

# Stormwater Quality Control Requirements

What **Developers, Builders,**  
and **Project Proponents**  
Need to Know



# Background

Stormwater quality throughout California is regulated through permits issued by the State of California. These permits are called National Pollutant Discharge Elimination System (NPDES) Permits. NPDES Permits were created, through the 1987 re-authorization of the Federal Clean Water Act, to reduce the amount of pollution being conveyed to waterways from dispersed sources such as pollution from urbanized areas.

## **Examples of pollutants include:**

- pesticides
- fertilizers
- herbicides
- motor oil and other automotive fluids (from spills & leaks)
- sediment
- metals from brake pad dust
- trash
- excess irrigation water
- air pollutants that deposit on roof tops and roadways during the dry season (6-8 months of the year) and are washed into creeks and the San Francisco Bay
- decomposition of roofing and roof gutter materials and other building materials
- pet wastes

Individual pollutants may appear harmless, but cumulatively they impact water quality. In fact the U.S. Environmental Protection Agency (EPA) estimates that half of all pollutants in waterways in the U.S. comes from urban runoff.

In Alameda County, each of the 14 cities, the Unincorporated Area and the 2 flood control districts all share one NPDES Permit. This is done through a consortium of the 17 agencies called the Alameda Countywide Clean Water Program (ACCWP). ACCWP has been issued NPDES Municipal Stormwater Permits since 1991. The NPDES Permits are usually adopted in five year cycles. The NPDES permits outline the requirements that jurisdictions must adhere to for the improvement and protection of water quality within their jurisdictions. The NPDES Permit usually provides requirements and standards for categories such as municipal maintenance, public outreach, illicit discharge controls, industrial & commercial discharge controls, and new development discharge controls.

*NPDES rules and regulations are subject to changes. This is the first edition of this brochure, September 2005. For additional copies of this brochure call the Alameda County Public Works Agency Clean Water Division at 510-670-5543.*

# Alameda County NPDES Permit Requirements

## Introduction

The San Francisco Bay Regional Water Quality Control Board (SFRWQCB) incorporated updated requirements into Alameda County's National Pollution Discharge Elimination System (NPDES) Permit in February 2003. These updated stormwater quality control requirements are predominantly in the category of new development discharge controls. The Permit requires that permanent, post-construction stormwater quality control measures be implemented as part of development projects.

### Updated stormwater quality control measures include:

- Treatment Control
- Source Control
- Site Design
- Hydromodification Management (HM)

Each of these four categories is further defined and explained in more detail in this brochure. This information is provided so that your project team can fully comply with state and local NPDES permit requirements.

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# Alameda County Stormwater Control Measures

## Stormwater Treatment

### What is stormwater treatment?

Treatment is the removal of pollutants from stormwater prior to releasing the stormwater to the public stormwater system.

### Will my project need to provide stormwater treatment?



Category	Definition	Start Date
Group 1	Creation or replacement of one acre or more of impervious surface area, or less than one acre if part of a larger common plan for development	Numeric Sizing Criteria beginning 2/15/05
Group 2	Creation or replacement of 10,000 sq. ft. or more of impervious surface area, or less than 10,000 sq. ft. if part of a larger common plan for development	Numeric Sizing Criteria beginning 8/15/06

### GROUP 1

Group 1 projects must design and install a permanent, post-construction stormwater treatment facility on the site. The system must be sized according to numeric sizing criteria.

### GROUP 2

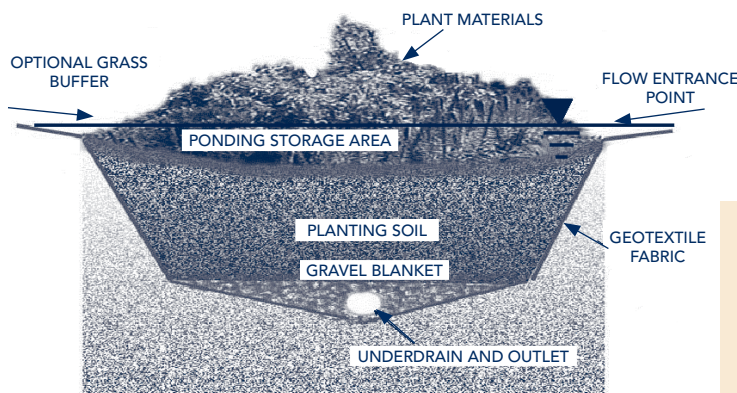
Beginning August 15, 2006, all Group 2 projects must design and install a permanent post-construction stormwater treatment facility on the site. The system must be designed and installed according to numeric sizing criteria.

**One acre = 43,560 square feet**

### MAXIMUM EXTENT PRACTICABLE (MEP)

MEP means the best treatment that can be provided at a reasonable cost with currently available technology and information.

All projects regardless of size that create or replace impervious surface may be required to install stormwater quality controls.



See the Best Management Practices Handbook and the Site Design Guidebook at [www.cleanwaterprogram.org](http://www.cleanwaterprogram.org)

# Alameda County Stormwater Control Measures

## Stormwater Treatment

### *What are acceptable permanent on-site stormwater treatment systems?*

Numerous studies show that pollutants bind to soil particles. When these pollutants have contact with soil they begin to break down or are captured, preventing the pollutants from moving into waterways and causing harm to humans and wildlife. By providing soil- or landscaped-based permanent stormwater treatment, development projects can protect water quality and reduce maintenance frequency of the treatment facilities.

Most soil-based systems are bio-swales, bio-retention areas or landscaped areas. See page 6-7 for design guidelines.

### *What are unacceptable treatment systems?*

- a. Inlet filters alone are not considered adequate treatment by the San Francisco Bay Water Quality Control Board.
- b. Oil/water separator “vault” systems alone are not considered adequate treatment by the State Water Quality Control Board.
- c. Manufactured systems are disallowed as treatment measures for most residential developments by unincorporated Alameda County due to maintenance frequency, targeted pollutants and proprietary parts.

## **Numeric Sizing Criteria for Pollutant Removal Treatment Systems**

All projects for which numeric sizing is required must use one of the following design criteria to size the treatment facilities. As appropriate for each criterion, the Dischargers shall use or appropriately analyze local rainfall data to be used for that criterion.

### **A. Volume Hydraulic Design Basis:**

Treatment BMPs whose primary mode of action depends on volume capacity, such as detention/retention units or infiltration structures, shall be designed to treat stormwater runoff equal to:

1. the maximized stormwater quality capture volume for the area, based on historical rainfall records, determined using the formula and volume capture coefficients set forth in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178 (e.g., approximately the 85th percentile 24-hour storm runoff event); or
2. the volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the

methodology set forth in Appendix D of the California Stormwater Best Management Practices Handbook, (2003), using local rainfall data.

### **B. Flow Hydraulic Design Basis:**

Treatment BMPs whose primary mode of action depends on flow capacity, such as swales, sand filters, or wetlands, shall be sized to treat:

1. 10% of the 50-year peak flow rate; or
2. the flow runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depths; or
3. the flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

# Alameda County Stormwater Control Measures

## Source Control & Site Design

**All development projects must incorporate project-appropriate site design and source control measures.**

### Source Control

#### *What is source control?*

Source control is the practice of preventing contact between stormwater and potential sources of pollutants. As of February 2003, all projects are required to implement source controls.

#### *Does my project need to include source control?*

Subject to review, most business establishments and some residential areas may require:

- Cleaning areas to be designated, roofed and plumbed to the sanitary sewer.
- Trash dumpsters to be stored in a roofed enclosure;
- Trash compactors to be roofed and plumbed to the sanitary sewer.
- Permanent or outdoor storage areas to be covered or enclosed.

See a complete list of source control measures at [www.cleanwaterprogram.org](http://www.cleanwaterprogram.org).



### Site Design

#### *What is site design?*

Site Design is the practice of reducing impacts to waterways by reducing the amount of impervious surface, or by reducing the flow of water from impervious surfaces. Incorporating site design measures at new development projects has been a requirement since 1996. Installation of site design measures can help to reduce the size of the treatment and possibly the HM facility.

This can be done through a variety of measures including:

- discharging roof down spouts to a landscaped area
- reducing street, sidewalk, and driveway widths or substituting pervious surfaces
- conveying parking lot runoff to landscaped areas.
- minimizing parking areas or substituting pervious surfaces.

See more comprehensive site design measures in "Start at the Source" and the "Site Design Guidebook" at [www.cleanwaterprogram.org](http://www.cleanwaterprogram.org).





# Alameda County Stormwater Control Measures

## Hydrograph Modification Management

### What is Hydrograph Modification Management?

Hydrograph Modification Management, also called Hydromodification Management (HM) is an NPDES requirement to control increases in peak runoff flow and volume when these increases would likely have negative impacts on creeks and other waterways. Negative impacts include erosion of creek banks and siltation.

Flow duration control is a structural approach to provide HM. For certain projects flow duration facilities are required to detain excess stormwater and release it at rates which match pre-development conditions.

### Is my project required to implement HM controls?

Applicability of HM controls depends largely on the location of the project. In certain applicable areas, projects must provide stormwater HM control for any increase in flow or volume of stormwater runoff. HM controls will apply to projects whose drainage could adversely affect natural creek channels. ACCWP is in the process of developing a HM map for the County that would identify locations where HM controls will be required.

Applicable projects creating or replacing one acre or more of impervious surface will be required to comply with the Alameda Countywide Hydromodification Management Plan *possibly beginning late 2005 or early 2006.*

This timeline has not been finalized by the SFRWQCB. Check for updates at [www.cleanwaterprogram.org](http://www.cleanwaterprogram.org)

### What about flood control?

Flood control is a separate requirement not addressed in this document. Applicants will need to refer to the Alameda County Hydrology & Hydraulics Criteria Summary (HHCS) for additional stormwater management requirements relating to flood control.



This is an example of a creek with incised banks.

### Do HM controls fulfill the requirement for post-construction stormwater treatment?

HM requirements are separate from post-construction treatment. Whereas stormwater treatment is intended to improve the quality of stormwater by removing pollutants, HM controls the volume and/or duration of runoff to minimize the erosion of creeks. However, where both treatment controls and HM controls are required, one facility may be designed to meet the needs for both requirements.

### How do I determine which HM controls to use?

HM controls may include, but are not limited to, detention basins and site design methodologies.

ACCWP is developing an approach to assist project proponents in determining if their project sites would be required to incorporate hydromodification controls (including county-wide mapping) and a modeling tool to assist in the site planning and the design of the controls for controlling post-project flows to meet the Flow Duration requirement. Consideration of HM is required at every stage of project development. During initial project planning, the location must be checked against the ACCWP HM map to determine if HM controls are required. Site planning can minimize runoff effects and reduce the space needed for HM controls.

# Alameda County Stormwater Control Measures

## Design Guidelines for Landscaped-Based Stormwater Controls

**Most soil-based treatment systems are bio-retention areas and bio-swales, a swale lined with grass or other vegetation. Other systems include but are not limited to paver systems, vertical pipes/boxes or dry well boxes with a mixture of soil, sand, and rock, and other systems as new methodologies are developed. In most cases, land will need to be set aside or dedicated for treatment or HM controls.**

### Design Guidelines

Treatment system design considerations include type of soil, depth of soil, infiltration rates, height of grass, slope, width, and length of swale.

#### 1. Sizing Treatment & HM Controls

Use the Flow Hydraulic Design Basis for treatment controls whose primary mode of action depends on **flow** capacity, such as swales, sand filters, or wetlands.

Use the Volume Hydraulic Design Basis for treatment measures whose primary mode of action depends on **volume** capacity, such as detention/retention units or Infiltration structures.

The calculations can be found at [www.cleanwaterprogram.org](http://www.cleanwaterprogram.org)

#### 2. Residence Time for Treatment Controls

Landscape or soil-based treatment systems shall be designed to allow a minimum residence time of 10 minutes and a maximum residence time of 48 hours to prevent mosquito breeding (especially a concern due to West Nile virus).

#### 3. Geotechnical Considerations

All systems must be built to provide adequate protection of slopes, foundations and other surfaces. This may include under drains and overflow devices. Consultation with a Geotechnical Engineer is encouraged and sometimes required.

#### 4. Groundwater Considerations

Stormwater treatment or HM control facilities, with an earthen bottom, may not be located within 10 feet of the seasonal high groundwater mark.

#### 5. Location of Treatment & HM Controls

Treatment & HM Controls shall be located on the private property of the development project. No treatment or HM Controls shall be built in the public right-of-way.

Stormwater treatment & HM Controls shall be located outside of the Alameda County designated creek set back area and shall not be located inside designated riparian corridor boundaries. See setback requirements in the Alameda County Watercourse Ordinance.

#### 6. When to Build Treatment or HM Controls

The stormwater treatment or HM controls should be built at the end of the project so that it does not fill with sediment, or become damaged by construction activities. If built at the beginning of a project, the systems will need to be fully functioning before final inspection.

#### 7. Side slopes

Side slopes shall not exceed 3:1, horizontal:vertical.

#### 8. Bottom width

The bottom of the treatment area must be at least 2 feet wide; 4-6 feet wide is preferable. The bottom must be graded flat. Soil shall remain un-compacted or become un-compacted, or be augmented to improve drainage and therefore improve pollutant removal.



# Alameda County Stormwater Control Measures

## Design Guidelines for Landscaped-Based Stormwater Controls

### 9. Longitudinal slope

Longitudinal slope of swales, bio-retention areas, etc, shall be between 2% and 5%. Swales with a slope greater than 3% may be required to install check dams to reduce the velocity through the area.

### 10. Velocity

Velocity of water for treatment shall be not slower than one foot per second and no faster than 2 feet per second. Velocity for 10 year design storm should not exceed the maximum velocity for the vegetation selected (estimated at 8-10ft/s max for most grasses with a channel slope of less than 5%.

### 11. Drainage & Ponding

Treatment areas shall be designed to prevent water from ponding for more than 48 hours. All treatment areas shall provide adequate provisions to prevent ponding and potential problems resulting from over-saturation. Underdrains and/or emergency overflow may be required.

### 12. Irrigation

Landscape-based treatment areas must be designed with sufficient but not excessive irrigation to establish and maintain complete turf coverage. Turf damaged due to ponding, erosion, insufficient irrigation, or other problems, must be replaced. Turf or other plants shall be mowed or otherwise maintained as required.

### 13. Protect vegetation

Stormwater conveyance systems on the site shall not convey water to existing or proposed trees/plants that would be harmed by the quantity of water.

### 14. Maintenance

Maintenance for stormwater quality controls and all associated costs will be the responsibility of the property owner(s). The County will not assume maintenance responsibility for treatment or HM controls. Make ease of maintenance a criteria of design of treatment and HM controls. Maintenance agreements shall be recorded to the property deed and include language allowing County inspectors access to the facility for on-going inspections.

## Submittal Requirements for Stormwater Treatment Plans

Plan submittals shall include a dedicated plan page for stormwater management illustrating the integration of:

- a. the proposed finished grade;
- b. the storm drainage system including all inlets, pipes, catch basins, overland flows, outlets and water flow direction;
- c. the permanent stormwater treatment system, including all design details, legend, icons;
- d. the design details of all source control and site design measures to be implemented;
- e. drainage map indicating flow direction; and
- f. sizing calculations used.

## Resources

### Information to assist with NPDES Permit Compliance

*The following are available through the Alameda County Clean Water Program (ACCWP) at [www.cleanwaterprogram.org](http://www.cleanwaterprogram.org):*

- "California BMP Handbooks for New and Redevelopment"
- "Start at the Source"
- "Using Start at the Source"
- "C.3 Stormwater Handbook"
- "Site Design Guidebook"

*The following are available through the Bay Area Stormwater Management Agencies Association (BASMAA) at [www.basmaa.org](http://www.basmaa.org):*

- List of qualified consultants to design permanent stormwater treatment systems
- Computerized sizing tool for permanent stormwater treatment systems
- Bay Area stormwater quality control examples & photos

# Landscape Design to Minimize Pesticide Fertilizer Pollution

*How can I reduce pesticide and fertilizer use?*

## 1. Native Plants

First and foremost, create landscaping with California native plants. This can help reduce water use, and reduce the need for pesticides and fertilizers. Reducing the use of these chemicals can reduce the harm they can cause to the aquatic life in the creeks. Native plants also provide food for native animals like birds & butterflies.

## 2. Drought-tolerant Plants

If landscaping with native plants is not possible or preferable, choose drought tolerant plants so that once plants are established, irrigation can be minimized. Minimizing irrigation conserves water and reduces the amount of chlorine entering creeks that can cause harm to aquatic life.

## 3. Slow-growing Plants

Choose slow-growing plants to minimize waste from the clippings that goes to landfills.

## 4. Landscape Design

Design the landscape so that plants get proper amounts of water and sunshine. Designing the landscape correctly can prevent the need for pesticides and fertilizers.

## 5. Professional Help

Contact a landscape architect or other landscape professional for recommendations.

*Why should my company reduce pesticide and fertilizer use?*

You can save money while protecting the community's water quality as well as the health of people and animals.



## Resources

**"Bay-Friendly Landscape Guidelines"** free through the Alameda County Waste Management Authority [www.stopwaste.org](http://www.stopwaste.org).

**"Plants and Landscapes for Summer Dry Climates"** \$30 - \$45 through East Bay Municipal Utility District [www.ebmud.com](http://www.ebmud.com).

**"Sunset Western Garden" & "Sunset Western Landscaping"** at bookstores.

**California Native Plant Society**  
[www.cnps.org](http://www.cnps.org).

# Protecting Water Quality During Construction

## State of California Water Resources Control Board (SWRCB) General Construction Permit

*This permit is separate from the Alameda County Municipal NPDES permit, and applies to projects regardless of installation of impervious surfaces.*

### Do the General Construction Permit requirements apply to my project?

For projects of one or more acres:

**You need this permit** if your construction project is anywhere in California and:

- *disturbs* one or more acres of land by grading, clearing (removal of vegetation), excavation, stockpiling, storage of machinery, and/or creation or replacement of paved or impervious areas, or
- disturbs less than one acre, but is part of a larger common plan of development or sale.

**You do not need this permit** for routine maintenance of stormwater or flood control facilities for:

- original line and grade
- hydraulic capacity, or
- restoring the function to a facility.

*“Disturb” refers to grading, clearing (removal of vegetation), excavation, stockpiling, storage of machinery, and/or creation or replacement of paved or impervious areas.*

### What if the project disturbs less than one acre?

Projects disturbing less than an acre need to protect the site from erosion and sediment loss. Other potential sources of water pollution resulting from construction also need to be averted by incorporating construction controls using BMPs or Best Management Practices. BMPs include covering construction materials and supplies with tarps, covering storm drain inlets to prevent soil from entering the storm drain system and creeks, reducing tracking of soil off the construction site by truck tires.

For more BMPs see Blueprint for a Clean Bay, [www.cleanwaterprogram.com](http://www.cleanwaterprogram.com)

### How does the General Construction Permit work?

Owners of new construction projects must file a completed Notice of Intent (NOI) with the State of California Water Resources Control Board and develop and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Section A of the California General Construction Permit prior to the commencement of soil-disturbing activities. A Waste Discharger Identification (WDID) number will be issued by the California Water Resources Control Board within 10 days of receipt of a complete application.

For more information on the General Construction permit:

**State Water Resources Control Board**  
510-622-2300  
[www.waterboards.ca.gov](http://www.waterboards.ca.gov)

### If working in or adjacent to a creek, you may need to apply for:

- A streambed alteration agreement from the State of California Department of Fish & Game.

[www.dfg.ca.gov](http://www.dfg.ca.gov)

- A Water Quality Certification (Clean Water Act Section 401) from the SFRWQCB.

[www.waterboards.ca.gov](http://www.waterboards.ca.gov)

- A permit from the U.S. Army Corps of Engineers.

[www.usace.army.mil](http://www.usace.army.mil)

- A Grading Permit, a Watercourse Permit, and/ or an encroachment permit for a flood control facility issued by the Alameda County Public Works Agency.

510-670-5868





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