, vents, filters, and air pollution control devices will not present a significant source of pollutants of concern in storm water, and

d. the storm water conveyance system does not directly or indirectly discharge to a natural stream or unlined channel or channel segment scheduled for restoration.

Exclusions

Restaurants, where the land area for development or significant redevelopment is less than 5,000 square feet, are excluded from the requirements of this Section.

10. PROVISIONS APPLICABLE TO INDIVIDUAL PRIORITY PROJECT CATEGORIES

A. 100,000 SQUARE FOOT COMMERCIAL DEVELOPMENTS

1. PROPERLY DESIGN LOADING/UNLOADING DOCK AREAS

Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

- Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
- Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

2. PROPERLY DESIGN REPAIR/MAINTENANCE BAYS

Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

- Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water runon or contact with storm water runoff.
- Design a repair/maintenance bay drainage system to capture all washwater, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3. PROPERLY DESIGN VEHICLE/EQUIPMENT WASH AREAS

Vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. To alleviate this problem, consider including in the project plans an area for washing/steam cleaning of vehicles and equipment. If such an area is included in the site design, it must meet the following:

- This area must be self-contained, covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer.

B. RESTAURANTS

1. PROPERLY DESIGN EQUIPMENT/ACCESSORY WASH AREAS

Outdoor equipment/accessory washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. To alleviate this problem, include in the project plans an area for the washing/steam cleaning of equipment and accessories. This area must meet the following:

- This area must be self-contained, equipped with a grease trap, and properly connected to a sanitary sewer.
- If this wash area is to be located outdoors, it must be covered, paved, have secondary containment, and be connected to the sanitary sewer.

C. RETAIL GASOLINE OUTLETS

1. PROPERLY DESIGN FUELING AREA

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. The project plans must include the following BMPs:

- Fuel dispensing areas should be covered with an overhanging roof structure or canopy. The canopy's minimum dimensions must be equal to or greater than the area within the grade break. The canopy must not drain onto the fuel dispensing area, and the canopy downspouts must be routed to prevent drainage across the fueling area.
- Fuel dispensing areas must be paved with portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
- The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water to the extent practicable.
- At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

D. AUTOMOTIVE REPAIR SHOPS

1. PROPERLY DESIGN FUELING AREA

Fueling areas have the potential to contribute oil and grease, solvents, car battery acid, coolant and gasoline to the storm water conveyance system. Therefore, design plans, which include fueling areas, must contain the following:

- Fuel dispensing areas should be covered with an overhanging roof structure or canopy. The cover's minimum dimensions must be equal to or greater than the area within the grade break. The cover must not drain onto the fuel dispensing area and the downspouts must be routed to prevent drainage across the fueling area.
- Fuel dispensing areas must be paved with portland cement concrete (or equivalent smooth impervious surface), and the use of asphalt concrete shall be prohibited.
- The fuel dispensing area must have a 2% to 4% slope to prevent ponding, and must be separated from the rest of the site by a grade break that prevents run-on of storm water.
- At a minimum, the concrete fuel dispensing area must extend 6.5 feet (2.0 meters) from the corner of each fuel dispenser, or the length at which the hose and nozzle assembly may be operated plus 1 foot (0.3 meter), whichever is less.

2. PROPERLY DESIGN REPAIR/MAINTENANCE BAYS

Oil and grease, solvents, car battery acid, coolant and gasoline from the repair/maintenance bays can negatively impact storm water if allowed to come into contact with storm water runoff. Therefore, design plans for repair bays must include the following:

- Repair/maintenance bays must be indoors or designed in such a way that doesn't allow storm water run-on or contact with storm water runoff.
- Design a repair/maintenance bay drainage system to capture all washwater, leaks and spills. Connect drains to a sump for collection and disposal. Direct connection of the repair/maintenance bays to the storm drain system is prohibited. If required by local jurisdiction, obtain an Industrial Waste Discharge Permit.

3. PROPERLY DESIGN VEHICLE/EQUIPMENT WASH AREAS

Vehicle/equipment washing/steam cleaning has the potential to contribute metals, oil and grease, solvents, phosphates, and suspended solids to the storm water conveyance system. To alleviate this problem, consider including in the project plans an area for washing/steam cleaning of vehicles and equipment. If such an area is included in the site design, it must meet the following:

- This area must be self-contained, covered, equipped with a clarifier, or other pretreatment facility, and properly connected to a sanitary sewer or to a permitted disposal facility.

4. PROPERLY DESIGN LOADING/UNLOADING DOCK AREAS

Loading/unloading dock areas have the potential for material spills to be quickly transported to the storm water conveyance system. To minimize this potential, the following design criteria are required:

- Cover loading dock areas or design drainage to minimize run-on and runoff of storm water.
- Direct connections to storm drains from depressed loading docks (truck wells) are prohibited.

E. <u>PARKING LOTS</u>

1. PROPERLY DESIGN PARKING AREA

Parking lots contain pollutants such as heavy metals, oil and grease, and polycyclic aromatic hydrocarbons that deposit on these surfaces from motor vehicle traffic. These pollutants are directly transported to surface waters.

- Reduce impervious land coverage of parking areas
- Infiltrate runoff before it reaches storm drain system.
- Treat runoff before it reaches storm drain system

2. PROPERLY DESIGN TO LIMIT OIL AND PERFORM MAINTENANCE

Parking lots may accumulate oil, grease, and water insoluble hydrocarbons from vehicle drippings and engine system leaks.

- Treat to remove oil and petroleum hydrocarbons at parking lots that are heavily used (e.g. fast food outlets, lots with 25 or more parking spaces , sports event parking lots, shopping malls, grocery stores, discount warehouse stores)
- Ensure adequate operation and maintenance of treatment systems particularly sludge and oil removal,

and system fouling and plugging prevention control

11. WAIVER

A Permittee may, through adoption of an ordinance or code inc incorporating the treatment requirements of the SUSMP, provide for a waiver from the requirement if impracticability for a specific property can be established. Recognized situations of impracticability include (i) extreme limitations of space for treatment on a redevelopment project, (ii) unfavorable or unstable soil conditions at a site to attempt infiltration, and (iii) risk of ground water contamination because an underground source of drinking water is less than 10 feet from the soil surface. Any other justification for impracticability must be separately approved by the Regional Board Executive Officer before it becomes recognized and effective. A waiver granted to any development or significant redevelopment project may be revoked by the Regional Board Executive Officer for cause and with proper notice upon petition.

If a waiver is granted for impracticability, the Permittee must require the project proponent to transfer the savings in cost, as determined by the Permittee, to a storm water mitigation fund to be used to promote regional or alternative solutions for storm water pollution in the storm watershed and operated by a public agency or a non-profit entity.

12. LIMITATION ON USE OF INFILTRATION BMPS

Three factors significantly influence the potential for storm water to contaminate ground water. They are (i) pollutant mobility, (ii) pollutant abundance in storm water, (iii) and soluble fraction of pollutant. The risk of contamination of groundwater may be reduced by pretreatment of storm water. A discussion of limitations and guidance for infiltration practices is contained in, *Potential Groundwater Contamination from Intentional and Non-Intentional Stormwater Infiltration, Report No. EPA/600/R-94/051, USEPA (1994).*

In addition, the distance of the groundwater table from the infiltration BMP may also be a factor determining the risk of contamination. A water table distance separation of ten feet depth in California presumptively poses negligible risk for storm water not associated with industrial activity or high vehicular traffic.

Infiltration BMPs are not recommended for areas of industrial activity or areas subject to high vehicular traffic (25,000 or greater average daily traffic (ADT) on main roadway or 15,000 or more ADT on any intersecting roadway) unless appropriate pretreatment is provided to ensure groundwater is protected and the infiltration BMP is not rendered ineffective by overload.

13. ALTERNATIVE CERTIFICATION FOR STORM WATER TREATMENT MITIGATION

A Permittee may elect to accept a signed certification that the plan meets the criteria established herein and that the plan preparer has undergone training on designing BMPs to meet the numerical mitigation criteria, in lieu of conducting detailed BMP review to verify treatment control BMP adequacy. The training must have been conducted by an organization with storm water BMP design expertise (e.g., a University, American Society of Civil Engineers, American Society of Landscape Architects, or the California Water Environment Association) with the training and curriculum accepted by the Regional Board Executive Officer. For the certification to be valid, training must have been received not more than two years prior to the signature date on the plan.

SUGGESTED RESOURCES	HOW TO GET A COPY
Start at the Source (1999) by Bay Area Stormwater Management Agencies Association Detailed discussion of permeable pavements and alternative driveway designs presented.	**Bay Area Stormwater Management Agencies Association** 2101 Webster Street Suite 500 Oakland, CA 510-286-1255
Design of Stormwater Filtering Systems (1996) by Richard A. Claytor and Thomas R. Schuler Presents detailed engineering guidance on ten different stormwater filtering systems.	**Center for Watershed Protection** 8391 Main Street Ellicott City, MD 21043 410-461-8323
Better Site Design: A Handbook for Changing Development Rules in Your Community (1998) Presents guidance for different model development alternatives.	**Center for Watershed Protection** 8391 Main Street **Ellicott City, MD 21043** 410-461-8323
Design Manual for Use of Bioretention in Stormwater Management (1993) Presents guidance for designing bioretention facilities.	**Prince George's County** Watershed Protection Branch 9400 Peppercorn Place, Suite 600 Landover, MD 20785
Operation, Maintenance and Management of Stormwater Management (1997) Provides a thorough look at stormwater practices including, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.	**Watershed Management Institute, Inc.** **410 White Oak Drive** Crawfordville, FL 32327 850-926-5310

TABLE 1 (Continued)

SUGGESTED RESOURCES	HOW TO GET A COPY
California Storm Water Best Management Practices Handbooks (1993) for Construction Activity, Municipal, and Industrial/Commercial Presents a description of a large variety of structural and good housekeeping BMPs.	**Los Angeles County Department of Public Works** Cashiers Office 900 S. Fremont Avenue Alhambra, CA 91803 626-458-6959
Second Nature: Adapting LA's Landscape for Sustainable Living (1999) by Tree People Detailed discussion of BMP designs presented to conserve water, improve water quality, and achieve flood protection.	Tree People 12601 Mullholland Drive Beverly Hills, CA 90210 818-753-4600 (?)
Florida Development Manual: A Guide to Sound Land and Water Management (1988 Presents detailed guidance for designing BMPs	**Florida Department of the Environment 2600 Blairstone Road, Mail Station 3570** Tallahassee, FL 32399 850-921-9472
Stormwater Management in Washington State (1999) Vols. 1-5 Presents detailed guidance on BMP design for new development and construction.	**Department of Printing** **State of Washington Department of Ecology** **P.O. Box 798** Olympia, WA 98507-0798 360-407-7529
Maryland Stormwater Design Manual (1999) Presents guidance for designing storm water BMPs.	**Maryland Department of the Environment** 2500 Broening Highway Baltimore, MD 21224 410-631-3000
Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (1993) Report No. EPA–840-B-92-002. Provides an overview of, planning and design considerations, programmatic and regulatory aspects, maintenance considerations, and costs.	**National Technical Information Service U.S. Department of Commerce** **Springfield, VA 22161** 800-553-6847
Caltrans Storm Water Quality Handbook: Planning and Design Staff Guide (Best Management Practices Handbooks (1998) Presents guidance for design of storm water BMPs	**California Department of Transportation** **P.O. Box 942874** Sacramento, CA 94274-0001 916-653-2975

TABLE 2: Example Best Management Practices (BMPs)

The following are examples of BMPs that can be used for minimizing the introduction of pollutants of concern that may result in significant impacts, generated from site runoff to the storm water conveyance system. (See Table 1: Suggested Resources for additional sources of information):

- Provide reduced width sidewalks and incorporate landscaped buffer areas between sidewalks and streets. However, sidewalk widths must still comply with regulations for the Americans with Disabilities Act and other life safety requirements.
- Design residential streets for the minimum required pavement widths needed to comply with all zoning and applicable ordinances to support travel lanes; on-street parking; emergency, maintenance, and service vehicle access; sidewalks; and vegetated open channels.
- Comply with all zoning and applicable ordinances to minimize the number of residential street cul-de-sacs and incorporate landscaped areas to reduce their impervious cover. The radius of cul-de-sacs should be the minimum required to accommodate emergency and maintenance vehicles. Alternative turnarounds should be considered.
- Use permeable materials for private sidewalks, driveways, parking lots, or interior roadway surfaces (examples: hybrid lots, parking groves, permeable overflow parking, etc.).
- Use open space development that incorporates smaller lot sizes.
- Reduce building density.
- Comply with all zoning and applicable ordinances to reduce overall lot imperviousness by promoting alternative driveway surfaces and shared driveways that connect two or more homes together.
- Comply with all zoning and applicable ordinances to reduce the overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in spillover parking areas.
- Direct rooftop runoff to pervious areas such as yards, open channels, or vegetated areas, and avoid routing rooftop runoff to the roadway or the storm water conveyance system.
- Vegetated swales and strips
- Extended/dry detention basins
- Infiltration basin
- Infiltration trenches
- Wet ponds
- Constructed wetlands
- Oil/Water separators
- Catch basin inserts
- Continuous flow deflection/ separation systems
- Storm drain inserts
- Media filtration
- Bioretention facility
- Dry-wells
- Cisterns
- Foundation planting
- Catch basin screens
- Normal flow storage/ separation systems
- Clarifiers
- Filtration systems
- Primary waste water treatment systems

Attachment B

STANDARD URBAN STORM WATER MITIGATION PLANS (SUSMPs)
Numerical Sizing Criteria for Development Planning
Sample Calculations

STANDARD URBAN STORM WATER MITIGATION PLANS (SUSMPs)

Numerical Sizing Criteria for Development Planning

<u>Sample Calculations</u>

Sample calculations for using the numerical sizing criteria under consideration by the San Diego Regional Water Quality Control Board were performed for a hypothetical commercial development. The case examples illustrate that (i) the three different numerical sizing criteria for calculating best management practice (BMP) sizing dimensions produce values that are within 15 percent of one another; (ii) the sizing criteria for treatment BMPs (i.e., infiltration trenches) based on filtration and adsorption, as opposed to storage, are reasonable and practicable using the numerical sizing criteria being considered by the Regional Board; and (iii) commercially available catch-basin inserts are adequately manufactured to handle and treat flows equivalent to the storage volume that is needed for a detention basin BMP.

Requirement: capture of 85th percentile rainfall event
Project: Light industrial warehouse/office with parking lot
Project Size: 240,000 sq. ft = 5.51 acres

Case Sample 1 - Detention Basin: Sample calculation demonstrates the water quality treatment volume required to size a detention basin using (a) the maximized water quality treatment volume method; (b) the 85th percentile rainfall event treatment volume for Orange County; and (c) the 90 percent annual runoff volume capture method.

(a) Maximized Water Quality Treatment Method – WEF Manual of Practice#23 (Chap 5)

Maximized Detention Volume, $P_o = a\ C\ P_6$ [WEF, p.175]

For 85th percentile event capture for 24 hours

Regression constant, a = 1.299 [WEF, Tbl 5.4, p.177]
Mean Storm Depth, P_6 = 0.57 in. [WEF, Fig 5.3, p.176]
(Note: Local precipitation record can be used to calculate more accurate P_6 for the site)
Runoff Coefficient, C = 0.9 [Dunne, p.300]

⇨ P_o = 1.299 x 0.9 x 0.57 = 0.67 inch
⇨ Required storage volume = P_o x area of site
⇨ = (0.67 in/12) x 240,000 sq. ft
⇨ 13,400 cu. ft

Basin Size ~ 40'L x 30'W x 11.5'D

(b) Using treatment volume from all events up to and including 0.8”rainfall

P_o = 0.8 in.

⇨ Required storage volume = (0.8 in/12) x 240,000 sq. ft
⇨ 16,000 cu. ft

Basin Size ~ 40’L x 30’W x 13.5’

(c) California Stormwater Handbook

90 percent annual runoff volume capture for 40 hours [Indus. Handbook, p. D1]

Use Riverside 40 Hour Detention Storage Analysis Curve [Indus. Handbook, p. D3]

Unit basin storage volume = 0.049 ac-ft/ac [Indus. Handbook, p. D9]

⇨ Required storage volume = Unit basin storage x area of site
⇨ = 0.049 ac-ft/ac x 5.51 ac
⇨ = 0.27 ac-ft
⇨ = 11,761 cu. ft

Basin Size ~ 40’L x 30’W x 10’D

Case Example 2 – Infiltration Trench: These calculations demonstrate sizing of an alternate BMP to achieve storm water treatment without storage capture as would be required with the detention basin BMP illustrated in Case Example 1. The method used is the maximized water quality treatment approach.

Area of project = 5.51 acres
Runoff Coefficient = 0.9 [Dunne, p. 300]

Requisite site conditions: [WEF, p. 206]

- High groundwater must be > 4 ft. below bottom of infiltration trenches
- Bedrock must be > 4. ft. below bottom of the trenches
- No fill or recompacted soil in and around the trenches
- Soil around the trenches must be of HSG Group A or B

Assumptions:

- Sandy soil on site
- Hydraulic conductivity, K = 3.3×10^{-3} ft/sec [WEF, Tbl 5.11, p. 205]
- Trench is filled with mix of uniform and graded gravel
- Porosity of trench fill, p = 35% [WEF, Tbl 5.12, p. 206]
- Width of trench, W = 3 ft [WEF, p. 206]

“Maximized” storm volume (V_r) calculated in Case Example 1, P_o = 13,400 cu. ft

- ⇨ Volume of the required trench with gravel,
  $V_T = Vr/p$ = 13400 cu. ft/ 0.35 = 38,286 cu. ft

Total area of the sides of the trenches, $A_T = 2\ V_T/Kt$ [WEF, Eq. 5.7, pg. 209]

If all captured runoff (V_r) is to drain out of the trench in one day,

t = 24 hours = 86,400 sec

=> $A_T = 2 \times 38{,}286 / (3.3 \times 10^{-3} \times 86{,}400)$ = 268.6 sq. ft

Required Trench Size ~ 3’W x 4’D x 68’L

Case Example 3 – Catchbasin Inserts: This calculation demonstrates that commercially available catch-basin inserts are adequately designed for flow treatment equivalent to the storage volume required in Case Example 1, based on manufacturers product performance claims.

To treat the “maximized” treatment volume calculated for detention basin (Case Example 1) in 24 hours,

- ⇨ Outflow rate = 13,400 cu. ft / 24 hours = 69.6 gpm

Commercially available inserts:

a. Aquashield Model 300, capacity 855 gpm [Aquashield]

b. Fossil Filter, 2’ x 2’ Rectangular, capacity 76 gpm [Fossil Filter]

Each of these will require a catch basin to collect runoff and drainage pipings for outflow from the inserts.

Case Example 4 – Infiltration Field: Sample calculation demonstrates the water quality treatment volume required to size a landscaped field for infiltration using the maximized water quality treatment method. A project site can be graded to direct storm water flows towards landscaped topographical depressions, which can function in a manner similar to detention basins.

“Maximized” Treatment Volume (from Case Example 1) = 13,400 cu. ft

Infiltration Field Size ~ 100’L x 67’W x 2’D

References

Aquashield, Remedial Solutions, Inc., 1999.

Dunne, Thomas and Leopold, Luna B., *Water in Environmental Planning*, W.H. Freeman and Company, New York, 1978.

Fossil Filter, Kristar Enterprise, 1996.

Storm Water Quality Task Force, *California Best Management Practice Handbook – Industrial Handbook*, 1993.

Water Environment Federation (WEF), *Urban Runoff Quality Management*, WEF Manual of Practice No. 23, Joint Task of the WEF and ASCE, 1998.

Attachment C

Calculation of 85th Percentile Storm Event for Southern Orange County Area
Covered by the Permit

Calculation of 85th Percentile Storm Event for Southern Orange County Area Covered by the Permit

Laguna Beach* (1929-1999)

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	852	852	35.11%
0.10 - 0.49	988	1840	75.81%
0.50 - 0.99	368	2208	90.98%
1.00 - 1.99	175	2383	98.19%
2.00 - 2.99	38	2421	99.75%
3.00 - 3.99	5	2426	99.96%
4.00 - 4.99	0	2426	99.96%
5.00 - 5.99	1	2427	100.00%

Palisades Reservoir (1966-1999)

Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	331	331	30.28%
0.10 - 0.49	471	802	73.38%
0.50 - 0.99	179	981	89.75%
1.00 - 1.99	91	1072	98.08%
2.00 - 2.99	16	1088	99.54%
3.00 - 3.99	5	1093	100.00%

Sulphur Creek Dam (1975-1999)

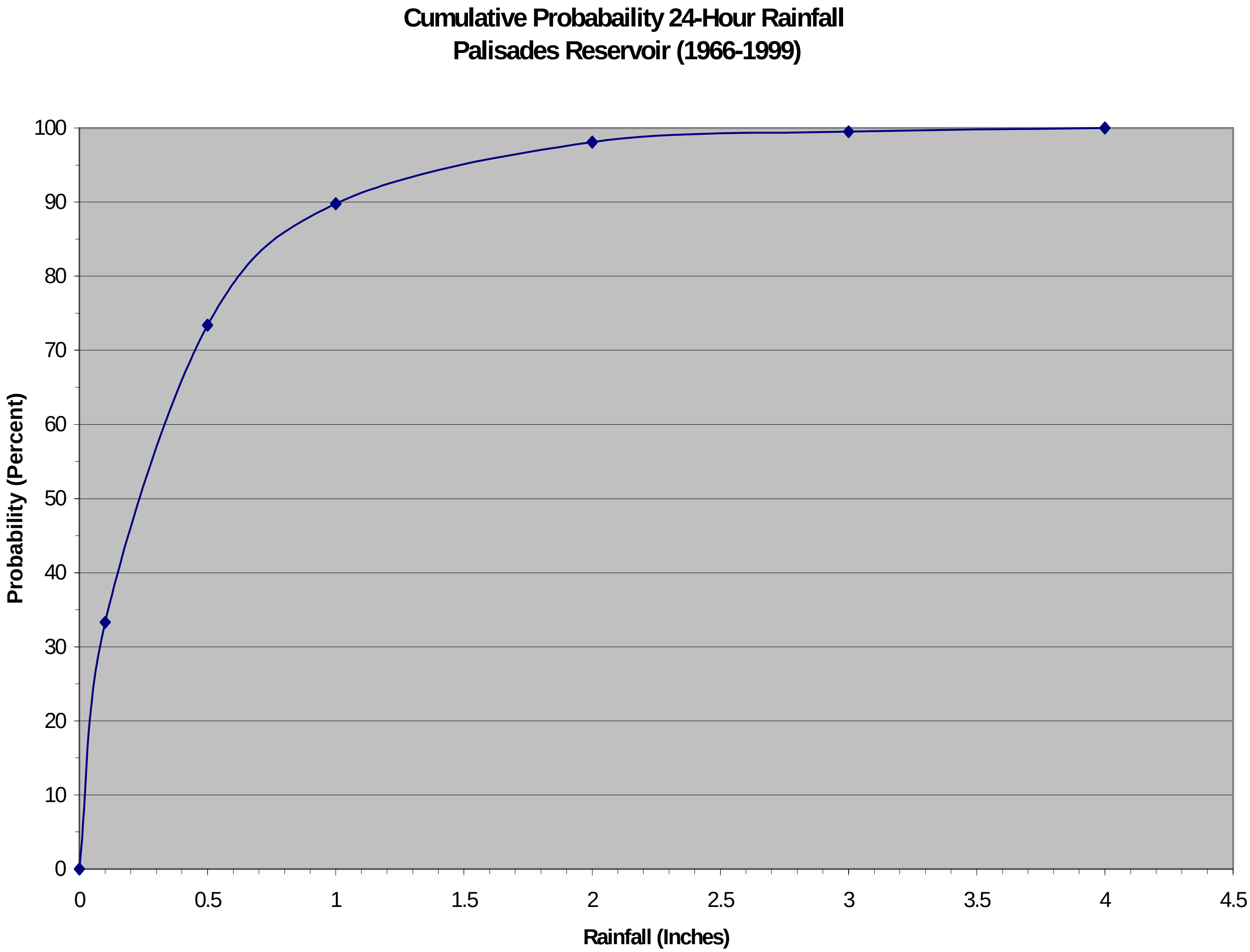
Total Range (Inches)	Number of Storms	Cumulative	Cumulative Percent
0.01 - 0.09	231	231	26.89%
0.10 - 0.49	378	609	70.90%
0.50 - 0.99	149	758	88.24%
1.00 - 1.99	80	838	97.56%
2.00 - 2.99	15	853	99.30%
3.00 - 3.99	5	858	99.88%
4.00 - 4.99	1	859	100.00%

Average 85th Percentile Storm Event For Area=

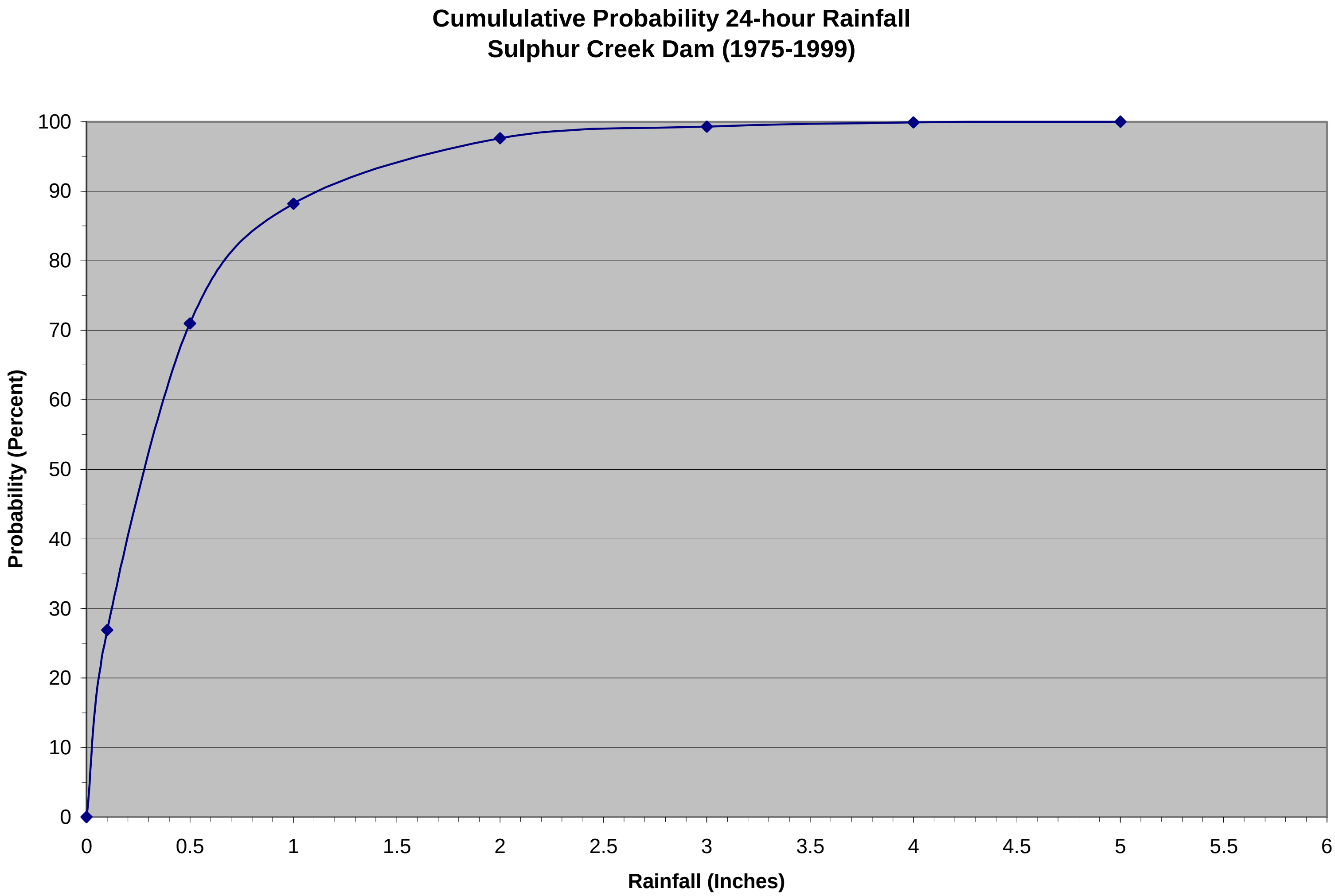
(Laguna Beach + Palisades Reservoir + Sulphur Creek Dam)/3

(0.7 + 0.8 + 0.9)/3= **0.8 inch 85th Percentile Storm Event for Orange County Region**

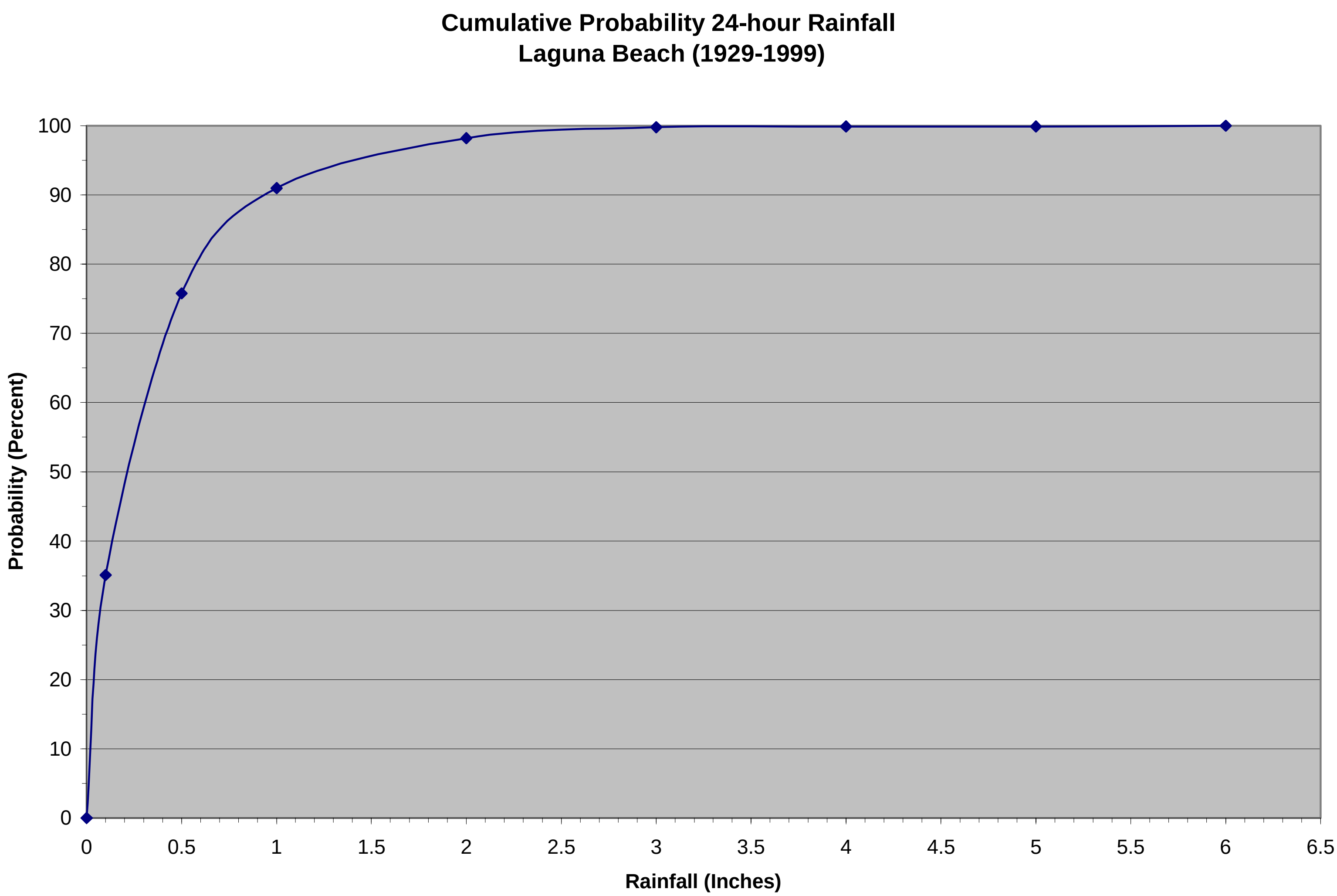
*All precipitation data from County of Orange Public Facilities Resources Department



From the graph, 85th Percentile Storm Event is 0.8 inch.



From the graph, 85th Percentile Storm Event is 0.9 inch.



From the graph, 85th Percentile Storm Event is 0.7 inch.

ATTACHMENT D

STANDARD URBAN STORM WATER MITIGATION PLANS
Numerical Sizing Criteria for Development Planning
BMP Cost Estimates

Numerical Sizing Criteria for Development Planning

BMP Cost Estimates

Cost estimates have been developed for post-construction BMPs for a commercial development project using the numerical sizing criteria under consideration by the San Diego Regional Water Quality Control Board. The cost estimate calculations are based on cost estimates developed by the Los Angeles Regional Board Water Quality Control Board and City of Los Angeles staff. The San Diego Regional Board realizes costs in the Los Angeles Region will not be identical to those in the San Diego Region. However, the cost estimates should be similar, providing adequate information for analysis at the planning level.

The cost estimates indicate that the capital and maintenance costs associated with treatment BMPs sized to meet the numerical sizing criteria are reasonable and amount to less than 0.7 percent of the project cost. The total cost of the project was estimated to be $6.5 million and includes the land acquisition, engineering and design, any clean-ups, construction, permits, etc.

Case Example 1 – Detention Basin

Excavation and haul away - $22/ cu. yd [1]

- ⇨ Warehouse Project: 13,400 cu. ft = 496 cu. yd = $10,912

Land Cost - $25 / sq. ft [2]

- ⇨ Warehouse Project: 40’ x 30’ = 1200 sq. ft = $30,000

Maintenance cost – 1 clean out per year

Event mean TSS concentration for Commercial Area = 91 mg/L [3]

Total rainfall volume captured by basin ~ 70% of 9 in. per year
= (6.3 in./12) x 240,000
= 126,000 cu. ft
= 3,567,942 L

TSS collected = 80% (91 mg/L x 3,567,942) = 324.7 kg/yr
If sediment density = 1.5 tons/ cu. yd, total TSS removed = 0.23 cu. yd/yr
⇨ Clean Out Cost: 1 cu. yd / 4 years = $99/4 yrs = $25 / yr

Total Capital Cost = $40,912
Annual Maintenance = $ 25

<u>Case Example 2 – Infiltration Trench</u>

Infiltration Trench with gravel ~ $27.77 per cu. ft [4]

⇨ Warehouse Project: 3'W x 4'D x 68'L = $22,660

Land Cost: 3'W x 68'L x $25/sq. ft = $5100

Maintenance Cost: Replacement of gravel every 5 years ~ ½ of initial set up = $11,330

=> Annual Maintenance Cost = $11,330 every 5 years = $2,266

Total Capital Cost = $27,760
Annual Maintenance Cost = $2,266

<u>Case Example 3 – Catchbasin Inserts</u>

To treat "maximized storage volume calculated for detention basin in 24 hours, outflow = 13,400 cu. ft / 24 hours = 69.6 gpm

Aquashield Model 300, capacity 855 gpm = $1335 [5]
Fossil Filter, 2' x 2' rectangular, capacity 76 gpm = $1,000 [5]

⇨ Warehouse Project: $1,000

Land cost: Negligible

Storm Drain Connection Cost: ~ $300

Maintenance and disposal cost: 3 cleanings and 2 replacement = $285 / yr [6]

Total capital Cost - $1,000
Annual Maintenance Cost - $285

<u>Case Example 4 – Infiltration Field</u>

Excavation and Haul Away – $22/ cu. yd

⇨ Warehouse Project: 13,400 cu. ft = 496 cu. yd = $10,912

Land Cost – No extra land required – Area to be incorporated in landscaping plan.

Maintenance Cost – Routing landscape upkeep. No additional mowing or cleaning.

Total Capital Cost - $10,912

References for Costs

1. Earthwork Estimate – Bureau of Engineering, City of Los Angeles
2. Real Estate Estimator – Department of General Services, city of Los Angeles. Estimate varies from $15 to $25 in South Central Los Angeles
3. Watershed Model, Us Environmental Protection Agency
4. Infiltration Trench in Department of Transportation Parking Lot. Venice, Los Angeles. Cost for 5'W x 3'D x 12'L trench.
5. BMP Demonstration Projects by City of Los Angeles
6. Rick Campos, DPS Kristar Enterprise, Cotati, CA. $45/cleaning and $75/replacement

Attachment E
Glossary

Glossary

Best management practices (BMPs): the schedule of activities, prohibition of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. The term BMPs is used very broadly used to include essentially any policy, activity, ordinance, measure, treatment technology or method that is employed by a discharger to reduce or eliminate the discharge of pollutants into storm water conveyance systems and receiving waters.

Post construction BMPs: the combination of source control BMPs and structural treatment BMPs incorporated into the early planning phases of a project and implemented after construction activities have ceased but before the project is ready for occupancy or use. Post construction BMPs are permanent BMPs which means that the project proponents must secure a funding source and arrangements for the routine maintenance of the post construction BMPs in perpetuity.

Source control BMPs: Also known as nonstructural BMPs, are preventative actions that involve management and source controls such as: policies and ordinances that provide requirement and standards to direct growth to identified areas, protect sensitive areas such as wetlands and riparian areas, maintain and/or increase open space (including a dedicated funding source for open space acquisition), provide buffers along sensitive water bodies, minimize impervious surfaces, and minimize disturbance of soils and vegetation; polices or ordinances that encourage infill development in higher density urban areas, and areas with existing infrastructure (i.e., smart growth that limits the adverse impacts of growth and development on water quality); education programs for developers and the public about project design that minimize water quality impacts; and measures such as minimization of percent impervious area after development and minimization of directly connected impervious areas (DCIAs).

Structural treatment BMPs: any type of structure or landscape designed to remove pollutants and reduce runoff flow. Structural treatment BMPs include: storage practices such as wet ponds and extended-detention outlet strictures; filtration practices such as grassed swales, sand filters and filter strips; and infiltration practices such as infiltration basins and infiltration trenches.

Numeric sizing criteria: The numeric sizing criteria indicates the specific volume of water that the combination of all BMPs at a given site must treat, infiltrate, or filter to be effective. In order to provide maximum performance (pollutant removal and flow reduction), the structural BMPs selected for a site must (1) be the most effective available and (2) be adequately sized. In order to ensure you have selected the most effective BMPs for a specific site, one should consult the published tables of performance ranges for various types of structural BMPs. To ensure that the BMPs you've selected are adequately sized, one should require the use of minimum numeric sizing criteria that is applicable to the geographic area in which the project will be located. In Orange County, the combination of all BMPs employed at a site must be sufficiently sized to infiltrate, filter, or treat the first 0.8 inches of storm water runoff from every storm event.