

Start at the Source

*Design Guidance Manual
for Stormwater Quality
Protection*

1999 Edition

**Bay Area Stormwater
Management Agencies
Association**

B A S M A A



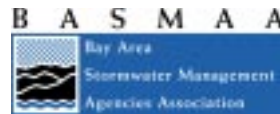
TOM RICHMAN & ASSOCIATES
Urban Design and Landscape Architecture

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Acknowledgements

This document was prepared for the San Francisco Bay Area Stormwater Management Agencies Association (BASMAA) New Development Committee.

BASMAA Participating Programs

Alameda Countywide Clean Water Program
Contra Costa Clean Water Program
Fairfield-Suisun Urban Runoff Management Program
Marin County Stormwater Pollution Prevention Program
San Mateo Countywide Stormwater Pollution Prevention Program
Santa Clara Valley Urban Runoff Pollution Prevention Program
Vallejo Sanitation and Flood Control District

Geoff Brosseau, Executive Director, BASMAA
Tom Dalziel, Chairman, New Development Committee

This document was first published as *Residential Site Planning & Design Guidance Manual for Stormwater Quality Protection* in January, 1997.

This current edition has been updated and expanded to include commercial, industrial, and institutional development, as well as a technical section to provide more detailed information on the characteristics, applications, design criteria, maintenance, and economics of the details that are discussed in this document.

This manual was developed under the guidance of a Review Committee comprised of representatives from regulatory agencies, planning and public works departments, builders, engineers, landscape architects and members of the academic community. We are grateful for all the comments and suggestions provided by the Review Committee in development of this document.

Thanks also to Professor Robert L. Thayer, Jr. of the University of California at Davis for providing guidance and counsel throughout.

Disclaimer

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Consultant Team

This document was prepared by:

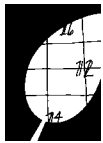
Tom Richman & Associates Tom Richman, ASLA, AICP
Patric Dawe, AIA
Jennifer Worth, ASLA

with **Camp Dresser & McKee** John Aldrich, PE
Tom Quasebarth
Jeff Endicott, PE

and **Prof. Bruce Ferguson**, FASLA of the University of Georgia.

Document design by **Artefact Design**.

Drawings by Patric Dawe. Photos by Tom Richman unless otherwise credited.



TOM RICHMAN & ASSOCIATES
Urban Design and Landscape Architecture
[now Catalyst: 415/267-5100]

Review Committee

Todd Adair
Danny Akagi
Rodney Andrade
Oscar Balaguer
Shabnam Barati
Charlie Beck
Jill C. Bicknell
Bart Brandenburg
Geoff Brosseau
Carl Cahill
Mike Campbell
Dan Cloak
Gary Cullen
Liz Cullinan
Jagtar Dhaliwal
Tom Dalziel
Genevieve Fire
David Fowler
Jack Hall
Steven Hunte
Janice Jagelski
Roger James
Fred Jarvis
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Jenny Linenberger
Roger Loftfield
Danielle Machotka
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Christine McCann
Gary Moore
Melissa Morton
Tom Mumley
Trish Mulvey
Heather Nelson
Michael Parenti
Ed Pancoast
Julie M. Pappa
Alex Pascual
Diane Pierce
Irum Shiekh
Bill Springer
Ken Strelow
Ramon (Ray) Towne
Tim Tucker
Marcel Uzegbu
Richard Watson
Steven Zeiger

Brian Kangas Foulk
City of Berkeley
MacKay & Soms
State Water Resources Control Board
Woodward-Clyde
City of Fairfield
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Central Contra Costa Sanitary District
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City of Pittsburg
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City of Antioch
Alameda Co. Public Works Agency
San Mateo County Planning
Woodward-Clyde
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County of San Mateo
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CA Regional Water Quality Control Board
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Centex Homes
Royston Hanamoto Alley & Abbey
Woodward-Clyde
Town of Danville
Alameda Co. Public Works Agency
Contra Costa Co. Public Works
Regional Water Quality Control Board
Friends of the Estuary
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Woodward-Clyde
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City of Pleasant Hill
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Alameda County Planning Dept.
City of San Jose Planning Department
Santa Clara Valley Water District
City of Pittsburg
KCA Engineers, Inc.
City of Walnut Creek
City of Concord
Richard Watson & Associates
City of San Rafael

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Introduction by the Consulting Engineers and Land Surveyors of California (CELSOC)

BASMAA's second edition of "Start at the Source" focuses on the importance of considering storm water quality in the early stages of planning and designing new land development projects.

The implementation of permanent "best management practices" is the most recent newcomer to a list of activities which have stormwater quality as their goal. These efforts include heightening public awareness, care in construction practices, and the dedication of public agencies to increased maintenance efforts related to stormwater quality.

The planning of new projects is not only an activity conducted by planning and engineering professionals, it is equally an effort on the part of cities and counties to make sometimes-difficult choices among public benefits, which are often mutually exclusive. This process involves local agencies deciding what is most important to their community within a range of project acceptability and feasibility. Many of these conflicting issues are pertinent to the subject at hand, and are touched on in this guidance manual.

- Providing compact development may conflict with the idea of minimizing impervious area
- Engineering solutions to high groundwater and expansive soils conflict with the desire to trap and percolate storm drainage;

- Clustering residential density often conflicts with demonstrated preferences of homebuyers
- Reduced pavement widths often conflict with public safety issues
- The ideal of alternative means of transportation conflicts with Americans' love of their automotive freedom;
- The ever growing demand on limited public funds makes the maintenance of new pollution control systems difficult.

Most of all, the need for viable new development projects can conflict with local, regional, and other agencies' unfortunate vision of new growth as a source of revenue to help solve social and environmental problems which were either created by past practices or are more reasonably the responsibility of society in general. These "legacies" include diminishing wetlands, endangered species, school funding shortfalls, deteriorating transportation systems, lack of low cost housing, and even demands for child care. Adding stormwater quality to this list must be resisted.

We encourage Federal, State, and especially local agencies considering these guidelines to proceed in partnership with all sectors of private business and with the professional planning and engineering community to provide reasonable, equitable, responsible and cost effective means of improving water quality.

Rodney T. Andrade
subcommittee chairman

**Consulting Engineers and Land Surveyors
of California**

Consulting Engineers and Land Surveyors of California (CELSOC) is a statewide association of 850 professional engineering and land surveying firms in private practice which are dedicated to enhancing the consulting engineering and land surveying professions and protecting the general public.

Introduction by the American Society of Landscape Architects

Landscape architects are involved with design issues at every scale, from the setting of a catch basin to the layout of new towns. They deal principally with making places between buildings and the systems that link buildings and people together on the land. At the core of this place-making is grading and drainage—the shaping of the land to manage stormwater and accommodate human use.

Historically, grading and drainage design has largely neglected the environmental implications of stormwater runoff. In the past few years, we have begun to recognize the effect of stormwater runoff on environmental quality, especially on watershed and stream health. Today’s designers must consider not only flood control and protection of property, but also how to minimize the creation of new runoff, and how to minimize the pollutants carried in that runoff.

The link between development and the quality of our environment is becoming increasingly evident. Though considerable

professional attention has been given to direct stream and wetland protection, strategies for minimizing impacts of new development on watersheds have been less well articulated. This manual is an important step in showing how watershed protection can be achieved in urban and suburban development.

Through its integrative approach and illustrative method, “Start at the Source” shows how new development can be designed and built to meet functional and market demands while protecting water resources. It balances broad concepts with practical details. It provides a rationale for the design of places and the selection of building materials. It bridges the traditional gap between landscape architecture and civil engineering.

Finally, and perhaps most importantly, it shows how drainage systems can be integrated into overall site planning and landscape architecture to form the basis of practical, cost-effective, environmentally responsible, and aesthetically pleasing design.

Jim Dalton, Executive Vice President
American Society of Landscape Architects

The American Society of Landscape Architects is a professional association of over 11,000 members whose mission is “the advancement of the art and science of landscape architecture by leading and informing the public, by serving members, and by leading the profession in achieving quality in the natural and built environment.”

<http://www.asla.org/asla/>

How to use this book

This document is intended for use in the **planning and design** phases of residential, commercial, institutional and industrial development and redevelopment. It recognizes that one of the best opportunities to reduce the generation of urban runoff or “nonpoint source pollution” (see glossary) from development is through planning and design. Once developments are built, it is very difficult and expensive to correct land use patterns and storm drain systems that contribute to urban runoff.

Because the principles and techniques described here inform basic siting and design considerations, they will be easiest to incorporate and most effective if explored early in the planning and design phases of a project. Because of the wide variety of development sites in the Bay Area — such as infill, hillside, and redevelopment — and the wide array of regulations facing the development community, many of which are potentially in conflict with each other, this document suggests design and planning strategies for adaptation to each particular condition rather than defining specific solutions for every case.

During the **construction phase** additional strategies must be employed to minimize erosion and the introduction of other pollutants into stormwater runoff. These temporary strategies, such as silt fencing, straw-bales, and erosion control matting, are documented elsewhere. For information on stormwater management during the construction phase, see the *California Storm Water Best Management Practice Handbooks (Construction Activity)* and the *Manual of Standards for Erosion & Sediment Control Measures* by the Association of Bay Area Governments (ABAG).

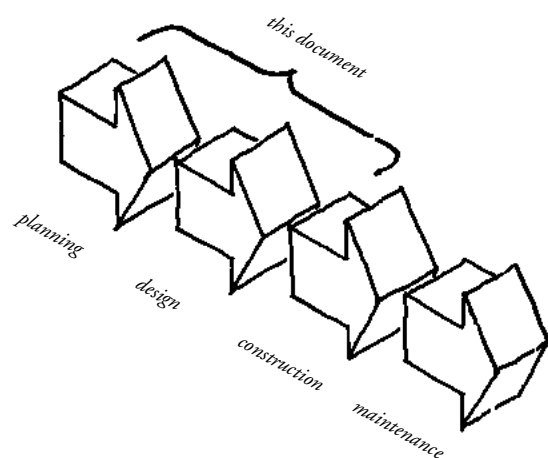
After construction, other practices must be employed for proper management of properties and facilities to prevent introduction of pollutants into the storm drain system. These “best management practices,” such as proper storage and disposal of chemicals, recycling of used oils, and community education, are also treated elsewhere. For a principal source of information on best management practices after construction see the *California Storm Water Best Management Practice Handbooks*.

Along with planning, design, and management practices, effective **maintenance** and operation of control measures is as critical as proper selection and design. Many of the control measures and practices presented in this manual capture and retain stormwater pollutants. It is important to establish a maintenance and monitoring program to ensure that the systems function as designed, and that over the long term pollutants do not accumulate to unacceptable or toxic levels. Maintenance requirements for specific site design and landscape details are discussed in Chapter 8.

This guidance manual is not intended as a prescriptive document mandating that all projects adopt all the ideas presented here. Rather it is a menu of choices to illustrate a design philosophy and approach. Once the basic approach is understood, it is envisioned that each project team will adopt or adapt those solutions that best suit the unique circumstances of each site.

The approach presented here implies some different ways of handling stormwater. Answers to **frequently asked questions** can be found on page 150.

This manual is not intended as a prescriptive document mandating that all projects adopt all the ideas presented here. Rather it is a menu of choices to illustrate a design philosophy and approach.

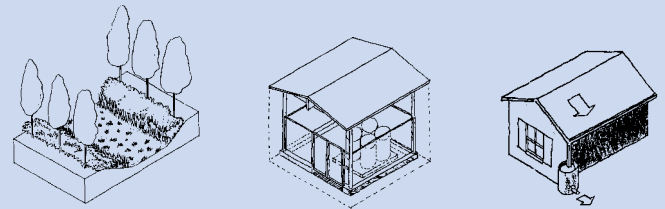


Finding that the way we design and build communities has a direct effect on water quality, the Bay Area Stormwater Management Agencies Association (BASMAA) has prepared **Start at the Source**, a manual that aims to help designers, developers, and municipal agencies create communities that achieve water quality goals.

The *Site Planning & Design Guidance Manual* contains introductory information on hydrology, watersheds, the importance of minimizing impervious land coverage, zoning and planning strategies for stream protection, and conceptual examples of dozens of methods for integrating stormwater management into all kinds of projects, including new development, infill, and redevelopment.

A **new technical section** presents detailed information on a wide variety of designs that can be adapted to residential, commercial, industrial and institutional projects.

This document recognizes that the one of the best opportunities to reduce the generation of urban runoff or nonpoint source pollution is through planning and design.



“The more we study stormwater runoff, the more we realize the critical role site planning and design play in our ability to reduce the impacts of development on the quality of our nation’s waters. This manual is a significant step in teaching planners and developers to plan for water quality.”

Thomas E. Mumley

California Regional Water Quality Control Board

San Francisco Bay Region

Urban Runoff Program Manager

“BASMAA’s *Start at the Source* guidance manual is a pioneering effort which focuses on the importance of considering storm water quality in the early stages of planning new residential development in the San Francisco Bay area.”

Community Planning & Environmental Committee

**Consulting Engineers and Land Surveyors
of California (CELSOC)**

“Through its integrative approach and illustrative method, *Start at the Source* shows how new development can be designed and built to meet functional and market demands while protecting water resources.”

Jim Dalton, Executive Vice President

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