City of
Santa Monica℠

"Tangible Community Benefits Through Innovative Stormwater Management Solutions"

FINAL

Watershed Management Plan

April 2006

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CITY OF SANTA MONICA

WATERSHED MANAGEMENT PLAN

FINAL

April 2006

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EXECUTIVE SUMMARY

Santa Monica is a community with a historic and comprehensive commitment to sustainability. This Watershed Management Plan (WMP) is an additional critical step in the community's vision for a sustainable future. This Plan proposes a long-term vision, as well as the interim steps, for Santa Monica to achieve integrated and sustainable management of its urban water resources.

Traditionally, cities have prepared storm drain master plans only to evaluate the capacity and condition of their storm drain systems to provide adequate flood protection in their communities. This Watershed Management Plan recognizes that the storm drainage systems in the 21st century must equally address not only flood control, but also stormwater quality objectives, and must consider multi-functional infrastructure, facilities, programs and benefits. This Plan may also be the first in the nation to comprehensively address the complete range of pollutants contained in urban runoff during both dry and wet weather. An existing example of Santa Monica's commitment to a more comprehensive approach is the Santa Monica Urban Runoff Recycling Facility (SMURRF), which is designed to divert, treat and reuse dry weather urban runoff from Santa Monica and Los Angeles.

Santa Monica Bay is an internationally recognized symbol that is both the principal beneficiary, as well as the touchstone, for this initiative. The Bay is an important economic engine for the tourism upon which the City depends for significant annual tax revenues. Further, it is also the body of water for which the region's regulations for the total maximum daily load (TMDL) of water quality pollutants have been established. This Plan has been developed to achieve compliance with the existing and anticipated TMDL standards, as well as to improve quality of life and contribute measurable benefits to the City's water, recreational and aesthetic resources.

WATERSHED MANAGEMENT PLAN MISSION AND GOALS

The mission of the Watershed Management Plan (WMP) is to restore a healthier balance between the urban environment and the natural ecosystem, including the Santa Monica Bay, by reducing the pollution in urban runoff, reducing urban flooding, and increasing water conservation, recreational opportunities, open space, and wildlife and marine habitat.

To support the Mission Statement, the goals that have been established for this Plan are to:

1. Reduce urban runoff pollution
2. Reduce urban flooding
3. Increase water conservation
4. Increase recreational opportunities and open space
5. Increase wildlife and marine habitat

The development of the Plan is occurring within a larger context of the Santa Monica Sustainable City Plan. The Sustainable City Plan is founded on nine Guiding Principles:

1. The concept of sustainability guides City policy.
2. Protection, preservation, and restoration of the natural environment are high priorities of the City.
3. Environmental quality, economic health and social equity are mutually dependent.
4. All decisions have implications to the long-term sustainability of Santa Monica.
5. Community awareness, responsibility, participation, and education are key elements of a sustainable community.

6. Santa Monica recognizes its linkage with the regional, national, and global community.

7. Those sustainability issues most important to the community will be addressed first, and the most cost-effective programs and policies will be selected.

8. The City is committed to procurement decisions which minimize negative environmental and social impacts.

9. Cross-sector partnerships are necessary to achieve sustainable goals.

Projects proposed by the WMP also meet objectives within several of the Sustainable City Plan's goal areas, which include Resource Conservation, Environmental and Public Health, Open Space and Land Use, Community Education and Civic Participation, and Human Dignity. This Plan is intended to provide specific direction to help meet Santa Monica's own goals for sustainability, while also serving as an example and catalyst for other communities to follow suit.

This Plan provides a set of recommended projects and activities, prioritized by specific public benefit criteria, which will allow the City to improve the quality of its urban runoff, such that the waters of the Santa Monica Bay and its tributaries will meet the fishable, swimmable goals of the nation's Clean Water Act. This Act states that the chemical, biological and physical components of the natural environment all contribute to the ability of the natural environment to support these beneficial uses. Therefore, the strategies and recommendations in this Plan address all three components of the aquatic environment in an integrated way, rather than separating them or focusing on one aspect above the others.

EXISTING WATERSHED MANAGEMENT PROJECTS AND ACTIVITIES

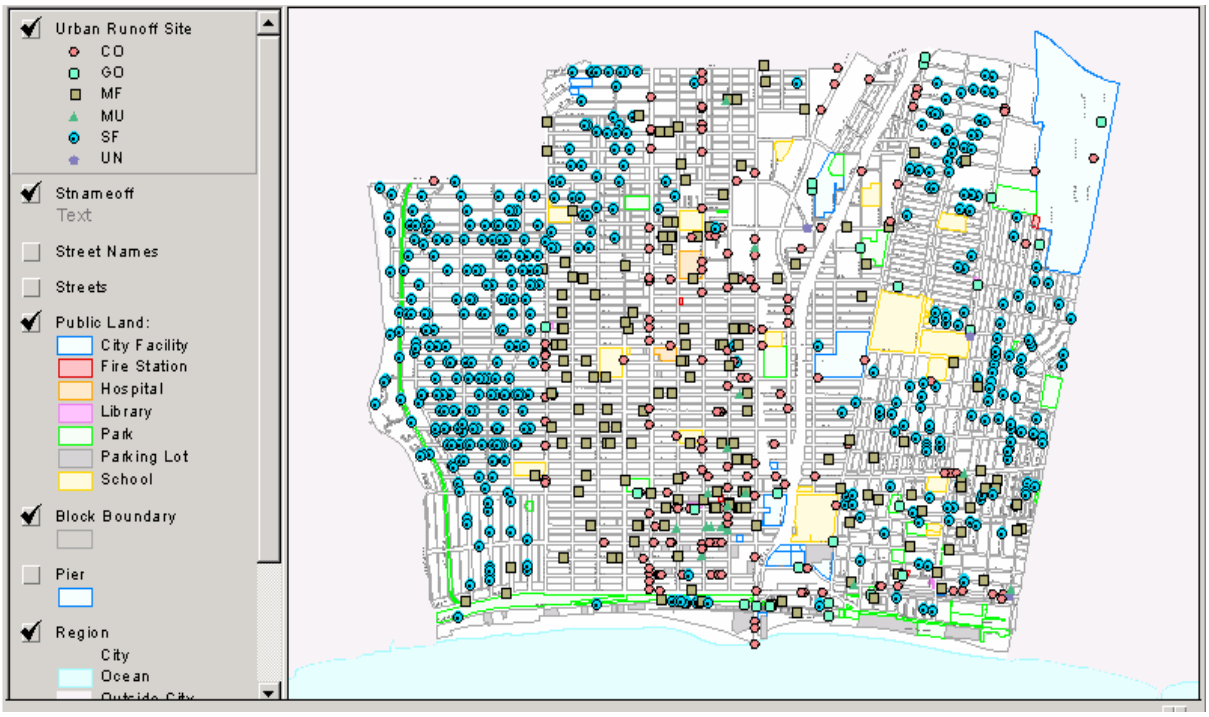
Consistent with its record of proactive and environmentally-conscious resource management, Santa Monica has already engaged in numerous activities that help to reduce runoff volume and contamination in Santa Monica. This section of the WMP describes an inventory of existing activities the City has undertaken to improve its management of urban runoff. These activities are grouped by type of project or activity into the following categories:

- Existing Stormwater System Projects
  - ✓ Park Improvements
  - ✓ Storm Drain Retrofits and Activities
  - ✓ Urban Runoff Treatment Facilities
  - ✓ Onsite Stormwater Retention Systems
- Existing Stormwater System Activities
  - ✓ Stormwater System Maintenance
  - ✓ Public Outreach and Education
  - ✓ Urban Runoff Policy
  - ✓ Funding Mechanisms
  - ✓ Rebate Programs

See Fig. ES-1 on the following page for an overview of existing City stormwater Best Management Practices (BMP's).

ANALYSIS OF URBAN RUNOFF CONVEYANCE SYSTEM

The storm drain system hydraulic modeling analysis for the City of Santa Monica revealed that the facilities do not have enough hydraulic capacity in approximately 16 miles of pipe for the 10-year storm event, and 18 miles for the 25-year storm. This section of the report presents a summary of the procedures used to implement the analysis, and a detailed summary of the specific storm drain capacity findings.



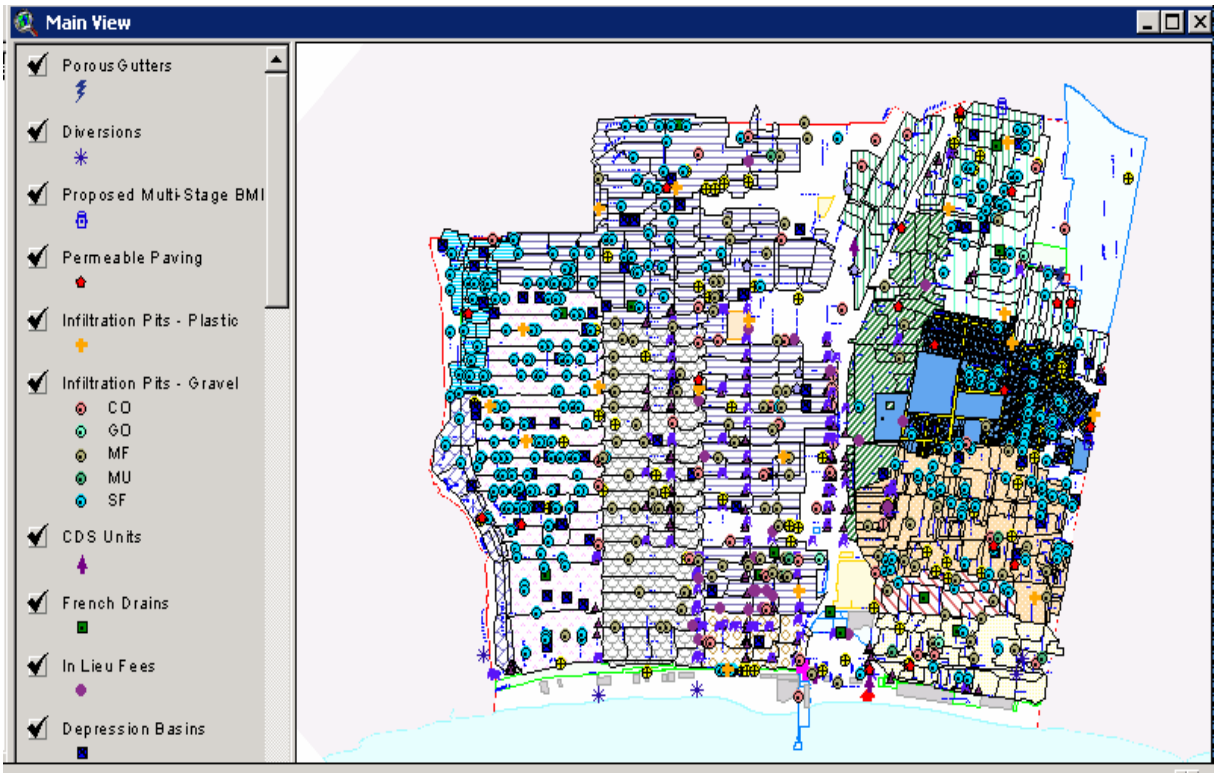


Figure ES-1. Existing City BMPs by Land Use Types (above) and BMP Types (below)

Information on the location, size, cost and benefit of the storm drain deficiencies will be used later to help prioritize projects throughout the City. The City emphasizes reducing urban runoff[1] quantity as a strategy to reduce dry and wet weather runoff amounts, and the pollution found in runoff. Generally, the capital projects of the Plan mitigate wet weather, i.e. stormwater, runoff.

RECOMMENDED WATERSHED MANAGEMENT PROJECTS AND ACTIVITIES

Specific recommendations for improvements to Santa Monica's storm water system have been developed for each sub-watershed throughout the City. Recommendations are broken into the following three categories:

1. Storm drain conveyance system upgrades
2. Multipurpose capital improvement projects
3. On-site stormwater management systems

This section includes the recommended upgrades to the City's existing storm drain conveyance system and recommends a prioritized set of multipurpose capital improvement projects to assure compliance with the Watershed Management Plan mission statement as well as the specific TMDL requirements. An analysis was performed within each of the City's thirteen sub-watersheds to identify the specific opportunities, constraints and benefits for achieving compliance with the multiple goals. The fiscal benefits embodied within the recommended projects can be substantial. This analysis has resulted in the identification of capital projects and associated costs of approximately $200 million over the next 20 years to bring the City into compliance with existing and expected future water quality regulations for the protection of the Santa Monica Bay and its tributaries. Identification of this level of capital improvements and associated expenditures in order to comprehensively address all urban runoff quality improvement needs is an unprecedented move for a single city within the United States.

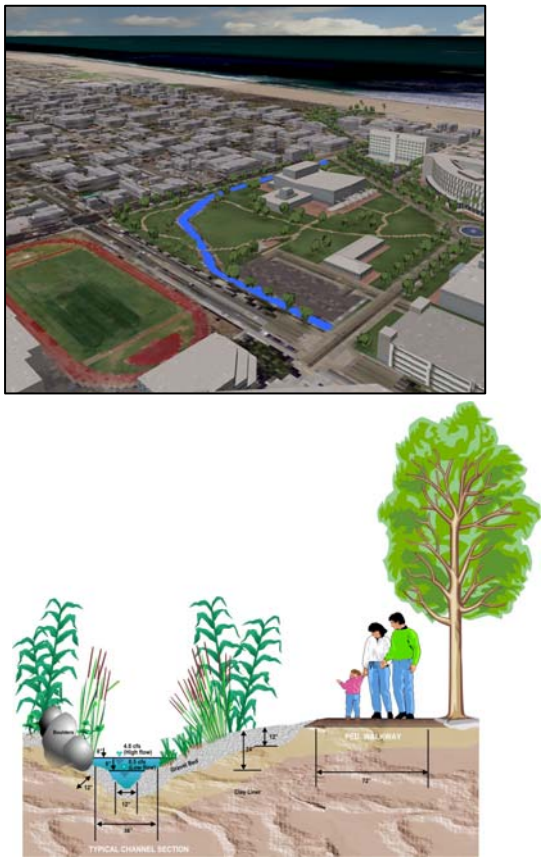


Figure ES-2. Proposed Daylighting of Kenter Storm Drain

Overall, the recommended projects and activities will bring the following benefits to the City:

- Maintenance of water quality
- Flood control
- Recharge of groundwater to increase water supply
- Water collection and reuse
- Restoration of the natural hydrologic cycle

[1] In the Plan, the use of the terms "urban runoff" and "stormwater" are often used interchangeably.

- Reduction of soil erosion and sedimentation
- Preservation of important aquatic and terrestrial ecosystems
- Habitat restoration and protection
- Creation of open space and parks for recreation and aesthetics
- Protection of public health
- Efficient land use management
- Increased property values resulting from aesthetically designed runoff treatment and control facilities

While the revenues currently being generated by the City do not provide adequate funding to address future needs, the following section of the report begins to outline a funding plan to accomplish this goal.

STORMWATER PROGRAM EXPENDITURE PLAN

Development of the initial set of projects and cost estimates in the previous section is an important first step in the City's planning process to bring the City into compliance with future regulations over the next 20 years. City staff and elected officials must have valid information on possible projects and costs to assist them in prioritizing projects within this Plan, as well as to assist them with prioritizing projects and expenditures among various City programs. Moreover, this information is critical to develop public support for future expenditures, and to attract outside funding sources to partner in the City's efforts. Additionally, because the Plan envisions multi-function projects that offer multiple benefits, such as a stormwater retention projects that augment groundwater supplies, additional funding entities can be attracted.

While the projects and costs included in the Plan will assist the City in these decision-making efforts, they should also be considered as the starting point in a multi-year planning effort. As such, ultimate projects and specific project budgets may be revised to reflect new ideas or combined projects. As an example, the City may want to consider combining several of the proposed projects together into one larger, regional creek daylighting project, as stakeholders have already suggested. This section of the Plan is intended to serve as a catalyst for this type of dialog and brain storming, and it is the City's intent to update this Plan on a regular basis to reflect current thinking.

Figure ES-3. Drainage Basin and Land Use Map

One or more projects have been recommended in each of the 13 sub-watersheds. Multi-purpose projects were recommended based on the following factors: open space, local hydraulics, community benefits, upstream land uses, collection area, public property, and cost. The sub-watersheds were also prioritized or ranked mainly according to land use and proximity to the beach. For example, there is a large parking lot adjacent to the beach in the Pier sub-watershed.

This provides an opportunity for parking lot retrofits with runoff treatment and infiltration. Because the sub-watershed is near the beach, end-of-pipe treatment was also recommended to augment the existing SMURRF facility. The advantage of this strategy is that runoff is treated without the additional construction of a potentially expensive facility. Sub-basins far from the beach have been recommended to have their own treatment equipment and facilities. These projects are more costly, and therefore less prioritized.

Sub-watersheds with a high proportion of residential areas are ranked lower than those which have a smaller percentage of this land use category. Because residential areas are private properties, there are issues with property owners whose permission is necessary for building runoff control facilities. Areas with residential properties also limit the amount of land that can be used for constructing facilities. It is also more difficult to purchase land from private owners. Conversely, sub-basins with open spaces like parks and schools are highly ranked. When an open area belongs to the public, then the recommended project associated with it becomes more desirable.

Figure ES-4. Existing Funding Sources

In addition to providing project cost estimates, this section outlines a strategy for funding the City's urban runoff program with the WMP implementations. It identifies funding alternatives, and provides a recommended strategy for the City's stormwater utility.

A detailed financial plan for the first five years is also proposed in this section. During this initial period, the monthly user fee is supplemented by a variety of local funding sources, resulting in an increase in the urban runoff program-related charge from $3 to almost $20 monthly per single-family parcel, by FY 2008-09. It is also possible that the charge be collected in a variety of ways, including utility surcharges, local sales tax, and parcel benefit assessments (for project costs). However, the local community ratepayers must ultimately support the urban runoff program costs, and in this Plan utility charges and surcharges are used.

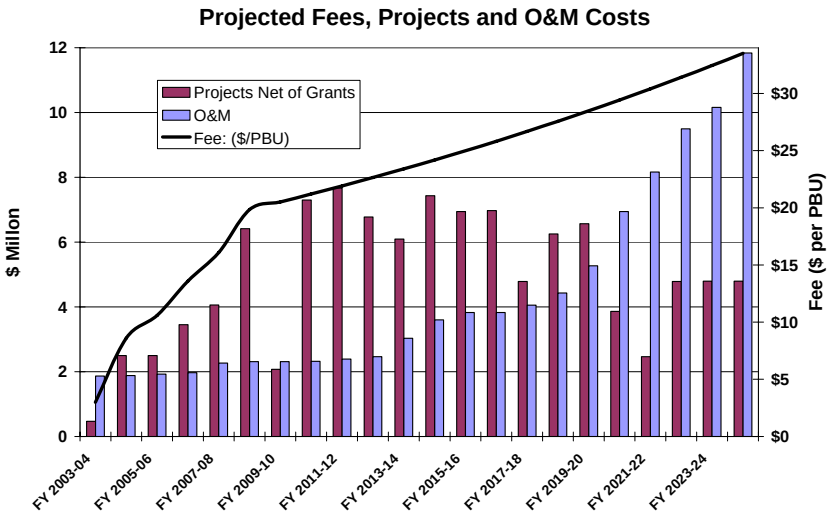


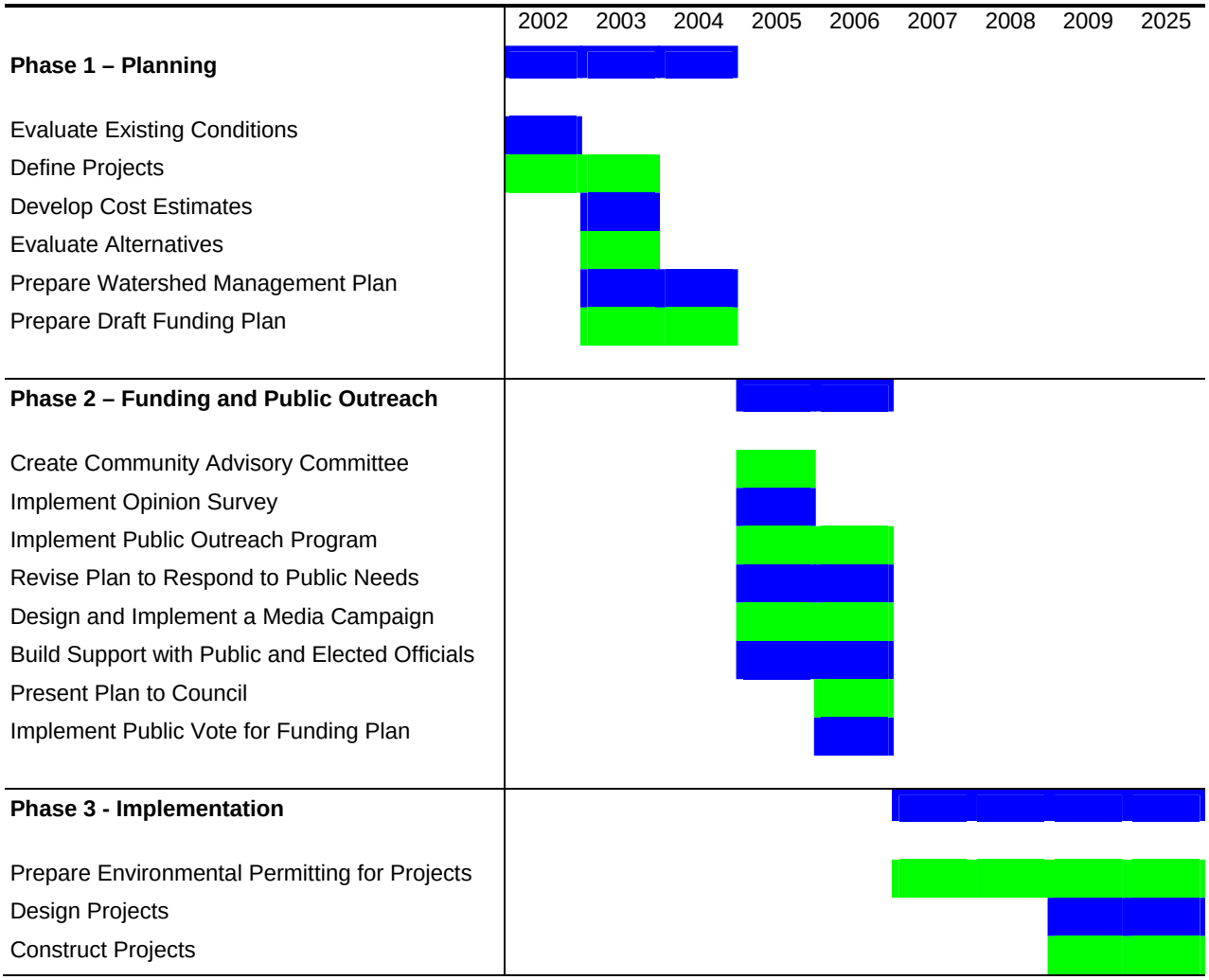
Figure ES-5. Projected Fees, Projects and O&M Costs

This section also provides a suggested 20-year capital improvement program which includes recommendations for annual expenditures and project implementation. Costs have been distributed over the 20-year period based on the expected increased revenues generated from the funding plan.

NEXT STEPS

This section of the Plan provides a detailed set of steps through 2006 to achieve progress towards the increased funding that will be needed to implement the watershed improvements. A brief summary of the steps already accomplished as well as the recommended next steps and implementation schedule is provided on the following page.

Table ES-1. Implementation Schedule



SECTION 1

INTRODUCTION

WATERSHED MANAGEMENT PLAN MISSION AND GOALS

The mission of the Watershed Management Plan (WMP) is to restore a healthier balance between the urban environment and the natural ecosystem, including the Santa Monica Bay, by reducing the pollution in urban runoff, reducing urban flooding, and increasing water conservation, recreational opportunities, open space, and wildlife and marine habitat.

The WMP is intended to provide specific direction toward the City's accomplishment of sustainability, while serving as an example and catalyst for other communities to follow suit.

Specific goals have been developed for the WMP that will assist the City in fulfilling its mission. These goals have quantitative metrics for evaluating the City's progress toward its mission. The following five WMP Goals have been identified:

1. Reduce urban runoff pollution
2. Reduce urban flooding
3. Increase water conservation
4. Increase recreational opportunities and open space
5. Increase wildlife and marine habitat

In addition to the broad goals described above, the following specific quantifiable goals have been defined for the purpose of measuring progress towards the goals. The WMP is intended to support the Sustainable City Plan by defining a specific set of recommended actions which will result in measurable progress towards the following specific quantifiable goals:

1. Reduce urban runoff pollution.

    - Infiltrate or treat the first ¾-inch of rainfall in a 24-hour period (consistent with the City's Urban Runoff Mitigation Ordinance), which is approximately equivalent to the runoff from the 85th percentile 24-hour runoff event.

    - Achieve 100 percent diversion, infiltration, or treatment of dry weather runoff for all Santa Monica storm drains from April through November, and the maximum amount possible from December through March.

    - Achieve compliance with Total Maximum Daily Loads (TMDLs) adopted by the Regional Board.

2. Reduce urban flooding.

- Achieve compliance with Los Angeles County Department of Public Works flood control guidelines:

  a. Drains for sumps must be designed for the 50-year storm,

  b. Streets must convey the difference between the 25-year and 10-year flow up to the property line, and

  c. Pipelines must convey the 10-year storm and any additional flow necessary to maintain the flow below the property line (LACDPW, 1991).

3. Increase water conservation.

   - Maximize the infiltration of urban runoff, both during dry and wet weather;
   - Maximize permeable surfaces and minimize impermeable surfaces; and
   - Maximize storage and reuse of urban runoff.

4. Increase recreational opportunities and open space.

   - Achieve compliance with the Recreation and Parks Commission standard of 2.5 acres of open space per 1000 residents; and
   - Maximize the use of multipurpose solutions which provide recreation.

5. Increase wildlife habitat.

   - Increase the number of species on a parcel;
   - Increase the ratio of native to non-native species on a parcel;
   - Increase the diversity of native habitat types; and
   - Connect existing significant habitat areas with other significant habitat areas to allow for intermixing and increased genetic diversity.

REGULATORY ENVIRONMENT

The City of Santa Monica has a history of responsible environmental management, and it continues to be one of the City's primary endeavors. The City recognizes that the Santa Monica Bay is an important resource for both its residents and visitors, and is proactively engaged in programs to protect the Bay and its tributaries. In addition to this proactive approach, the City recognizes that there are water quality regulations that also require attention to the management of urban runoff from the City. This section is intended to provide a brief overview of these regulatory drivers.

EXISTING WATER QUALITY STANDARDS

California Regional Water Quality Control Board, Los Angeles Region, Order No. 01-182-NPDES Permit No. CAS004001

On December 13, 2001, the Los Angeles Regional Water Quality Control Board (Regional Board), adopted Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges within the County of Los Angeles, and the Incorporated Cities Therein, (Except the City of Long Beach). The City of Santa Monica is one of the cities governed by this permit.

http://www.swrcb.ca.gov/agendas/2003/march/0304-09_res2002-022.doc
http://www.swrcb.ca.gov/rwqcb4/html/programs/stormwater/la_ms4_final.html

Santa Monica Bay Beaches Bacterial TMDL

On January 24, 2002 the Los Angeles Regional Water Quality Control Board (Los Angeles Regional Board) adopted *Resolution No. 02-004* amending its Water Quality Control Plan (Basin Plan) to incorporate a Total Maximum Daily Load (TMDL) for bacteria at Santa Monica Bay beaches during dry weather.

On December 12, 2002 the Regional Board adopted *Resolution No. 2002-022* amending its Water Quality Control Plan (Basin Plan) to incorporate TMDL requirements for bacteria at Santa Monica Bay beaches during wet weather. This document sets forth bacterial effluent limits and deadlines for compliance with which the City of Santa Monica must comply.

http://www.swrcb.ca.gov/agendas/2003/march/0304-09_res2002-022.doc
http://www.swrcb.ca.gov/agendas/2003/march/0304-09_res2002-022att.doc

Ballona Creek Trash TMDL

On September 19, 2001, the Regional Board adopted *Resolution No. 01-014* amending its Basin Plan to incorporate TMDL requirements for trash in Ballona Creek.

http://www.swrcb.ca.gov/rwqcb4/html/meetings/tmdl/ballona_creek/010919_BC%20Final%20resolution.pdf

Future Water Quality Regulations

The City of Santa Monica's ongoing commitment to the environment includes an intention to comply with existing, as well as, anticipated storm water quality regulations, such as the TMDLs currently being developed by the Regional Board. While not all of these regulations are in effect yet, the City has decided to take a proactive approach and work toward compliance in anticipation of adoption of these regulations. Following is a brief description of pending TMDLs for the Regional Board.

A consent decree between the U.S. Environmental Protection Agency (USEPA), Heal the Bay, Inc. and BayKeeper, Inc. was approved on March 22, 1999. This court order directs the USEPA to complete TMDLs for all impaired waters within 13 years. A schedule was established in the consent decree for the completion of the first 29 TMDLs within 7 years. The remaining TMDLs have been scheduled by Regional Board staff within the 13-year period, and can be found in Appendix 2 of the Board's Watershed Management Initiative (see attached links for complete list and schedule of impaired water bodies, and constituents for which TMDLs to be adopted). In addition, the following information was obtained through a personal communication with Renee DeShazo, TMDL Coordinator for the Regional Board. The following schedule is the most current summary of expected TMDL adoption dates, and supersedes information presented in the links provided below.

October 2004
Los Angeles Regional Water Quality Control Board
Tentative TMDL Development Schedule*

Watershed	Trash	Nutrients	Bacteria	Metals	Organics
Santa Monica Bay	Not Listed	Not Listed	2003	Not Listed	2008
Ballona Creek	2002	Not Listed	2005	2006	2006

* Based on personal communication with Renee DeShazo, October 12, 2004.

Stormwater runoff from the City is tributary to both the Santa Monica Bay and Ballona Creek, and the projects proposed in this document are designed to achieve compliance with the TMDLs described above.

Watershed Management Initiative:

http://www.swrcb.ca.gov/rwqcb4/docs/wmi/webchapter02.pdf

Watershed Management Initiative, Appendix 2:

http://www.swrcb.ca.gov/rwqcb4/docs/wmi/webappendix02.pdf

RELATION TO OTHER CITY PROGRAMS

SUSTAINABLE CITY PLAN

Santa Monica's Sustainable City Plan was formulated to address the strain that population growth, high levels of consumption, and the desire to feed growing economies place on natural resources. These demands can have a negative impact on the natural environment, local communities, and quality of life. The Sustainable City Plan, adopted in 1994 and updated in 2004, outlines a program to minimize these negative impacts while accommodating the needs of the City's residents and businesses – in the present and the future.

The Sustainable City Plan is founded on nine Guiding Principles and has been expanded to include eight Goal Areas. The Guiding Principles are listed below as they are described in the Sustainable City Plan (2004 revision).

Santa Monica Sustainable City Plan – Guiding Principles:

1. The concept of sustainability guides City policy.

2. Protection, preservation, and restoration of the natural environment are high priorities of the City.

3. Environmental quality, economic health and social equity are mutually dependent.

4. All decisions have implications to the long-term sustainability of Santa Monica.

5. Community awareness, responsibility, participation and education are key elements of a sustainable community.

6. Santa Monica recognizes its linkage with the regional, national, and global community.

7. Those sustainability issues most important to the community will be addressed first, and the most cost-effective programs and policies will be selected.

8. The City is committed to procurement decisions which minimize negative environmental and social impacts.

9. Cross-sector partnerships are necessary to achieve sustainable goals.

Eight Goal Areas have been developed that include specific objectives of the Sustainable City Plan, as well as indicators which Santa Monica will monitor and use to quantify progress toward becoming a sustainable city. The City's eight Goal Areas are:

1. Resource Conservation
2. Environmental and Public Health
3. Transportation
4. Economic Development
5. Open Space and Land Use
6. Housing
7. Community Education and Civic Participation
8. Human Dignity

Projects proposed by the WMP meet objectives within several of the Goal Areas, including Resource Conservation, Environmental and Public Health, Open Space and Land Use, Community Education and Civic Participation, and Human Dignity.

PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

The mission of the Planning and Community Development Department is to create a better community for the people of Santa Monica. It provides information and services to maintain and develop Santa Monica's environment while ensuring a high quality of life for the community.

The Planning Department is currently updating its City general plans, and the goals and objectives of this WMP as well as recommended projects and activities that are being considered in that process.

OPEN SPACE MANAGEMENT DIVISION

More than 420 acres of public open space and approximately 173,000 square feet of community facilities in the City of Santa Monica serve thousands of residents and visitors each year. The Open Space Management Division maintains these areas and encourages the enjoyment of the City's parks and beaches. The Division oversees the City's community forest as well as contract services (e.g., beach concessions and lifeguard services) and manages community events in City parks and on the beach, as well. Division staff assists event planners in using City resources, securing permits and following City guidelines.

Santa Monica's open space system includes 245 acres of state beach, 24 regional, community and neighborhood parks, five Playground Partnership playfields, over 50 other public landscaped areas, 27 community facility sites and the community forest. In addition to landscaping and maintaining numerous playfields, tennis and basketball courts, and 10 community centers, the Open Space Management Division is responsible for the 47,440 square foot Santa Monica Swim Center at Santa Monica College and Miles Memorial Playhouse at Reed Park.

Other important public landscapes under the Division's supervision are City Hall, the new Public Safety Facility, the Civic Auditorium, the Third Street Promenade, libraries, fire stations, parking lots and City streetscapes, which together constitute a highly visible representation of the City's well-being. Among current construction projects that will allow the City to better serve its residents, a skate park will open at Memorial Park in the winter of 2005, and Virginia Avenue Park will reopen in late 2005 following an extensive 18-month reconstruction.

Open Space Management provides important direct services to the public, including information and referral, and reserving and staffing community meeting rooms. Division staff also provides support to the City's Recreation and Parks Commission.

HOUSING AND REDEVELOPMENT AGENCY

Housing and Redevelopment is dedicated to preserving existing affordable housing in Santa Monica and creating new housing opportunities for residents with low and moderate incomes. Pressures on the existing housing stock in Santa Monica from market forces and changes to state and federal laws will impact affordable housing opportunities for low and moderate income persons and families. Housing and Redevelopment works with private affordable housing developers and multi-family property owners to ensure that economic diversity, a hallmark of Santa Monica, continues to flourish and that longtime residents can remain in their households.

The Santa Monica Redevelopment Agency, in partnership with the community, strives to improve a neighborhood's physical, economic and social environment through redevelopment activities. Redevelopment activities represent a community's effort toward achieving various neighborhood revitalization goals. Neighborhoods benefit through financial investment in public facilities as well as residential, commercial and retail properties.

USE OF THE WATERSHED MANAGEMENT PLAN

The WMP recognizes that technologies are constantly evolving and new information is continually being gathered. It is therefore suggested that future project teams use the WMP as a guide throughout the process of improving the City's storm water infrastructure, rather than a strict plan. Each of the recommendations presented in the WMP should be reevaluated prior to final design and construction to take advantage of any technological advances that may have been made.

PLAN DEVELOPMENT PROCESS

STAKEHOLDER INVOLVEMENT

This document has been developed through a collaboration of City staff, consultants, and other stakeholders throughout the local community. This section provides a brief overview of the process currently underway to incorporate stakeholder input into the final document. Stakeholders outside of the City's departments were invited to participate in the Watershed Visioning Charrette on June 9, 2004. This meeting offered a unique visioning charrette designed to solicit cutting edge solutions to stormwater problems of quality and quantity in Santa Monica and worldwide.

Charrette participants were identified by regional experts in issues of environment and stormwater. A complete list of attendees is shown in Table 1-1.

Table 1-1. Watershed Visioning Charrette Participants

Name	Affiliation
Angie Bera	Santa Monica BayKeeper
Susan Cloke	LA RWQCB
Suzanne Dallman	LA and San Gabriel Rivers Watershed Council
Bill DePoto	LA County Department of Public Works
Stephen Groner	Stephen Groner Associates
Jessica Hall	North East Trees
Nancy Hastings	Surfrider Foundation
Shelley Luce	Heal the Bay
Xavier Swammikannu	LA RWQCB
Wing Tam	City of LA Bureau of Sanitation
Guangyu Wang	SMBRC
Jennifer Wolch	University of Southern California
Bob Wu	Caltrans

Name	Affiliation
Andy Agle	City of Santa Monica Planning Department
Anthony Antich	City of Santa Monica EPWM
Brian Johnson	City of Santa Monica EPWM
Spiros Lazaris	City of Santa Monica EPWM
Neal Shapiro	City of Santa Monica EPWM
Michael Drennan	Brown and Caldwell
Nancy Gardiner	Brown and Caldwell
Lissa MacVean	Brown and Caldwell

The workshop stakeholders gathered at Joslyn Park, Santa Monica. As a result of over two months of planning, the workshop was extremely well-attended and preliminary feedback received from several stakeholders indicated that the workshop was very well received. The City emphasized its intention to listen to the participants' opinions after providing some preliminary comments about the status of the City's efforts to date to develop a draft WMP.

The participants were then invited to provide a brief introduction about themselves and the organizations they represented. Participants were then offered an opportunity to suggest revisions to the City's draft mission statement for the WMP. (None were provided.) The City emphasized the fact that the mission statement embodies multiple objectives beyond water quality improvement, and explained the City's objectives to develop projects that accomplished as many of the objectives as possible. It was noted that this Plan is the first to allow a city to claim they are managing 100 percent of urban runoff during dry weather and 80 percent of stormwater runoff during wet weather for all existing and future water quality standards expected as a result of upcoming water quality standards to be developed by the Regional Board.

The City also described some of the methods being considering as potential solutions to accomplish the objectives of the mission statement, and an overview of the preliminary cost estimates which include construction of new facilities and land acquisition. The City also provided the stakeholders with a brief overview of some of the nonstructural best management practices currently under consideration by the City as well as a PowerPoint presentation which includes useful reference materials for the workshop including historical photos of Santa Monica, examples of best management practices (structural and non-structural), and some computer animations which depict the "daylighting" of the Pico-Kenter Storm Drain through the City's Civic Center. This project will include adjacent stormwater detention and treatment facilities to reduce pollutants entering the Bay.

For the second portion of the charrette, the stakeholders were asked to form three groups to discuss the following questions:

1. Please suggest solutions to reach the goals of our mission statement.
2. Please share success stories to reach the goals in the mission statement.

3. Please describe any barriers to success.
4. Please suggest the next steps the City should consider.

Each group summarized its discussions on flip-charts and presented its suggestions to the rest of the stakeholders. Suggestions that resulted from each discussion group are presented in Appendix A.

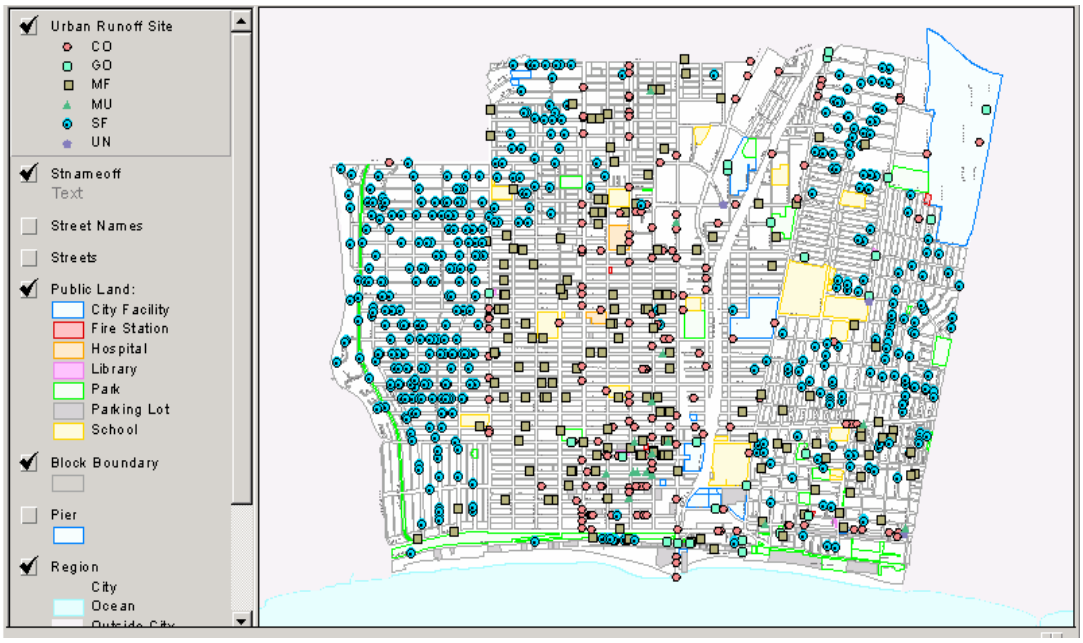
The City concluded the workshop with some closing remarks indicating the City's intention to summarize the results of the stakeholders' input and utilize their input to help make decisions about the priority and direction of the final WMP. The City indicated its intention to distribute the draft WMP to the stakeholders for their review and input. The input will be incorporated into the final WMP.

SECTION 2

EXISTING WATERSHED MANAGEMENT PROJECTS AND ACTIVITIES

Consistent with its record of proactive and environmentally-conscious resource management, the City has already engaged in numerous activities that help to reduce runoff volume and contamination in Santa Monica. This section of the WMP describes an inventory of existing activities the City of Santa Monica has undertaken to improve its management of urban runoff. While the purpose of this document is not intended to be a comprehensive inventory of the City's stormwater management activities, it is important to understand some of the more innovative and effective measures already employed within the City in 2004. These projects and activities serve as the foundation for the recommended capital improvements described in Section 4 which are designed to provide compliance with future water quality regulations anticipated over the next 20 years. These activities are grouped by type of project or activity into the following categories:

- Existing Stormwater System Projects
  - ✓ Park Improvements
  - ✓ Storm Drain Retrofits and Activities
  - ✓ Urban Runoff Treatment Facilities
  - ✓ Onsite Stormwater Retention Facilities
- Existing Stormwater System Activities
  - ✓ Stormwater System Maintenance
  - ✓ Public Outreach and Education
  - ✓ Stormwater Policy
  - ✓ Funding Mechanisms
  - ✓ Rebate Programs



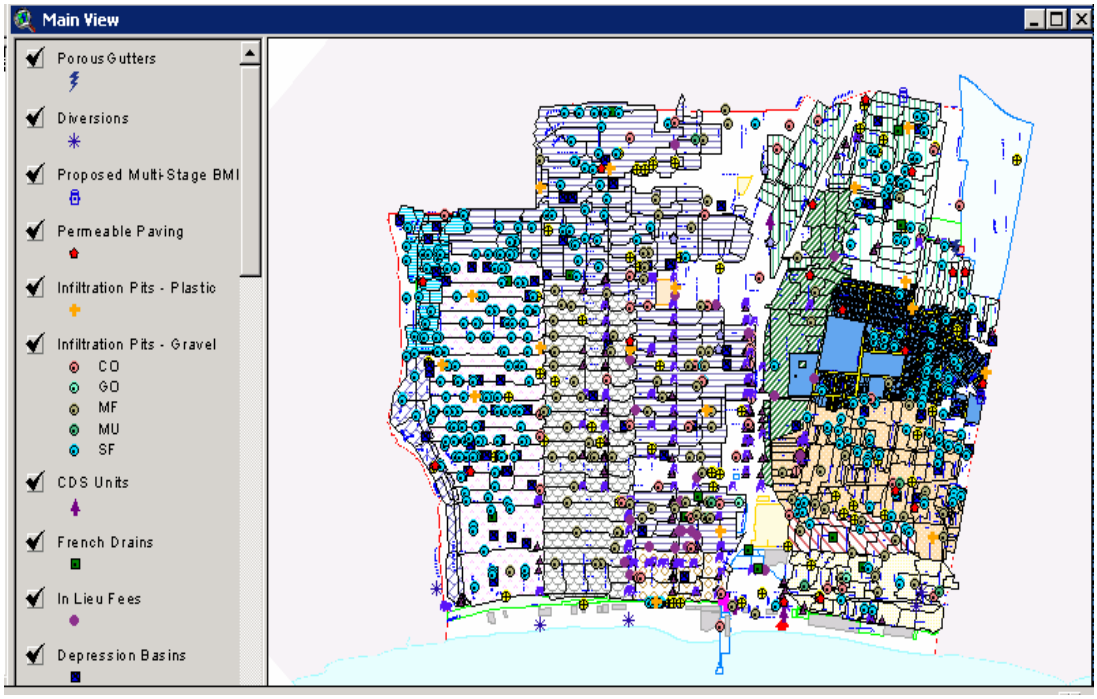


Figure 2-1. Existing City BMPs by Land Use Types (above) and BMP Types (below)

The following summary table provides an overview of the BMPs currently in place, or planned prior to development of this document, in each of the City's thirteen drainage basins. The following table is a more specific discussion of some of the more innovative projects and activities implemented by the City to date.

Table 2-1. Overview of BMPs

Basin	BMPs Completed	BMPs Planned (Budgeted and Unbudgeted)
Ashland	CDS Dry Weather Diversion (LA County)	Bicknell "Green Street" BMP Project (Budgeted)
Montana	Catch Basin Inserts	Dry Weather Diversion (Budgeted)
Wilshire	Catch Basin Inserts	Dry Weather Diversion (Budgeted)
Pico-Caltrans	Catch Basin Inserts SMURRF CDS Virginia Park BMP	Porous Pavement/DryWells/ Infiltration Facility (Budgeted)
Lincoln	CDS Catch Basin Inserts SMURRF	
Pier	CDS Catch Basin Inserts SMURRF	
San Vicente	Dry Weather Diversion (LA City)	
Georgina	Dry Weather Diversion (LA City)	
Centinela	Catch Basin Inserts	Two-stage BMP Facility (Budgeted)
Airport	Catch Basin Inserts Clover Park BMP Retrofit Project	Airport WMP (Budgeted) Airport Park BMP Project (Budgeted)
16th Street	Catch Basin Inserts	Three-stage BMP Infiltration Facility (Budgeted)
Pico-4th Street	CDS Catch Basin Inserts SMURRF	
Kenter Canyon	CDS Catch Basin Inserts SMURRF BBB Phase 1	BBB Phase II (Budgeted) Yale "Green Street" BMP Project (Budgeted)

EXISTING STORMWATER SYSTEM PROJECTS

PARK IMPROVEMENTS

Santa Monica Airport Park

The Santa Monica Airport Park is being developed in the nonaviation lands of the Municipal Airport. Because of the site location at the southerly border of the City with limited access from surrounding streets, it is not envisioned that this new recreational complex would be oriented to neighborhood use or pedestrian access. Rather, Airport Park will serve City-wide recreational needs, in particular for new field sports. Airport Park will feature a recreational pathway that extends to the limits of the park, providing walking, jogging, and cycling within a well-landscaped setting. Airport Park will also include five new sports fields, multi-use paved areas for court games, skating events, and parking, a 1.5-acre off-leash dog park, programmable indoor recreational/community spaces, and children's play areas. Stormwater runoff from the park and some surrounding Airport non-park land will be treated and infiltrated into underlying soils.

Clover Park

Stormwater best management practices were installed in Clover Park to capture the 3/4-inch storm from the park's parking lot and office areas. A large, subterranean infiltration pit at the western side of the park receives the park's runoff, including a layer of infiltration devices called "Infiltrators". A catch basin insert provides pretreatment of runoff from the parking lot.

Virginia Park

Virginia Park was expanded by 2.9 acres to provide an opportunity for new facilities to better serve the surrounding community. Stormwater runoff from the park will be treated and infiltrated into underlying soils. A series of subterranean pits filled with gravel surround much of the park's eastern and southern perimeter and receive and infiltrate runoff from the park. The park's parking lot is built with a variety of permeable surfaces and infiltration zones to enhance stormwater infiltration and reduce runoff.

Figure 2-2. Virginia Park Subsurface Infiltration Facilities

STORM DRAIN RETROFITS AND ACTIVITIES

Description. The following figures provide examples of existing storm drain retrofits employed throughout the City to reduce stormwater pollutants and debris from entering the storm drains and ocean. These examples include catch basin inserts, catch basin screens, and separation devices.

Additional Information. Please visit the web site at: http://santa-monica.org/epd/residents/Urban_Runoff/pdf/UR_Brochure.pdf

Figure 2-3. Catch Basin Inserts

Figure 2-4. Catch Basin Screens

Figure 2-5. Separation Devices

URBAN RUNOFF TREATMENT FACILITIES

Santa Monica Urban Runoff Recycling Facility (SMURRF)

Description. The Santa Monica Urban Runoff Recycling Facility (SMURRF) treats up to 500,000 gallons per day and is designed to remove pollutants from dry weather runoff (from excessive irrigation, spills, construction sites, pool draining, car washing, washdown of paved areas, and some first flush wet weather runoff) (See Figure 2-6). SMURRF is a joint project with the City of Los Angeles. Historically, this runoff went directly into the Santa Monica Bay through storm drains, taking with it pollutants such as trash, sediment, oil, grease, and pathogens. Currently runoff is diverted from the City's two main storm drains (Pier and Pico-Kenter storm drains) into the

SMURRF and treated to meet Title 22 requirements. SMURRF effluent is reused for activities such as landscape irrigation and flushing of toilets.

Figure 2-6. Santa Monica Urban Runoff Recycling Facility

Additional Information. Contact the City's urban runoff coordinator: (310) 458-8223 or visit the web site at http://epwm.santa-monica.org/epwm/smurrf/smurrf.html

Storm Drain Low-Flow Diversion

Description. Dry weather flow from the Pico-Kenter and Pier storm drains is diverted to SMURRF and treated year-round with interruptions only during storm events and maintenance. Dry weather flow from the Ashland storm drain (LA County project) is diverted to the City of LA's Hyperion Sewerage Treatment Plant and treated each year between May and October. Dry weather flows from the Wilshire and Montana storm drains will soon be diverted to Hyperion as a result of grants received by the City from the State of California. Runoff from the northern section of the City flows to a City of LA diversion at the end of Santa Monica Canyon at Pacific Coast Highway.

Additional Information. Please visit the web site at http://santa-monica.org/environment/policy/bay/programs.htm#Storm

Onsite Stormwater Management Facilities

Description. The following figures provide examples of existing onsite stormwater management facilities employed throughout the City to reduce stormwater pollutants and debris from entering the storm drains and ocean. These examples include an onsite stormwater retention basin and an onsite basin with a filter insert.

Additional Information. Please visit the web site at: http://santa-monica.org/epd/residents/Urban_Runoff/pdf/UR_SMBRP_Brochure.PDF

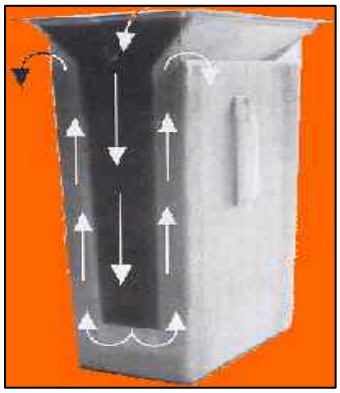


Figure 2-7. Onsite Basin with Filter Insert

EXISTING STORMWATER SYSTEM ACTIVITIES

STORMWATER SYSTEM MAINTENANCE

Catch Basin Cleaning and Street Sweeping

Description. The City's 650 catch basins are cleaned on a regular basis, up to eight times per year, and no less than twice per year, or as needed. All City streets are swept at least once per week, and some downtown streets are swept up to five times per week. This effort helps to eliminate debris and contaminants from the streets and catch basins that might otherwise be carried to the Santa Monica Bay.

Additional Information. Please visit the web site at http://santa-monica.org/environment/policy/bay/programs.htm#Catch%20Basin%20Cleaning

PUBLIC OUTREACH AND EDUCATION

Resources and References

Description. This list provides the names of documents with information about stormwater management and BMPs, as well as contact information for obtaining each document.

Additional Information. Please visit the web site at http://pen1.ci.santa-monica.ca.us/engineering/design_center/urban_runoff/csm.URr1.pdf

2003 Adopted Sustainable City Plan

Description. The Sustainable City Plan was created to help Santa Monica meet its current resource needs without compromising the ability of future generations to do the same. The Sustainable City Plan specifies guiding principles as well as quantitative indicators of the City's progress.

Additional Information. Please visit the web site at
http://santa-monica.org/epd/scp/pdf/SCP_2003_Adopted_Plan.pdf

2002 Sustainable City Status Report

Description. The 2002 status report summarizes the City's efforts toward sustainability since the Sustainable City Program began and also describes the challenges that remain before Santa Monica can truly call itself a Sustainable City. It also provides information on the future of the program and ways that residents can become involved in helping the City to meet its goals.

Additional Information. Please visit the web site at
http://santa-monica.org/epd/scp/pdf/SCP_2002_Status_Report.pdf

"Working for a Cleaner Bay" Brochure

Description. The brochure provides design regulations, construction practices and good housekeeping requirements for new and redevelopment building projects and existing properties to reduce urban runoff water pollution.

Additional Information. Please visit the web site at
http://santa-monica.org/epd/residents/Urban_Runoff/urban.htm

Urban Mitigation Plan: Worksheet and Summary

Description. This worksheet provides guidance to builders of new and retrofitted structures on how to calculate the mitigation runoff volume from the property that must be treated and how to accommodate that runoff using BMPs.

Additional Information. (310) 458-8223 or visit the web site at
http://santa-monica.org/epd/residents/Urban_Runoff/urban.htm

Suggested List of Modular Permeable Paving Products

Description. The City provides a list of permeable paving products, including details about the manufacturer and product. This list is intended for use by residents, architects, and developers.

Additional Information. Please visit the web site at
http://santa-monica.org/epd/residents/Urban_Runoff/urban.htm

Example of Best Management Practices (BMPs)

Description. The City provides a list of examples of BMPs that can be used for minimizing the introduction of pollutants of concern, which may result in significant impacts and are generated from site runoff, into the storm water conveyance system.

Figure 2-8. Example BMP: Berm to Collect Runoff and Spills, and then Filtered in a Catch Basin Insert

Additional Information. Please visit the web site at http://santa-monica.org/epd/residents/Urban_Runoff/urban.htm

Cooperative Education for At-Risk Youth

The City contracted with Chrysalis and Los Angeles Conservation Corps, a non-profit group that helps at-risk youth, to employ up to four young people to receive on-the-job training and in-class education (toward a high school diploma or college degree). They worked with City stormwater staff cleaning catch basins and CDS units.

Stormwater Public Education Programs

Description. Listed below are public education programs related to stormwater and Santa Monica Bay that have been implemented by the City.

1. **Stormwater Environmental Educational Partnership (SWEEP).** This educational pilot program was funded by the Santa Monica Bay Restoration Project and is implemented by the City in partnership with Heal the Bay, a Santa Monica-based environmental advocacy group. The program increased public awareness about urban runoff pollution by training local junior high and high school students to make presentations to business and community groups and distributed public education door hangers throughout the community.

2. **Urban Runoff Videos.** In 1990 and 1991 the City produced two educational videos about urban runoff that aired on the Santa Monica cable television station and where distributed throughout the country.

3. **Catch Basin Stenciling Program.** Santa Monica began the first catch basin stenciling program in the region in 1989. This program involved the painting of a stencil adjacent to catch basins indicating that the catch basin drains directly to the Bay. Where feasible, all of the catch basins maintained by the City have been stenciled. Because the painted stencils tend to fade over time, the City has also used two permanent marking systems to restencil: ceramic tiles (1998) and thermoplastic stencils (2003).

4. **Educational Posters for the Restaurant and Auto Maintenance Industries.** The City has developed and distributed educational brochures and posters for the restaurant and auto maintenance industries, outlining BMPs to reduce urban runoff contamination and volume due to their operations.

Additional Information. Please visit the web site at http://santa-monica.org/environment/policy/bay/programs.htm#Stormwater%20Public%20Education%20Programs

STORMWATER POLICY

Urban Runoff Pollution Control Ordinance

Description. The purpose of the Urban Runoff Ordinance is to permanently modify the structural causes of urban runoff pollution. This modification is intended to result in the reduction of both runoff volume and runoff contamination from existing residential and nonresidential properties and from future developments. The two primary mechanisms for accomplishing these reductions in runoff and contamination are:

1. Ensuring that project sites maximize on-site percolation of runoff, and

2. Ensuring that rain water is directed or contained so as not to become polluted by passage through contaminating material.

Additional Information. Please visit the web site at http://pen.ci.santa-monica.ca.us/municode/codemaster/Article_7/10/index.html

Industrial Pretreatment Program

Description. The industrial pretreatment program is intended to ensure that the Publicly Owned Treatment Works are used for treating and conveying domestic wastewater and stormwater by imposing regulations on all other types of waste discharged to the system.

Additional Information. Please visit the web site at
http://pen.ci.santa-monica.ca.us/municode/codemaster/Article_5/20/index.html

Plumbing Code

Description. The Plumbing Code contains specific conditions for the best use of water heater enclosures, water softeners with drywells for discharge, and combined sanitary and storm sewers.

Additional Information. Please visit the web site at
http://pen.ci.santa-monica.ca.us/municode/codemaster/Article_8/32/index.html

Water Conservation Ordinance #1580

Description. The City implemented the Water Conservation Ordinance to minimize the needless waste of water. Activities affected include: watering of landscaping, sidewalk washing, vehicle washing, and serving water in restaurants, among others.

Additional Information. Please visit the web site at
http://pen.ci.santa-monica.ca.us/municode/codemaster/Article_7/16/index.html

Water-Conserving Landscape Regulations

Description. Regulations in place to require water-conserving landscaping, including limits on turf area, recommended low-volume irrigation systems, and prohibiting ponds, fountains, and other freshwater bodies that promote evaporation.

Additional Information. Please visit the web site at
http://pen.ci.santa-monica.ca.us/municode/codemaster/Article_9/04/10.04.110.html

FUNDING MECHANISMS

Stormwater Enterprise Fund

Description. The City's storm drainage system has been designated a City enterprise and utility for the purpose of providing for and managing aspects such as funding, permitting, maintaining, planning, designing, reconstructing, constructing, environmentally restoring, regulating, water quality testing, and inspecting of storm drainage and the storm drainage system.

Additional Information. Please visit the web site at
http://pen.ci.santa-monica.ca.us/municode/codemaster/Article_7/56/index.html

REBATE PROGRAMS

Landscape Water Efficiency Competitive Grant Program

Description. Established in 2004, this program provides partial funding for new or remodeled innovative garden designs that demonstrate sustainable practices, which include one or more of the following: California native plants, water-efficient irrigation systems, stormwater catchment systems, graywater systems, and/or other innovative water saving features. Water efficient landscapes reduce runoff and its pollutants.

Grantees may receive up to half the cost of a proposed project up to $20,000. A maximum of $80,000 total will be awarded on a bi-annual basis as long as funds are available. Funds may be used for plant material, irrigation systems, water-saving features and/or design-construction costs. These funds will not cover maintenance of the landscape.

Additional Information. http://santa-monica.org/epd/news/Landscaping_Grant.htm

SECTION 3

ANALYSIS OF URBAN RUNOFF CONVEYANCE SYSTEM (HYDRAULICS AND WATER QUALITY)

STORM DRAIN SYSTEM ANALYSIS AND RESULTS

The City of Santa Monica lies within the County of Los Angeles. The County has developed guidelines for the design and construction of storm drain facilities in its Hydrology Manual, dated December 1991. These guidelines define design criteria for storm drain facilities to provide an acceptable level of flood protection in urban areas defined as "Urban Flood Protection." Urban Flood Protection stipulates that the 10-year storm be conveyed in underground storm drains, and the balance of the 10-year and 25-year storm be conveyed via curb and gutter over the street's surface. Therefore, an analysis was conducted for the City storm drain system for the 10-year and 25-year storm events.

The analysis presented herein for the City revealed that a portion of the facilities are under their theoretical capacity as defined by the Urban Flood Protection guideline in approximately 16 miles of pipe for the 10-year storm event, and an additional two miles for the 25-year storm. Following are a summary of the procedures used to implement the analysis, and a summary of the storm drain segments for the 10-year storm event. (Information on the storm drain system for the 25-year event can be found in Appendix B.) Information on the location, size, cost and benefit of the segments of storm drain under theoretical capacity will later be used to help prioritize system upgrades.

Discussions with City Engineering staff indicate there has been minimal flooding of City streets during extremely large storm events including heavy rains in 1978, 1980, 1982, 1995, 1998, and 2005. The overall performance of the City's storm drain system has been very good, even though the analysis described above indicates there are portions of the system that are under their theoretical capacity. The analysis presented in this section identifies storm drains that are under their theoretical capacity as defined by LA County as Urban Flood Protection. This information should be used in combination with actual information on system performance during flood events to assist the City Engineer in determining the appropriate and necessary upgrades (if any) to the storm drain system.

PROCEDURE AND RESULTS

The City's storm drain system was analyzed to determine whether any facilities were under their theoretical capacity for conveyance of runoff from the 10-year and 25- year storms. The analysis included the following steps:

1. Review the City's past drainage reports. These reports are:

    - Hydrology Report prepared by Berryman and Henigar dated June 1998

- Hydrology Report for Kenter Canyon Basin prepared by FAR, Inc., dated May 1997
- Hydrology Report prepared by PRC Engineering, Inc. dated May 1985

2. Compile storm drain and hydrologic characteristics from these sources.
3. Calculate the theoretical hydraulic capacity of each storm drain, assuming uniform flow.
4. Compare the theoretical capacity to the modeled inflow for each pipe segment determined in the above listed drainage reports.
5. Determine if the predicted inflow exceeds the calculated capacity. If yes, then the pipe segment is deemed deficient.
6. For any pipe segments under theoretical capacity, the amount of inflow in excess of the pipe's capacity was calculated. Any upgrades to the system would need to accommodate this amount to achieve the appropriate hydraulic capacity based on present land use and development conditions.

The analysis revealed that a portion of the storm drain system is under the theoretical capacity for the 10-year and 25-year storms. A summary of the results of this analysis is shown in Table 3-1. The cfs figures represent an average of the excess flow for all storm drains in the given basin.

Table 3-1. Storm Drain Theoretical Capacity Summary

	10-Year Event		25-Year Event	
Basin Name	**Average Excess Flow (cfs)**	**Length of Storm Drain Under Theoretical Capacity (miles)**	**Average Excess Flow (cfs)**	**Length of Storm Drain Under Theoretical Capacity (miles)**
16th Street	66	1.1	87	1.1
Airport	41	1.6	62	1.7
Ashland	15	0.8	12	1.2
Centinela	5	0.2	5	0.5
Georgina	81	0.9	114	0.9
Kenter Canyon	55	3.4	69	3.6
Lincoln	79	1.5	111	1.7
Montana	40	1.9	83	2.1
Pico-4th Street	54	0.5	55	0.6
Pico-Caltrans	10	0.4	18	0.4
Pier	21	0.7	27	0.7

Basin Name	10-Year Event		25-Year Event	
	Average Excess Flow (cfs)	**Length of Storm Drain Under Theoretical Capacity (miles)**	**Average Excess Flow (cfs)**	**Length of Storm Drain Under Theoretical Capacity (miles)**
San Vicente	36	0.1	72	0.1
Wilshire	48	2.9	63	3.7
Total Length of Deficient Storm Drain		16.0 miles		18.1 miles
Percent of Storm Drains that are Deficient	31%		35%	

The column labeled "Average Excess Flow" displays, for each watershed, the average difference in the amount of flow expected in the system and the pipe's hydraulic capacity. The column called "Length of Storm Drain Under Theoretical Capacity" provides the cumulative length of all pipe segments. The table provides this information for the 10-year and 25-year events.

Santa Monica's storm drains under theoretical capacity (during the 10-year rainfall event) are shown in Figure 3-1. The pipes in blue were determined to have sufficient capacity. The pipes in green, yellow, and red are undersized by varying amounts, as shown in the figure's legend, with green being the nearest to the required capacity and red being the most under theoretical capacity.

The pipelines under theoretical capacity in the 10-year storm are summarized in tabular form, as shown in Table 3-2. The column called "Storm Drain Alignment" shows the street in which the pipe segment under theoretical capacity is located, and "From" and "To" indicate the extent of the segment. The pipe size is given in inches, the magnitude under capacity in cubic feet per second, and the segment length in feet. The details of the hydraulic analysis are located in Appendix B.

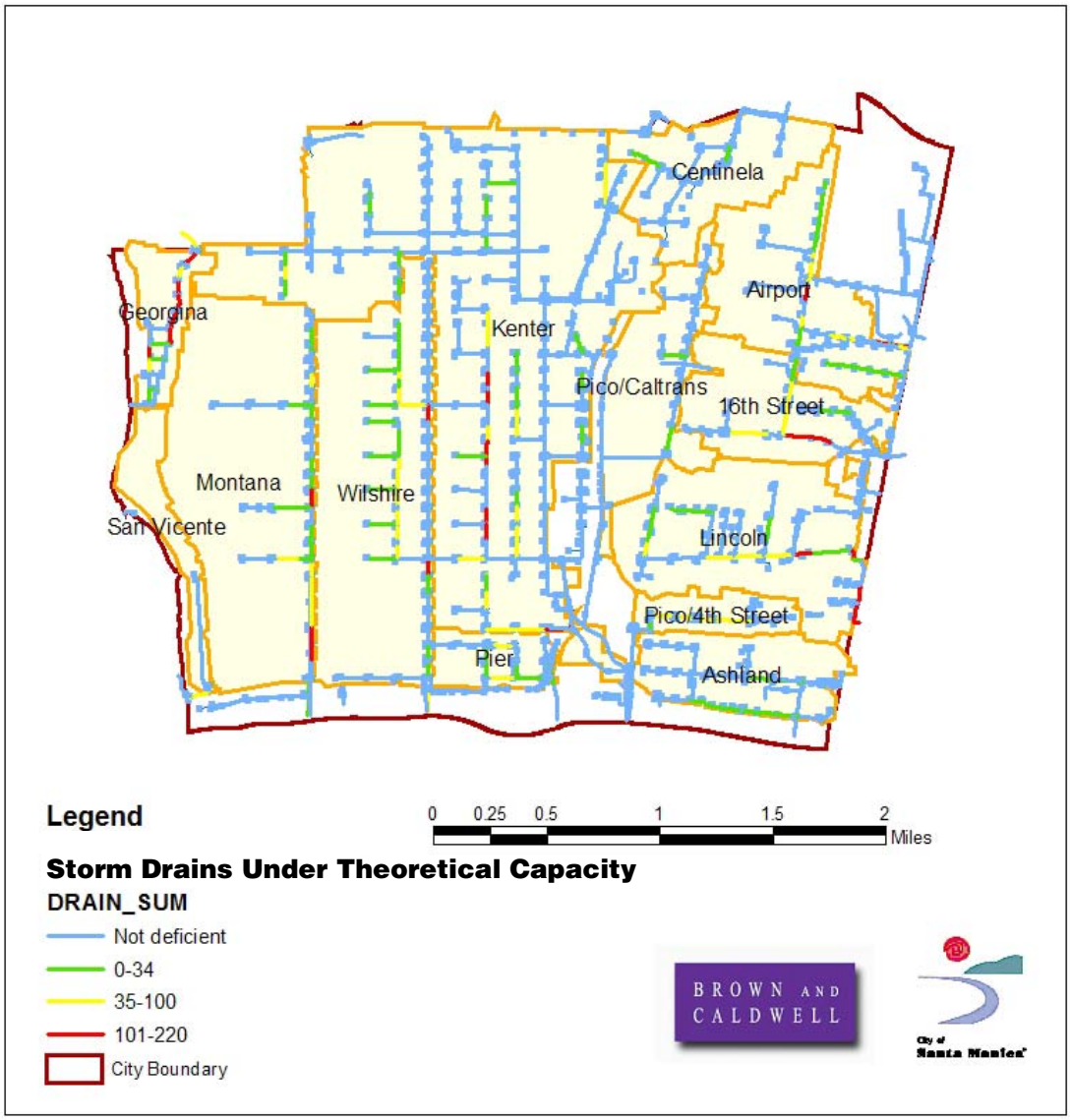


Figure 3-1. Santa Monica Storm Drains Under Theoretical Capacity (cfs) During 10-year Storm Event

Table 3-2. Storm Drain Theoretical Capacity Summary – 10-Year Storm Event

Airport Basin					
Storm Drain Alignment	**From**	**To**	**Pipe Diameter (inches)**	**Drain Under Capacity by: (cfs)**	**Length (feet)**
23rd St.	Dewey St.	Navy St.	45	73	450
23rd St.	Pier St.	Pier Pl.	45	115	160
23rd St.	Pier Pl.	Oak St. Park	54	71	1,300
Ocean Park	23rd St.	Cloverfield Blvd.	57	77	700
Ocean Park	24th St.	25th St.	54	103	300
Ocean Park	25th St.	27th St.	48	42	730
Ocean Park	27th St.	29th St.	33	12	710
Ocean Park	29th St.	30th St.	27	13	400
Ocean Park	30th St.	31st. St.	24	10	720
Ocean Park	23rd St.	22nd St.	33	2	400
Ocean Park	Marine Ave.	Navy St.	24	1	350
Ocean Park	Navy St.	Dewey St.	24	8	350
21st St.	Dewey St.	Hill St.	18	5	1,850
				TOTAL	**8,420**

Ashland Basin					
Storm Drain Alignment	**From**	**To**	**Pipe Diameter (inches)**	**Drain Under Capacity by: (cfs)**	**Length (feet)**
Ocean Ave.	Strand	Hollister	24	9	300
Barnard	Hollister	Wadsworth	33	10	570
Barnard	Wadsworth	Fraser	39	12	500
Barnard	Fraser	Ashland Ave.	45	9	1,500
Main St.	Ocean Park	Hill St.	54	21	500
Main St.	Hill St.	Ashland	60	28	800
				TOTAL	**4,170**

Centinela Basin					
Storm Drain Alignment	**From**	**To**	**Pipe Diameter (inches)**	**Drain Under Capacity by: (cfs)**	**Length (feet)**
Dorchester Ave.	Olympic Blvd.	Exposition Blvd.	24	2	800
Stewart St.	Kansas Ave	Yorkshire Ave.	33	1	320
Pico Blvd.	32nd St.	33rd St.	33	10	180
				TOTAL	**1,300**

Georgina Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Georgina	San Vicente	26th St.	36	58	650
Georgina	26th St.	25th St.	39	114	600
Georgina	25th St.	24th St.	39	68	300
Georgina	24th St.	23rd St.	39	111	320
Georgina	23rd St.	22nd St.	39	175	400
Georgina	22nd St.	21st Place	60	127	280
Georgina	21st Place	21st St.	60	159	350
San Vicente	21st St.	20th St.	60	154	400
San Vicente	20th St.	19th St.	60	64	350
San Vicente	18th St.	17th St.	60	19	500
21st St.	Inlet pt.	San Vicente	24	2	305
20th St.	Inlet pt.	San Vicente	24	5	330
18th St.	Inlet pt.	San Vicente	24	1	120
				TOTAL	**4,905**

Kenter Canyon Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Alta Ave.	23rd St.	24th St.	24	8	350
Alta Ave.	24th St.	25th St.	33	35	350
Alta Ave.	25th St.	26th St.	39	21	350
Washington Ave.	Princeton	Harvard	36	13	2,100
California Ave.	24th St.	Chelsea	30	7	370
California Ave.	Chelsea	25th St.	45	10	350
Santa Monica Blvd.	5th St.	6th St.	24	39	400
Santa Monica Blvd.	6th St.	7th St.	24	9	400
Santa Monica Blvd.	9th St.	10th St.	60	185	400
Santa Monica Blvd.	11th St.	12th St.	63	118	400
Santa Monica Blvd.	Euclid	14th St.	57	135	400
Santa Monica Blvd.	Euclid	14th St.	56	119	400

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Santa Monica Blvd.	14th St.	15th St.	54	111	400
Santa Monica Blvd.	15th St.	16th St.	54	85	400
Santa Monica Blvd.	17th St.	18th St.	33	159	400
Santa Monica Blvd.	18th St.	19th St.	33	130	400
Santa Monica Blvd.	21st St.	23rd St.	24	59	350
Santa Monica Blvd.	26th St.	Princeton	30	11	320
Santa Monica Blvd.	Harvard	Yale	24	7	320
Broadway	Lincoln	9th St.	36	71	400
Broadway	10th St.	11th St.	36	54	400
Broadway	11th St.	12th St.	33	44	400
Broadway	12th St.	Euclid	30	34	400
Broadway	15th St.	16th St.	39	46	400
Broadway	16th St.	17th St.	33	54	400
Broadway	17th St.	18th St.	33	33	400
Broadway	19th St.	20th St.	30	3	400
Olympic Blvd.	16th St.	17th St.	24	6	400
Olympic Blvd.	18th St.	19th St.	24	2	400
Olympic Blvd.	20th St.	21st St.	15	6	400
4th St.	Santa Monica	Broadway	36	61	680
4th St.	Broadway	Colorado	36	99	680
4th St.	Colorado	I-10	36	133	480
Lincoln Blvd.	Arizona	Santa Monica	66	55	680
14th St.	Arizona	Santa Monica	16	7	680
Stanford	Broadway	Santa Monica	30	7	720
Nebraska	Stanford	Stewert	42	68	600
Nebraska	Stanford	Berkeley	33	42	300
				TOTAL	**18,080**

Lincoln Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Dewey St.	Rennie Ave.	7th St.	72	154	850
Dewey St.	7th St.	Ozone St.	72	172	600
Longfellow	Ozone St.	Navy St.	72	29	150
Navy St.	Longfellow	Lincoln Blvd.	72	219	180
Lincoln Blvd.	Navy St.	Ashland	72	27	930
Lincoln Blvd.	Ashland	Hill St.	69	188	400
Lincoln Blvd.	Hill St.	Ocean Park	63	58	650
Lincoln Blvd.	Ocean Park	Pine St.	57	50	630
Lincoln Blvd.	Pine St.	Ceder St.	54	53	380
Lincoln Blvd.	Cedar St.	Pearl St.	54	56	420
Pico Blvd.	Lincoln Blvd.	9th St.	33	53	750
Pico Blvd.	9th St.	11th St.	24	33	472
Ocean Park	10th St.	11th St.	30	17	323
11th St.	Pearl St.	Bay St.	24	2	1,000
				TOTAL	**7,735**

Montana Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Montana Ave.	Junction Node	Ocean Ave.	78	18	575
Montana Ave.	2nd St.	4th St.	75	124	850
Montana Ave.	4th St.	Lincoln Blvd.	75	53	1,400
Montana Ave.	Lincoln Blvd.	10th St.	75	10	800
Montana Ave.	11th St.	12th St.	66	128	500
Montana Ave.	12th St.	16th St.	57	6	700
Montana Ave.	16th St.	17th St.	54	27	350
Montana Ave.	18th St.	19th St.	45	47	400
Montana Ave.	20th St.	21st. St.	33	4	480
Montana Ave.	21st St.	21st Place	30	2	320
Montana Ave.	Palisades Beach Road	Ocean Ave.	42	108	600

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Lincoln Blvd.	Alta Ave.	Manhole	27	49	1,200
Lincoln Blvd.	Man Hole	Montana	30	6	600
11th St.	Alta Ave.	Montana	24	7	850
17th St.	Alta Ave.	Montana	24	14	600
				TOTAL	**10,225**

Pico – 4th Street Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
4th St.	Pico Ave.	Bay St.	48	14	350
5th St.	Bay St.	Hollister St.	48	89	1,500
5th St.	Hollister St.	Ocean Park	45	59	920
				TOTAL	**2,770**

Pico – Caltrans Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Pico Blvd.	14th St.	16th St.	51	16	750
Cloverfield	Virginia Ave.	Kansas Ave.	24	0	700
20th St.	Virginia Ave.	Pico Blvd.	24	13	600
				TOTAL	**2,050**

Pier Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Santa Monica Blvd.	3rd St.	2nd St.	21	8	370
Santa Monica Blvd.	2nd St.	Ocean Ave.	27	16	400
Ocean Ave.	Santa Monica Ave.	Broadway Ave.	24	38	720
3rd St.	Santa Monica Blvd.	Broadway Ave.	24	41	650
Broadway Ave.	2nd St.	Ocean Ave.	27	2	380

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Ocean Ave.	Broadway Ave.	Colorado Ave.	30	26	670
Colorado Ave.	Ocean Ave.	2nd St.	42	15	250
				TOTAL	**3,440**

San Vicente Basin

Ocean Ave.	San Vicente	Adelaide Dr.	30	36	600
				TOTAL	**600**

Wilshire Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Wilshire Blvd.	Ocean Ave.	3rd St.	90	13	830
Wilshire Blvd.	7th St.	Lincoln Blvd.	75	120	450
Wilshire Blvd.	16th St.	17th St.	69	151	330
Wilshire Blvd.	Outfall	Palisades Beach Rd.	48	61	600
Wilshire Blvd.	Ocean Ave.	3rd. St.	36	106	800
Wilshire Blvd.	3rd St.	4th St.	30	74	400
Wilshire Blvd.	6th St.	7th St.	24	17	790
Wilshire Blvd.	5th St.	6th St.	24	20	400
Wilshire Blvd.	4th St.	5th St.	24	57	400
14th St.	Washington	California	20	29	700
12th St.	Washington	California	18	9	700
10th St.	Washington	California	18	5	700
Lincoln St.	Washington	California	18	5	700
California	California	Wilshire Blvd.	45	99	650
California	Lincoln St.	9th St.	39	68	360
California	9th St.	11th St.	42	68	800
California	11th St.	12th St.	36	76	400
California	12th St.	Euclid	33	80	670
California	Euclid	14th St.	27	40	220
California	14th St.	15th St.	20	9	570
16th St.	Washington	California	18	10	220
17th St.	Washington	California	18	1	700
17th St.	California	Wilshire Blvd.	36	83	630
19th St.	Washington	California	16	3	700
California	17th St.	18th St.	33	93	400
California	18th St.	18th Court	30	33	160

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
California	18th Court	19th St.	24	68	200
California	19th St.	20th Court	22	33	350
California	20th Court	21st St.	18	19	220
California	21st St.	22nd St.	16	2	320
				TOTAL	**15,370**

16th Street Basin

Storm Drain Alignment	From	To	Pipe Diameter (inches)	Drain Under Capacity by: (cfs)	Length (feet)
Dewey Ave	16th St.	Robson St.	27	1	580
17th St.	Pier Ave.	Hill St.	27	16	750
16th St.	17th St.	Marine St.	48	147	250
16th St.	Marine St.	Lot 365/Marine St.	39	104	206
16th St.	Ashland Ave.	Oak St.	33	103	500
16th St.	Oak St.	Ocean Park Ave.	39	174	350
Ocean Park	16th St.	17th St.	39	52	566
Ocean Park	17th St.	18th St.	33	42	570
Ocean Park	18th St.	20th St.	30	30	400
Ocean Park	20th St.	21st St.	27	5	440
16th St.	Maple St.	Pearl St.	33	47	950
				TOTAL	**5,562**

SECTION 4

RECOMMENDED WATERSHED MANAGEMENT PROJECTS

Specific recommendations for improvements to Santa Monica's stormwater system have been developed for each watershed. Recommendations are broken into the following three categories:

1. Storm drain conveyance system upgrades
2. Multipurpose capital improvement projects
3. On-site stormwater management systems

STORM DRAIN CONVEYANCE SYSTEM UPGRADES

Details of recommended upgrades to the storm drain conveyance system are described in Appendix C based on the analysis of the existing storm drain system, described in Section 3 Analysis of Urban Runoff Conveyance System. In discussion with City's engineering staff, there has been a minimal amount of flooding during disaster in the storm drain conveyance system and the overall performance of the system has been good. Therefore, recommended conveyance upgrades will not be included in this section.

MULTIPURPOSE CAPITAL IMPROVEMENT PROJECTS

Multipurpose projects are recommended in addition to conveyance system upgrades to accomplish the mission of the WMP. Specifically, multipurpose projects provide improved water quality, water conservation, and increased recreational and wildlife habitat areas. Each multipurpose project would incorporate a variety of water treatment technologies in a multi-benefit design. For example, water would be treated by screening, separation, and infiltration in a design that also provides recreational area, flood reduction, wildlife habitat, and groundwater recharge.

WATER TREATMENT TECHNOLOGIES

In order to select specific multipurpose methods, a matrix of possible technologies was developed (see Table 4-1). The technologies are described below, and the matrix includes information such as pollutant removal efficiencies, costs, and operation and maintenance requirements. Once selected, technologies were sized to capture and treat the 3/4-inch storm event, which includes the "first flush", and is the numerical standard found in the City's Urban Runoff Mitigation Ordinance, as well as in the NPDES permit (i.e., SUSWP).

Table 4-1. Multipurpose Capital Improvement Project Matrix

	Technology	Gross Pollutant Categories - Removal at Peak Design Flow					Treatment Level[1]	Peak Flow Reduction	Applicable Drainage Area	Relative O&M	Relative Hydraulic Restrictions	Included Pretreatment
		Floatables	Solids	TP	Metals	Bacteria						
1	Catch Basin Retrofits	yes	< 10%	< 10%	< 10%	< 90%	1	None	Streets	High	Low	none
2	Bioretention	yes	80%[2]	30%[2]	60%[2]	> 99.9%	1	Medium	Up to 5 acres	Low	Medium	none
3	Subsurface Storage	yes	40%	< 10%	< 10%	< 90%	1	Medium	Any Size	Medium	Medium	Screening/Vortex
4	Subsurface Infiltration	yes	n/a[3]	n/a[3]	n/a[3]	n/a[3]	1	High	Any Size	Low	High	Screening/Vortex
5	Screening	yes	40%	< 10%	< 10%	< 90%	1	None	Over 1 acre and up to 500 acres	Medium	Medium	none
6	Vortex	yes	50%	< 10%	< 10%	< 90%	1	Low	Over 1 acre and up to 500 acres	Low	Medium	none
7	Fuzzy Filtration[4]	yes	> 80%	50%	< 10%	< 90%	2a	None	Over 1 acre and up to 500 acres	High	High	Vortex
8	Chlorine Disinfection	n/a[5]	n/a[5]	n/a[5]	n/a[5]	> 99.9%	2b	Medium	Over 1 acre and up to 500 acres	High	Low	Screening/Vortex
9	UV Disinfection	n/a[5]	n/a[5]	n/a[5]	n/a[5]	> 99.9%	2b	None	Over 1 acre and up to 500 acres	Medium	Low	Screening/Vortex
10	Chemical Flocculation	yes	> 90%	> 90%	> 90%	< 90%	3	None	Over 1 acre and up to 250 acres	High	Low	Vortex and fuzzy filtration

Notes:

1. Treatment levels are based on 1997 Report by Caltrans, Storm Water Facilities Retrofit Evaluation, with level 2 broken into two separate and distinct processes: a is for removal of fine solids and b is for disinfection.
2. Dependent on media removal and replacement as pore space becomes saturated.
3. Due to groundwater as receiving water.
4. Fuzzy Filtration is a post treatment to chemical flocculation.
5. Disinfection is not a physical treatment process and only removes bacteria.

Sources. http://www.epa.gov/owow/nps/urbanmm/mm05.pdf, http://www.stormwatercenter.net/, CALTRANS STORM WATER FACILITIES RETROFIT EVALUATION (Brown and Caldwell, 1997), http://www.fhwa.dot.gov/environment/ultraurb/

Catch Basin Retrofits (screens, inserts)

Description. Fabric and/or media filters, and screens installed under or in front of the catch basin, which are periodically cleaned or replaced after a predetermined number of storm events. There are a variety of types, vendors, and different operational qualities for each. A discussion of these differences is beyond the scope of this document, and there are many websites and references for stormwater BMPs defined in Section 2 of this document for additional information.

Figure 4-1. Catch Basin Inserts

Bioretention

Description. Bioretention landscaping can be installed and adapted to treat the first flush of runoff from small sites by incorporating pollutant removal mechanisms known to exist in forested ecosystems (infiltration, bio-uptake, evapotranspiration, etc.).

Figure 4-2. Examples of Bioretention

Source. California Stormwater Quality Association

Subsurface Storage

Description. Concrete vaults installed below grade to detain stormwater until there is room in the conveyance system to accept it, or to reuse this local water resource for landscape irrigation, or toilet flushing.

Figure 4-3. Subsurface Storage Vault at the City Main Library

Subsurface Infiltration

Description. Plastic vaults installed below grade from which there is no discharge except to groundwater.

Figure 4-4. Subsurface Infiltration Installation at City Big Blue Bus Terminal

Screening

Description. Horizontal or vertical screens installed on a weir, or rotary screen installed below grade in a vault or manhole.

Vortex

Description. A swirl tank which provides separation and screening and acts as a regulator of flow and concentrator of solids. The concentrated solids are removed by City staff on a regular basis.

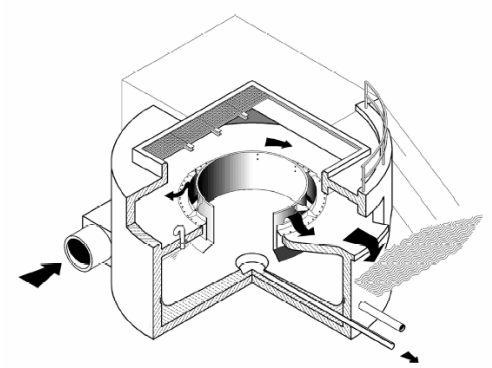


Figure 4-5. Example Vortex Unit

Source. John Meunier Inc.

Figure 4-6. Example Vortex Unit

Source: Vortechnics, Inc.

Fuzzy Filtration

Description. Filtration accomplished by flow-through engineered media.

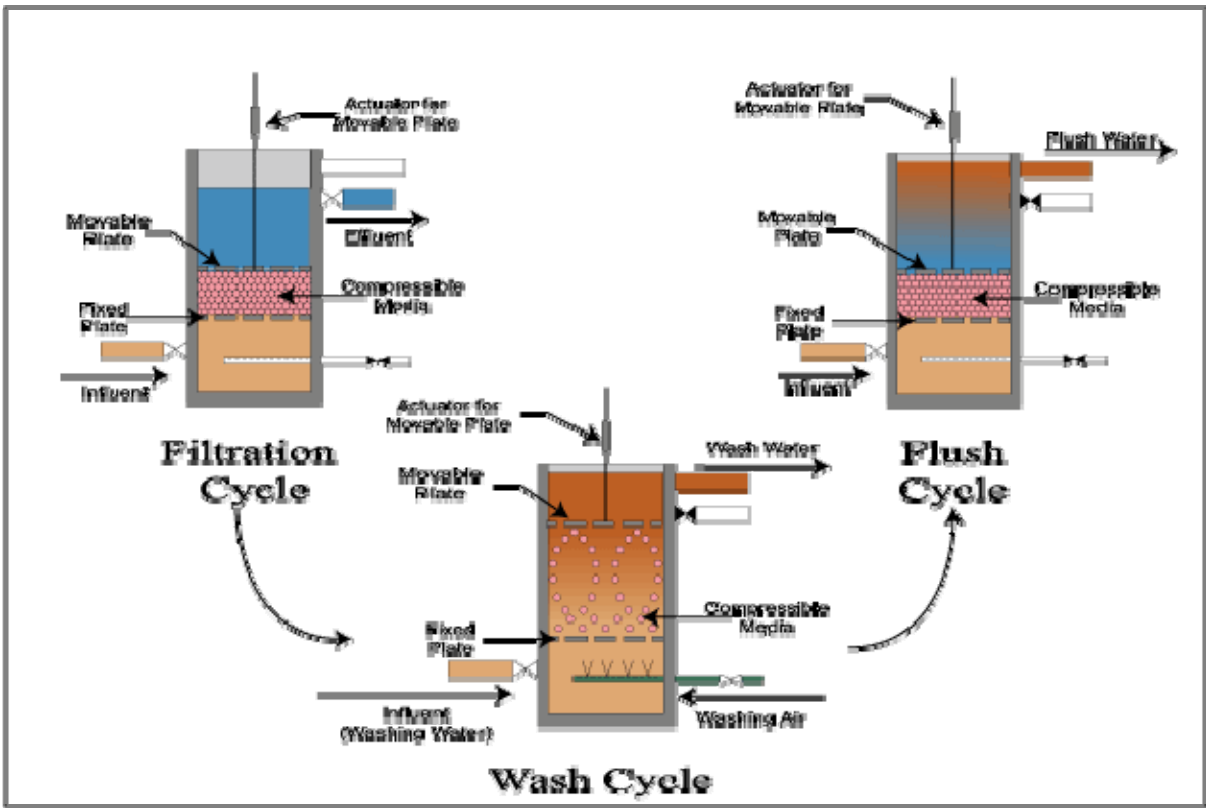


Figure 4-7. Fuzzy Filtration Schematic

Source. Schreiber LLC.

Chlorine Disinfection

Description. High rate disinfection accomplished by rapid induction of sodium hypochlorite into a contact tank and then a dechlorination agent after 5 minutes of contact time.

Ultraviolet (UV) Disinfection

Description. Disinfection achieved by exposing flow to medium pressure UV.

Chemical Flocculation

Description. Injection of a mix of chemicals that bind to pollutants and together with adsorption, result in increased settleability of solids.

MULTI-BENEFIT PROJECT DESIGN EXAMPLES

Designs for multipurpose capital improvement projects will provide many benefits in addition to water quality improvement. Wherever possible, treatment technologies will be incorporated into a setting that provides recreational, wildlife habitat, groundwater recharge, and flood reduction benefits. The following are detailed examples of such designs.

Retrofitted Recreational Areas at Schools and Parks

Recreational areas and open space at schools and parks can be retrofitted to employ screening and vortex treatment of storm water, and infiltration or reuse of the effluent. The technologies are located underground and are not visible to anyone using the space. The open spaces can also be mildly depressed with sloped sides to provide additional flood control benefits, and the treatment and infiltration gallery can be buried beneath the depressions. The subsurface infiltration structures drain the depressions quickly in a small rain event, keeping them available for recreational use. In larger events, the depressed areas fill with water, and they drain into the treatment and infiltration system, or are discharged through an overflow to the storm drain.

A rendering of a depressed open area is shown in Figure 4-8.

Figure 4-8. Rendered Depressed School Yard – Before and After

Source. Los Angeles County Department of Public Works.

Bioretention in Residential and Street Landscaping

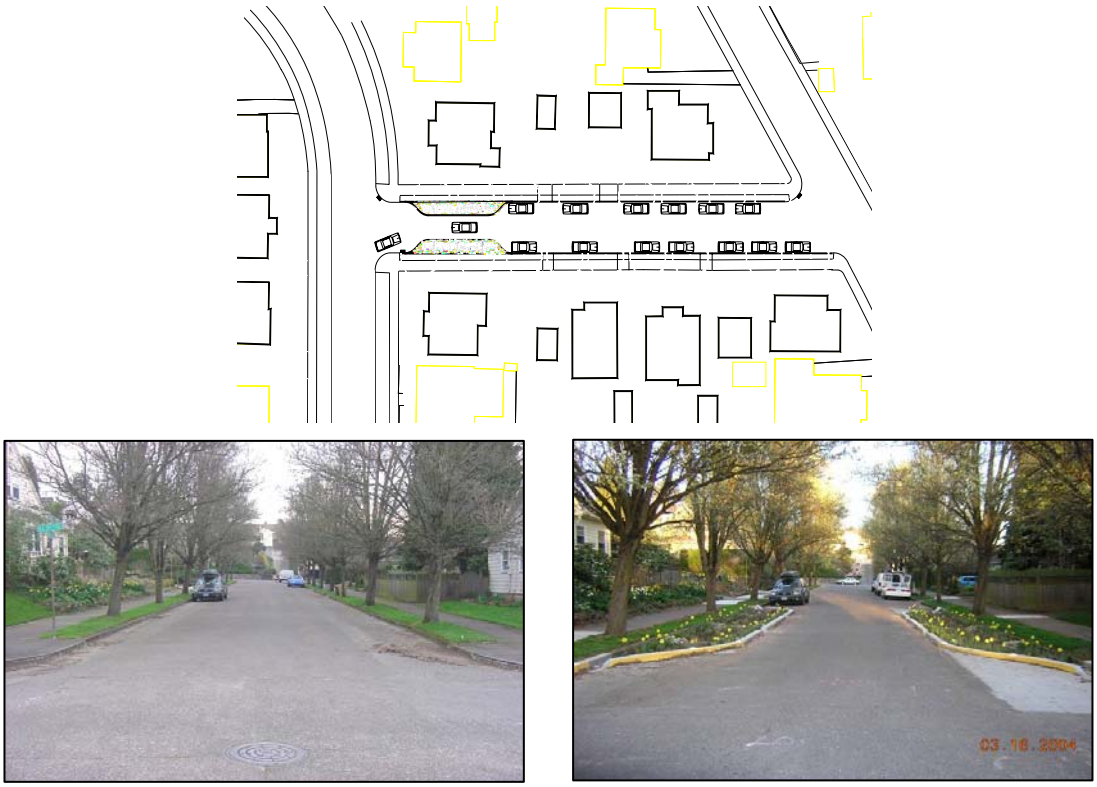
Residential and City landscaped areas are ideal opportunities for multipurpose storm water projects that use bioretention. Bioretention requires a similar level of maintenance and irrigation as traditional landscaping, while providing groundwater recharge, wildlife habitat, runoff volume reduction, and improved water quality. Applications of bioretention include Seattle's Street Edge Alternative (SEA Street), shown in Figure 4-9.

Figure 4-9. Bioretention – Seattle SEA Street

Source. Seattle Public Utilities

Existing streets may also be retrofitted within the existing curb and gutter with bioretention facilities (stormwater planters) as shown below in the City of Portland.

Curb Extensions on Siskiyou Street, Portland Oregon.



Before **After**

Figure 4-10. Bioretention in Curb Extensions

Figure 4-11. Curb Extensions During Winter Rain

GREEN STREETS

Bicknell Avenue

Bicknell is currently a wide street with excess pavement. The project will reduce the existing pavement width from 56 feet to 40 feet: include 22 feet of original pavement in the center, boarded by an 8-foot parking lane of pervious pavers on each side of the street. The existing curb and gutter will be replaced with porous concrete. The reduced width of the street, added to existing parkway space, will allow room to create two 12-foot wide biofilter swales with mulch and plantings. Overflow will drain into an existing catch basin at the base of the project area. This solution demonstrates how a project can beautify a street with decorative pavement, landscaping, while treating runoff for groundwater recharge and reducing the amount of pollution reaching the neighboring beach (Figure 4-12).

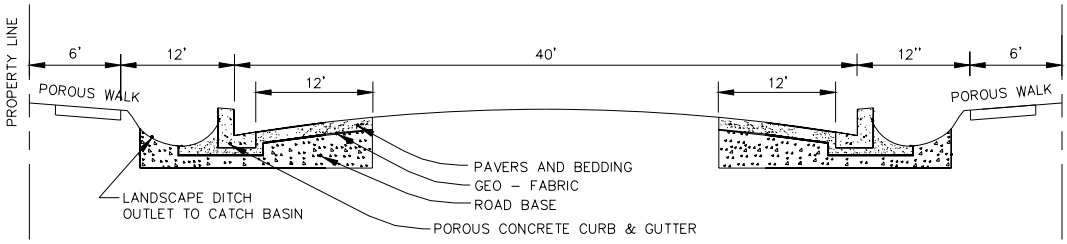


Figure 4-12. Proposed Cross Section for Bicknell Avenue Green Street

Hollister Avenue Phase I – Main Street to Neilson Way

This section of street is bordered on one-side by commercial buildings and a parking lot and on the other by a small community garden. The 5-feet of pavement closest to the curb will be replaced with pervious pavers and the curb and gutter will be replaced with porous concrete. Due to the limited right-of-way, a storage/treatment trench will be developed under the sidewalk, out of sight from the public and allowing continued pedestrian access. The overflow will be connected to an existing catch basin at the base of the project. This portion of the project demonstrates how groundwater recharge and runoff treatment can occur in a dense urban setting, with limited public right-of-way.

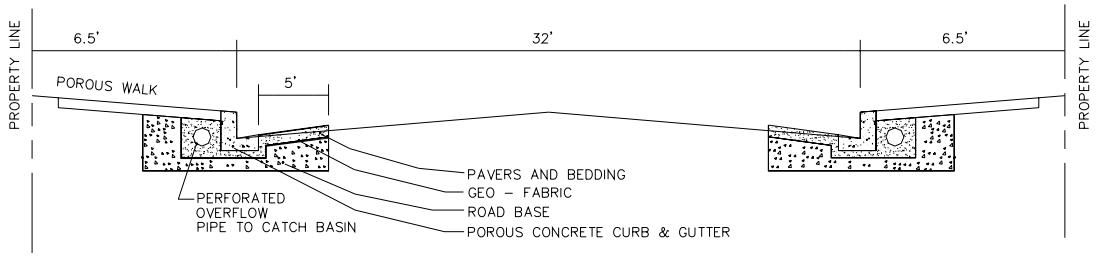


Figure 4-13. Proposed Cross Section for Hollister Avenue Phase I Green Street

Hollister Avenue Phase II – Neilson to Ocean Avenue

High density, multi-family housing and a narrow public right-of-way characterize this block. The street is narrow with a 5-foot sidewalk and a 3.5-foot parkway. This project will demonstrate maximizing the beneficial uses of existing parkway space by replacing 5-feet of pavement on both sides of the street with pervious pavers and constructing porous curbs and gutters. A storage-treatment trench will be constructed in the existing parkway and will include additional landscaping.

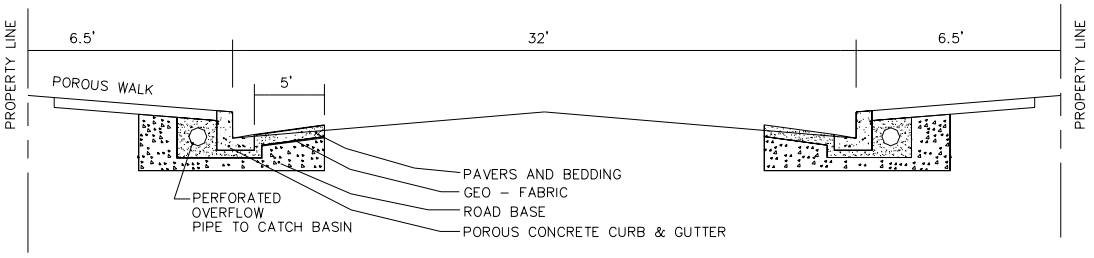


Figure 4-14. Proposed Cross Section for Hollister Avenue Phase II Green Street

Tree Well Infiltration Pits

Tree wells and landscape planters in existing developed areas can be retrofitted to provide storage and infiltration of gutter runoff.

Figure 4-15. Tree Well Infiltration Pits
Photos courtesy of Tom Liptan, Bureau of Environmental Services, City of Portland

Parking Lot Retrofits

Paved parking areas are appropriate sites for multipurpose storm water treatment projects. Existing parking lots (without any subsurface structures) can be retrofitted with screening and vortex treatment at the collection point, and an underground infiltration gallery to discharge the treated runoff to the groundwater table. A surface parking lot layout can be augmented with depressed landscaped areas (biofilters).

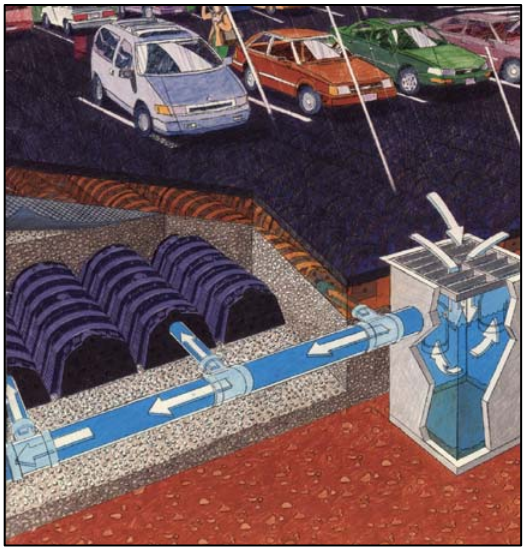


Figure 4-16. Schematic - Treatment and Infiltration at a Retrofitted Parking Lot

Street Storage

Street storage consists of underground storage tanks that receive gutter runoff from screening and vortex pretreatment units. Storm water is stored in the street storage vaults (or above ground parkway) and discharged to the groundwater through infiltration galleries or back into the storm drain system. Each unit of street storage has a variable length and a width, depending upon design constraints in each location. The actual width of street storage at a particular location should be based on a width that does not require extensive relocation of utilities. Underground storage could be provided using a number of methods provided that they are able to support street loads, including concrete vaults, buried corrugated metal pipe (CMP) or high density polyethylene (HDPE) systems, or fields of pre-fabricated cisterns. Figure 4-17 depicts a concept design of street storage with discharge to the groundwater table via infiltration. If upstream land uses contribute significant contamination to the runoff, detained flow may be discharged to the storm drain.

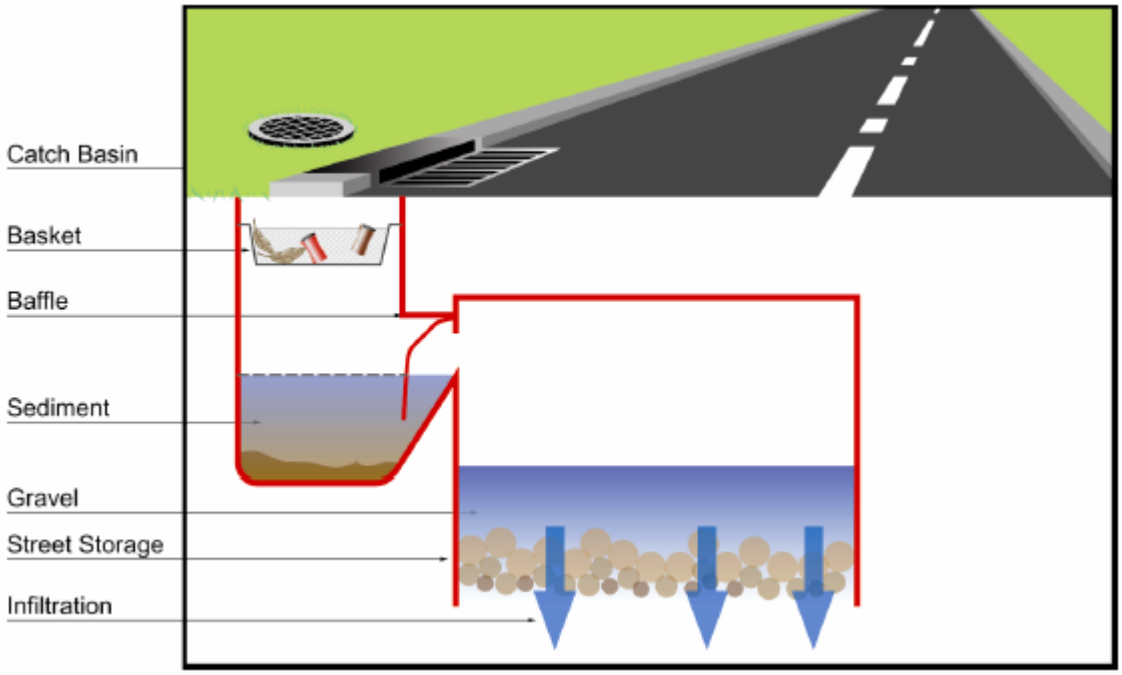


Figure 4-17. Street Storage with Infiltration

Street storage provides multiple benefits, including flood reduction and groundwater recharge (where allowed by contaminant loadings), in addition to water quality treatment. Street storage does not provide wildlife habitat or recreational space, but has the advantage of being located in the public right-of-way.

Parkway storage is an ideal strategy because parkways are adjacent to gutters, where runoff flows, and generally underutilized, vacant, and have adequate underground storage space.

Flow-Through Treatment

Flow-through treatment consists of in-line disinfection sized to treat the water quality design flow, or the peak flow from the 3/4-inch storm. This mechanism is effective as an end-of-pipe treatment where open space is virtually unavailable. It does not provide benefits such as recreational area or wildlife habitat, and therefore is proposed in the WMP only when open space does not exist and land acquisition is not feasible.

ON-SITE STORMWATER MANAGEMENT SYSTEMS

In addition to the variety of multipurpose regional facilities described above, the City also encourages residents and businesses to implement on-site stormwater management systems through its Urban Runoff Management Program. The Program provides homeowners and businesses with a variety of technical resources and publications on how to comply with its Urban Runoff Management Ordinance on individual parcels to help reduce stormwater pollutant discharges to the public storm drain system, to reduce urban runoff volumes, to help reduce peak flood flows, and to increase groundwater recharge. Although it would be redundant to repeat the information described above in this document, following is a brief discussion of a few of the more effective and innovative on-site systems.

CISTERNS AND RAIN BARRELS

A cistern is defined as an above or below ground storage system that collects, stores and distributes runoff of rain from roofs. Benefits of cistern and rain barrels include:

- Reduces the use of treated municipal water for uses such as landscaping, toilet flushing and laundry
- Reduces peak storm water volume
- Reduces discharge of stormwater pollutants to the aquatic environment.

Figure 4-18. Rain Barrel and Cistern

DOWNSPOUT DISCONNECT PROGRAM

Across the country, cities have mandated that residents disconnect their downspouts from the storm and sanitation sewer systems. Portland, Oregon, has implemented the Downspout Disconnection Program. Residents of selected neighborhoods disconnect their downspouts from the combined sewer system and allow their roof water to drain to gardens and lawns. Residents can do the work themselves and earn $53 per downspout, or they can have community groups and local contractors disconnect them. Community groups earn $13 for each downspout they disconnect. More than 42,000 homeowners have disconnected downspouts, removing more than 942 million gallons of stormwater per year from the combined sewer system, and helped to improve stormwater quality and reduce local flooding.

Figure 4-19. Downspout Disconnect

GREEN ROOFS

The following definition of a green roof and its public benefits was provided by the website www.greenroof.org.

A green roof system is a roof covered with plants (unpotted), which includes a special water proof and root repellant membrane, a drainage system, filter cloth, a lightweight growing medium and plants. Green roof systems may be modular with drainage layers, filter cloth, growing media and plants already prepared in movable, interlocking grids, or each component of the system may be installed separately. Community benefits include:

- Cost savings from increased stormwater retention and decreased need to expand or rebuild related infrastructure.
- Cost savings from extended life of green roof over a conventional roof system.

- Decreased cost of meeting greenhouse gas reductions and adapting to climate change by reducing the "Urban Heat Island Effect" and the need for interior building insulation.
- Decreased need for health care services from reductions in ground level ozone resulting from a reduction in the urban heat island.
- Decreased need for health care services and medication due to the benefits of passive experiences with nature and vegetation.
- Increased worker productivity and creativity.

Figure 4-20. Example Green Roof and Components

Photos and Graphics courtesy of Greenroof.org.

MULTI-BENEFIT PROJECT SELECTION

Recommended projects were selected based on the following criteria:

- Open Space
- Local Hydraulics

- Community Benefits
- Upstream Land Uses
- Collection Area
- Public Property
- Cost

For each watershed, the first step was to identify any open space. Given the lack of open space in Santa Monica, virtually all that remains was included in the recommended projects. It was still necessary to identify other project locations in order to meet the City's water quality objective of treating the 3/4-inch storm. Locations for these projects were selected based on public property, local hydraulic constrictions, and opportunities to provide additional community benefits. For example, if an area had no existing park space, land acquisition was recommended to provide a multi-purpose recreational area, along an under-capacity storm drain. If this location coincided with public property, the site was more desirable. The type of project was determined by the upstream land uses, collection area, and opportunity to provide community benefits. For example, watersheds that discharge directly to the beach include a recommendation for end-of-pipe treatment near the beach and outfalls. Watersheds with largely residential land uses and few parks are suitable sites for a multi-purpose recreational area with infiltration.

ASSUMPTIONS

The following assumptions were made during the process of selecting multipurpose projects to accomplish the goals of the WMP throughout the City's thirteen drainage basins.

1. Ponding depth of standard infiltration galleries at recreational areas is 4 feet. (Averaged galleries can be 20-40 feet in depth)

2. Land costs in Santa Monica were estimated to be an average of $7.5 million per acre ($172/square foot).

3. Land acquisition for new parks was assumed to be twice the area required for the function of the BMP. (Only if ponding will be allowed during the 3/4-inch event.)

4. Costs are reported in 2004 dollars.

COST SUMMARY

The following table shows a summary of the costs of multipurpose capital improvement projects, and associated land acquisitions:

Table 4-2. Santa Monica Watershed Management Plan Project Costs

Project Title	Multipurpose Project Construction Cost	Land Acquisition Cost	Total Costs
16th Street Watershed	$10,650,000	$4,129,000	$14,779,000
Airport Watershed	$11,128,000		$11,128,000
Ashland Watershed	$6,697,000		$6,697,000
Centinela Watershed	$8,413,000	$6,076,000	$14,489,000
Georgina Watershed	$1,053,000		$1,053,000
Kenter Canyon Watershed	$37,592,000	$22,875,000	$66,236,000
Lincoln Watershed	$10,001,000		$10,001,000
Montana Watershed	$16,540,000	$13,890,000	$30,430,000
Pico-4th Street Watershed	$4,854,000		$4,854,000
Pico-CalTrans Watershed	$6,808,000	$3,453,000	$10,261,000
Pier Watershed	$1,559,000		$1,559,000
San Vicente Watershed	$1,018,000		$1,018,000
Wilshire Watershed	$18,840,000	$17,276,000	$36,116,000
Total Expenditures	**$135,153,000**	**$67,699,000**	**$208,621,000**

FURTHER INVESTIGATION

For each recommended project, a rigorous analysis should be performed prior to final design and construction. Proposed conveyance projects should be modeled to ensure that they fulfill flood control requirements and have no negative impacts on other parts of the storm drain system. Multipurpose capital improvement projects should be analyzed to ensure that the following recommendations are met:

1. Any infiltration that results from the project should not pass through contaminated soil or groundwater plumes.

2. Coastal influences on the groundwater table should be considered for projects near the beach. These influences may limit the amount of infiltration that will occur, or impact the design of an impermeable retention basin.

3. Treatment requirements for reuse of storm water for irrigation or industrial processes must be met.

The projects outlined in the next section do not include costs and reduced runoff flow benefits from a City-wide cistern, downspout disconnect, and green roof incentive program.

RECOMMENDED STORMWATER SYSTEM PROJECTS

AIRPORT BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. The Airport Basin is located in the southeastern corner of Santa Monica. It is adjacent to the Santa Monica Airport, and contains mostly residential land use, with a small amount of commercial areas and two parks. Airport Basin is shown in Figure 4-21. The specific land use breakdown is shown in Table 4-3. The hydrologic features of Airport Basin during a rainfall event of 3/4-inch are shown in Table 4-4.

Figure 4-21 Airport Basin

Table 4-3. Airport Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Residential	215	68%
Transportation	82	26%
Commercial	18	6%
Parks	1	0%
TOTAL	**317**	**100%**

Table 4-4. Airport Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
129 cfs	12 acre-feet

Preliminary Opportunities.

- Bioretention on residential properties;
- Transfer of runoff to Clover Park in the adjacent basin and just west of the Santa Monica Airport, and
- Transfer of runoff to the infiltration BMPs at the Airport parking lots.

Preliminary Constraints. Potential contaminated soils at the Airport.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **Clover Park –** Subsurface storage added and UV treatment of overflow implemented. Figure 4-22 shows Clover Park in July of 2004.

Figure 4-22. Clover Park (2004)

2. **Airport Parking –** Parking lots retrofitted with sub-surface infiltration and UV treatment of overflow.

3. **Residential Bioretention –** Landscaping augmented with bioretention cells for infiltration and storm water treatment along streets and on residential properties.

4. **Street-Storage –** Sub-surface runoff storage with UV disinfection. Treated water is attenuated and discharged into the storm drain.

Table 4-5. Airport Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Clover Park	25%	3.1	28.1	1.5	$ 3,164,000
Airport Parking	20%	2.5	22.5	1.2	$ 2,673,000
Residential Bioretention	10%	1.2	11.3	0.6	$ 350,000
Street-Storage	45%	5.5	50.7	2.8	$ 4,941,000
TOTAL	**100%**	**12.3**	**N/A**	**N/A**	**$ 11,128,000**

Total Costs

A summary of the total preliminary costs for Airport Basin is shown in Table 4-6.

Table 4-6. Airport Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 11,128,000	$ 0	$ 11,128,000

ASHLAND BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. The Ashland Basin is located in the southwestern corner of Santa Monica. It lines the beach and contains mostly residential land use, with a strip of commercial areas along Main Street and three parks: Ocean View Park, Hotchkiss Park, and Pacific Street Park (see Figure 4-23). The City owns several pieces of property in the Ashland Basin. The specific land use breakdown is shown in Table 4-7. The hydrologic features of Ashland Basin during a rainfall event of 3/4-inch are shown in Table 4-8.

Table 4-7. Ashland Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	56	29.5%
Commercial	22	11.3%
Open Space	0.2	0.1%
Parking	2	0.9%
Parks	11	5.7%
Residential	100	52.6%
TOTAL	**191**	**100%**

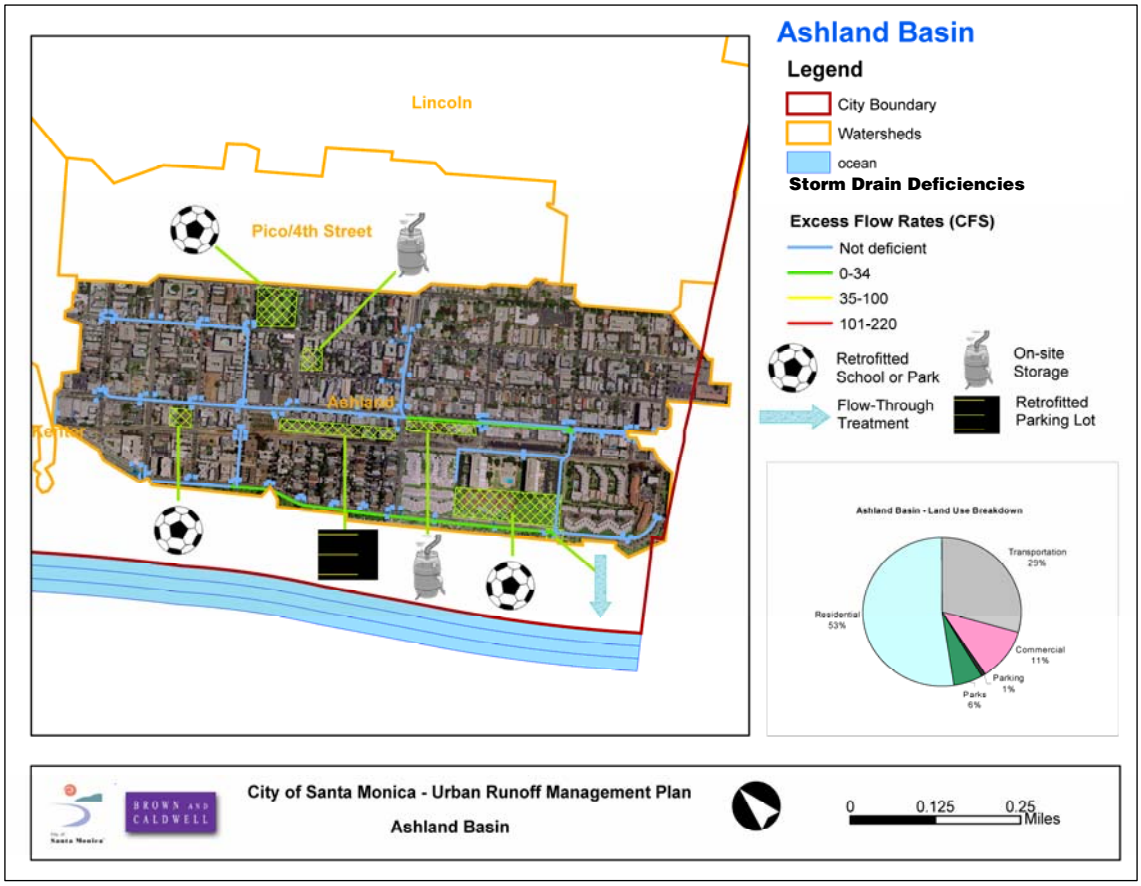


Figure 4-23. Ashland Basin

Table 4-8. Ashland Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
73 cfs	7 acre-feet

Preliminary Opportunities.

- Retrofits of recreational areas to store and treat runoff;
- Infiltration at City-owned parking lots;
- Flow-through disinfection at storm drain outlet at the beach; and
- Retrofitted beach parking lots for onsite storage and infiltration.

Preliminary Constraints. Consider tidal influence in infiltration near the beach.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **City Facilities –** Properties owned by the City retrofitted with sub-surface storage and UV disinfection. Treated water is attenuated and discharged to the storm drain.

2. **Local Parking Lots –** Parking lots retrofitted with sub-surface infiltration and UV treatment of overflow.

3. **Multiple Parks –** Existing parks upgraded with sub-surface infiltration and UV treatment of overflow. Ocean View Park is shown in Figure 4-24 in July of 2004.

Figure 4-24. Ocean View Park (2004)

4. **Residential Bioretention –** Landscaping augmented with bioretention cells for infiltration and storm water treatment along streets and on residential properties.

5. **Flow-Through Disinfection –** UV treatment designed for the peak flow of the 3/4- inch storm event. No storage is required.

Table 4-9. Ashland Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
City Facilities	15%	1.1	11.0	0.6	$ 1,510,000
Local Parking Lots	15%	1.1	11.0	0.6	$ 1,510,000
Multiple Parks	45%	3.4	33.0	1.7	$ 3,463,000
Residential Bioretention	10%	0.7	7.3	0.4	$ 214,000
TOTAL	**85%**	**6.3**	**N/A**	**N/A**	**$ 6,697,000**
Optional Flow-Through UV	15%	1.1	11.0	0.6	*$ 1,439,000*

Total Costs

A summary of the total preliminary costs for Ashland Basin is shown in Table 4-10.

Table 4-10. Ashland Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 6,697,000	$ 0	**$ 6,697,000**

CENTINELA BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. Centinela Basin is located in the central-eastern portion of Santa Monica. Its land uses are mostly residential, mixed with a lesser amount of commercial and industrial. There are no existing parks or open space in the Centinela watershed. (See Figure 4-25.) The specific land use breakdown is shown in Table 4-11. The hydrologic features of Centinela Basin during a rainfall event of 3/4-inch are shown in Table 4-12.

Table 4-11. Centinela Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	69	30%
Commercial	13	6%
Industrial	33	14%
Residential	118	51%
TOTAL	**233**	**100%**

Table 4-12. Centinela Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
63 cfs	10 acre-feet

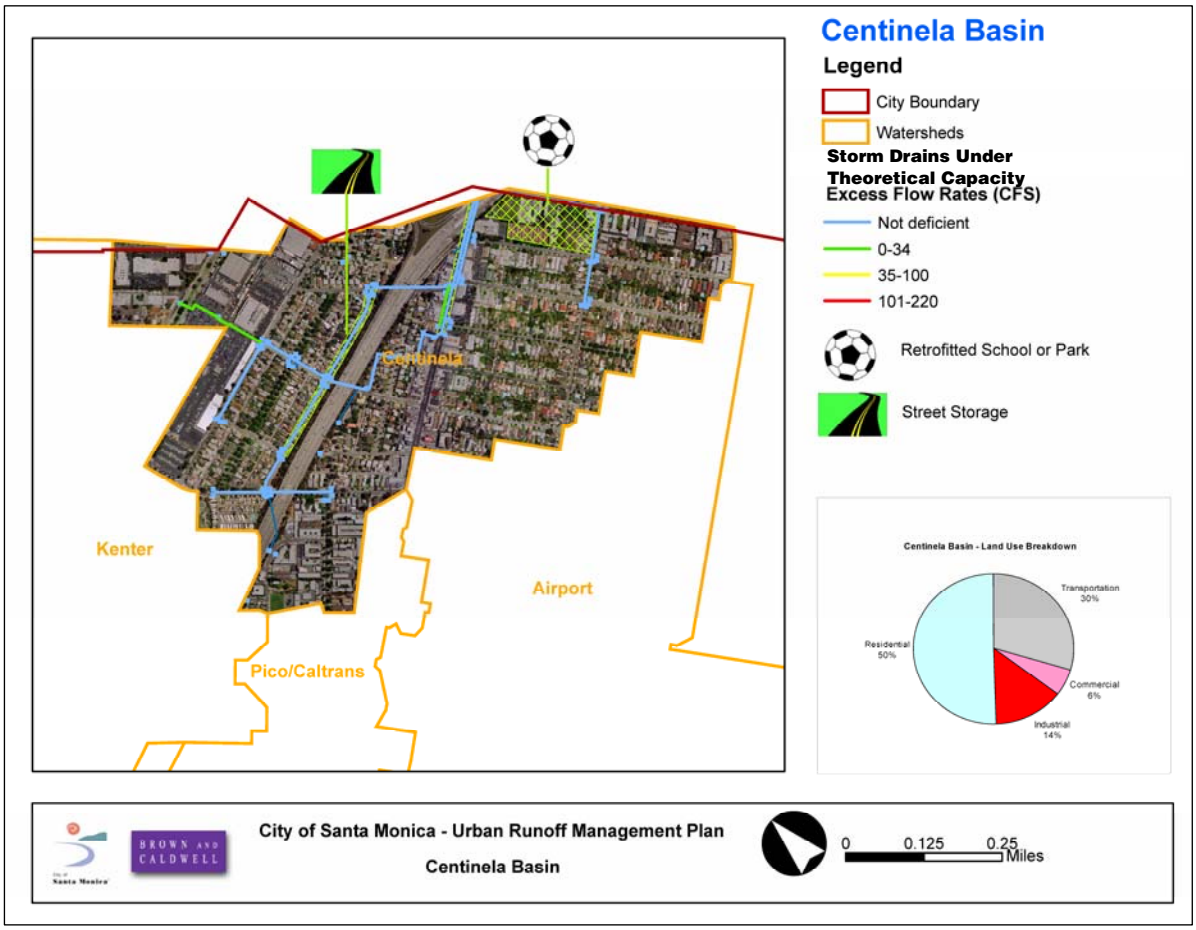


Figure 4-25. Centinela Basin

Preliminary Opportunities.

- Bioretention in streets and on residential properties;
- Land acquisition for new multipurpose park; and
- Subsurface treatment and storage.

Preliminary Constraints.

- No parks or open space exist in the Centinela Basin.
- Some industrial land uses drain to the Centinela Basin, so infiltration should be limited in those areas.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **New Centinela Park –** Property acquisition to create a new park with sub-surface infiltration and UV treatment of overflow. Approximately 0.8 acres of land must be acquired for the new park.

2. **Residential Bioretention –** Landscaping augmented with bioretention cells for infiltration and stormwater treatment along streets and on residential properties.

3. **Street-Storage –** Sub-surface and parkway runoff storage with UV disinfection. Treated water is attenuated and discharged into the storm drain. A possible location for street storage on Centinela Ave. is shown in Figure 4-26.

Figure 4-26. Centinela Street Storage

Table 4-13. Centinela Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
New Centinela Park	33%	3.2	43.0	1.6	$ 3,749,000
Residential Bioretention	33%	3.2	43.0	1.6	$ 915,000
Street Storage	33%	3.2	43.0	1.6	$ 3,749,000
TOTAL	**100%**	**9.6**	**N/A**	**N/A**	**$ 8,413,000**

Total Costs

A summary of the total preliminary costs for Centinela Basin is shown in Table 4-14.

Table 4-14. Centinela Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 8,413,000	$ 6,076,000	$ 14,489,000

GEORGINA BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. Georgina Basin is located in the northeastern corner of the City. It is a small watershed of almost solely single-family residential land use. Within the watershed there is a strip of open space that runs the length of San Vicente Boulevard into the San Vicente Basin and terminates at the beach. This open space hosts two rows of historic coral trees that provide shade and habitat to the surrounding neighborhoods (See Figure 4-27). The specific land use breakdown is shown in Table 4-15. The hydrologic features of Georgina Basin during a 3/4-inch rainfall event are shown in Table 4-16.

Table 4-15. Georgina Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	29	31%
Commercial	2	2%
Residential	63	67%
TOTAL	**94**	**100%**

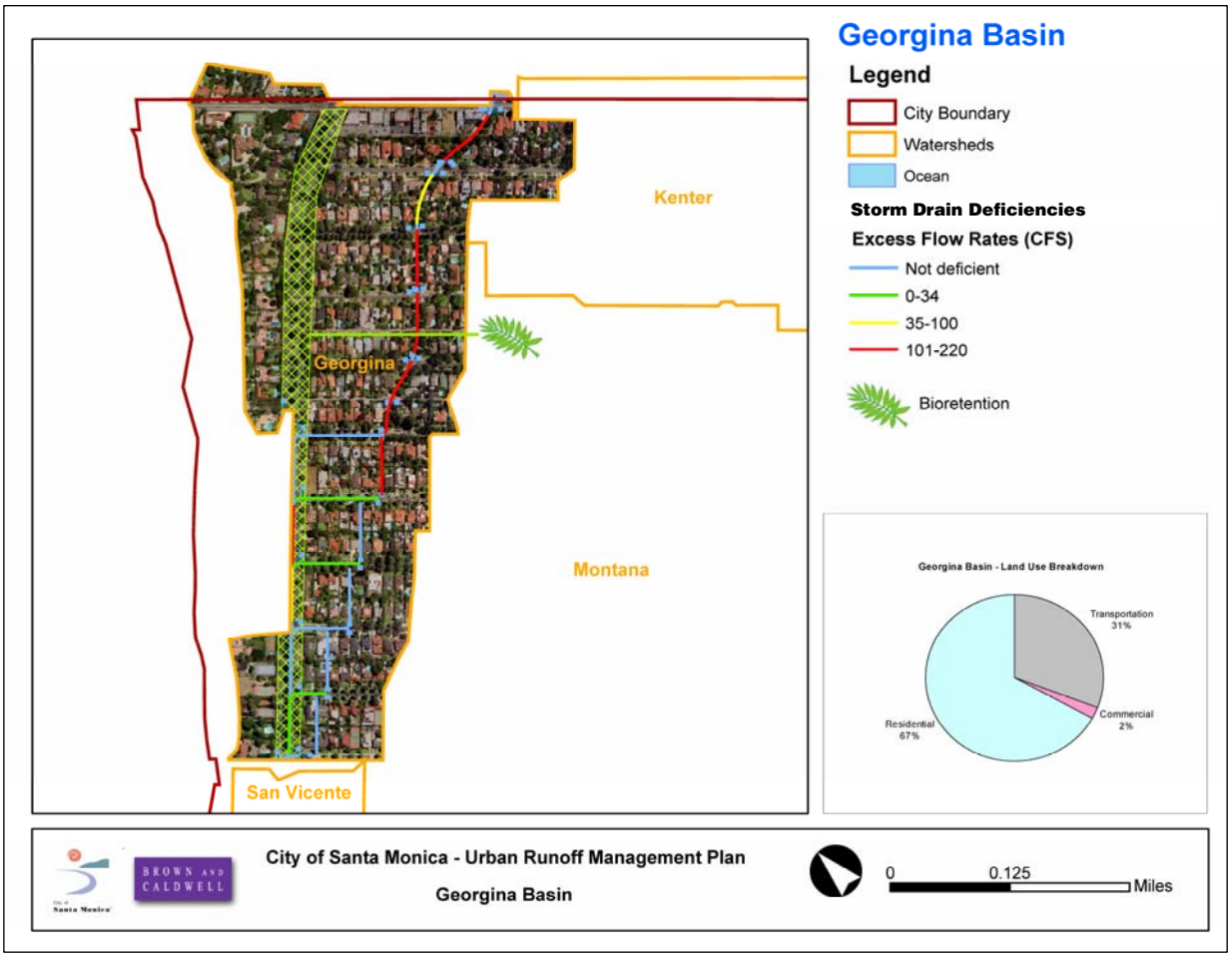


Figure 4-27. Georgina Basin

Table 4-16. Georgina Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
86 cfs	4 acre-feet

Preliminary Opportunities.

- Bioretention in wide, residential streets.

Preliminary Constraints.

- Georgina Basin contains minimal open space with severely undersized storm drains.

Multipurpose Capital Improvement Projects

The proposed multipurpose project is:

> **Residential Bioretention –** Landscaping augmented with bioretention cells for infiltration and stormwater treatment along San Vicente Boulevard and on residential properties with wide parkways. San Vicente Boulevard is shown in Figure 4-28.

Figure 4-28. San Vicente Boulevard and 17th Street, Facing Northeast (2004)

Table 4-17. Georgina Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Residential Bioretention	100%	3.7	86.1	1.9	$ 1,053,000

Total Costs

A summary of the total preliminary costs for Georgina Basin is shown in Table 4-18.

Table 4-18. Georgina Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 1,053,000	$ 0	$ 1,053,000

KENTER CANYON BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. Kenter Canyon Basin is the largest watershed in Santa Monica. Its total area is approximately 3,968 acres, of which 1,424 acres (or 35 percent) are located within the City limits. (The balance is in the City of Los Angeles.) The portion of Kenter Canyon Basin that lies within Santa Monica mainly consists of residential, commercial, transportation, and industrial land uses. There are also a handful of schools and parks scattered throughout the basin, as well as a park in the uppermost portion of Wilshire Basin, Douglas Park, that could accommodate runoff from Kenter Canyon (See Figure 4-29). The specific land use breakdown is shown in Table 4-19. The hydrologic features of Kenter Canyon Basin during a rainfall event of 3/4-inch are shown in Table 4-20.

Table 4-19. Kenter Canyon Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	423	30%
Commercial	290	20%
Industrial	201	14%
Parks	11	1%
Residential	499	35%
TOTAL	**1,423**	**100%**

Table 4-20. Kenter Canyon Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
1,162 cfs	61 acre-feet

Preliminary Opportunities.

- Civic Center Redevelopment Project;
- Retrofit existing parks and schools;

- Bioretention on residential properties and in City parkways, curb extensions and tree wells;
- Land acquisition for new parks and open space; and
- Daylighting of Kenter Storm Drain within Civic Center Redevelopment project.

Preliminary Constraints.

- Kenter Canyon Basin's large size requires many projects throughout the watershed to assure collection and treatment of all of its runoff.
- A significant portion of the watershed (65%) is located entirely within the City of Los Angeles. Any solution will benefit from cooperation between these stakeholders.
- Some industrial land uses exist in this basin. Infiltration should not be proposed for severely contaminated runoff, or for areas with contaminated soils.

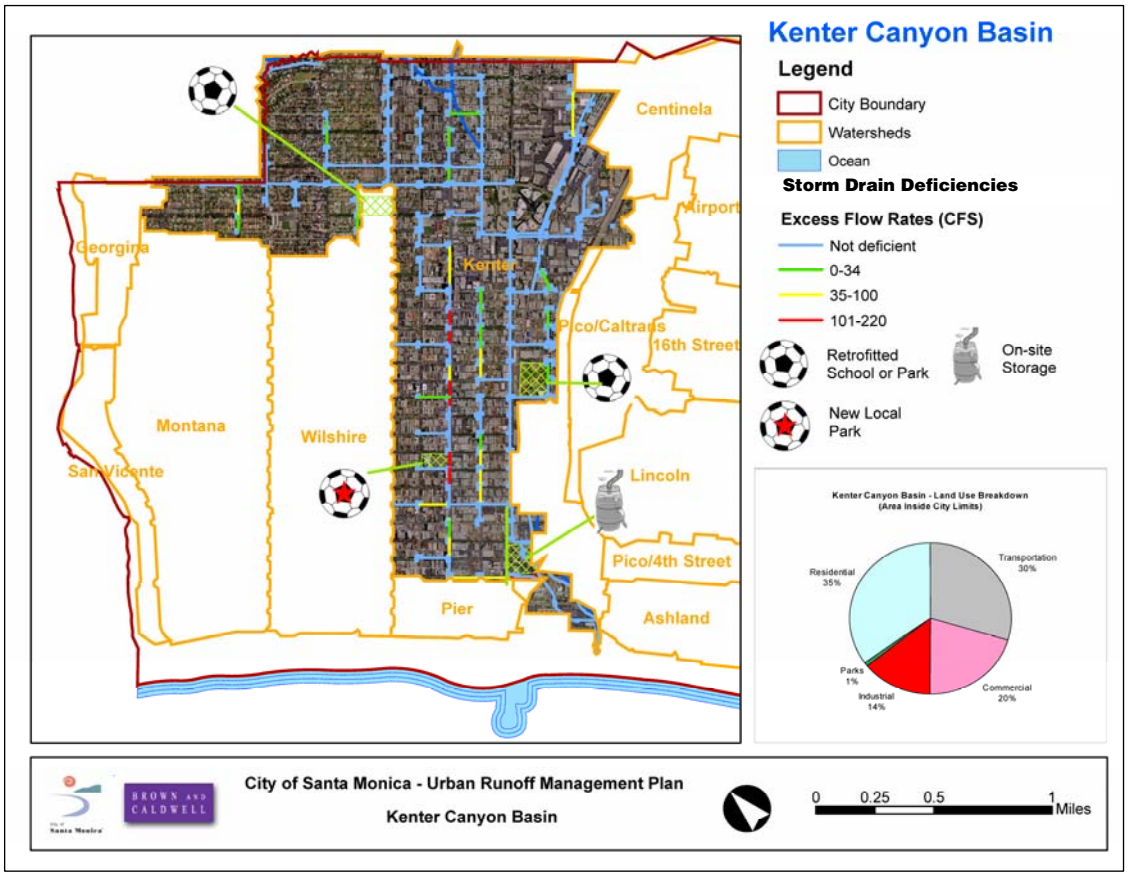


Figure 4-29. Kenter Canyon Basin

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **Douglas Park –** Existing park upgraded with sub-surface infiltration and UV treatment of overflow. The park is well situated for flow diversions from Kenter Canyon storm drains.

2. **Memorial Park –** Existing park retrofitted with sub-surface infiltration and UV treatment of overflow. Memorial Park is shown in Figure 4-30 in July of 2004.

Figure 4-30. Memorial Park (2004)

3. **New Kenter Canyon Park –** Property acquisition to create a new park with sub-surface infiltration and UV treatment of overflow. Approximately 3 acres of land would be acquired for the new park.

4. **Residential Bioretention –** Landscaping augmented with bioretention cells for infiltration and stormwater treatment along streets and on residential properties.

5. **Street-Storage –** Sub-surface runoff storage with UV disinfection. Treated water is attenuated and discharged into the storm drain.

6. **City Center Redevelopment - Creek/Treatment Wetland –** Create a surface creek/linear wetland system as part of the Redevelopment project. Figure 4-31 below is an artist's rendering of such a system. Key elements would include:

   a. Water supply from the SMURRF treatment facility (up to 1 cfs) to the top of the system providing flow.

   b. New pump station at Pico Boulevard to obtain water from the subsurface pipe system (up to 3 cfs)

   c. A new Channel to convey flows between Pico Boulevard and the beach (See Figure 4-32). The channels would consist of a creek between alternating reaches of linear wetland designed to provide water quality enhancement.

d. A recirculation pumping system to return flow (up to 1 cfs) to the top of the system.

Figure 4-31. Artist's Rendering of "Pico-Kenter" Creek

Figure 4-32. Hypothetical Creek Alignment

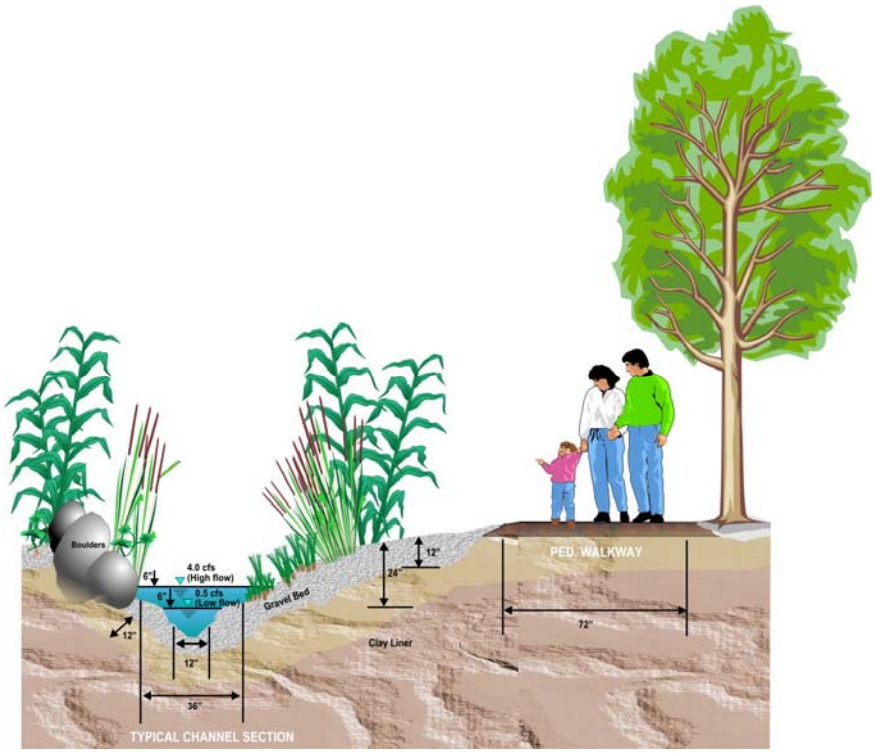


Figure 4-33. Hypothetical Creek Cross Section

Table 4-21. Kenter Canyon Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Douglas Park	20%	12.2	84.1	6.2	$ 8,229,000
Memorial Park	20%	12.2	84.1	6.2	$ 8,229,000
New Kenter Canyon Park	20%	12.2	84.1	6.2	$ 8,229,000
Residential Bioretention	10%	6.1	42.1	3.1	$ 1,712,000
Street Storage	30%	18.3	126.2	9.2	$11,193,000
TOTAL	**100%**	**61**	**N/A**	**N/A**	**$37,592,000**

Table 4-22. Kenter Canyon Basin Creek Daylighting Project Details

Element		Quantity	Unit	Unit Cost	Total
1	Creek Supply from SMURRF (1 cfs)				
	8" Dia Pressure Pipe	2000	lf	$250	$500,000
	Utility Relocation	1	ls	$200,000	$200,000
	Restoration	1	ls	$100,000	$100,000
	Subtotal				***$800,000***
2	Creek Supply from Pico Blvd. (3 cfs)				
	Pumping Station at Blvd.	1	ea	$300,000	$300,000
	10" Dia Pressure Pipe	800	lf	$180	$144,000
	Utility Relocation	1	ls	$50,000	$50,000
	Restoration	1	ls	$100,000	$100,000
	Subtotal				***$594,000***
3	Conveyance (4 cfs)				
	Creek Channel Construction	317	lf	$250	$79,250
	Wetland Channel Construction	633	lf	$600	$379,800
	3x2 Box Culvert	300	lf	$300	$90,000
	Creek Channel Construction	83	lf	$250	$20,750
	Wetland Channel Construction	167	lf	$600	$100,200
	Pico Blvd Box Culvert (3x2)	550	lf	$600	$330,000
	Creek Channel Construction	267	lf	$250	$66,750
	Wetland Channel Construction	533	lf	$600	$319,800
	Utility Relocation	1	ls	$300,000	$300,000
	Restoration	1	ls	$200,000	$200,000
	Subtotal				***$1,420,000***

Element		Quantity	Unit	Unit Cost	Total
4	Recirculation Pumping (1cfs)				
	Pumping Station at Beach	1	ea	$200,000	$200,000
	6" Dia Pressure Pipe	2850	lf	$130	$370,500
	Utility Relocation	1	ls	$150	$150
	Restoration	1	ls	$100	$100
	Subtotal				***$570,750***
	Construction Subtotal				$3,782,010
	Sales Tax	10%			$378,201
	Contingency	30%			$113,460
	Construction w/Tax and Contingency				$4,273,671
	Design Engineering	15%			$641,051
	Permitting	10%			$427,367
	Construction Administration	10%			$427,367
			TOTAL		**$5,769,456**

Total Costs

A summary of the total preliminary costs for Kenter Canyon Basin is shown in Table 4-23.

Table 4-23. Kenter Canyon Basin Cost Summary

BMP Construction	Land Acquisition	Stream Daylighting	Total
$ 37,592,000	$ 22,875,000	$5,769,000	$66,236,000

LINCOLN BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. Lincoln Basin is located along the southern border of the City. It consists of mostly residential land use with strips of commercial parcels along Lincoln and Pico Boulevards. Open space in Lincoln Basin is provided by the Olympic High School grounds and Ozone and Joslyn Parks (See Figure 4-34). The specific land use breakdown is shown in Table 4-24. The hydrologic features of Lincoln Basin during a rainfall event of 3/4-inch are shown in Table 4-25.

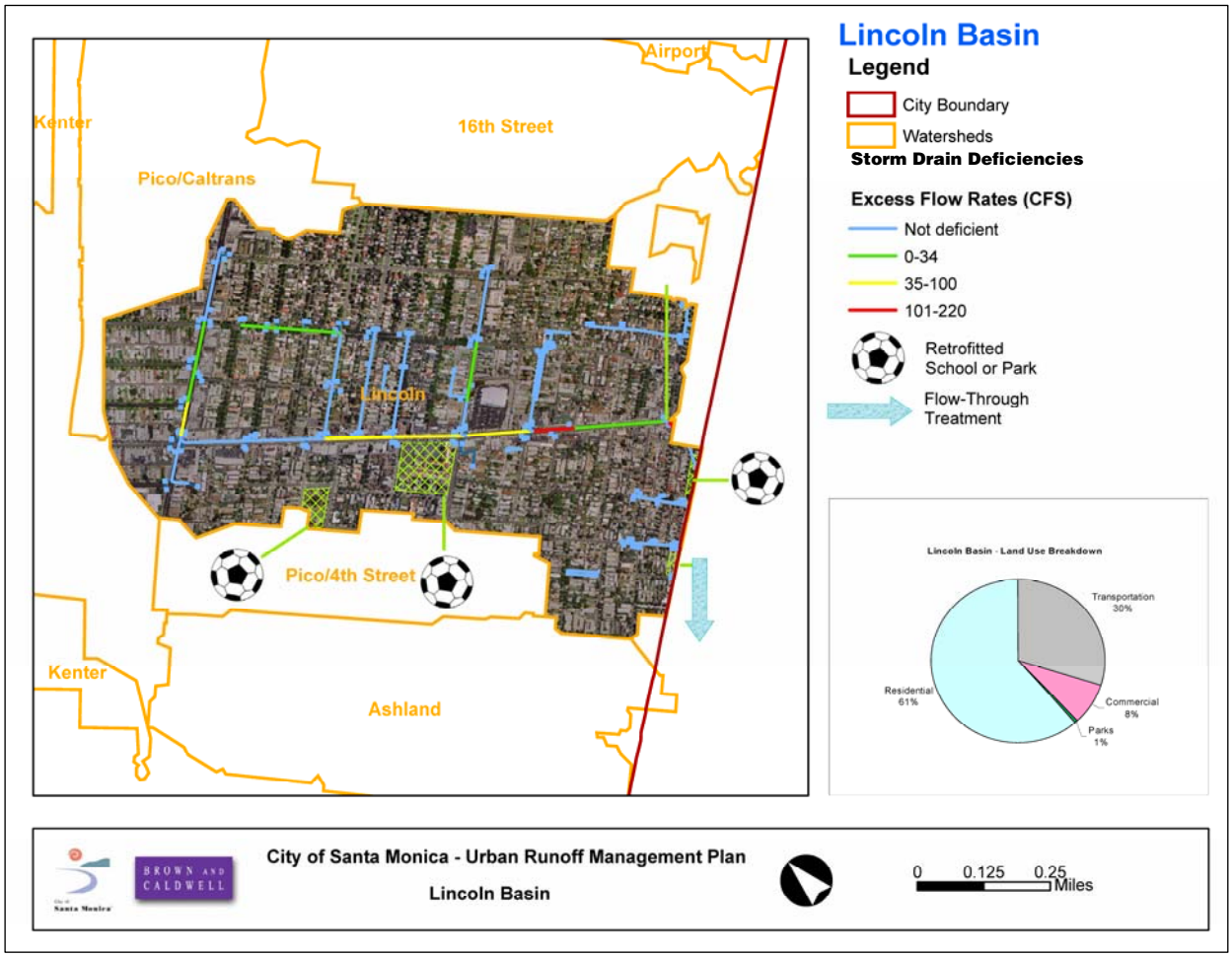


Figure 4-34. Lincoln Basin

Table 4-24. Lincoln Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	121	30%
Commercial	32	8%
Parks	3	1%
Residential	247	61%
TOTAL	**402**	**100%**

Table 4-25. Lincoln Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
135 cfs	16 acre-feet

Preliminary Opportunities.

- Retrofit existing schools and parks;
- Surface parking lots (in commercial areas) with no underground structures; and
- Employ end-of-pipe treatment for basin outflow.

Preliminary Constraints.

- The Lincoln Basin contains minimal open space.

- Joslyn Park is located at a high point within the watershed, and therefore can provide minimal opportunity for stormwater runoff collection.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **Olympic High School –** High school grounds upgraded with sub-surface infiltration and UV treatment of overflow.

2. **Ozone Park –** Existing park retrofitted with sub-surface infiltration and UV treatment of overflow.

3. **Joslyn Park –** Existing park retrofitted with sub-surface infiltration and UV treatment of overflow. Figure 4-35 shows Joslyn Park in July of 2004.

Figure 4-35. Joslyn Park (2004)

4. **Flow-Through Disinfection –** UV treatment designed for the peak flow of the 3/4-inch storm event. No storage is required.

Table 4-26. Lincoln Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Olympic High School	35%	5.6	47.3	2.8	$ 4,867,000
Ozone Park	15%	2.4	20.3	1.2	$ 2,567,000
Joslyn Park	15%	2.4	20.3	1.2	$ 2,567,000
TOTAL	**65%**	**10.4**	**N/A**	**N/A**	**$ 10,001,000**
Optional Flow-Through UV	*35%*	*5.6*	*47.3*	*2.8*	*4,877,000*

Total Costs

A summary of the total preliminary costs for Lincoln Basin is shown in Table 4-27.

Table 4-27. Lincoln Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 10,001,000	$ 0	**$ 10,001,000**

MONTANA BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. Montana Basin is located in the northern portion of the City, and the west side borders the beach. Land use is made up almost exclusively with single-family residential properties and transportation. The watershed contains one public school (Roosevelt Elementary) and the very small Goose Egg Park (See Figure 4-36). The specific land use breakdown is shown in Table 4-28. The hydrologic features of Montana Basin during a rainfall event of 3/4-inch are shown in Table 4-29.

Table 4-28. Montana Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	186	30%
Commercial	12	2%
Parks	2	0%
Residential	427	68%
TOTAL	**626**	**100%**

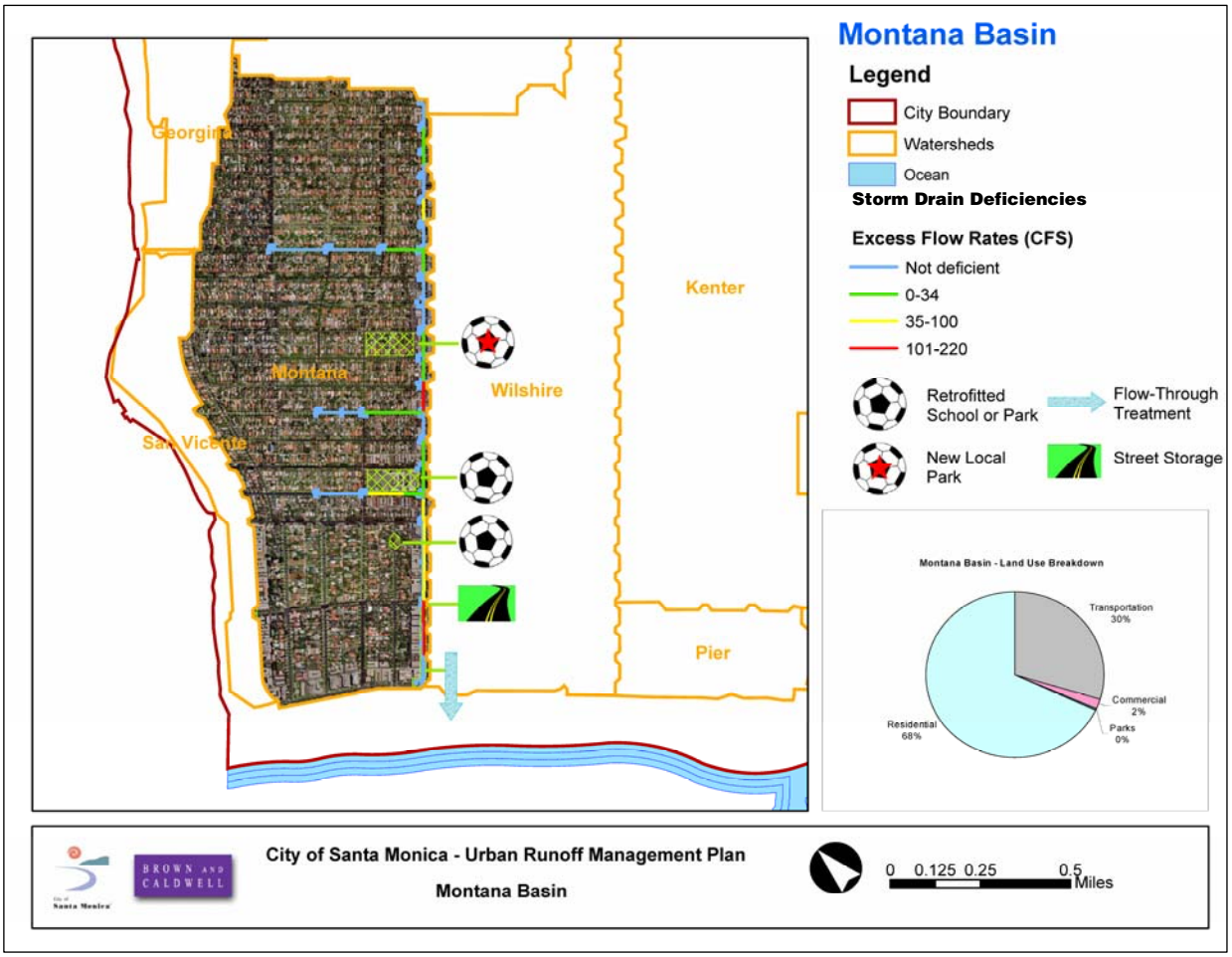


Figure 4-36. Montana Basin

Table 4-29. Montana Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
226 cfs	25 acre-feet

Preliminary Opportunities.

- Bioretention in streets, parkways, and on residential properties;
- Retrofit existing schools and parks;
- Subsurface storage and end-of-pipe treatment;
- Consider engaging the residents in the design of bioretention facilities concurrent with future street reconstruction projects;

- Maintain new planned project: 2-stage diversion BMP system for all dry flows and 3/4 –inch storm flows.

Preliminary Constraints.

- The Montana Basin contains minimal existing open space.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **New Montana Park –** Property acquisition to create a new park with sub-surface infiltration and UV treatment of overflow. Approximately 1.9 acres of land would be acquired for the new park.

2. **Roosevelt Elementary –** School grounds upgraded with sub-surface infiltration and UV treatment of overflow.

3. **Goose Egg Park –** Existing park retrofitted with sub-surface infiltration and UV treatment of overflow.

4. **Residential Bioretention –** Bioretention cells with infiltration and storm water treatment augmented with landscaping along streets, parkways, and on residential properties. The wide streets in Montana Basin (shown in Figure 4-34) make it an ideal location for "SEA-Street"-style bioretention.

Figure 4-37. Potential Montana Basin Bioretention Sites

5. **Street Storage –** Sub-surface runoff storage with UV disinfection. Treated water is attenuated and discharged into the storm drain.

6. **Flow-Through Disinfection –** UV treatment designed for the peak flow of the 3/4-inch storm event. No storage is required.

Table 4-30. Montana Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
New Montana Park	30%	7.4	67.8	3.7	$ 6,171,000
Roosevelt Elementary	15%	3.7	33.9	1.9	$ 3,644,000
Goose Egg Park	2%	0.5	4.5	0.2	$ 803,000
Residential Bioretention	20%	4.9	45.2	2.5	$ 1,389,000
Street Storage	20%	4.9	45.2	2.5	$ 4,533,000
TOTAL	**87%**	**21.5**	**N/A**	**N/A**	**$ 16,540,000**
Optional Flow-Through Disinfection	*13%*	*3.2*	*29.4*	*1.6*	*$ 3,273,000*

Total Costs

A summary of the total preliminary costs for Montana Basin is shown in Table 4-31.

Table 4-31. Montana Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 16,540,000	$ 13,890,000	$ 30,430,000

PICO – 4TH STREET BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. The Pico – 4th Street Basin is located just inland from the Ashland Basin, in the southwest corner of the City. Its land uses are largely residential and transportation. The Pico – 4th Street Basin contains open space in the form of John Muir School, which is adjacent to Los Amigos Park (See Figure 4-38). The specific land use breakdown is shown in Table 4-32. The hydrologic features of Pico – 4th Street Basin during a rainfall event of 3/4-inch are shown in Table 4-33.

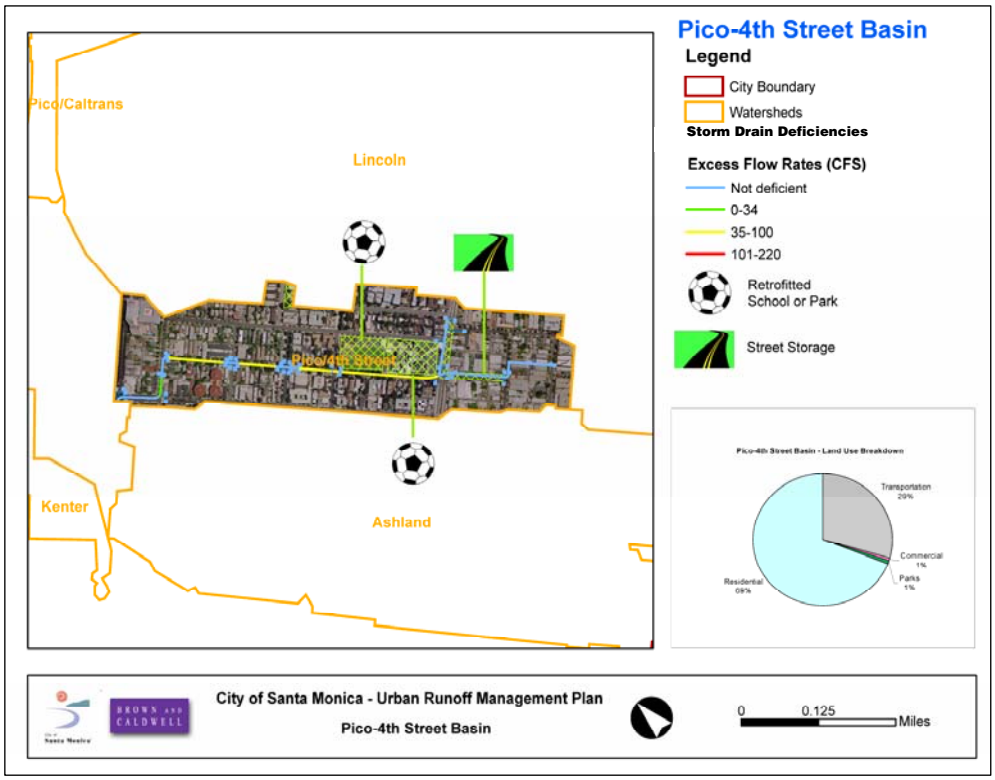


Figure 4-38 Pico – 4th Street Basin

Table 4-32. Pico – 4th Street Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	24	29%
Commercial	1	1%
Parks	1	1%
Residential	56	69%
TOTAL	**81**	**100%**

Table 4-33. Pico – 4th Street Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
44 cfs	3 acre-feet

Preliminary Opportunities. Retrofit large school adjacent to existing park.

Preliminary Constraints. No open space exists in the downstream half of the basin.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **John Muir School –** School grounds upgraded with sub-surface infiltration and UV treatment of overflow. John Muir School is shown in Figure 4-39.

Figure 4-39 John Muir School (2004)

2. **Los Amigos Park –** Existing park retrofitted with sub-surface infiltration and UV treatment of overflow.

3. **Street Storage –** Sub-surface runoff storage with UV disinfection. Treated water is attenuated and discharged into the storm drain.

Table 4-34. Pico – 4th Street Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
John Muir School	40%	1.3	17.8	0.6	$ 1,874,000
Los Amigos Park	20%	0.6	8.9	0.3	$ 1,106,000
Street Storage	40%	1.3	17.8	0.6	$ 1,874,000
TOTAL	**100%**	**3.2**	**N/A**	**N/A**	**$ 4,854,000**

Total Costs

A summary of the total preliminary costs for Pico – 4th Street Basin is shown in Table 4-35.

Table 4-35. Pico – 4th Street Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 4,854,000	$ 0	$ 4,854,000

PICO – CALTRANS BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. The Pico – Caltrans Basin is located in the center of the City, just south of Interstate 10. It is heavily residential with commercial areas lining Pico Boulevard and Lincoln Street. The Pico – Caltrans Basin also contains a large campus (part of the Santa Monica College property) with facilities that provide open space to be considered for multipurpose stormwater projects (See Figure 4-40). The specific land use breakdown is shown in Table 4-36. The hydrologic features of Pico – Caltrans Basin during a rainfall event of 3/4-inch are shown in Table 4-37.

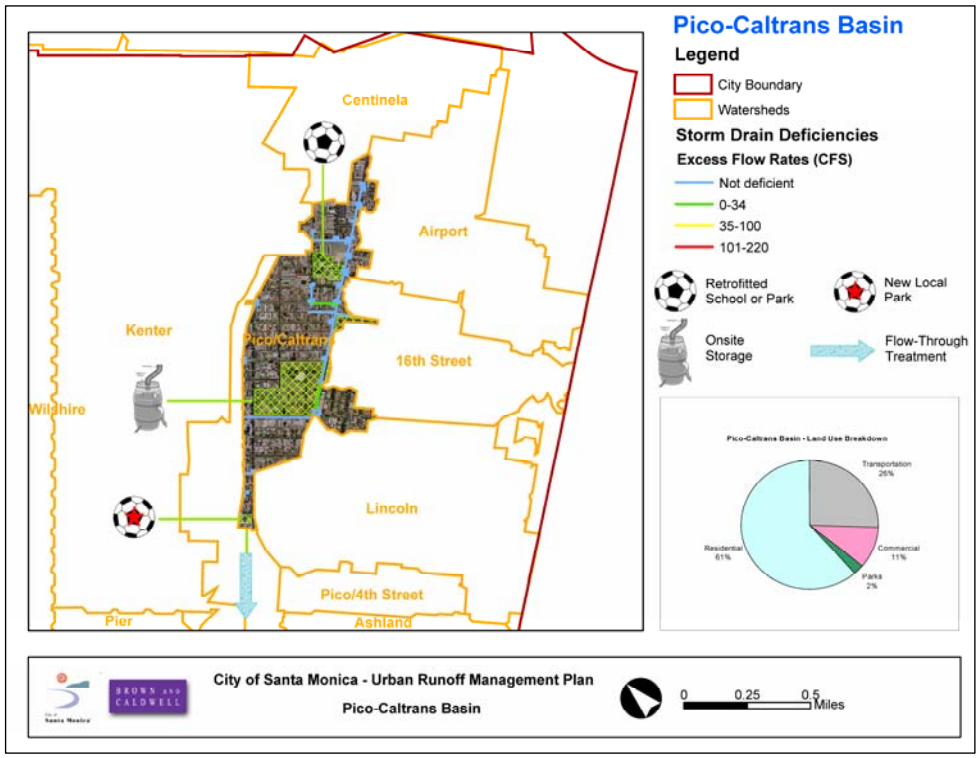


Figure 4-40. Pico – Caltrans Basin

Table 4-36. Pico – Caltrans Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	61	26%
Commercial	25	11%
Parks	6	2%
Residential	146	61%
TOTAL	**237**	**100%**

Table 4-37. Pico – Caltrans Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
47 cfs	9 acre-feet

Preliminary Opportunities.

- Retrofit existing parks and College;
- Retrofit City-owned facilities to include stormwater projects; and
- Consider the possibility of partnering with Caltrans on stormwater quality improvement projects.

Preliminary Constraints.

- Caltrans Basin is bordered on the north by Interstate 10, and Caltrans' right-of-way should be investigated in the planning of any storm water projects.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **Virginia Park –** Existing park retrofitted with sub-surface infiltration, perimeter infiltration basins, and permeable parking lots. Virginia Park is shown under construction in Figure 4-41, it opened in late 2005.

Figure 4-41. Virginia Park Under Construction (2004)

2. **City Facilities –** Retrofit the grounds of adjacent properties owned and operated by the City to include sub-surface infiltration and UV disinfection of runoff.

3. **New Pico-Caltrans Park –** Property acquisition to create a new park with sub-surface infiltration and UV treatment of overflow. Approximately one-half acre of land would be acquired for the new park.

4. **Flow-Through Disinfection –** UV treatment designed for the peak flow of the 3/4-inch storm event. No storage is required.

Table 4-38. Pico – Caltrans Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Virginia Park	20%	1.8	9.5	0.9	$ 1,855,000
City Facilities	40%	3.7	18.9	1.9	$ 3,098,000
New Pico-Caltrans Park	20%	1.8	9.5	0.9	$ 1,855,000
TOTAL	**80%**	**7.4**	**N/A**	**N/A**	**$ 6,808,000**
Optional Flow-Through UV	*20%*	*1.8*	*9.5*	*0.9*	*$ 1,269,000*

Total Costs

A summary of the total preliminary costs for Pico – Caltrans Basin is shown in Table 4-39.

Table 4-39. Pico – Caltrans Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 6,808,000	$ 3,453,000	$ 10,261,000

PIER BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. The Pier Basin is a very small (84 acres) watershed located next to the beach, just west of the Kenter Canyon Basin. The Pier Basin is densely commercial with a swath of waterfront residential parcels. The basin includes the highly popular pedestrian-friendly downtown shopping area called the Third Street Promenade. A large parking lot adjacent to the beach provides the greatest open area and opportunity for storm water projects (See Figure 4-42). The specific land use breakdown is shown in Table 4-40. The hydrologic features of the Pier Basin during a rainfall event of 3/4-inch are shown in Table 4-41.

Table 4-40. Pier Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	29	34%
Commercial	41	49%
Parks	7	8%
Residential	8	9%
TOTAL	**84**	**100%**

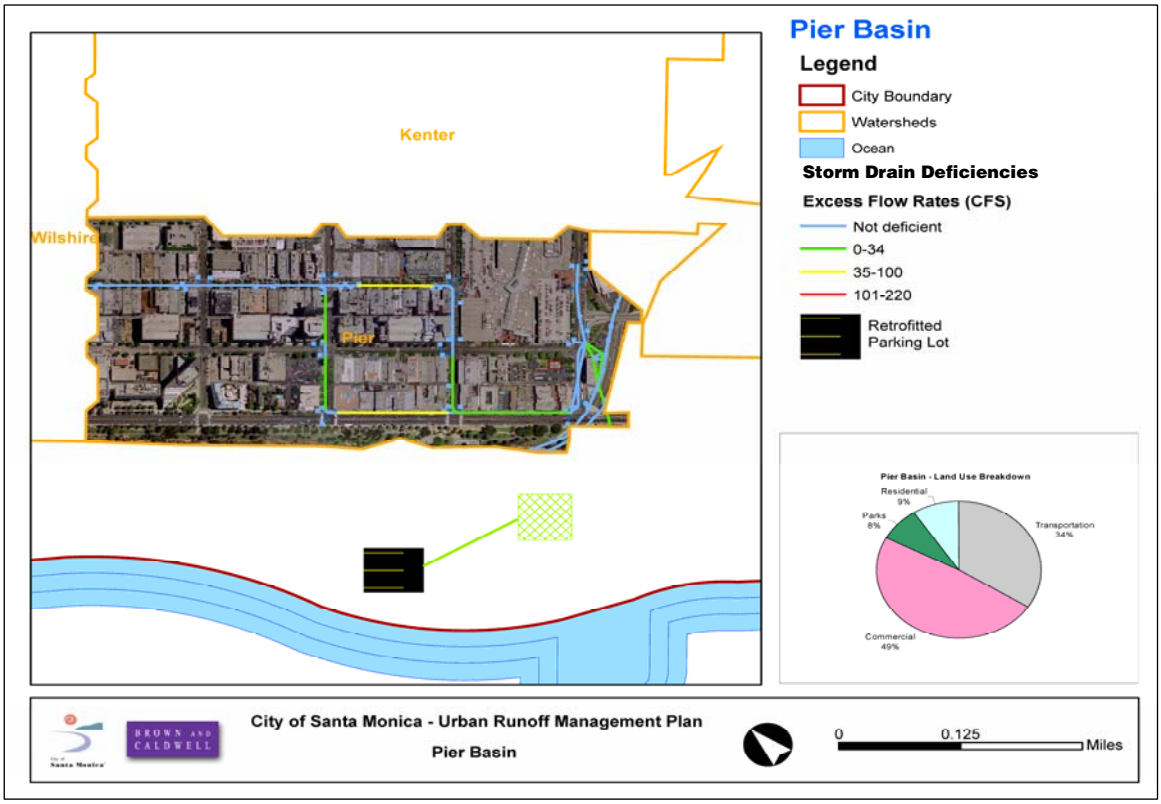


Table 4-41. Pier Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
33 cfs	4 acre-feet

Preliminary Opportunities.

- Parking lot retrofits with runoff treatment and infiltration; and
- End-of-pipe treatment (to augment existing SMURRF).

Preliminary Constraints.

- No parks or open space exist in the Pier Basin.
- Consider tidal influence on infiltration near the beach.

Multipurpose Capital Improvement Projects

Proposed multipurpose project:

Beach Parking Lots – Retrofit existing parking lots at the beach with an underground infiltration gallery and UV disinfection. The parking lot is shown in Figure 4-43.

Figure 4-43. Beach Parking Lot (2004)

Table 4-42. Pier Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Beach Parking Lots	33%	1.2	11.0	0.6	$ 1,559,000
TOTAL	**33%**	**1.2**	**N/A**	**N/A**	**$ 1,559,000**
Optional Flow-Through UV	*33%*	*1.2*	*11.0*	*0.6*	*1,443,000*

Total Costs

A summary of the total preliminary costs for Pier Basin is shown in Table 4-43.

Table 4-43. Pier Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 1,559,000	$ 0	$ 1,559,000

SAN VICENTE BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. San Vicente Basin is located in the northwest corner of the basin. It is bounded by the northern City limit and the western beach. Its land uses are similar to the Georgina Basin: almost exclusively single-family residential and transportation. It contains a strip of open space that runs on either side of San Vicente Boulevard, and is lined with two rows of historical coral trees (See Figure 4-44). The specific land use breakdown is shown in Table 4-44. The hydrologic features of San Vicente Basin during a rainfall event of 3/4-inch are shown in Table 4-45.

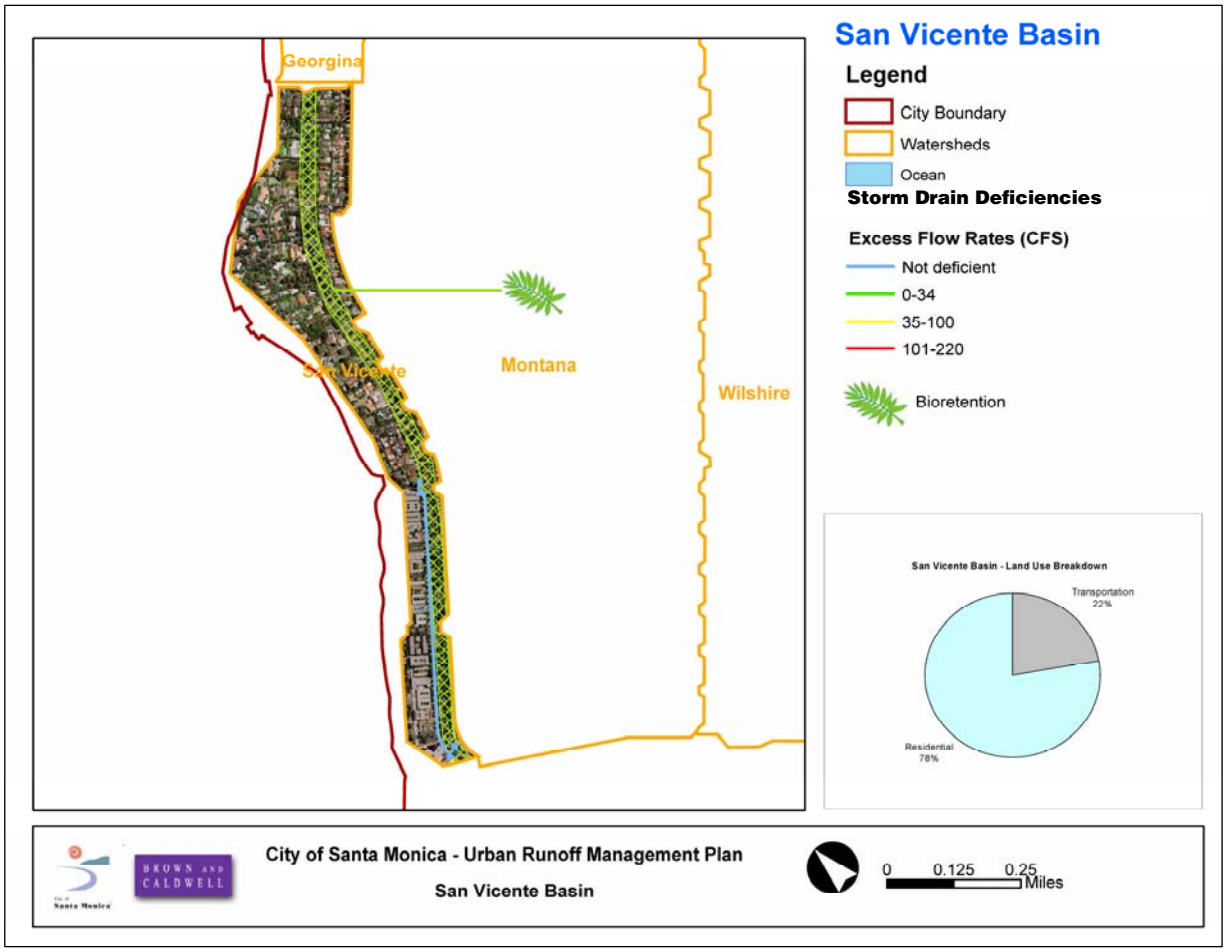


Figure 4-44. San Vicente Basin

Table 4-44. San Vicente Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	21	22%
Residential	75	78%
TOTAL	**96**	**100%**

Table 4-45. San Vicente Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
37 cfs	4 acre-feet

Preliminary Opportunities. Bioretention in wide, residential streets and parkways.

Preliminary Constraints. Minimal open space exists in the San Vicente Basin.

Multipurpose Capital Improvement Projects

Proposed multipurpose project is:

Residential Parkway Bioretention – Landscaping augmented with bioretention cells for infiltration and stormwater treatment along San Vicente Boulevard and on residential properties (Figure 4-45).

Figure 4-45. San Vicente Boulevard and 17th Street, Facing Southwest (2004)

Table 4-46. San Vicente Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Residential Bioretention	100%	3.6	36.5	1.8	$ 1,018,000
TOTAL	**100%**	**3.6**	**N/A**	**N/A**	**$ 1,018,000**

Total Costs

A summary of the total preliminary costs for San Vicente Basin is shown in Table 4-47.

Table 4-47. San Vicente Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 1,018,000	$ 0	$ 1,018,000

WILSHIRE BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. Wilshire Basin is located in the west-central portion of the City and drains to the beach. It is bordered by the Montana Basin on the north, and Kenter Canyon Basin to the east and south. Wilshire Basin consists primarily of multi-family residences and transportation with a long commercial strip along Wilshire Boulevard. There are two neighborhood parks in Wilshire: Reed Park in the lower half of the basin and Douglas Park in the upper half of the basin. Douglas Park is being proposed as an infiltration facility to accommodate runoff from the Kenter Canyon Basin, as the park is located such that it would collect very little runoff from Wilshire Basin, but a great deal of runoff from Kenter Canyon. This project is described in the Kenter Canyon Multipurpose Capital Improvement Projects section. The Wilshire Basin also contains Lincoln Middle School, which provides additional open space for stormwater management (See Figure 4-46). The specific land use breakdown is shown in Table 4-48. The hydrologic features of Wilshire Basin during a rainfall event of 3/4-inch are shown in Table 4-49.

Preliminary Opportunities.

- Bioretention on residential properties;
- Retrofit existing schools and parks;
- Land acquisition for new multipurpose recreational areas; and
- Subsurface storage and/or end-of-pipe treatment.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **Lincoln Middle School –** School grounds upgraded with sub-surface infiltration and UV treatment of overflow.

2. **Reed Park –** Existing park retrofitted with sub-surface infiltration and UV treatment of overflow.

3. **New Wilshire Park(s) –** Property acquisition to create one large new park or two smaller ones with sub-surface infiltration and UV treatment of overflow. A total of approximately 2.3 acres of land would be acquired for the new park(s).

4. **Residential Bioretention –** Landscaping augmented with bioretention cells for infiltration and stormwater treatment along streets and on residential properties.

5. **Street Storage –** Sub-surface runoff storage with UV disinfection. Treated water is attenuated and discharged into the storm drain.

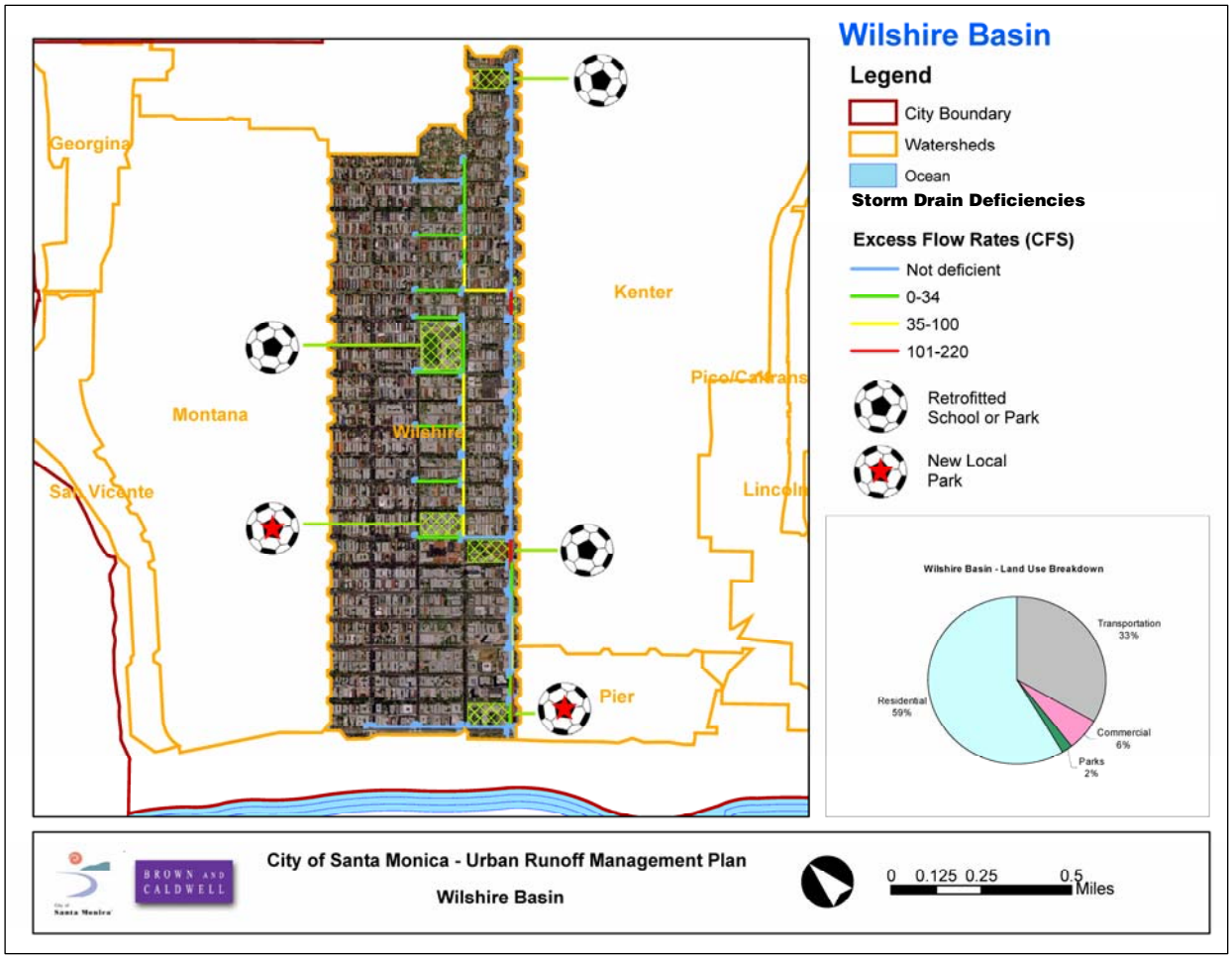


Figure 4-46. Wilshire Basin

Table 4-48. Wilshire Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	192	33%
Commercial	35	6%
Parks	11	2%
Residential	335	58%
TOTAL	**573**	**100%**

Table 4-49. Wilshire Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
266 cfs	23 acre-feet

The hotel parking lot shown in Figure 4-47 is located in the downstream-most corner of Wilshire Basin and could be retrofitted to include a stormwater BMP. This project has not been included in the hydrologic calculations for this plan, but could be considered in the future to help reduce the size of projects proposed in this basin.

Figure 4-47. Potential Site for a New Wilshire Park, Street Storage, or Bioretention

Table 4-50. Wilshire Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Lincoln Middle School	5%	1.2	13.3	0.6	$ 1,623,000
Reed Park	5%	1.2	13.3	0.6	$ 1,623,000
New Wilshire Parks	40%	9.2	106.3	4.6	$ 7,936,000
Residential Bioretention	20%	4.6	53.2	2.3	$ 1,297,000
Street Storage	30%	6.9	79.7	3.5	$ 6,361,000
TOTAL	**100%**	**23.0**	**N/A**	**N/A**	**$ 18,840,000**

Total Costs

A summary of the total preliminary costs for Wilshire Basin is shown in Table 4-51.

Table 4-51. Wilshire Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 18,840,000	$ 17,276,000	$ 36,116,000

16TH STREET BASIN

Opportunities and Constraints Analysis

Watershed Characteristics. 16th Street Basin is located on the southern edge of the City, between the Lincoln and Airport Basins. Land uses in the 16th Street Basin are mostly residential, with a short strip of commercial properties along Ocean Park Boulevard. In addition, the 16th Street Basin includes three large school campuses: part of the Santa Monica College (SMC) property, John Adams Middle School, and Will Rogers Elementary School. These schools provide open space and an opportunity to engage residents and the academic community of SMC in the retrofit of the grounds (See Figure 4-48). This basin also includes Marine Park, which is located in the southeast section of the basin, and is adjacent to 16th and Marine. The specific land use breakdown is shown in Table 4-52. The hydrologic features of 16th Street Basin during a rainfall event of 3/4-inch are shown in Table 4-53.

Figure 4-48. 16th Street Basin

Table 4-52. 16th Street Basin Land Use

Land Use Category	Area (acres)	Percent of Basin
Transportation	55	24%
Commercial	6	2%
Parks	1	0%
Residential	169	74%
TOTAL	**230**	**100%**

Table 4-53. 16th Street Basin Hydrology for the 3/4-inch Storm

Peak Flow During the 3/4-inch Storm	Runoff Volume for the 3/4-inch Storm
111 cfs	9 acre-feet

Preliminary Opportunities.

- Bioretention on residential properties;
- Retrofit existing large school campuses and parks; and
- Subsurface storage and/or end-of-pipe treatment.

Multipurpose Capital Improvement Projects

Proposed multipurpose projects are:

1. **Santa Monica College –** College grounds upgraded with sub-surface infiltration and UV treatment of overflow.

2. **John Adams Middle School –** High school grounds upgraded with sub-surface infiltration and UV treatment of overflow (Figure 4-49).

Figure 4-49. John Adams Middle School (2004)

3. **New 16th Street Park –** Property acquisition to create a new park with sub-surface infiltration and UV treatment of overflow. Approximately 0.6 acres of land would be acquired for the new park.

4. **Residential Bioretention –** Landscaping augmented with bioretention cells for infiltration and stormwater treatment along streets and on residential properties.

5. **Street Storage –** Sub-surface runoff storage with UV disinfection. Treated water is attenuated and discharged into the storm drain.

Table 4-54. 16th Street Basin Multipurpose Project Details

BMP Name	Percent of basin tributary to BMP	3/4-inch Storm - Runoff Volume (Acre-feet)	3/4-inch Storm - Peak Flow (cfs)	3/4-inch Storm - Dewatering Flow (cfs)	BMP Cost
Santa Monica College	25%	2.2	27.8	1.1	$ 2,738,000
John Adams High School	25%	2.2	27.8	1.1	$ 2,738,000
New 16th Street Park	25%	2.2	27.8	1.1	$ 2,738,000
Residential Bioretention	5%	0.4	5.6	0.2	$ 127,000
Street Storage	20%	1.8	22.2	0.9	$ 2,309,000
TOTAL	**100%**	**8.8**	**N/A**	**N/A**	**$ 10,650,000**

Total Costs

A summary of the total preliminary costs for 16th Street Basin is shown in Table 4-55.

Table 4-55. 16th Street Basin Cost Summary

BMP Construction	Land Acquisition	Total
$ 10,650,000	$ 4,129,000	$ 14,779,000

SECTION 5

WATERSHED MANAGEMENT PROGRAM EXPENDITURE PLAN

This section presents the annualized costs for the projects identified in the WMP, and outlines a strategy for funding the City's Urban Runoff program with the WMP implementations. The financial calculations in this section are based on a 2004 dollar value. This section describes the annual costs of the WMP, identifies funding alternatives, and provides a recommended strategy for the City's stormwater utility.

SUMMARY

The City operates the stormwater utility as an enterprise. The FY (fiscal year) 2002-03 stormwater costs were $1.7 million for O&M and $1.2 million for project appropriations. These costs are funded from $1.2 million in stormwater management user fees and a variety of reimbursements, project grants and reserve draw downs.

Under Proposition 218 (California Article XIII D), any increase in an existing user fee that is "incidental of property ownership" requires a majority vote of the fee payers. Until a vote increases the City's stormwater user fees, or other steady revenue sources are developed, the stormwater utility revenues will remain below required levels. A five-year projection of current operations and projects with the existing fees indicates that by FY 2009-10 the stormwater enterprise represented by Fund 34 will have a $7.5 million deficit, even without the additional projects identified in this study.

The WMP identified more than $200 million in BMP project and land expenditures, equaling a one-time cost of almost $5,890 per single family parcel billing unit. The expenditure plan developed in this section spreads these project costs over 20 years, with a ramping up of the rate of project expenditures over the first nine years. A programmatic estimate for the O&M costs for the proposed WMP facilities is an additional $10.2 million per year, or $21 per month above the current O&M costs per single-family parcel billing unit.

A detailed financial plan for the first five years is proposed in this section, in addition to the 20 year projection. During this initial period, the monthly user fee can be supplemented by a variety of local funding sources, resulting in an increase in the stormwater program-related charge from the current $3 to $18 monthly per single-family parcel, in FY 2009-10. It is also possible that the charge be collected in a variety of ways, including utility surcharges, local sales tax, and parcel benefit assessments (for project costs). However, the local community ratepayers must ultimately support the stormwater program costs, and in this plan utility charges and surcharges are used.

Over the remaining years of the 20-year projection without grant funding, an annual increase of 18 percent annually is required. However, with at least 50 percent of the WMP project construction costs grant-funded, the annual local fee increases are reduced to approximately the level of inflation. This presumption is based on the City's current success in grant-funding projects and the potential for a repeat of the wastewater clean water grant program for stormwater pollutant remediation facilities. Due to the projected two decades of steady capital funding requirements, there is little long-term benefit of debt funding the projects prioritized for the first five years.

All of the costs for the recommended capital improvements are assumed to be the responsibility of the urban runoff program. Some of the costs, such as $68 million for land acquisition for stormwater management facilities, may be shared with other City departments, including Open Space Management. Cost-sharing will ultimately help to reduce the costs of the urban runoff program, which are not included in the calculations provided in this section.

It is recommended that the City continue to aggressively apply for grants for building innovative urban runoff pollutant remediation facilities. However, to fund the WMP projects, the City should also seek to diversify and increase its local funding sources, especially in coordination with regional stormwater funding programs.

The key additional funding source for the immediate urban runoff program needs are surcharges on water and trash utility bills. These surcharges represent the cost of the urban runoff pollutant loads associated with those services. The City should also create an environmental fee charged to all City utility customers for funding land acquisition needed for multi-purpose open space parks and flood water bioretention. It is possible that, subject to City legal counsel findings, these revenue sources can be implemented without an approving vote of the utility customers. However, the City should also consider increasing the existing user fee, either unilaterally or after a Citywide utility customer vote. Based on the combination of these mechanisms, the program funding from local City customers should increase from the current $3 per month to $18 per equivalent single-family parcel in FY 2009-10. Revenues from other customer classes, including multi-family and commercial discharges, should also increase proportionally.

ANNUALIZED COSTS OF WMP PROJECT CONSTRUCTION AND FACILITY OPERATION

The prioritized BMP project recommendations are scheduled for completion over a period of 20 years. With an estimated total cost for all projects of $204 million for BMPs only, an average annual project expenditure rate of $10 million is required. As this project expenditure rate exceeds the current stormwater project construction level ten-fold, the City currently lacks the financial and staffing resources required to immediately commit to the WMP project schedule. Instead, a phase-in period of 9 years is incorporated, with the prioritized BMP project expenditures starting at approximately $1.6 million in the first year (FY 2005-06), and increasing to $11 million per year after nine years. Table 5-1 provides the projected year of construction startup and duration for each BMP project. The rate of expenditure for each project is based on an annual construction cost expenditure of approximately $1.5 million per year.

Operation of runoff pollution control facilities is labor-intensive. As such, a programmatic projection of the annual cost of operation and maintenance (O&M) of the WMP facilities is set at an estimated five percent of the construction cost of each new asset. In contrast, the City currently spends four percent of the current SMURRF asset value on O&M services each year, as calculated from background data provided in Appendix D. In contrast, the City's current total program O&M expenditures, including street cleaning, are 20 percent ($1.6 million) of the reported asset value ($8.1 million). The projected annual O&M cost of the new BMP assets is provided in Table 5-2. As shown, by the tenth year (FY 2014-15), new O&M costs are $1.5 million per year, and in 20 years the WMP-based O&M costs are $9.7 million per year, in current 2005 dollars.

Table 5-1
Annual Project Costs of the Watershed Management Plan

Best Management Practice Project	Construction Cost	Land Acquisition Cost	Project Duration (years)	Const. Cost per year	Project Start	FY 2005-06 Year 1	FY 2006-07 Year 2	FY 2007-08 Year 3	FY 2008-09 Year 4	FY 2009-10 Year 5	FY 2014-15 *Year 10*	FY 2019-20 *Year 15*	FY 2024-25 *Year 20*
Pier Watershed -- Rank 1													
Beach Parking Lots	$1,559,000		2	$779,500	FY 2005-06	$779,500	$779,500	$779,500					
Kenter Canyon Watershed -- Rank 2													
Residential Bioretention	$1,712,000		2	$856,000	FY 2005-06	$856,000	$856,000						
Memorial Park	$8,229,000		6	$1,371,500	FY 2006-07		$1,371,500	$1,371,500	$1,371,500	$1,371,500			
Douglas Park	$8,229,000		6	$1,371,500	FY 2007-08			$1,371,500	$1,371,500	$1,371,500			
New Kenter Canyon Park	$8,229,000	$22,875,000	8	$1,028,625	FY 2010-11						$3,888,000		
Creek Daylighting	$5,770,000		4	$1,442,500	FY 2010-11								
Street Storage	$11,193,000		8	$1,399,125	FY 2009-10				$1,399,125	$1,399,125	$1,399,125		
Ashland Watershed -- Rank 3													
Local Parking Lots	$1,510,000		2	$755,000	FY 2013-14								
City Facilities	$1,510,000		2	$755,000	FY 2013-14								
Residential Bioretention	$214,000		1	$214,000	FY 2012-13								
Multiple Parks	$3,463,000		3	$1,154,333	FY 2012-13						$1,154,333		
Wilshire Watershed -- Rank 4													
Residential Bioretention	$1,297,000		1	$1,297,000	FY 2015-16								
Reed Park	$1,623,000		2	$811,500	FY 2015-16								
Lincoln Middle School	$1,623,000		2	$811,500	FY 2015-16								
Street Storage	$1,297,000		1	$1,297,000	FY 2014-15						$1,297,000		
New Wilshire Park(s)	$7,936,000	$17,276,000	6	$1,322,667	FY 2015-16							$4,202,000	
Montana Watershed -- Rank 5													
Existing Pocket Park	$803,000		1	$803,000	FY 2014-15						$803,000		
Residential Bioretention	$1,389,000		1	$1,389,000	FY 2014-15						$694,500		
Roosevelt Elementary	$3,644,000		3	$1,214,667	FY 2015-16								
Street Storage	$4,533,000		4	$1,133,250	FY 2014-15						$1,133,250		
New Montana Park	$6,171,000	$13,890,000	5	$1,234,200	FY 2016-17							$4,012,200	
San Vicente Watershed -- Rank 6													
Residential Bioretention	$1,018,000		1	$1,018,000	FY 2013-14								
Pico-CalTrans Watershed -- Rank 7													
City Facilities	$3,098,000		3	$1,032,667	FY 2015-16								
Virginia Park	$1,855,000		2	$927,500	FY 2014-15						$927,500		
New Pico-CalTrans Park	$1,855,000	$3,453,000	2	$927,500	FY 2016-17								
Lincoln Watershed -- Rank 8													
Joslyn Park	$2,567,000		2	$1,283,500	FY 2018-19							$1,283,500	
Ozone Park	$2,567,000		2	$1,283,500	FY 2018-19							$1,283,500	
Olympic High School	$4,867,000		4	$1,216,750	FY 2018-19							$1,216,750	
16th Street Watershed -- Rank 9													
Residential Bioretention	$127,000		1	$127,000	FY 2018-19								
John Adams High School	$2,738,000		2	$1,369,000	FY 2018-19							$1,369,000	
Santa Monica College	$2,738,000		2	$1,369,000	FY 2018-19							$1,369,000	
New 16th Street Park	$2,738,000	$4,129,000	2	$1,369,000	FY 2019-20								
Street Storage	$2,309,000		2	$1,154,500	FY 2019-20							$1,154,500	
Pico-4th Street Watershed -- Rank 10													
Los Amigos Park	$1,106,000		1	$1,106,000	FY 2021-22								
John Muir School	$1,874,000		2	$937,000	FY 2019-20							$937,000	
Street Storage	$1,874,000		2	$937,000	FY 2019-20							$937,000	
Centinela Watershed -- Rank 11													
Residential Bioretention	$915,000		1	$915,000	FY 2021-22								
Street Storage	$3,749,000		3	$1,249,667	FY 2022-23								$1,249,667
New Centinela Park	$3,749,000	$6,076,000	3	$1,249,667	FY 2020-21								
Georgina Watershed -- Rank 12													
Residential Bioretention	$1,053,000		1	$1,053,000	FY 2021-22								
Airport Watershed -- Rank 13													
Residential Bioretention	$350,000		1	$350,000	FY 2021-22								
Airport Parking	$2,673,000		2	$1,336,500	FY 2022-23								
Clover Park	$3,164,000		3	$1,054,667	FY 2021-22								
Street Storage	$4,941,000	$0	3	$1,647,000	FY 2022-23								$1,647,000
Total Expenditures	$135,859,000	$67,699,000				$1,635,500	$3,007,000	$3,522,500	$4,142,125	$4,142,125	$11,296,708	$17,764,450	$2,896,667
Avg. Service Life (years)	35											**Grand Total:**	$203,558,000
Annual Depreciation	$4,000,000												
Ind. Proj Exp. Rate ($ /year)	$1,500,000												

Table 5-2
Operation and Maintenance Costs of the Watershed Management Plan Projects

Best Management Practice Project	New O&M Costs ($/yr, a)	FY 2005-06 Year 1	FY 2006-07 Year 2	FY 2007-08 Year 3	FY 2008-09 Year 4	FY 2009-10 Year 5	FY 2014-15 *Year 10*	FY 2019-20 *Year 15*	FY 2024-25 *Year 20*
Pier Watershed -- Rank 1									
Beach Parking Lots	$77,950				$77,950	$77,950	$77,950	$77,950	$77,950
Kenter Canyon Watershed -- Rank 2									
Residential Bioretention	$85,600			$85,600	$85,600	$85,600	$85,600	$85,600	$85,600
Memorial Park	$411,450						$411,450	$411,450	$411,450
Douglas Park	$411,450						$411,450	$411,450	$411,450
New Kenter Canyon Park	$1,555,200							$1,555,200	$1,555,200
Creek Daylighting	$288,500						$288,500	$288,500	$288,500
Street Storage	$559,650							$559,650	$559,650
Ashland Watershed -- Rank 3									
Local Parking Lots	$75,500						$75,500	$75,500	$75,500
City Facilities	$75,500						$75,500	$75,500	$75,500
Residential Bioretention	$10,700						$10,700	$10,700	$10,700
Multiple Parks	$173,150							$173,150	$173,150
Wilshire Watershed -- Rank 4									
Residential Bioretention	$64,850							$64,850	$64,850
Reed Park	$81,150							$81,150	$81,150
Lincoln Middle School	$81,150							$81,150	$81,150
Street Storage	$64,850							$64,850	$64,850
New Wilshire Park(s)	$1,260,600								$1,260,600
Montana Watershed -- Rank 5									
Existing Pocket Park	$40,150							$40,150	$40,150
Residential Bioretention	$69,450							$69,450	$69,450
Roosevelt Elementary	$182,200							$182,200	$182,200
Street Storage	$226,650							$226,650	$226,650
New Montana Park	$1,003,050								$1,003,050
San Vicente Watershed -- Rank 6									
Residential Bioretention	$50,900						$50,900	$50,900	$50,900
Pico-CalTrans Watershed -- Rank 7									
City Facilities	$154,900							$154,900	$154,900
Virginia Park	$92,750							$92,750	$92,750
New Pico-CalTrans Park	$265,400							$265,400	$265,400
Lincoln Watershed -- Rank 8									
Joslyn Park	$128,350								$128,350
Ozone Park	$128,350								$128,350
Olympic High School	$243,350								$243,350
16th Street Watershed -- Rank 9									
Residential Bioretention	$6,350							$6,350	$6,350
John Adams Middle School	$136,900								$136,900
Santa Monica College	$136,900								$136,900
New 16th Street Park	$343,350								$343,350
Street Storage	$115,450								$115,450
Pico-4th Street Watershed -- Rank 10									
Los Amigos Park	$55,300								$55,300
John Muir School	$93,700								$93,700
Street Storage	$93,700								$93,700
Centinela Watershed -- Rank 11									
Residential Bioretention	$45,750								$45,750
Street Storage	$187,450								
New Centinela Park	$491,250								$491,250
Georgina Watershed -- Rank 12									
Residential Bioretention	$52,650								$52,650
Airport Watershed -- Rank 13									
Residential Bioretention	$17,500								$17,500
Airport Parking	$133,650								$133,650
Clover Park	$158,200								$158,200
Street Storage	$247,050								
Total Annual Expenditures	$10,177,900			$85,600	$163,550	$163,550	$1,487,550	$5,105,400	$9,743,400
Percentage of Project Cost	5%								

a. The new asset O&M costs are estimated at 5% of the BMP facilty acquisition/construction cost excluding land and upgrades, and a startup after the project is completed.

The annualized expenditures of the project construction costs and annual O&M are shown in Table 5-3. This table lists the annual capital expenditures for each of the projected 20 years for the proposed project expenditures and the annual O&M activities. As shown, projects with high priority are built first (with a ranking 1 of 13). As described above, the annual expenditures are ramped up from $1.6 million in Year 1 (FY 2005-06), to as much as $21 million per year, In addition, almost $10 million in annual O&M costs are projected by Year 20 (FY 2024-25). With the current stormwater customer base totaling Parcel Billing Units (PBUs) of 34,600 billing units on 22,600 parcels, the annual project construction costs alone are equivalent to a monthly cost of between $7 and $51 per PBU, and the O&M costs are ultimately $23 per month per PBU. The values are all listed in current (unescalated 2005) dollars.

The $204 million in BMP projects is also equivalent to a one-time funding need of almost $5,900 per PBU (single family household). It is important to note that the $204 million in additional BMP facilities will also result in annual rehabilitation and replacement costs (often budgeted as depreciation). Excluding land costs, the WMP facility costs are $136 million. The $68 million in land acquisition has dual uses for both drainage bioremediation and for parklands. These stormwater assets have a probable average service life of 35 years, which results in annual depreciation costs of approximately $4 million. However, depreciation-related costs have not been included in this analysis. In conclusion, the sustained average annual O&M cost of the proposed WMP totals $25 monthly per PBU, plus a one-time cost of $5,900 per PBU to acquire the facilities (excluding grants).

A detailed revenue and expenditure cashflow projection of this analysis is limited to the period ending in FY 2009-10. These annual expenditures are shown in Table 5-4, and illustrated in Figure 5-1. As shown, over the detailed projection period, the cost is between $4 and $10 per month per PBU. Note that these PBU costs are in addition to the current City urban runoff program, which is partially supported by a $3 per month PBU fee per equivalent single-family parcel.

FUNDING STRATEGIES FOR THE URBAN RUNOFF PROGRAM AND WATERSHED MANAGEMENT PLAN

The potential strategies for funding an urban runoff program and WMP expenditures are developed in the following section. These strategies are based on continuing the City's success in developing project grants and on developing a diversified range of local funding sources for the projected increases in O&M costs associated with this program. In order to develop a strategy, the current program revenues and expenditures are first evaluated, as documented in the following section.

CURRENT CITY URBAN RUNOFF PROGRAM EXPENDITURES EXCLUDING THE WMP

The stormwater fund expenditures can be divided between operations and maintenance (O&M), and capital facility projects. Table 5-5 lists the historical Fund 34 stormwater expenses, which have increased annually and reached an estimated $1.8 million per year in FY 2003-04. Fund 34 is the City's urban runoff management program accounting fund. Based on these historical expenditures, City staff projected the Fund 34 expenditures through FY 2009-10, as shown in Table 5-6. These expenditures are expected to increase to $2.1 million due to inflationary escalations. The projections of inflation and other financial indices are listed in Appendix B. Figure 5-2 illustrates the City's costs in FY 2004-05.

Table 5-3
Annual Capital and O&M Expenditures for the Watershed Management Plan Projects

Best Management Practice Project	Total BMP Cost	FY 2005-06 Year 1	FY 2006-07 Year 2	FY 2007-08 Year 3	FY 2008-09 Year 4	FY 2009-10 Year 5	FY 2010-11 Year 6	FY 2011-12 Year 7	FY 2012-13 Year 8	FY 2013-14 Year 9	FY 2014-15 Year 10	FY 2015-16 Year 11	FY 2016-17 Year 12	FY 2017-18 Year 13	FY 2018-19 Year 14	FY 2019-20 Year 15	FY 2020-21 Year 16	FY 2021-22 Year 17	FY 2022-23 Year 18	FY 2023-24 Year 19	FY 2024-25 Year 20
WMP Project Costs																					
Pier Watershed -- Rank 1	$1,559,000	$779,500	$779,500	$779,500																	
Kenter Canyon Watershed -- Rank 2	$66,237,000	$856,000	$2,227,500	$2,743,000	$4,142,125	$4,142,125	$9,472,625	$9,472,625	$8,101,125	$6,729,625	$5,287,125	$5,287,125	$3,888,000	$3,888,000							
Ashland Watershed -- Rank 3	$6,697,000								$1,368,333	$2,664,333	$1,154,333										
Wilshire Watershed -- Rank 4	$31,052,000										$1,297,000	$8,419,000	$7,122,000	$5,499,000	$5,499,000	$4,202,000	$4,202,000				
Montana Watershed -- Rank 5	$30,430,000										$2,630,750	$3,042,417	$6,360,117	$5,226,867	$4,012,200	$4,012,200					
San Vicente Watershed -- Rank 6	$1,018,000									$1,018,000											
Pico-CalTrans Watershed -- Rank 7	$10,261,000										$927,500	$1,960,167	$3,686,667	$2,654,000							
Lincoln Watershed -- Rank 8	$10,001,000														$3,783,750	$3,783,750	$1,216,750	$1,216,750			
16th Street Watershed -- Rank 9	$14,779,000														$2,865,000	$3,892,500	$4,588,000	$3,433,500			
Pico-4th Street Watershed -- Rank 10	$4,854,000															$1,874,000	$1,874,000	$1,106,000			
Centinela Watershed -- Rank 11	$14,489,000																$3,275,000	$4,190,000	$4,524,667	$1,249,667	$1,249,667
Georgina Watershed -- Rank 12	$1,053,000																	$1,053,000			
Airport Watershed -- Rank 13	$11,128,000																	$1,404,667	$4,038,167	$4,038,167	$1,647,000
Annual Expenditures	$203,558,000	$1,635,500	$3,007,000	$3,522,500	$4,142,125	$4,142,125	$9,472,625	$9,472,625	$9,469,458	$10,411,958	$11,296,708	$18,708,708	$21,056,783	$17,267,867	$16,159,950	$17,764,450	$15,155,750	$12,403,917	$8,562,833	$5,287,833	$2,896,667
Current Stormwater Parcel Billing Units:		34,611																			
Unit Cost of WMP Projects ($/PBU-month)			$7	$8	$10	$10	$23	$23	$23	$25	$27	$45	$51	$42	$39	$43	$36	$30	$21	$13	$7
Total Cost of WMP Projects ($/PBU)		$5,881	One time Payment																		
Annual Cost of WMP Projects ($/PBU)		$470	Payment for 20 Years																		
New O&M Costs of Watershed Management Plan Projects																					
Annual O&M Costs				$85,600	$163,550	$163,550	$163,550	$163,550	$863,500	$1,285,650	$1,487,550	$2,260,500	$2,487,550	$3,031,400	$5,034,200	$5,105,400	$6,638,950	$6,941,800	$8,960,300	$9,451,550	$9,743,400
Unit Cost of WMP Project O&M Costs ($/PBU-month)				$0.21	$0.39	$0.39	$0.39	$0.39	$2	$3	$4	$5	$6	$7	$12	$12	$16	$17	$22	$23	$23

Table 5-4
Watershed Management Plan Project and O&M Expenditures

Description	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
Total WMP Project Costs	$1,635,500	$3,007,000	$3,522,500	$4,142,125	$4,142,125
O&M Costs Due to New Project Facilities		$0	$85,600	$163,550	$163,550
Total WMP Costs	**$1,635,500**	**$3,007,000**	**$3,608,100**	**$4,305,675**	**$4,305,675**
Parcel Billing Units	34,611	34,611	34,611	34,611	34,611
Monthly Cost of WMP Projects ($/PBU)	$4	$7	$9	$10	$10

Figure 5-1
FY 2009-10 Proposed Watershed Management Plan Costs

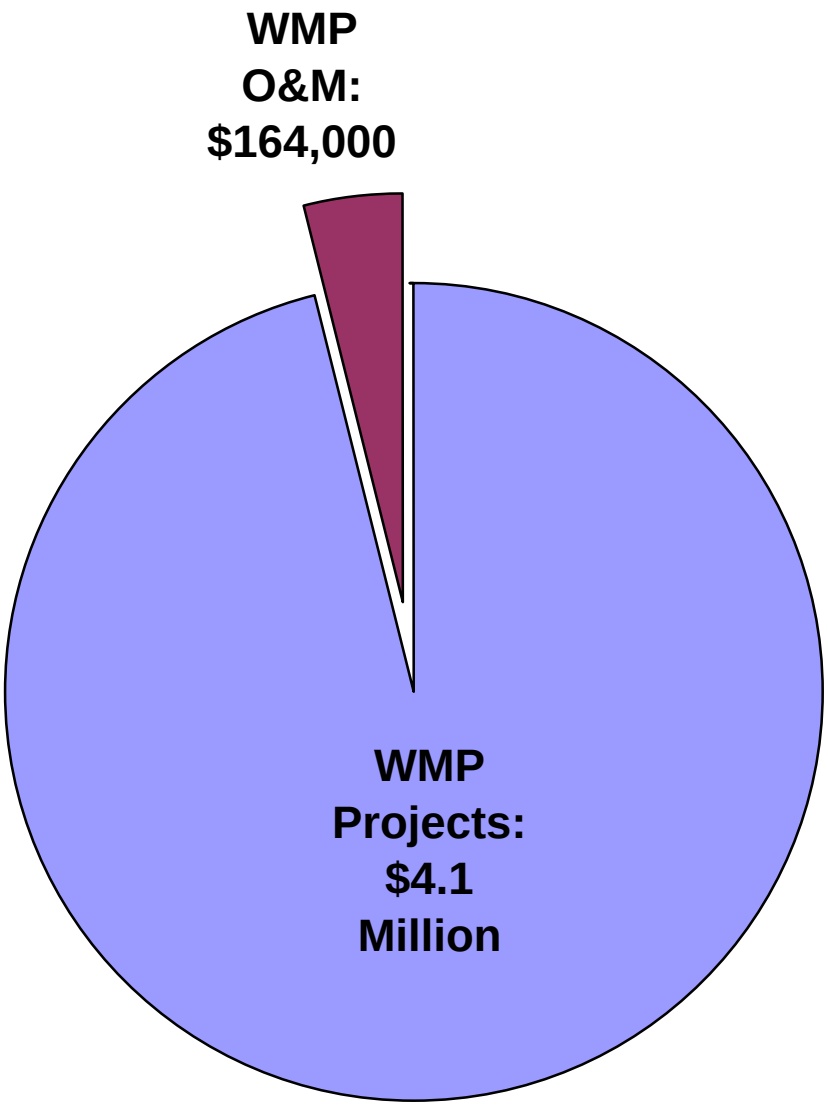


Table 5-5
Historical Stormwater Fund 34 Expenses

Descriptions	Actual FY 2000-01	Actual FY 2001-02	Estimated FY 2002-03	Estimated FY 2003-04	Fund 34 Acct. No's
Account 34 274 Expenditures (capital assets)					
Direct payment to the Water Fund			$39,100	$39,100	274.577090
Bank Fees			$300	$300	274.52218
State Revolving Fund Interest			$120,700	$115,309	274.56923
1918 Main Street Lease (Engineers)			$1,800	$1,910	274.5552
Total			$161,900	$156,619	
Account 34 695 Interfund Transactions (operations)					
Engineering Transfer	$30,600	$25,400	$27,100	$27,100	695.532
SMURRF O&M Costs	$21,716	$300,000	$230,500	$283,665	695.57788
Environmental Reimbursement (a)	$140,400	$372,000	$611,900	$558,085	695.55566
Stormwater/Wastewater Reimb. (a)	$763,500	$574,100	$713,800	$838,545	695.57825
Subtotal Transfer-out Expenditures	$956,216	$1,271,500	$1,583,300	$1,707,395	
Grand Total	**$956,216**	**$1,271,500**	**$1,745,200**	**$1,864,014**	
As Reported In City Comprehensive Annual Financial Report (CAFR)					
Repairs and Maintenance			$11,332		
Other			$41,088		
Interest			$117,861		

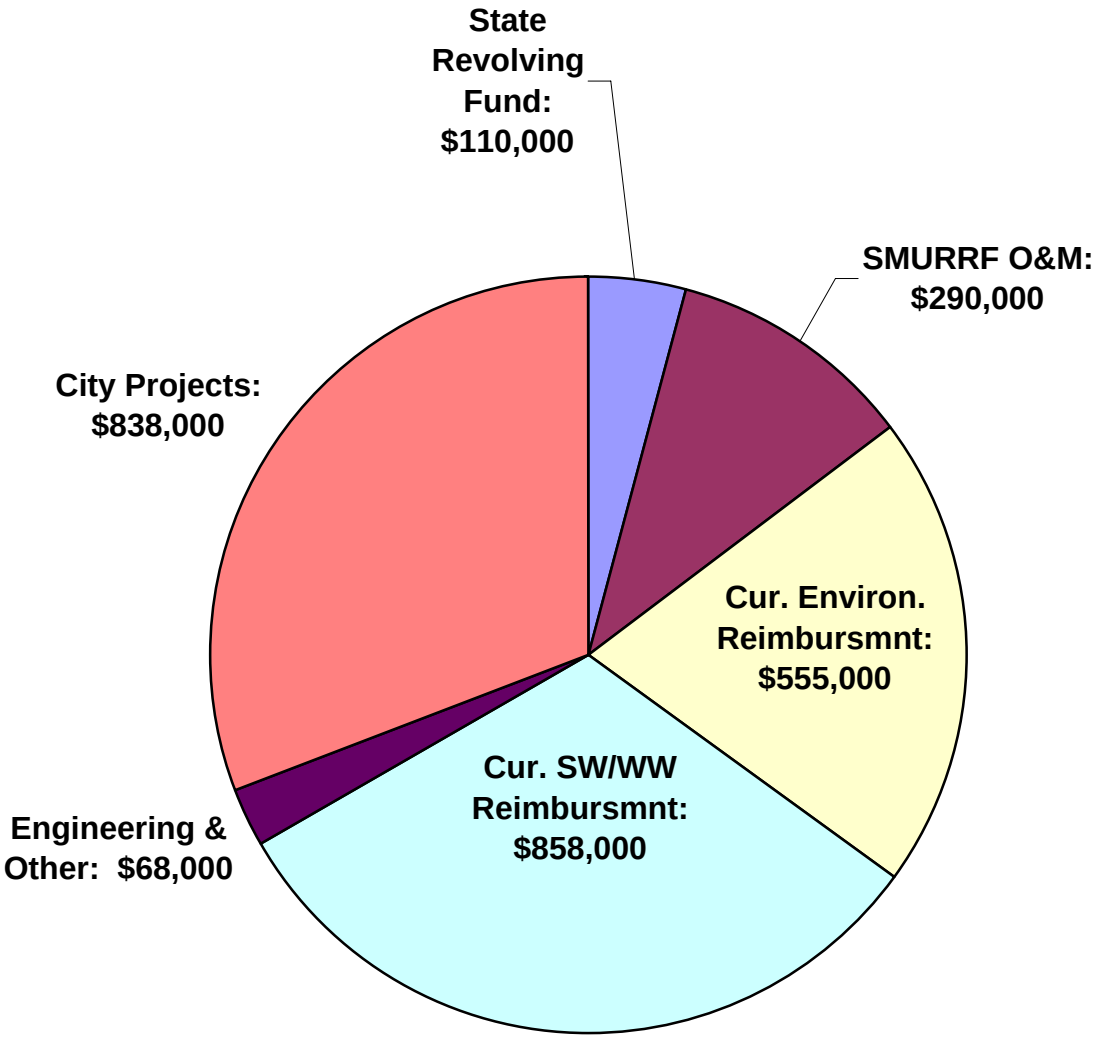
a. Reimbursement expenditures are for labor costs, professional services and O&M related to stormwater program services.

Table 5-6
Projected Stormwater Fund 34 Expenses Excluding WMP Activities

Descriptions	Estimated FY 2003-04	Estimated FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	Fund 34 Acct. No's
Account 34 274 Expenditures								
Direct payment to the Water Fund	$39,100	$40,214	$41,344	$42,634	$43,943	$45,121	$46,330	274.577090
Bank Fees	$300	$307	$314	$322	$331	$338	$345	274.52218
State Revolving Fund Interest	$115,309	$109,829	$104,206	$98,437	$92,518	$92,518	$92,518	274.56923
1918 Main Street Lease (Engineers)	$1,910	$3,337	$3,528					274.5552
Total	$156,619	$153,687	$149,393	$141,394	$136,792	$137,977	$139,193	
Account 34 695 Interfund Transactions								
Engineering Transfer	$27,100	$27,872	$28,656	$29,550	$30,457	$31,273	$32,111	695.532
SMURRF O&M Costs	$283,665	$290,331	$297,038	$304,820	$312,654	$319,470	$326,434	695.57788
Environmental Reimbursement	$558,085	$554,997	$570,592	$588,395	$606,459	$622,712	$639,400	695.55566
Stormwater/Wastewater Reimbursement	$838,545	$858,251	$878,076	$901,082	$924,240	$944,388	$964,976	695.57825
Subtotal Transfer-out	$1,707,395	$1,731,451	$1,774,362	$1,823,847	$1,873,809	$1,917,843	$1,962,922	
Less MWD Recycled Water Rebate Transfer-in		($3,587)	($3,587)	($3,587)	($3,587)	($3,587)	($3,587)	695.57789
Net Transfer Out	$1,707,395	$1,727,864	$1,770,775	$1,820,260	$1,870,222	$1,914,256	$1,959,335	
Total Current Expenses and Transfers	**$1,864,014**	**$1,881,552**	**$1,920,168**	**$1,961,653**	**$2,007,014**	**$2,052,233**	**$2,098,528**	

Cost Projected by City Staff in January 2004
Costs are escalated for inflation. The Environmental Reimbursement Account 555660 represents an operating transfer to the wastewater fund for stormwater program-related costs. The Engineering Transfer Account 695.532 represents an operating transfer to the general fund for stormwater program-related costs. The Stormwater/Wastewater Account 578250 represents an operating transfer to the wastewater fund for stormwater program-related costs incurred in the wastewater division.

Figure 5-2
FY 2004-05 Urban Runoff Program Costs



As illustrated in the figure, the City's current program includes capital projects and existing debt service on the State Revolving Fund loan. These expenditures are itemized in Table 5-7. Few specific projects are identified beyond FY 2003-04, but the table also includes estimates of future project costs supported by grants. These unspecified project expenditures are estimated at double the currently-awarded grant fund receipts. The projected receipt of awarded grant monies is listed in Table 5-8.

AWARDED URBAN RUNOFF PROJECT GRANTS

The City has actively pursued grant funding for pilot plants, runoff facilities and pollution remediation studies. Table 5-8 lists the grants already approved for the City's runoff projects. As shown, the $5.4 million in awarded grants includes $350,000 in monies received, with the remainder projected to be received from FY 2004-05 through FY 2009-10. As a result, approximately $5.1 million in awarded grant receipts are projected through FY 2009-10. Note that the specific projects proposed for grant funding are not in the current City-defined project list, so inclusion of these grant fund proceeds also requires the project costs as listed in the prior table. Not included in the projection of grants are Proposition 50 grant monies.

CURRENT CITY URBAN RUNOFF PROGRAM REVENUES

In 1995, the City approved Ordinance No. 1811CCS Para. 1, updating City Municipal Code Section 7.56.020. In it, the City designated the stormwater system as a City enterprise and utility, to be supported in part by the imposition of a stormwater management user fee on all parcels of property within the City, except as otherwise provided in this section. The financial purposes of the enterprise were defined to provide for the funding and establishment of fund reserve for the utility.

City Municipal Code Section 7.56.030 defines the stormwater management user fees for general use of the utility by developed and undeveloped parcels and their owners. The basic fee (BF) is calculated by applying the formula BF equals the Annual budget divided by the City-wide PBUs (Parcel Billing Unit, or PBU), where a single PBU equals the discharge from a single-family parcel. However, State voters approved Proposition 218 in 1996. Effective in 1997 in California Article XIII B and C, the proposition required a majority vote of parcel owners to change stormwater fees. As such, the BF has been frozen at $36 per year per PBU.

As shown in Table 5-9, currently there are 22,601 stormwater accounts being billed 34,611 PBUs. The annual stormwater management user fee revenues of $1.25 million are billed by the L.A. County Tax Assessor's Office, based on an annual Parcel Report filed with the City Clerk. More than half of the revenues are from single and multi-family residential parcels, while the bulk of the remaining revenues are from commercial lots, as illustrated in Figures 5-3 and 5-4. Government and utility parcels are billed directly.

Table 5-10 provides a projection of the stormwater fund's operating revenues at current rate levels, as provided by City staff. These revenues exclude capital related grant funds or any future bond proceeds. As shown, the future revenues under current rates and other irregular revenue sources are approximately $1.7 million, excluding one-time transfers and credits in FY 2003-04.

Table 5-7
Current City Capital Improvement Program

CIP Project Name	Estimated FY 2003-04	Estimated FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	Fund C340 Acct. No's
Reappropriated Projects								
Dry Weather Runoff Reclamation (a)	$10,566	$0	$0	$0	$0	$0	$0	C34039598
SMURRF-Phase II (Original Distribution Line, b)	$59,747							C34039599
SMURRF-Phase II (Distribution To Gardens, c)	$76,586							C34055800
SMURRF-Phase II (Distribution To Gardens, c)	$2,966							C34055801
Dry Weather Runoff Reclamation (a)	$52,315							C34055899
Stormwater System Improvement (c)	$44,352							C34058801
Stormwater Systems Improvement (c)	$49,841							C34058802
Stormwater Systems Improvement	$164,417							C34058803
GIS/Cad Workstations	$11,504							C34085299
New Stormwater System Improvement Projects (d)		$838,000	$838,000	$1,812,212	$2,696,712	$2,982,924	$1,919,000	C34058804-8
Total City CIP (e)	**$472,295**	**$838,000**	**$838,000**	**$1,812,212**	**$2,696,712**	**$2,982,924**	**$1,919,000**	
Current SRF Debt Service (f)	**$210,783**	**$216,263**	**$221,886**	**$227,655**	**$233,574**	**$233,574**	**$233,574**	

Prepared by City Staff January 2004
a. Old SMURRF construction account
b. Request to combine into FY03-04 Stormwater Systems Improvement acct.
c. Request to combine into FY03-04 Stormwater Systems Improvement acct.
d. Project expenditures equal twice the current approved grants plus $120,000 for improvements and $30,000 for in lieu costs.
e. Dept. approval requested to combine all reappropriated accounts into C34058803, and to remove GIS/CAD account.
f. Debt service for principal repayment to State revolving loan

Table 5-8
Stormwater Fund 34 Current and Awarded Grants

Grant Program	Description	Grant Amount	Monies Received	Awarded Grants in Contract Processing: Contracts Signed But Not Received	Waiting Signatures	Contracts in Preparation
Grant Monies Approved						
Clean Beaches Initiative	Pier BMPs	$350,000	$350,000			
Proposition 12	Centinela BMPs	$500,000		$500,000		
Integrated Waste Board	Centinela BMPs	$750,000		$750,000		
Proposition 13, CBI	Montana BMP	$962,000			$962,000	
PIE	Adopt A Catch Basin	$6,424			$6,424	
Proposition 40	Wilshire BMP	$980,000			$980,000	
Prop 13 Urban Conservation	Medical Facility	$126,000		$126,000		
Prop 13, Ph 3	Centinela BMPs	$600,000				$600,000
Prop 13, Ph 3	Beach Green Parking Lot	$699,000				$699,000
319 EPA Grant	16th Street BMP Demo	$470,000				$470,000
Total Grant Monies		**$5,443,424**	**$350,000**	**$1,376,000**	**$1,948,424**	**$1,769,000**
Projected Grant Fund Receipts (by year, a)						
Monies Received		$350,000	$350,000			
FY 2004-05 Anticipated		$344,000		$344,000		
FY 2005-06		$344,000		$344,000		
FY 2006-07		$831,106		$344,000	$487,106	
FY 2007-08		$1,273,356		$344,000	$487,106	$442,250
FY 2008-09		$1,416,462			$974,212	$442,250
FY 2009-10		$884,500			$0	$884,500
Grand Total		**$5,443,424**	**$350,000**	**$1,376,000**	**$1,948,424**	**$1,769,000**

a. The projected year of receipt of grant funds is estimated. Values are as of 2004.

Table 5-9
Stormwater Customer Characteristics

Use Code	Definition	No. of Accounts	Billing Acreage	Parcel Billing Units (PBU)	Revenues @ $36/PBU-year
0100	Single Family Dwelling	7,431	1,291	7,431	$267,516
010C	Condominium	8,250	224	2,881	$103,699
010F	Cooperative MFD	325	4	38	$1,365
0200	Double, Duplex	636	89	580	$20,892
0300	Three-Unit	565	85	911	$32,786
0400	Four-Unit	621	93	1,202	$43,289
0500	Five Or More Apartments Or Units	2,367	519	6,966	$250,781
0900	Mobile Home Parks	5	5	59	$2,121
Subtotal Multi-family Residential		12,769	1,018	12,637	$454,933
Subtotal Residential		20,200	2,309	20,068	$722,449
1000	Open Commercial	17	4	30	$1,091
1100	Stores	341	68	970	$34,926
1200	Store Combinations (W Office Or Resid)	255	59	840	$30,240
1300	Department Stores	5	5	76	$2,741
1400	Supermarkets	14	10	153	$5,500
1500	Shopping Centers (Community)	12	10	157	$5,665
1600	Shopping Centers (Regional)	2	6	89	$3,196
1700	Office Buildings	248	157	2,234	$80,413
1800	Hotels And Motels	60	26	393	$14,132
1900	Professional Buildings	55	19	279	$10,050
2100	Restaurants And Cocktail Lounges	99	21	311	$11,197
2300	Banks And Savings & Loans	31	10	152	$5,455
2400	Service Shops	17	4	54	$1,953
2500	Service Stations	19	6	92	$3,316
2600	Auto, Rec & Constr. Equip., Sales & Svc	154	45	665	$23,936
2700	Parking Lots (Comm-Use Properties)	264	57	843	$30,343
Subtotal Commercial		1,593	506	7,338	$264,154
3100	Light Manufacturing	189	76	1,090	$39,226
3200	Heavy Manufacturing	5	10	147	$5,284
3300	Warehousing, Distribution, Storage	68	28	398	$14,314
3600	Lumber Yards	1	3	44	$1,575
3800	Parking Lots (Ind-Use Properties)	13	6	91	$3,288
Subtotal Industrial		276	124	1,769	$63,687
6400	Clubs, Lodge Halls, Fraternal Orgs	16	9	131	$4,726
7100	Churches	50	21	272	$9,775
7200	Schools	31	14	179	$6,440
7400	Hospitals	10	9	105	$3,763
7500	Homes For Aged And Others	25	9	96	$3,472
8100	Utilities	6	7	52	$1,863
Varies	Miscellaneous Parcels	394	63	142	$5,102
Subtotal Institutional		532	132	976	$35,141
Subtotal Known Customers		22,601	3,071	30,151	1,085,431
Unknown Customers		est:	454	4,460	$160,569
Currently Budgeted Revenues and Calculated PBUs		22,601	3,525	**34,611**	**$1,246,000**

Source: City of Santa Monica billing database for FY 2003-04, representing revenues for FY 2002-03.
PBU: Stormwater Parcel Billing Unit. FY 2003-04 rate is $36/year per PBU.
The accounts have been consolidated into specific and generic land use classifications as defined by the LA County Flood Control District. The runoff factors are based on District standards.

Figure 5-3
Stormwater Customer Accounts

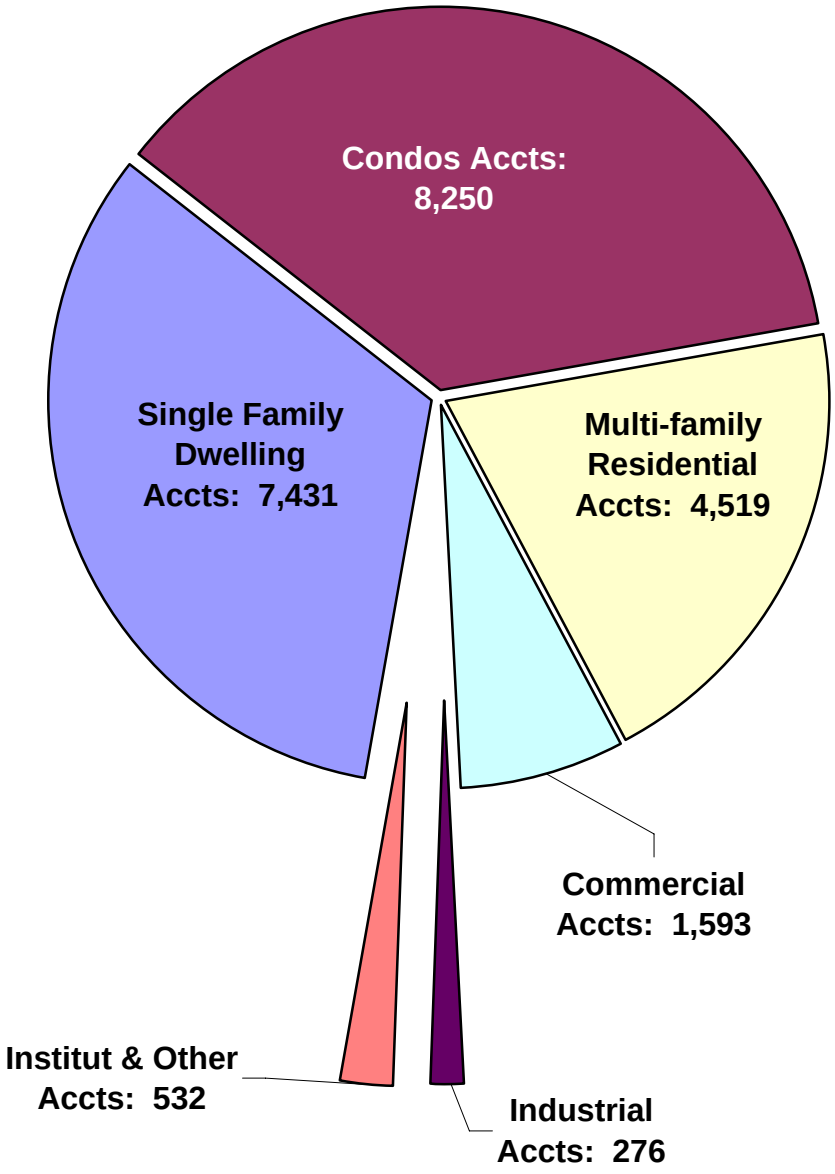


Figure 5-4
Stormwater Customer User Fee Revenues

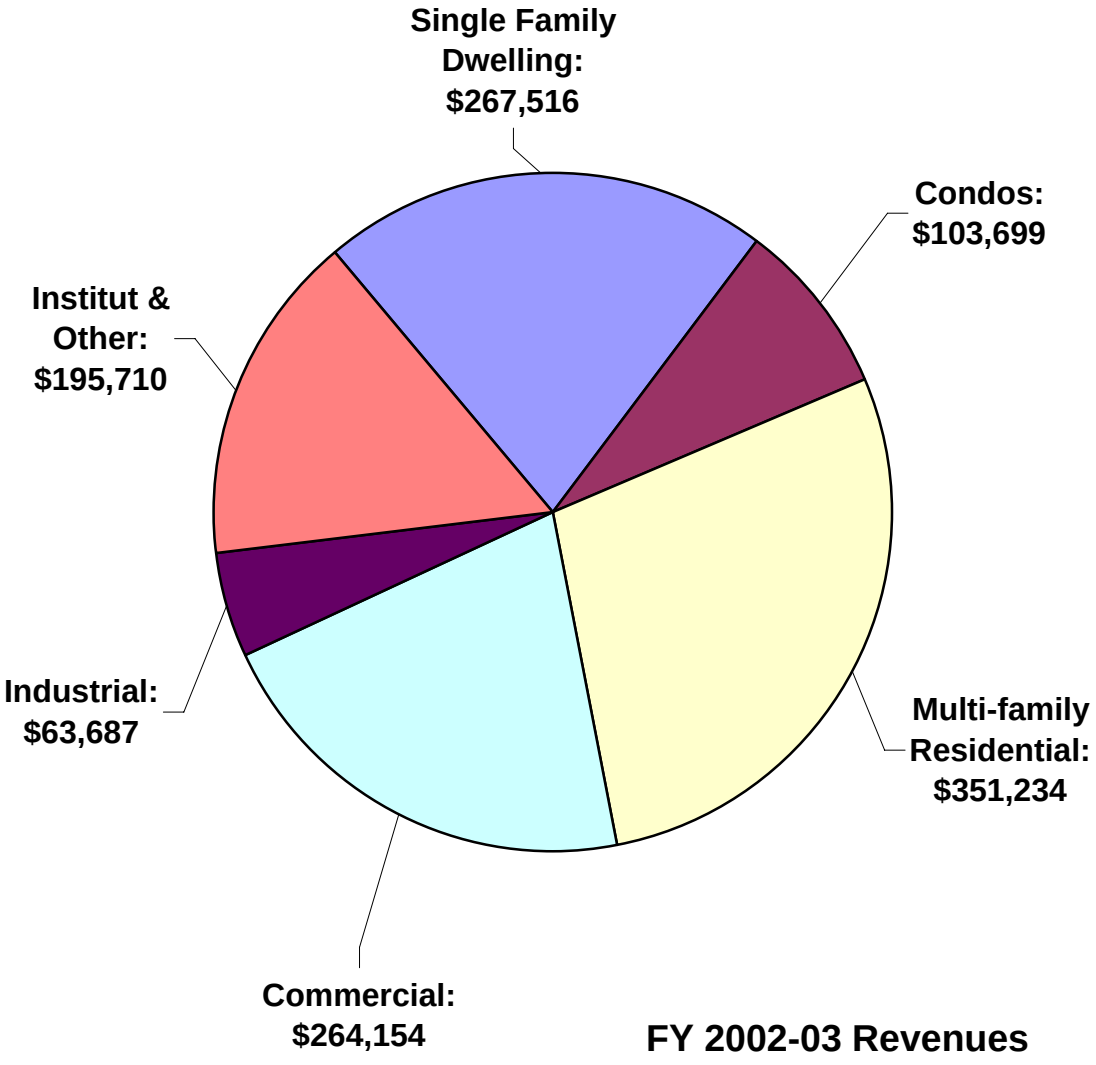


Table 5-10
Stormwater Fund 34 Account 661 Revenue Projection at Current Fees

Descriptions	Estimated FY 2003-04	Estimated FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	Fund 34 Acct. No's
Account 34 661 Revenues							
Current Stormwater Management User Fee	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	661.4055
Stormwater Developer Payments	$820,000						661.40232
SMURRF-City of LA Repayments	$1,018,497	$271,321	$233,397	$235,133	$236,908	$236,908	661.40273
Sale of Recycled SMURRF Product Water	$33,687	$115,681	$133,450	$136,400	$139,400	$139,400	661.40715
Stormwater In-Lieu Fees	$90,000	$30,000	$30,000	$30,000	$30,000	$30,000	661.40716
Total Revenues and Transfers (b)	**$3,208,184**	**$1,663,002**	**$1,642,847**	**$1,647,533**	**$1,652,308**	**$1,652,308**	

Current stormwater fees are $36 per year per Parcel Billing Unit (PBU).
Prepared by City staff 1/25/04.
a. Payments by Water Fund to Stormwater Fund includes interest payback of $189,263 and first of three installations of $300,000.
b. Not shown: Grant proceeds.

PROJECTED FUNDING SHORTFALL UNDER CURRENT REVENUES AND EXPENDITURES

Table 5-11 lists the Stormwater Fund 34 projected cashflow based on current stormwater fees, O&M expenses and debt, and the City CIP less grant-related projects. The WMP costs are not included in this projection. As shown, by FY 2009-10 the net unfunded costs will be $1.7 million per year, or $4 per PBU. As such, under current projections the stormwater fund will require City general fund transfers of approximately $2 million per year from FY 2007-08 and thereafter, if additional revenue sources are not implemented. It should be noted that per City documents, the Stormwater Fund 34 currently has unpaid obligations of more than $4 million, and by the end of FY 2007-08 the enterprise ending cash balance will be a negative $7.5 million (in addition to the $4 million obligation). In comparison, the costs of the WMP have been previously identified as an additional $4.3 million annually by FY 2009-10.

The funding source for many stormwater utility services are rate-based service fee revenues. These fees are frequently derived from a rate structure based on parcel characteristics including parcel size, type and improvements. The rates are based on the concept that each parcel owner seeks to receive a service from the utility and should pay fees in proportion to the benefit received for that service. In the following section the calculation process for fee-based program funding is described.

RATE SETTING PROCESS

In order to determine sufficient and equitable user fees, a rate setting process was conducted. This process is illustrated in Figure 5-5, and described below:

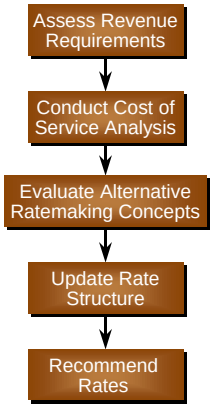


Figure 5-5 Rate Setting Process

Table 5-11
Stormwater Fund 34 Cashflow at Current Fees and City Projects Without WMP Program

Description	Estimated FY 2003-04	Estimated FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
Current Revenues	$3,208,184	$1,663,002	$1,642,847	$1,647,533	$1,652,308	$1,652,308	$1,652,308
O&M Expenses and Transfers	($1,864,014)	($1,881,552)	($1,920,168)	($1,961,653)	($2,007,014)	($2,052,233)	($2,098,528)
City CIP Expenses	($472,295)	($838,000)	($838,000)	($1,812,212)	($2,696,712)	($2,982,924)	($1,919,000)
Grant Monies (awarded)		$344,000	$344,000	$831,106	$1,273,356	$1,416,462	$884,500
Current Debt Service	($210,783)	($216,263)	($221,886)	($227,655)	($233,574)	($233,574)	($233,574)
Net Revenues (decrease)	$661,092	($928,813)	($993,207)	($1,522,881)	($2,011,636)	($2,199,961)	($1,714,294)
Beginning Cash Balance	$1,200,000	$1,861,092	$932,279	($60,928)	($1,583,809)	($3,595,445)	($5,795,406)
Net Revenues (decrease)	$661,092	($928,813)	($993,207)	($1,522,881)	($2,011,636)	($2,199,961)	($1,714,294)
Ending Cash Balance	$1,861,092	$932,279	($60,928)	($1,583,809)	($3,595,445)	($5,795,406)	($7,509,700)
Stormwater Fund 34 Obligations	$4,396,995						
Shortfall in Revenues per PBU ($/month)		($2)	($2)	($4)	($5)	($5)	($4)

1. **Assess Annual Revenue Requirements –** To recover revenues sufficient to operate the stormwater utility on a sound basis, annual revenue requirements must be projected. These revenue requirements include operating and maintenance (O&M) expenses, WMP capital expenditures, and debt service payments, if any. Other non-operating revenues, including grants and transfers, are deducted from the total revenue requirements to determine rate-based revenues.

2. **Conduct Cost of Service Analysis –** In order to recover costs equitably from the various customer classes, costs must first be allocated into functional cost categories. These categories include runoff loading categorized by hydraulic factors and pollutant loads (as estimated by parcel type and size), and number of parcels served. The City's costs of providing the service are allocated to the functional categories divided by the appropriate units (hydraulic loading, pollutant load remediation, and number of parcels) in order to calculate the unit costs of service.

3. **Evaluate Alternative Ratemaking Concepts –** California Articles XIII C and D create increased challenges with implementation of stormwater fees, so many California agencies have used indirect funding mechanisms. These alternatives include surcharges on water, sewer and refuse charges, sales taxes and property benefit assessments. Finally, drainage pollutants can flow into a community from other regional sources, so there is potential for cost-sharing agreements on a regional basis.

4. **Update Rate Structure –** Updated rates, surcharges, taxes and regional cost-sharing revenues are projected to fund the total costs identified in the stormwater enterprise.

5. **Recommended Rates –** The recommended rates are presented to the City Manager, stakeholders and the public in an information outreach program, and the approved rates are implemented in compliance with state and local laws. Increasingly, the public outreach program is the first step of this process, and includes identification of an oversight community advisory committee that actively participates in each step described above. The final recommended rates are then presented to the City Council and the public by the advisory committee, rather than the department staff, thus providing increased credibility for the recommendation, and reducing the risk of criticism of the City Council and Department staff.

REVENUE SOURCES

Currently the City uses several funding mechanisms for the urban runoff program, including parcel-based user fees, interest earnings, impact fees and state grants. These current funding sources are illustrated in Figure 5-6.

Figure 5-6. Current Funding Sources

Revenue requirements can be separated into O&M funding requirements and capital project costs. Parcel-based benefit assessments, grants and bonded debt financing are available only for capital project funding. In contrast, the City can use service fees and other utility surcharges, general fund transfers, taxes and interest earnings for both O&M costs and project expenditures, as tabulated below:

Project Funding Sources
- Parcel-based Benefit Assessments
- Grants
- Loan Financing

Project and O&M Funding Sources
- Taxes
- Interest Earnings
- User Fees

If the City seeks to develop equitable stormwater fees sufficient for the projected program rate-based revenue requirements in conformance with the requirements, then a cost of service and customer stormwater discharge analysis will be needed. Appendix D of this report contains a draft analysis of the stormwater hydraulic and pollutant loads from all Citywide parcels. That analysis is not emphasized in the findings of this section. Instead, in the following sections alternatives to build sufficient revenues in support of the WMP are developed.

PROJECTED WMP FUNDING UNDER UPDATED REVENUES

Table 5-12 identifies the immediate five-year funding requirements of the City's stormwater enterprise, including the WMP projects. These costs were previously illustrated in Figure 5-1. As shown in the table, Alternative I is based on a one-time user fee increase from $3 to $14.80 per month. This one increase will provide sufficient funding through FY 2009-10.

Table 5-12
Stormwater Fund 34 Cashflow with WMP and One-time Increased in Revenues

Description	Estimated FY 2003-04	Estimated FY 2004-05	Projected FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
Current Revenues							
Current Rate-based Revenues	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000
Rate-base Revenue Increase			$4,900,000	$4,900,000	$4,900,000	$4,900,000	$4,900,000
Other Revenues (including grants)	$1,962,184	$417,002	$396,847	$401,533	$406,308	$406,308	$406,308
Total Revenues	$3,208,184	$1,663,002	$6,542,847	$6,547,533	$6,552,308	$6,552,308	$6,552,308
O&M Expenses (City Budget)	($1,864,014)	($1,881,552)	($1,920,168)	($1,961,653)	($2,007,014)	($2,052,233)	($2,098,528)
New O&M Costs for Watershed Mgmt Plan Projects			$0	$0	($85,600)	($163,550)	($163,550)
City CIP Expenses (c)	($472,295)	($838,000)	($838,000)	($1,812,212)	($2,696,712)	($4,200,000)	($701,924)
Grant Monies (awarded)	$350,000	$344,000	$344,000	$831,106	$1,273,356	$1,416,462	$884,500
Current SRF Debt Service	($210,783)	($216,263)	($221,886)	($227,655)	($233,574)	($233,574)	($233,574)
Proposed Watershed Mgmt Plan Projects		$0	($1,635,500)	($3,007,000)	($3,522,500)	($4,142,125)	($4,142,125)
Net Revenues (decrease)	$1,011,092	($928,813)	$2,271,293	$370,119	($719,736)	($2,822,712)	$97,107
Beginning Cash Balance	$1,861,092	$2,872,183	$1,943,370	$4,214,664	$4,584,782	$3,865,046	$1,042,335
Ending Cash Balance (a)	$2,872,183	$1,943,370	$4,214,664	$4,584,782	$3,865,046	$1,042,335	$1,139,441
Parcel Billing Units (PBU)			34,611	34,611	34,611	34,611	34,611
Current SW Mgmt User Fee	$3.00	$3.00	$3.00	$3.00	$3.00	$3.00	$3.00
Alt. I Rates ($/single family account-month)			$14.80	$14.80	$14.80	$14.80	$14.80
Increase from prior year			393%	0%	0%	0%	0%
Alternative II Rates with Parcel Benefit Assessment							
Benefit Assessment Parcel Charge ($/year-PBU, 30 Years, b)			$31.36	$31.36	$31.36	$31.36	$31.36
Average Single Family Bill ($/month)			$12.18	$12.18	$12.18	$12.18	$12.18

a. Interest is not included as all values are shown in current (2004) dollars.
b. The benefit assessment bond is for the proposed WMP projects through FY 2008-09 only.
c. City CIP Expenses in FY 2009-10 are transferred to the prior year for expenditure balancing objectives.

Alternative II is provided in Table 5-12 to illustrate the use of a benefit assessment. A popular alternative funding mechanism for municipal facilities benefiting local communities is the creation of benefit assessment district, whereby the district then issues assessment bonds which pay for project costs. The annual debt on the bond is supported by annual benefit assessment to each parcel in proportion to the benefit received. The use of debt to support the initial project costs of a 20-year capital program has no long-term advantage, as it delays—but does not reduce—the annual revenues required from the local community. However, debt issuance can reduce the level of a one-time rate increase to fund the first five years of a capital program. As shown, funding the $16.5 million in WMP projects through FY 2009-10 would require a $31.36 per year benefit assessment to each single family parcel equivalent (PBU). With that funding source, the one-time user fee increases identified in Alternative I would be reduced to $12.18 per month for each household.

Based on experience in other programs, it is unlikely that either Alternative I or II can be successfully implemented within several years. The primary reasons are that the fee increase is likely too high and the implementation period likely too short to conduct the lengthy information and outreach program necessary to educate and persuade the public and the City's managers of the value and need for the program. An alternative funding strategy will likely be needed for the WMP. In the following section, a review of funding alternatives and development of a funding strategy is presented.

WATERSHED MANAGEMENT PLAN PROJECT ADDITIONAL FUNDING RESOURCES

Approximately $200 million in projects has been identified in the WMP, equivalent to almost $5,800 per PBU in one-time capital costs, excluding O&M. The City has been very successful in attracting grants and low-interest rate loans for its runoff projects, but at a level far below that needed to reduce local costs for the 20-year WMP implementation period. Nevertheless, significant additional grants may be awarded to the City if it continues to identify and promote innovative runoff pollution remediation facilities consistent with the principles of state and federal stormwater funding programs.

Potential Grants and Loans

Table 5-13 provides a summary of the project funding resources available from outside City sources. Based on the City's success in receiving grants for stormwater projects, it is assumed that many of the future WMP BMP projects will also attract grant and low-interest rate loan funding. State grant programs are already well known to the City and are currently funded with Proposition 12, 13, and 40 monies. However, due to the State's fiscal problems most of these programs have slowed or suspended disbursements. Federal government grants are available for specific projects from earmarked appropriations, but acquiring this money is a multi-year process requiring strong support from local, state, and federal elected officials. For these reasons, the following analysis of rate-based revenues is based on 50 percent of the WMP project costs being supported by grants after FY 2009-10. For the period FY 2004-05 through FY 2009-10, no new grant monies are presumed.

Table 5-13 Grant and Loan Resources

Program	Program Purpose	Type of Funding	Source	Terms	Annual Debt for $1 Million	Maximum Project Amount	Restrictions	Funding Size	Details/Other	Contact
Bank Loans										
Muni Revenue Bonds/Certificates of Participation	All Financially Viable Projects	Loan	Banks, Underwriters, Private Institutions	30 Yr @ 4.5% Loan	$63,000	No Limit	Project must be financially viable	Unlimited	Revenue Bond Law of 1941; Sewer Revenue Bond Act of 1933. Issuance fee is ~2%.	Investment Banking Institutions
Infrastructure State Revolving Fund (ISRF), and Governmental Revenue Bond Program	Infrastructure: Water/WW treatment & distribution, flood control	Loan	California Infrastructure & Economic Devlmt Bank	30 yrs at 67% of Thompson's Muni Mkt "A"	$61,000	$250,000 to $10M (based on need)	Must be ready w/in 18 mos.; Preference for economic tie-in	State supported revolving funds program	California Business, Transportation & Housing Agency	http://commerce.ca.gov/state/ttca/ttca_navigation.jsp?path=Financial+Assistance&childPath=Infrastructure+%26+Community
Appropriation Grants										
Unique local projects or programs supported by your local politician (aka "Pork")	Varies, but generally related to local critical needs such as groundwater cleanup or flood protection	Grant	Government Appropriation Initiatives for Specific Local Projects	Rider on Appropriation Bill	NA	Varies depending on initiative	Varies	NA	Requires long term pursuit by local special interest group and supportive political representative	
State Revolving Fund (SRF) Loans										
Clean Water State Revolving Fund (SRF) Loan Program	Wastewater, Nonpoint Source, Estuary, Stormwater; Seawater Intrusion; Water Recycling	Loan	State Water Resources Control Board (SWRCB)	20 Year Loan @ 2.8%	$67,000	$50M Approx.	20% Upfront Match. Favors small communities under 10,000 pop.	Prop 204 funded in 1997; Prop 13 funded in 2000, Prop 50 in 2002	SRF application process rqmts incd. Environ report, rev. program and engr. report	http://www.swrcb.ca.gov/funding/index.html
Grant Programs										
2003 Consolidated Grants: Nonpoint Source Pollution Control, Watershed Protection, Drinking Water Quality	Reduce polluted runoff, protect watershed, prevent and reduce water pollution	Grant	State Water Resources Control Board (SWRCB)	Grant	NA	Varies by Program		Prop 13, Prop 50 and federal appropriations; $90M remaining as of June 2004	This is a consolidation of 8 programs; request for full proposals in progress	http://www.swrcb.ca.gov/funding/index.html
Loan Programs										
Urban stream restoration	Reduce urban flooding/erosion, restore and promote community stewardship	Loan	Calif. Dept. of Water Resources (DWR)	Loan		$1M per project	Local public agency and citizen's group (both required)	Prop 40; $5M total	Due Date: 11/2003; $4.5M for FY2004 has been postponed until further notice	http://www.grantsloans.water.ca.gov/grants/restoration.cfm

Updated 6/04.

Funding a 20-year facilities plan using debt at market rates has no long-term advantage, as it delays but does not reduce the annual revenues required from the local ratepayers. As such, conventional bank loans are of no benefit to the WMP funding needs. However, low-interest rate loans are beneficial as they free up cash resources for high priority projects without exacting an interest-rate penalty in the debt repayment schedule. Both the Clean Water State Revolving Fund (CWSRF) and the Infrastructure State Revolving Fund (ISRF) programs provide low-interest rate loans. The State's fiscal problems have also held up funding for some of the lower priority projects in this program. The California Department of Water Resources also has a low-interest loan program for urban stream restoration, but currently this program is also suspended. It is likely that with the improving State economy in the coming years, the low-interest loan programs will be funded again. However, this strategy is not incorporated into the proposed funding plan.

Unlike water and sewer utility services, stormwater and watershed utilities are expected to have a relatively significant O&M cost requirement. The WMP capital expenditures represent an exception to this generality, but only during the construction phase. As such, there is a greater need over the long-run for funding of O&M services rather than the project construction cost. Unfortunately, grant and low-cost loans are available only for construction and start-up programs, and never for the ongoing costs of sustainable utility services, leaving only the local community as the source of ongoing stormwater utility funding.

Local Funding Sources

Table 5-14 provides a summary of the local funding sources for the stormwater utility. Unlike the funding resources available from outside City sources described in the prior table, all local funding is collected from the residents and businesses within the City. As shown, the local funding sources include direct fees and charges, surcharges collected from other municipal utilities, such as water and trash, City revenues transferred to the stormwater utility, assessments and taxes. The fundamental issues associated with each local funding method is from whom the revenues are collected (residents versus businesses, stormwater dischargers versus property owners, etc), and the way the revenues are collected (use fees, property assessments, or sales and ad valorem property taxes).

Although fee-based charges are easily the most direct and equitable for utility services, the historical use of each of the local funding mechanisms has varied. Transfers and utility taxes have been used for convenience or when the revenue requirements were modest. If the funds are for property-oriented infrastructure-related improvement projects, a benefit assessment or an ad valorem property tax mechanism can be used.

Restrictions and Limits to Local Funding. With the California "tax-payer's revolt" of the last several decades, Proposition 13 and 218 have greatly limited the flexibility of local governments to generate revenues for new programs or services.

Table 5-14 Local Funding for Stormwater Activities

Type	Source	Pros	Cons
Fees and Charges			
Fees for SW Service	All Properties with SW Runoff	Proportional to Benefit Received	Must Have Nexus to Cost. Requires Vote Under Prop 218.
Capital Facilities (impact) Fees	New Development Properties	Proportional to Benefit Received	Limited and Irregular Revenues
Other Utility Service Surcharges			
SW Charge on Other Utility Bills	Water, Sewer, and Trash Customers	Popular among Cities. Evades property nexus.	Burdens non-stormwater utilities. Not Proportional to Burden.
Transfers of SW Program Costs to Other Utility Funds	Water, Sewer, and Trash Customers	Eliminates Need for Direct Billing	Shifts Costs without Creating Funding Source
City Revenues			
General Fund Transfers	All city sources (sales, property and local taxes	Simple.	Competition for Funding with Other City Services
Utility Taxes	Water, Sewer, and Trash Customers	Simple to Understand and Implement	Requires Vote. No Direct Nexus to SW Service.
Benefit Assessments			
Benefit Assessment Act Bond	Residents and Businesses	Proportional to Benefit Received	Requires majority approval of owners. Limited to asset costs (no O&M)
Special Purpose Taxes			
Ad valorem Property Tax	Residents and Businesses	Proportional to Ability to Pay.	Requires majority approval of owners. Not equitable.
Sales Tax	Consumers	Proportional to Ability to Pay.	Not equitable. Requires Vote.
Transient (Hotel) Tax	Visitors	Visitors Enjoying Beaches Share Costs	Limited and Variable Revenues. Cost to Tourism.

Under most interpretations of Proposition 218, property owners appear to have been given the authority to approve fee-based stormwater program revenues. The only city successfully implementing a voter-approved fee for O&M has been San Clemente, in 2002. Note that the Successful Proposition O enacted with a super majority by the City of Los Angeles voters in 2004 funded only capital project costs, and not O&M costs. However, there have been other cities not seeking property owner or resident approval before creating or increasing their equitable pollutant-based stormwater fees. While it is not a foregone conclusion that implementing a stormwater fee without voter approval will draw an immediate lawsuit, it appears to be a risk that few agencies are willing to take.

New Local Funding of Stormwater Programs. In an effort to fund local stormwater programs, California cities have implemented a variety of charge and surcharge funding mechanisms, partially for the convenience of using existing utility billing systems, and partially to avoid addressing voting requirements of California Article XIII D. For example, in the years since Proposition 218 was implemented, the City of Escondido has implemented a utility/stormwater charge at $2 per month on all utility bills, the Irvine Ranch Water District implemented a 2 percent surcharge on all water commodity revenues (based on the excess water used on-site which is correlated with runoff), and the City of Carlsbad placed a $1.95 charge on refuse customers (based on the rationale that some of the trash finds its way into storm drains and therefore requires expenses in that program). None of these agencies sought voter approval of the revenue enhancement for funding stormwater activities.

Over the past several years, California cites and counties have developed voter-approved funding for multiple-use projects that benefited drainage and stormwater pollutant remediation. Specifically, in 2000 property owners in the County of Santa Clara approved a $3.30 per month parcel assessment for parklands, clean streams and flood protection which will generate approximately $28 million over the next 15 years. Similarly, in 1998 the voters of the City of Napa approved a ½ percent sales tax for city center river restoration which will generate approximately $250 million over the next 20 years. The restoration includes a naturalized bank-stabilization of the Napa River through downtown (rather than the traditional concrete trapezoidal channel) and creating multi-use parks in the downtown area.

There is potential to develop additional runoff program revenue from agencies outside of Santa Monica. For example, funding from LA County Department of Public Works may be requested for improvements identified in the WMP for County-owned storm drains. The County has formally indicated that its benefit assessment historically collected for flood control to address "unmet drainage needs" will likely be used in the future to fund multipurpose projects, which include stormwater pollution control. Moreover, the City of Los Angeles can be approached for funding the remediation of stormwater pollutant loads originating from the Kenter Canyon Basin in Los Angeles (2,600 acres).

Southern California regional authorities are proceeding in 2005 with voter initiatives to fund stormwater programs. The Orange County Sanitation District is discussing a countywide parcel owner user fee for stormwater pollutant remediation. This fee, if authorized by the Board and approved by 50 percent of the District's property owners, will total $50 per year per parcel starting in 2005, to support a $25 million program to build dry weather flows/diversions to the District's wastewater treatment plants.

RECOMMENDED FUNDING PLAN

In the past five years there has been very limited success in voter approved fees and taxes. The basic cause for failed ballot measures is the public perception that the benefit is too low for the proposed fee. In some cases, the public presumed that they were already receiving the benefits from the stormwater program, and had no need to pay for something they already received for free. In other cases, the public did not perceive a personal need for enhanced environmental conditions.

However, now may be an appropriate time for the City of Santa Monica to proceed with an outreach program followed by a voter-approved fee increase. As such, an outreach program is included in the following funding strategy proposed for the next five years in Santa Monica. However, unlike the single fees identified by Los Angeles and Orange County, for Santa Monica several utility fees and an annual phasing-in of increased rates is recommended. The plan does not include the option of seeking a citywide sales tax. This mechanism has the potential to offset stormwater user fees, in that a 1/10 percent city sales tax would generate $2.3 million per year for the runoff program. However, voter approval is essential (for a sales tax increase).

The City provides water, sewer and solid water services. As shown in Table 5-15, these utilities have substantial rate-base revenues. If the City were to implement the three fee surcharges on the water, trash and utility services, additional revenue of $2.9 million per year would be collected, based on the calculations shown in Table 5-16. This represents a 233 percent increase in the current rate-based revenues to the stormwater utility. The total revenues from stormwater fees and surcharges are illustrated in Figure 5-7.

Table 5-17 provides the recommended stormwater utility projected cashflow through FY 2009-10. It is based on the City's projected O&M and CIP costs, plus the additional expenditures identified in the WMP projections. The revenues are based on the current stormwater user fees, the new utility surcharges developed in the prior table, plus annual increases to all unit rates. As shown, by FY 2009-10 the enterprise will have a cash reserve of almost $1 million, and will not require City general fund transfers. However, in order to develop these new utility surcharge-based revenue sources and to escalate the new charges by an average of 43 percent per year through FY 2009-10, a significant public outreach and information process is also recommended.

FUNDING REQUIREMENTS FOR TWENTY YEAR WMP AND URBAN RUNOFF PROGRAM

Table 5-18 identifies the increases to stormwater user fees for the entire WMP period of 20 years. For the 15 years after the detailed analysis ending in FY 2009-10, annual user fee increases averaging three percent above inflation are required to maintain the stormwater enterprise as self-funded. Note that the annual O&M costs, estimated at five percent of WMP project costs, plus the current City O&M costs and excluding land purchases, will total $13 million per year by 2025 (in current year dollars). As shown in Table 5-18, by the Year 2025 the runoff program costs will be $29 per month per PDU in current dollars, or ten times the current rate. The total revenues and expenditures of the program are illustrated in Figures 5-8 and 5-9.

Table 5-15
Other City Utilities -- Customer Characteristics

Description	Demand	Revenue
Water Utility		
Customers		
Single Family	7,431	
Others	9,469	
Total	16,900	$2,609,400
Water Demand (Hcf/yr)		
Single Family	1,556,999	
Multi-family	2,587,205	
Commercial	1,550,781	
Institutional	140,735	
Irrigation	225,740	
Total	6,061,460	$8,688,600
Total Annual Revenues		$11,298,000
Monthly Single Family Bill Including Tax (a)		$29.63
Sewer Utility		
Monthly Single Family Bill (a)		$17.78
Total Equivalent Dwelling Unit Customers		16,300
Solid Waste (Refuse) Utility		
Revenue from Utility Customers (FY 2002-03)		$14,622,424
Monthly Single Family Bill (68 gal cart)		$22.50
Total Equivalent Dwelling Unit Customers		**59,573**
Combined Water/ Sewer/ Refuse Bill ($/SFD-month)		$70

Source: City of Santa Monica billing database for FY 2002-03
a. The monthly single family bill is based on average water demand of 35 Hcf in two months plus a 10% utilities tax.
SFD: Single Family Dwelling

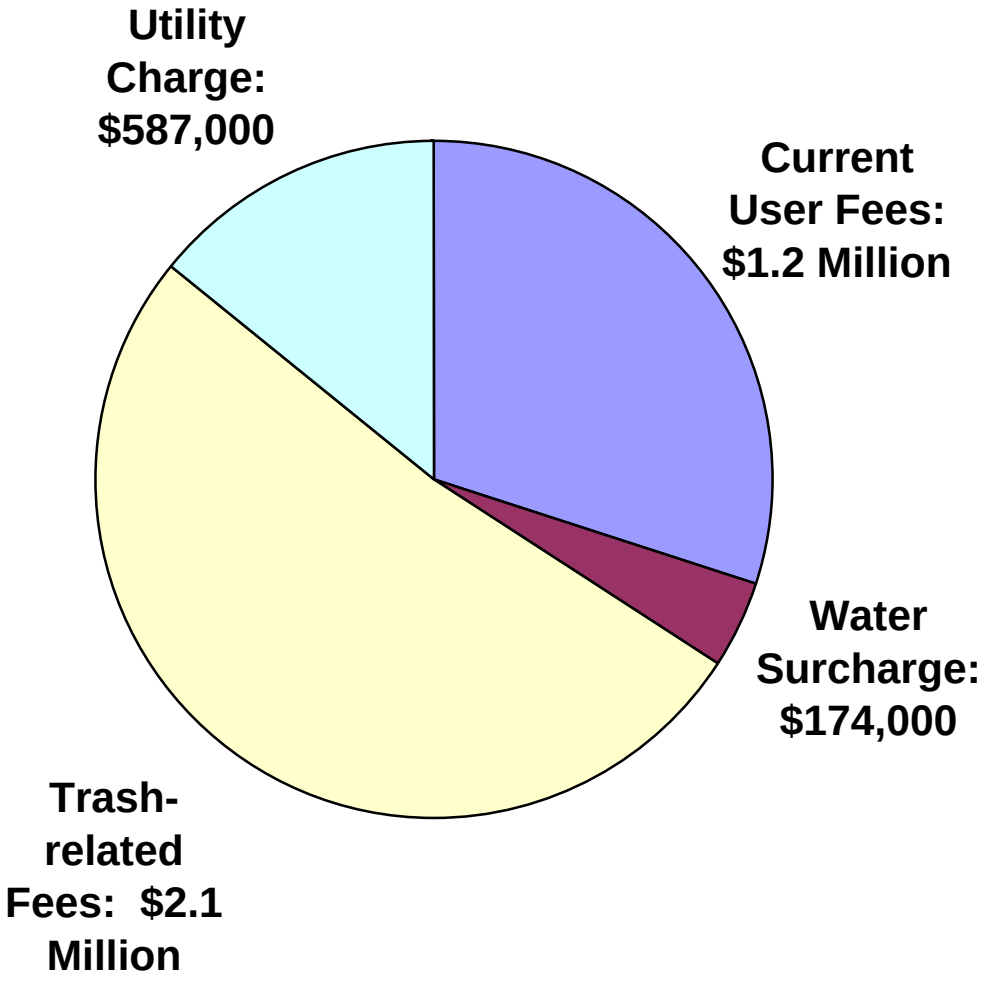
Table 5-16
Stormwater Fund 34 Additional Revenues from User Fees and Surcharges

Additional Revenue Surcharges for Pollutant Loads	New Stormwater Charge	Base Billing Units	Potential New Revenue
Current User Fee Revenues			$1,246,000
Additional Revenue Surcharges for Pollutant Loads			
Water Commodity Demand Surcharge (% of water commodity revenue)	2%	$8,688,600	$173,772
Trash-related Fee ($/month per equivalent refuse customer)	$3.00	59,573	$2,144,622
Utility Customer Stormwater Charge ($/month per sewer service acct)	$3.00	16,300	$586,800
Total Additional Revenues from All Sources			**$2,905,194**
Grand Total All Revenues (FY 2005-06)			**$4,151,194**
Increase in Annual Funding			233%

	Stormwater Sales Tax	Citywide Sales ($ Billion, 2000)	Alternative Revenue (Not Used in Projection)
Alternative Stormwater Funding Source: Sales Tax	0.1%	$2.3	$2,300,000

Base City Demand represents the base load or base revenue to be charged.

Figure 5-7
FY 2005-06 Proposed
Stormwater Fee Revenues



Not Shown: Project Grant Proceeds

Table 5-17
Proposed Stormwater Fund with Incrementally Increased User Fee and Surcharge Revenues

	Est. Actual		Projected				
Description	**FY 2003-04**	**FY 2004-05**	**FY 2005-06**	**FY 2006-07**	**FY 2007-08**	**FY 2008-09**	**FY 2009-10**
Current Revenues							
Current Rate-based Revenues	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000
Revenues from New Surcharges and Fees			$2,905,194	$4,648,696	$5,238,165	$5,886,582	$6,599,840
Total Rate-based Revenues	$1,246,000	$1,246,000	$4,151,194	$5,894,696	$6,484,165	$7,132,582	$7,845,840
Other Non-Rate Revs (including grants)	$1,962,184	$417,002	$396,847	$401,533	$406,308	$406,308	$406,308
Total Revenues	$3,208,184	$1,663,002	$4,548,041	$6,296,229	$6,890,473	$7,538,890	$8,252,148
O&M Expenses (City Budget)	($1,864,014)	($1,881,552)	($1,920,168)	($1,961,653)	($2,007,014)	($2,052,233)	($2,098,528)
New O&M Costs for Watershed Mgmt Plan Projects			$0	$0	($85,600)	($163,550)	($163,550)
City CIP Expenses (estimated)	($472,295)	($838,000)	($838,000)	($1,812,212)	($2,696,712)	($2,982,924)	($1,919,000)
Grant Monies (awarded)		$344,000	$344,000	$831,106	$1,273,356	$1,416,462	$884,500
Current SRF Debt Service	($210,783)	($216,263)	($221,886)	($227,655)	($233,574)	($233,574)	($233,574)
Proposed Watershed Mgmt Plan Projects		$0	($1,635,500)	($3,007,000)	($3,522,500)	($4,142,125)	($4,142,125)
Net Revenues (decrease)	$661,092	($928,813)	$276,488	$118,814	($381,571)	($619,054)	$579,871
Beginning Cash Balance		$1,861,092	$932,279	$1,208,766	$1,327,581	$946,010	$326,956
Ending Cash Balance (a)		$932,279	$1,208,766	$1,327,581	$946,010	$326,956	$906,827
Projected Unit Charges ($/single family acct-month)							
Current SW Mgmt User Fee ($/PBU-month)	$3.00	$3.00	$3.00	$4.26	$4.69	$5.15	$5.67
Water Commodity Demand Surcharge			$0.59	$0.84	$0.93	$1.02	$1.12
Trash Surcharge			$3.00	$4.26	$4.69	$5.15	$5.67
Utility Customer Stormwater Charge			$3.00	$4.26	$4.69	$5.15	$5.67
Average Single Family Bill ($/month)	$3.00	$3.00	$9.59	$13.62	$14.98	$16.48	$18.13
Increase from prior year			220%	42%	10%	10%	10%
Average annual increase							43%

a. Interest is not included as all values are shown in current (2004) dollars.

Table 5-18
Stormwater 20 Year Cashflow with Incrementally Increased User Fees

Description	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10	FY 2010-11	FY 2015-16	FY 2020-21	FY 2024-25
Current Revenues								
Current Rate-based Revenues	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000	$1,246,000
Other Non-Rate Revs (including grants)	$401,533	$406,308	$406,308	$406,308	$406,308	$406,308	$406,308	$406,308
Revenues from New Surcharges and Fees	$4,648,696	$5,238,165	$5,886,582	$6,599,840	$6,599,840	$6,599,840	$12,708,441	$11,128,758
Future Increases to Rate-base Revenues								
Three Years of Annual Increases in FY 2015-16 to FY 2017-18						30.0%		
One-time Decrease in FY 2020-21							-11.0%	
Annual Increase in Revenues						$2,475,644	($1,579,682)	
Total Revenues	$6,296,229	$6,890,473	$7,538,890	$8,252,148	$8,252,148	$10,727,793	$12,781,066	$12,781,066
O&M Expenses (City Budget)	($1,961,653)	($2,007,014)	($2,052,233)	($2,098,528)	($2,098,528)	($2,098,528)	($2,098,528)	($2,098,528)
New O&M Costs for Watershed Mgmt Plan Projects		($85,600)	($163,550)	($163,550)	($163,550)	($1,487,550)	($5,105,400)	($9,451,550)
City CIP Expenses (budgeted)	($1,812,212)	($2,696,712)	($2,982,924)	($1,919,000)	$0	$0	$0	$0
Grant Monies (awarded)	$831,106	$1,273,356	$1,416,462	$884,500	$0	$0	$0	$0
Grant Monies as Percentage of Proposed WMP Projects:		52%			$4,925,765	$9,728,528	$7,880,990	$1,506,267
Current SRF Debt Service	($227,655)	($233,574)	($233,574)	($233,574)	($233,574)	($233,574)	$0	$0
Proposed Watershed Mgmt Plan Projects	($3,007,000)	($3,522,500)	($4,142,125)	($4,142,125)	($9,472,625)	($18,708,708)	($15,155,750)	($2,896,667)
Net Revenues (decrease)	$118,814	($381,570)	($619,054)	$579,871	$1,209,636	($2,072,039)	($1,697,622)	($159,412)
Beginning Cash Balance	$1,208,766	$1,327,581	$946,010	$326,957	$906,828	$3,808,037	$7,720,490	$2,927,233
Ending Cash Balance (a)	$1,327,581	$946,010	$326,957	$906,828	$2,116,463	$1,735,998	$6,022,868	$2,767,821
Projected Unit Charges ($/single family acct-month)								
SW Mgmt User Fee ($/PBU-month)	$4.26	$4.69	$5.15	$5.67	$5.67	$7.46	$8.94	$8.94
Water Commodity Demand Surcharge	$0.84	$0.93	$1.02	$1.12	$1.12	$1.47	$1.77	$1.77
Trash Surcharge	$4.26	$4.69	$5.15	$5.67	$5.67	$7.46	$8.94	$8.94
Utility Customer Stormwater Surcharge	$4.26	$4.69	$5.15	$5.67	$5.67	$7.46	$8.94	$8.94
Average Single Family Bill ($/month)	$13.62	$14.98	$16.48	$18.13	$18.13	$23.85	$28.60	$28.60
Increase from prior year	42%	10.0%	10.0%	10.0%	0.0%	31.6%	-11.3%	0.0%
Average Annual Increase from FY 2005-06 to FY 2024-25								4.2%
Average Annual Increase from FY 2009-10 to FY 2024-25								3.1%

a. Interest is not included as all values are shown in current (2004) dollars.

Figure 5-8
Projected Fees, Projects and O&M Costs

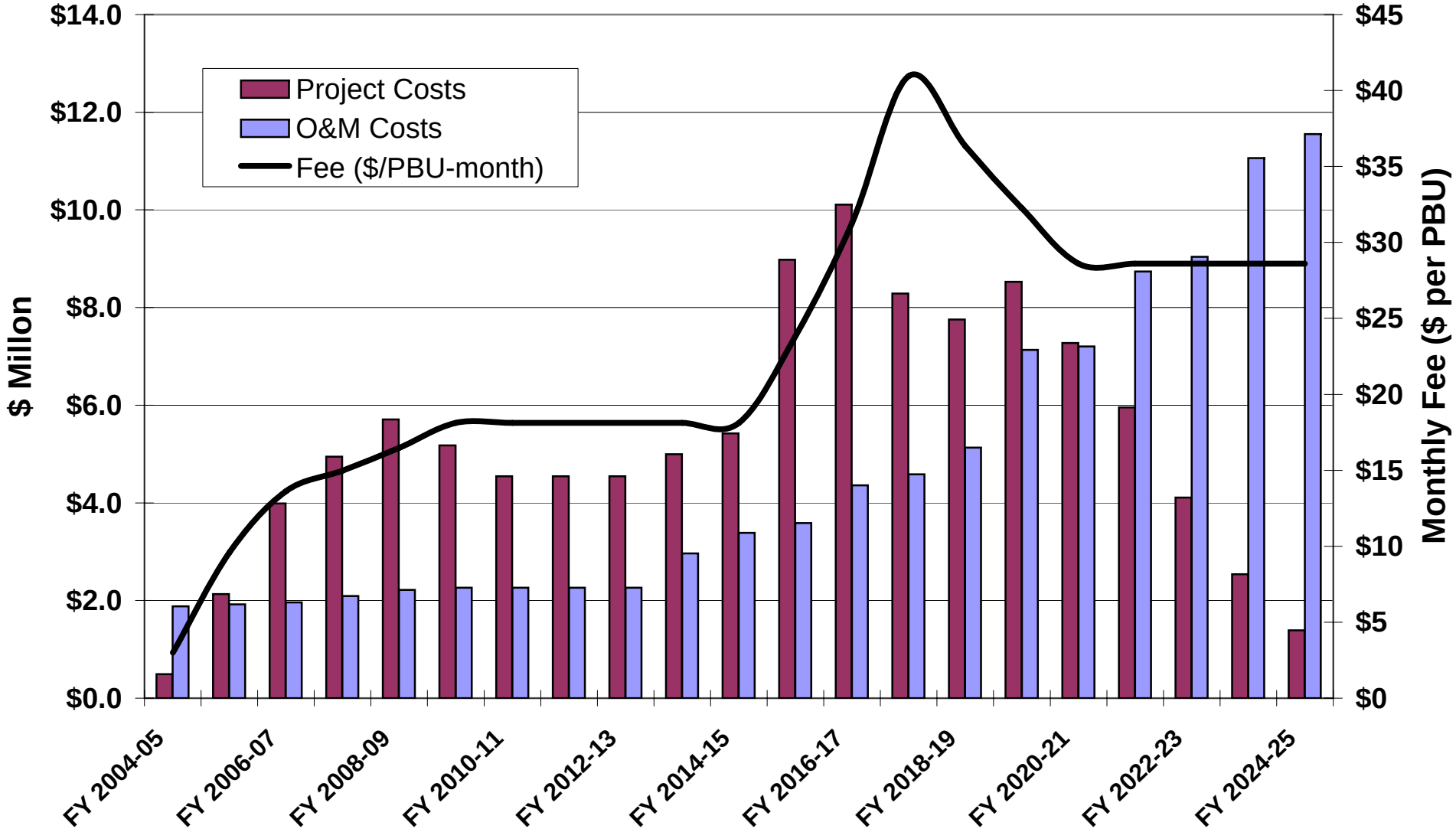
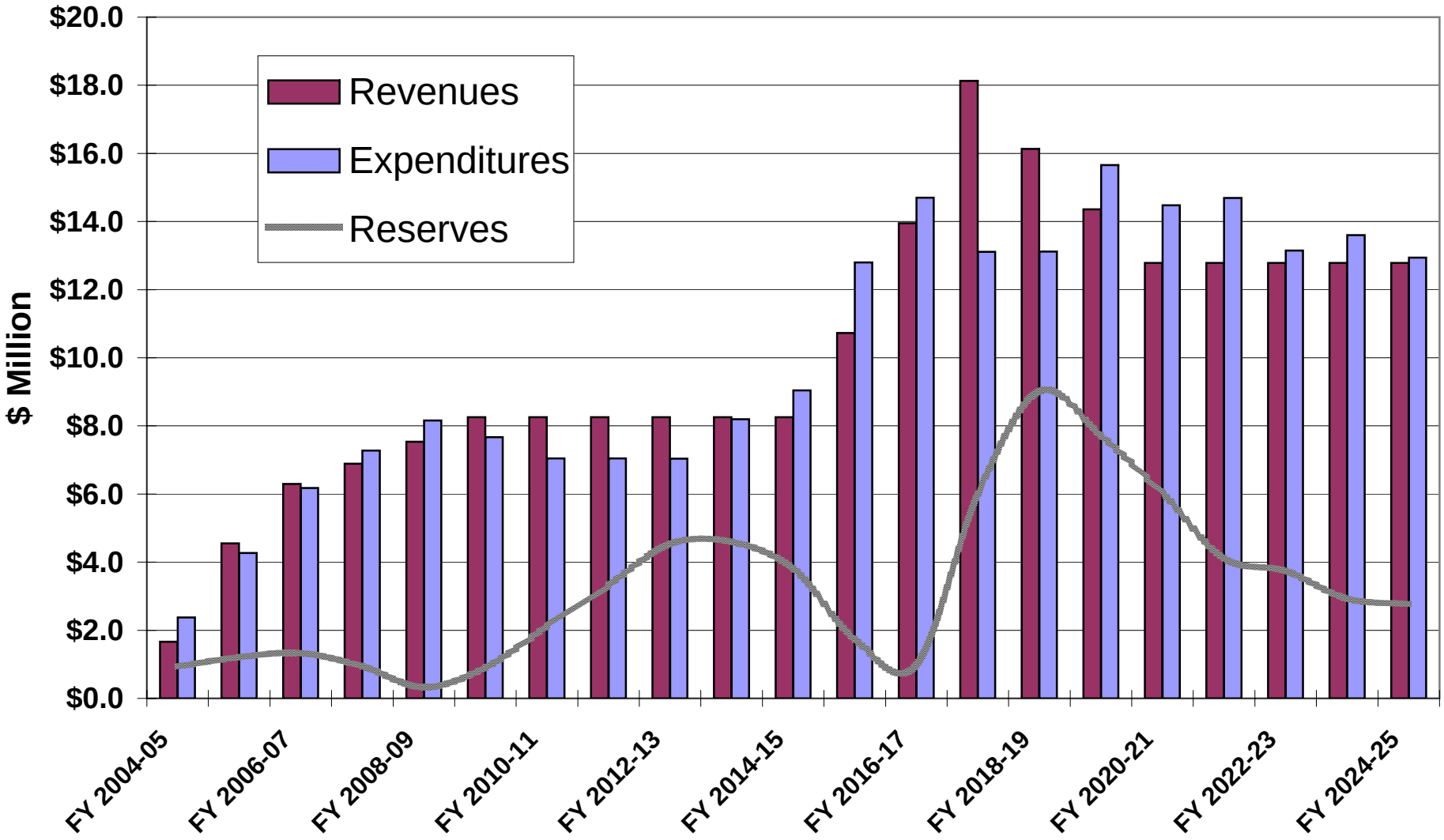


Figure 5-9
Projected Revenues, Expenses and Reserves



The projected level of fee increases is based on the previously discussed projection that 50 percent of the WMP projects will be grant funded. A sensitivity analysis to the level of grant-funded projects is show in Table 5-19. As shown, if grant funding of projects is eliminated, then the annual increase in user fees after FY 2009-10 is 18 percent rather than the 3 percent previously indicated, and the monthly stormwater charge will increase to $71 per single family. Conversely, if grant funding of projects increases to 73 percent, then minimal or no user fee increase is required after FY 2009-10, except for inflation.

PUBLIC OUTREACH PROGRAM

To implement this necessary stormwater fee structure to fund the urban runoff program costs, a public outreach and awareness program will be helpful in developing community awareness and support for runoff program objective and funding needs. This is particularly true with the five-year rate-based revenue requirement level reaching four times the fee levels sought by most stormwater agencies. The robust activities of the essential program should include the following elements:

- Enrollment of Champion within Elected Officials to Build Support with City Council
- Champion to Direct Advisory Committee
- Stormwater Needs Message Development
- Policy Maker and City Staff Briefings
- Stakeholder Meetings
- News Releases
- Creation of Community Advisory Committee for Funding Outreach
- Public Displays
- Media Outreach
- Community Presentations
- Mailings to Interested Parties

In 2004 the City of Los Angeles and other regional stormwater program administrators embarked on a series of television spots regarding stormwater-borne trash debris deposited on local beaches. These spots close with a young child picking up a sodden cigarette butt. These public messages were used for the successful November 2004 ballot measure. The City of Santa Monica should consider supporting this campaign, in addition to developing localized public information targeting its residents, business' and visitors.

Table 5-19
Alternative Rate Increases Required After FY 2009-10

Description	Project Grants Level		
	High	Medium	None
Percentage Grants	73%	52%	0%
Annual Rate Increases Reqd.	1%	3%	18%
Monthly Rate in FY 2024-25	$21	$29	$71
Monthly Rate in FY 2009-10	$18	$18	$18
Current Rate		$3.00	

The base case plan is represented by the medium grants level.

PROPOSITION 218 COMPLIANT NOTIFICATION AND ELECTION REQUIREMENTS

Thus far in California, there is virtually unanimous opinion regarding the need for stormwater fees to conform to the requirements of Proposition 218 as codified in California Constitution Articles XIII C and D. However, there is significant interest in avoiding these requirements. In any case, over time legislative procedures for implementation of the Articles will provide some clarification, as will judicial opinions on the applicability of the Articles to stormwater utility fees.

If the City Attorney for Santa Monica has opined that the notification and ballot requirements of Article XIIID, Section 6(a)(1) are required for stormwater user fee increases, then recipients must be notified by mail of the proposed fee with the following information:

- Amount of the fee
- Basis of the fee calculation
- Reason for the fee
- Ballot for approving or protesting the fee
- Date, time, and location of the public hearing on the proposed fee

One of the key decisions for the City Attorney is if the water, trash and utility surcharges recommended above can be utilized without the ballot requirements, as was done by other agencies. That opinion is essential to the success of developing runoff program surcharges from the water, trash and general utilities. The alternative requires voter approval for any number of funding mechanisms, from parcel benefit assessments to a new sales tax.

SECTION 6

NEXT STEPS

Following is a summary of potential next steps and tasks to prepare for implementation of the projects outlined in this WMP. Table 6-1 provides a schedule for implementation activities, and Table 6-2 provides a more detailed breakdown of recommended tasks needed to carry out the steps summarized below:

1. Develop a well-designed formal survey of the community to understand their hot buttons and their issues of interest.

2. Create at the beginning of the study process a bi-partisan, community advisory committee to represent the many interests of the community who may speak out, for or against, a proposed tax and ask them to serve as an oversight committee for technical and cost studies to define the problem and the solution. (This committee will lend credibility to the ultimate recommendation for a funding measure, as well as buffer from public criticism both the department(s) which needs the funds to execute urban runoff solutions and the elected officials who need to be in favor of any tax or bond measure to be considered on a public ballot.)

3. Develop a clear, simple technical study that defines the problem and evaluates alternatives that include costs and benefits of several solutions for decision-makers to consider.

4. Educate the public to help them understand the problem, the solution, the cost of the solution, and how that cost compares with other communities throughout the nation (the national average stormwater utility fee is approximately $4 - $5 per household per month).

5. Package the solution in a way that responds to the community's hot buttons and desires. (In Santa Clara the community survey indicated that the community would support increased fees for the flood control district, but only to support more natural solutions such as creek restorations and cleaner water. So they named the proposed special parcel tax the: "Clean, Safe Creeks and Natural Flood Protection" plan.)

6. Design a strong media campaign that requires private or non-profit partnerships because local agencies are prohibited from actively campaigning for or against a proposed tax.

7. Design solutions to accomplish multiple objectives such as: 1) creek restoration projects that also provide runoff pollution reduction facilities integrated into the design; or 2) stormwater retention basins which also serve as parks and provide stormwater pollution remediation, and groundwater recharge facilities. These solutions can attract multiple local funding partners (other City departments such as Open Space, neighboring cities such as Los Angeles, or regional agencies such as Metropolitan Water District), as well as attract outside state and federal partners.

DRAFT

Watershed Management Plan Implementation Schedule

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Phase 1 – Planning																								
Evaluate Existing Conditions																								
Define Projects																								
Develop Cost Estimates																								
Evaluate Alternatives																								
Prepare Watershed Management Plan																								
Prepare Draft Funding Plan																								
Phase 2 – Funding and Public Outreach																								
Create Community Advisory Committee																								
Implement Opinion Survey																								
Develop and Implement Public Outreach Program																								
Revise Watershed Plan to Respond to Public Needs																								
Design and Implement a Media Campaign																								
Build Support with Public and Elected Officials																								
Advisory Committee Present Watershed Plan and Funding Plan to Council																								
Implement Public Vote for Funding Plan																								
Phase 3 – Implementation																								
Prepare Environmental Permitting for Projects																								
Design Projects																								
Construct Projects																								

Table 6-1. Recommended Tasks

Task	Objective	Deliverables	Schedule
1. Community Advisory Committee Strategy	Increase probability of community financial support of WMP. Improve credibility of and reduce scrutiny on City Engineering Department. Recommendations to Council.	Initial identification of committee members. Facilitation of monthly committee meetings. Agreement on mission statement. Development of presentation materials for monthly meetings. Monthly meeting minutes. Follow-up on action items from monthly minutes. Formulation of recommendation to City Council of WMP.	24 months
2. Urban Runoff Program Funding and Service Fee Study	The deliverables of this planning study are reports and presentations on stormwater utility funding recommendations and technical support for the funding implementation.	Review California public agency stormwater program funding practices, post Proposition 218. Evaluation of the future program revenue requirements. Identification of the funding types and levels including (a) grants, (b) loan proceeds, (c) funds from upstream agencies discharging runoff to the City, and (d) locally charged fees and assessments. Calculate, technically-based, the type and level of locally charged fees and assessments, including an update of the current stormwater user fee.	9 months
3.1 GIS Data Change Management Strategy	Develop a change management strategy for GIS data collected during the WMP. Project will protect the investment made by the City for developing valuable information to assist various City Programs (e.g. WMP, Utilities Operations and Maintenance, etc).	Complete GIS data (minimum of 99 percent completion)	4 months
3.2 Field investigation to complete the remaining 20 percent of the storm drainage system.	Develop a complete data set for storm drain facilities, which will enhance decision-making capabilities for Engineering, Planning and O&M activities. Review available record drawings yielded 80 percent coverage for the City and County storm drainage facilities within the City of Santa Monica's City Boundary.	Work with City staff to develop a field inspection protocol to obtain missing attribute data where GIS data is incomplete. Utilize data collected in the field to populate all remaining data, perform QA/QC checks, and develop a gap analysis showing desired level of completeness. Perform necessary field inspections with City Staff or survey, as necessary. Alternatively, hire contractor to perform all necessary field work, in lieu of City staff, or contract with surveyor to obtain needed data.	3 months
3.3 Resolve discrepancies between the drawings and the City's GIS.	Resolve discrepancies in the storm drain GIS network configuration, found during URMP GIS data collection, to provide the City with an even greater level of confidence in the GIS model of the storm drain network.	Correct SHP files for each corrected storm drainage facility. List all previously identified discrepancies with updated correction or verification status.	4 months

Table 6-1. Recommended Tasks

3.4 Needs Assessment for Electronic Urban Runoff Management System	An electronic urban runoff management system would help the City in managing, documenting, and reporting on the various components of the Watershed Management Program.	Six Workshops, Needs Assessment Report, Cost Estimate with Multiple Options.	4 months
3.5 Enhanced GIS Analysis for Urban Runoff Quality	Develop a detailed understanding of runoff quality and characterization recommended prior to developing specific urban runoff water treatment options.	Develop and analyze GIS data to support enhanced WMP decision-making including the following topics: ▪ Understand sources of waste and characterization of waste entering each sub-watershed, including permitted industrial waste. ▪ Identify downstream impacts from upstream pollution into the stormwater system. ▪ Relate the land-use and runoff quality to evaluate impacts on runoff quality (and quantity) from changes to land-use ▪ Map historical beach closures and identification of repeating event triggers.	TBD
4. Runoff Characterization	Develop a sound understanding of stormwater quality, enabling the City to design and implement site-specific, cost-effective treatment and control solutions for the purpose of meeting current and future runoff regulations.	Characterize runoff by completing the following tasks: ▪ Develop a City-approved sampling plan that includes a description of the sub-watersheds, procedures for collecting water quality samples and measuring runoff flow rates and a description of the resulting database. ▪ Implement the sampling plan through field sampling and monitoring and develop the database ▪ Perform data analysis and reporting of findings	12 months
5. Storm Drain Improvement Master Plan	The existing WMP includes "planning level" cost estimates for proposed improvements. A comprehensive hydrologic and hydraulic model of the City storm drain system will likely enable the refinement of cost estimates and the savings of millions of dollars on final recommended capital improvements.	Prepare City-wide hydrology model	6 months

Table 6-1. Recommended Tasks

6. WMP – Phase II	The City may require assistance with implementation of recommendations for over $200 million in capital improvements included in WMP Phase 1. The WMP primarily emphasizes capital improvements, and Phase 2 should consider recommendations for improved stormwater management activities.	Prepare design concepts for project components. Prepare hydrologic/hydraulic modeling of project components within Santa Monica watershed. This task would not be necessary, if Task 5 were implemented. Cost estimate would be determined on a project-specific basis. Prepare qualitative and quantitative analysis of additional urban runoff management activities (e.g. evaluate impact of a possible City policy to require residents and businesses to be retrofitted upon sale of property to include on-site stormwater management facilities to address stormwater quality objectives).	As needed
7. Community outreach and media campaign	Develop community support for WMP.	Community outreach plan Media campaign plan Implementation of plans described above (cost estimate TBD)	4 months
8. Santa Monica Airport WMP	The airport has many activities and potential pollutant sources which may adversely impact storm water quality. Prepare a Plan to manage urban runoff from the airport, and maximize on-site retention and treatment of stormwater.	Prepare Airport WMP.	6 months
9. Prepare Benefit Cost Analysis for WMP	Understand the quantifiable benefits of multipurpose projects (such as water supply, flood control, water quality improvements), allowing for attraction of outside funding sources.	Prepare Benefit Cost Analysis of recommended capital improvements.	4 months
10. Project Funding Outreach Strategy	Identify, meet, and build relationships with the grant funding agencies and other funding partners that may support many of the projects identified in the WMP Phase 1.	Refine WMP list of appropriate agencies/funding partners. Develop appropriate educational materials to provide agencies. Meet with agencies individually to build relationships, learn more about their needs/ideal grant applications. Identify potential partners to participate in grant applications. Provide assistance in the preparation of grant applications.	6 months
11. Develop Monitoring Program	Track progress with the specific quantifiable goals and broader mission statement of the WMP to demonstrate accountablility and progress on an annual basis.	Prepare annual progress report on WMP mission statement and goals.	Annually
12. Integrate WMP into City Programs	Integrate objectives and projects identified in the WMP into other City planning documents and all General Plan revisions, City budget documents.	Prepare revised General Plan and budget documents.	TBD

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APPENDIX A

WATERSHED VISIONING CHARRETTE NOTES

BRAINSTORMING RESULTS – GROUP 1

Date: June 9, 2004

Group Members:

Name	Affiliation
Nancy Gardiner	Brown and Caldwell
Anthony Antich	City of Santa Monica
Wing Tam	City of LA Bureau of Sanitation
Bob Wu	Caltrans
Neal Shapiro	City of Santa Monica
Stephen Groner	Stephen Groner Associates

Solutions

1. Regulate environmentally friendly products
2. Reduce reliance on the automobile
   a. Reduce traffic
   b. Improve public transportation
   c. Eliminate surface freeways and replace w/ underground tunnels
   d. Designate "no-drive" days
   e. Apply new technology and reduce auto use
3. Regulate development to improve the environment
   a. Require all pavement to be porous
   b. Require low-impact development and dual water systems
   c. Require natural drainage conveyances
   d. Keep water on residential properties
   e. Create Riparian Districts
4. Encourage natural drainage systems
   a. Daylight the creeks
   b. Acquire property along existing channels
5. Provide funding and financial incentives
   a. Reduce property taxes
   b. Building permit fees should contribute to environmental protection

Success Stories

1. Caltrans
   a. Successful BMPs
   b. Large body of data to assist with decision-making
2. SMURRF
   a. Improved water quality
   b. Successful partnership (SM & LA)
   c. City of LA and TreePeople's Hall House retrofit
   d. City of LA beach parking lot with infiltration trenches

Barriers to Success

1. Ignorance/Need for education
2. Funding
3. Politics/Jurisdiction
4. Land use/Land rights
5. Water rights
6. Land availability

Next Steps

1. Put City staff in charge
2. Raise City stormwater fee
3. Apply for more grants
4. Have more stakeholder involvement and internal City involvement
5. Incorporate sustainable development into City planning/zoning/building codes
6. Start educating young people
7. Expand public outreach efforts:
    a. Billboards
    b. Pre-movie ads
    c. TV ads
    d. Posters
8. Proceed with proposed daylighting project
9. Pursue more partnerships
10. Get more neighborhood involvement
11. Advocate for a national holiday such as "Environment Protection Day" or "Traffic-free Day"

BRAINSTORMING RESULTS – GROUP 2

Date: June 9, 2004

Group Members:

Name	Affiliation
Suzanne Dallman	LA and San Gabriel Rivers Watershed Council
Shelley Luce	Heal the Bay
Angie Bera	Santa Monica BayKeeper
Bill DePoto	LA County
Xavier Swammikannu	RWQCB
Lissa MacVean	Brown and Caldwell

Solutions

1. Optimize current programs (e.g. MS4 permits)
2. Disconnect impervious surfaces
3. Integrate planning, public works, and building codes
4. Incentivize private retrofits
5. Transportation surfaces must infiltrate 1"
6. Daylight creeks
7. Install buffering around catch basins
8. Disconnect downspouts
9. Regional reuse – store stormwater in underground tanks

Barriers to Success

1. Existing ordinances
2. Funding
3. Maintenance and inspections

Next Steps

1. Cross-pollination
2. Leeds-type accreditation
3. Audit zoning regulations
4. Create incentives for retrofits on private property
5. Educate now!
6. Incentives:
   a. Raise assessment fees and give credits for infiltration BMPs
7. Inspections:
   a. Existing programs
   b. Random inspections
8. Pollution pays:
   a. % of parking fees go to retrofits
   b. Plastic bag tax

BRAINSTORMING RESULTS – GROUP 3

Date: June 9, 2004

Group Members:

Name	Affiliation
Jessica Hall	North East Trees
Nancy Hastings	Surfrider Foundation
Guangyu Wang	SMBRC
Brian Johnson	City of Santa Monica
Andy Agle	City of Santa Monica
Jennifer Wolch	University of Southern California

Solutions

1. Saturate Santa Monica with the image of native landscapes
2. Create a "Demonstration Neighborhood" or "Green Street"
3. Incorporate LEED into building codes
4. Manage rooftops as open space
5. Trade density for strategic open space
6. Expand open space along waterways:
    a. Buy-backs
    b. Stream restoration
    c. Flood accommodation
7. Transportation:
    a. Plate freeway
    b. Incentive trend away from private transportation
    c. EV/Bio-diesel
    d. Bike Blvd (e.g. Berkeley, CA)
    e. MTA Expo line underground, with a greenway and bike path above
8. Landscaping
    a. All public spaces should be planted with native plants
    b. Private/Public Trees (e.g. Calabasas – Oak trees, Berkeley – tree and creek ordinance)
9. Pollution
    a. Programs to incentive P2 within industry
    b. Hotel green programs
    c. Promote bio-plastics
    d. Ban Styrofoam
10. Create lawn assessment districts to perform water budgets
11. Examples:
    a. Creek Daylighting:
        i. Bay Area
        ii. Encinitas
        iii. Wuonasquetucket River in Providence, RI
        iv. Kalamazoo, MI

v. Seoul, Korea
vi. Tokyo
vii. Portland, OR
viii. Roof-top athletics, common in Korea, Japan, and NYC

b. Green roofs common in Europe
c. Bio-pools or swimming ponds – pools with natural vegetation, common in the UK and Germany

Barriers: No discussion

Next Steps: No discussion

APPENDIX B

CITY OF SANTA MONICA
DRAFT HYDRAULIC ANALYSIS REPORT

CITY OF SANTA MONICA

HYDRAULIC ANALYSIS REPORT

PREPARED FOR:

CITY OF SANTA MONICA
Environmental and Public Works Management Department
Civil Engineering and Architecture
1918 Main Street, Suite 300
Santa Monica, CA 90405

PREPARED BY:
Brown and Caldwell
In Association
With

WILLDAN
Serving Public Agencies

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(949) 470-8840
March 2004

CITY OF SANTA MONICA
HYDRAULIC ANALYSIS REPORT

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CITY OF SANTA MONICA
HYDRAULIC ANALYSIS REPORT

Executive Summary

In October 2003, the City of Santa Monica authorized Brown and Caldwell (BC) and Willdan (under subcontract to BC) to analyze and conduct a hydraulic analysis for the City storm drain system. In accordance with the approved scope of work, this report will present an approximate hydraulic analysis of the existing storm drain system and identify existing deficient storm drain systems. This report includes recommendations for drainage improvements to reduce (to a level of insignificance) or eliminate the existing deficiencies within the City's storm drain system and presents cost estimates and schedules for the design and construction of the recommended drainage improvements. The recommended drainage improvements in this report not only include additional conveyance system capacity to address deficiencies, but also include stormwater retention facilities that will help alleviate deficiencies. These recommendations are based on the City's stated objectives of identifying solutions, which provide progress towards stormwater quality objectives as well as progress with storm drain conveyance objectives.

To determine the locations that require drainage improvements, the existing storm drain system was analyzed through review of existing hydrology reports and performance of a hydraulic analysis. This analysis was based on ten-year and twenty five-year storm events. The primary reports reviewed include the Hydrology Report prepared by Berryman and Henigar dated June 1998, and the Hydrology Report for Kenter Canyon prepared by FAR, Inc., dated May 1997. The criteria for determining the deficiencies in the existing storm drain systems are outlined in Section 4 of this report.

Based on the results of these analyses, 160 storm drain improvement locations have been identified for a 10-year design storm and scheduled for design and construction in a 10-year and 20-Year Capital Improvement Project Plan. Similarly, 190 storm drain improvement projects have been identified for a 25-year storm event and scheduled for design and construction in a 10-year and 20-Year. Please refer to Tables C and D for a listing of the recommended projects, their descriptions, and estimated project costs. The estimated total cost for all of the improvement projects for a 10-year storm event is approximately $27.5 Million in 2004 dollars. The estimated total cost for all of the improvement projects for a 25-year storm event is approximately $31.7 Million in 2004 dollars. All deficient storm drain alignments are shown in the Maps.

This report will be beneficial to use as a guideline for designing future storm drain facility improvements and planning, coordinating future City improvement projects, and ensuring private development activities are built to be compatible

with the City's drainage needs. This report is a conceptual study, which identifies facilities needed to effectively control and convey runoff in the City of Santa Monica. This plan does not contain the appropriate data for final design purposes and should be updated periodically to reflect any changes in hydraulic modeling, additional rainfall-runoff data, watershed development, revised facility alignments and the construction of new facilities.

Upon the City's conceptual approval of the recommendations included in this report, a final Storm Drain Master Plan should be developed which would include but not be limited to the following:

Curb and gutter flow line elevations.

Detailed hydraulic analysis of the storm drain system utilizing the GIS model to verify and refine conceptual recommendations included herein.

Hydraulic analysis that includes a determination of street and system capacity, catch basin locations, lengths and hydraulic analysis using a computer program that accounts for losses at bends, manholes, friction losses, etc.

Hydraulic calculations consisting of pipe and catch basin sizing shall be performed for the main line and all laterals.

CITY OF SANTA MONICA
HYDRAULIC ANALYSIS REPORT

SECTION 1 - INTRODUCTION

1.1. SCOPE

The purpose of the hydraulic analysis is to provide comprehensive long-range plans for the implementation and development of drainage facility improvements within the City. Although the majority of the City is developed with many existing storm drains, it was determined that it would be advantageous to identify those areas that may be subject to existing and potential flooding in order to develop alternatives to reduce or eliminate flood hazards and street flooding.

The scope of the study included:

Review hydrology calculations prepared by Berryman and Henigar, and identify areas of insufficient capacity and flooding. Clarify criteria for insufficient capacity.

Review hydrology calculations for Kenter Canyon Storm drain watershed, Prepared By FAR, Inc., and identify areas of insufficient capacity and flooding. Clarify criteria for insufficient capacity.

Review the Santa Monica Municipal Airport Master Plan of Drainage. The purpose of this review was to verify areas consistent with the Berryman and Henigar report.

Review maintenance records and chronic problem areas with City Maintenance Staff. This was a helpful tool in analyzing flooding locations and for prioritizing the deficient storm drain systems.

Develop criteria for ranking drainage improvements.

Identify size and cost of stormwater retention facilities required to offset the need for storm drain conveyance system improvements.

Identify size and cost of stormwater retention facilities needed to retain the design storm of ¾-inch.

Prepare a summary report, which presents the results of the analyses described above.

1.2. DESCRIPTION OF STUDY AREA

Location

The City of Santa Monica is comprised of approximately 8.1 square miles of highly urbanized area. The City is bounded to the west by the Pacific Ocean, and to the south, north and east by the City of Los Angeles, as shown in **Figure 1**.

Figure 1
Santa Monica Geographical Location

Based on the existing street flow patterns and storm drain configuration, the City is divided into 13 watershed drainage basins. **Table 1** summarizes the peak outflow resulting from the 10- and 25-year events for each basin within the City.

Table 1
Drainage Basin Areas and Peak Outflows – 10-Year and 25-Year Rain Events

Basin No.	Basin Name	Basin Outflow (cfs)		Drainage Area (acres)
		Q(10)	Q(25)	
1	Pier Basin	120.3	135	81.6
2	Montana Basin	789	921	624.9
3	Wilshire Basin	175	207	105.6
		677	877	473.2
4	San Vicente Basin	108	149	118
5	Georgina Basin	297	351	181
6	Kenter Canyon Basin	4125	4780	3968
7	Centinela Basin	220	258	204.1
8	Ashland Basin	291	299	195.9
9	Pico-Caltrans Basin	164	193	157.4
10	Pico-4th Street Basin	158	181	103.4
11	Airport Basin	385.5	459	266.7
		19.4	22.9	16.9
		38.5	44	39.4
12	16th Street Basin	388	453	252.2
13	Lincoln Basin	480	551	347.1

City of Santa Monica Existing Storm Drain System

The majority of the existing storm drain system in the City of Santa Monica was constructed prior to 1971. Therefore, the majority of the existing storm drain system does not meet the current design standards for flood control. Current flood control standards are described in the following sections. Although the storm drain system does function, the capacity of the system is deficient. These deficient locations have been identified in the attached priority listings provided at the end of Section 3.

1.3. CONCLUSIONS AND RECOMMENDATIONS

Based on the studies and investigations made for this report, is has been determined that several of the existing storm drains have inadequate capacity to convey the runoff produced by 10-year and 25-year design storm events (described in Section 3).

160 storm drain locations are recommended to mitigate drainage deficiencies for a 10-year storm event. The improvements to the drainage facilities consist of the installation of a parallel storm drain system. The estimated total cost for all of the improvement projects for a 10-year storm event is approximately $27.5 million in 2004 dollars. The estimated total cost for all of the improvement projects for a 25-year storm event is approximately $31.7 million in 2004 dollars. These costs are based on the assumption that the drainage improvements consist exclusively of upgrades to the conveyance system.

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SECTION 2 - STUDY APPROACH

2.1. RESEARCH

Drainage Studies

Previous drainage and project reports from the City of Santa Monica were obtained and reviewed. The following reports were used for the analysis.

> Hydrology Report prepared by Berryman and Henigar dated June 1998.
> Hydrology Report for Kenter Canyon prepared by FAR, Inc., dated May 1997.
> Hydrology Report for prepared by PRC Engineering, Inc. dated May 1985.

Maintenance Records

To identify chronic flooding and maintenance problems within the city, maintenance records were obtained and reviewed. There are several areas where significant flooding occurs on regular basis which have been identified by City staff. These deficiencies have been included in the costs for the estimated improvements. (Described in Section 3).

2.2. ASSUMPTIONS AND CRITERIA FOR HYDROLOGY AND HYDRAULICS

Flood Control Criteria

In determining the level of protection desired for a community, it is essential to have an understanding of the term “flood frequency.” The following is a definition of flood frequency as defined by the Federal Emergency Management Agency’s Flood Insurance Study, Guidelines, and Specifications for Study Contractors,

> “Flood events (frequencies) of magnitude which are expected to be equaled or exceeded once on the average during any 10-, 25-, 50-, 100-, and 500-year floods, have a 10, 4, 2, 1, and 0.2 percent chance, respectively of being equaled or exceeded during any year. Although the recurrence interval represents long term, the average period between floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year

> flood (one percent chance of to be exceeded in one year) in any 50-year period is approximately 40 percent (four in ten), and for any 90-year period, the risk increases to approximately 60 percent (six in ten)."

Drainage facilities are typically designed to provide protection from storms of a specified intensity. Santa Monica is subject to Los Angeles County standards for flood control. LA County requires Urban Flood protection, which stipulates that the 10-year storm be conveyed in underground storm drains, and the balance of the 10-year and 25-year storm be conveyed via curb and gutter over the street's surface. In areas that are tributary to a sump or drain a sump, the storm drains must provide Capital Flood protection. The Capital Flood is defined as the 50-year, 96-hour rain event.

The hydrology calculations prepared for the City of Santa Monica were analyzed for the entire system for both the 10-year and 25-year storm events. The hydrology calculations for Kenter Canyon Storm drain watershed, Prepared By FAR, Inc were incomplete. Approximately 72% of the 10-year hydrology calculations where not included in the report. Therefore, a conversion factor of 0.8858 was used in determining the 10-year flows. The conversion was determined by comparing 28% of the known peak flows and taking the average for known flows within the same locations. The following is a sample calculation used in determining this conversation factor.

Conversion factor = $Q_{10(average)} / Q_{25\ (average)} = (0.8858)$, $Q_{10} = (0.8858) * Q_{25}$

Methodology

The approach used to study the existing drainage system for the City of Santa Monica was developed using the hydraulic criteria and methods accepted by the Los Angeles County Department of Public Works (LACDPW). Uniform flow calculations were used to determine hydraulic capacities of pipes, culverts and channels. A uniform flow analysis provides a conservative estimate of capacity, as it assumes pure gravity flow.

Analyses were performed to size the facilities for a parallel pipe system necessary to satisfy the flood control requirements. These facilities were sized to convey the 10-year and 25-year storm events.

Retention facilities to be used in combination with conveyance were also sized. A unit hydrograph analysis was used to develop volumes for flows beyond the existing conveyance system capacity for the 10-year and 25-year storms. The volumes were calculated by developing hydrographs at each point of deficient capacity in the City. The hydrographs were assumed to be triangular in shape, with a peak flow equal to the excess flow rate, and a time of concentration of 15 minutes.

For a 24-hour rainfall intensity, the typical time of concentration values range between 5 and 30 minutes. In order to determine the peak flow volume at the peak of the hydrograph, a 15-minute duration was assumed for all calculations.

The existing and proposed drainage systems were analyzed. The storm drain analysis program by FHWA Urban Drainage Design Program (HY-22). HY-22 is a hydraulics modeling program which can be used to determine the capacity of a storm drain system based on Manning's equation. Hy-22 modeling was performed by Willdan to size the proposed parallel systems. WSPG is a computer modeling program that is used to analyze storm drain systems that accounts for losses at bends, manholes and friction losses

The storm drains were assumed to flow open or without significant pressure. Slopes and pipe sizes were assumed to be parallel to the ground as shown in the hydrology reports. Pipe sizes were determined to the nearest three-inch diameter. The following is a definition of Manning's equation:

$$Q = \frac{1.486AR^{2/3} S_o^{1/2}}{n}$$

where:

Q = discharge (in cubic feet per second)
A = area (square feet)
R = hydraulic radius (feet) (A/P)
S_o = pipe slope (feet/feet)
n = Manning's roughness coefficient

Hydrology Conclusion

A hydrology analysis for the proposed storm drain improvements was not within the scope of this study. Therefore, detailed final hydrologic studies should be conducted in conjunction with the final design of the proposed storm drain facilities. Final hydrologic studies should include such items as catch basin hydrology, detailed field investigation of drainage patterns, and determination of any physical changes. It is anticipated that the required detailed studies and calculation will not have a significant impact on the priorities or construction costs. Based on the analysis performed for this study, 31% of the total storm drain system was determined to be deficient for the 10-year event, and 35% is deficient for the 25-year event. Refer to **Figure 2** for a map of the deficient storm drains.

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SECTION 3 - EXISTING DRAINAGE FACILITIES

3.1. GENERAL DESCRIPTION

Characteristics of the existing drainage facilities were obtained from a review of the hydrology calculations prepared by Berryman and Henigar,. Drainage facilities characteristics for Kenter Canyon Storm Drain Watershed and the Santa Monica Municipal Airport were obtained from reports prepared by FAR, Inc. and PRC Engineering, Inc., respectively. The FHWA Urban Drainage Design Program (HY-22) was used to analyze and to determine the capacity of the existing system.

Normal Depth Calculations

The FHWA Urban Drainage Design Program (HY-22), software utilizes normal depth calculations to determine depth of flow in pipes, culverts and channels. Normal depth assumes a steady uniform condition that does not change over time. The slope of the pipe or street is equal to the slope of the Energy Grade Line or friction slope. The results from this type of calculation will result in a conservative pipe size, which result in conservative cost estimates for design and construction and is desirable for budgeting and planning purposes.

Chronic Problem Areas based on Maintenance Records

There are several areas where significant flooding occurs on regular basis which have been identified by City staff. The following is a list of flooding areas.

LOCATION	DESCRIPTION OF DEFICIENCY	RECOMMENDATIONS
4th St. & California Ave.	Area floods during heavy storm	Install new storm drain and connect to storm drain on Ocean Ave.
17th St. north of Olympic Blvd.	Area floods during heavy storm	Upgrade existing storm drain system.
5th St. and Colorado Ave.	Cross gutter across 5th St. on north side of Colorado does not have positive drainage. Floods during heavy storm	Construct catch basin at north-east corner of 5th and Colorado to Intercept flow and connect to storm drain on 4th St.
Colorado Ave. East of 26th St.	Large drainage area tributary to this intersection including area outside city limits.	Construct storm drain system on Colorado Ave and connect to Kenter Canyon storm drain
Ocean Ave. north of Colorado. Ave.	Existing Storm drain does not have sufficient capacity to handle runoff from drainage area.	Upgrade existing storm drain system.

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SECTION 4 - PROPOSED STORM DRAIN IMPROVEMENTS

4.1. BASIS OF PRIORITY PROJECTS

Each deficiency was categorized into one of three priorities as follows:

PRIORITY 1

1. Flooding in streets, outside of R/W and above curb.
2. Identified by City maintenance crews as a problem area.
3. Large excess flow in pipe system.

PRIORITY 2

1. These areas are critical to the overall traffic circulation of the City for emergency vehicle access.
2. Medium excess flow in pipe system.

PRIORITY 3

1. These areas are not critical to the overall traffic circulation of the City.
2. The Majority of Streets are Residential Streets
3. Minimal excess flow in pipe system.

Items that were considered in the formulation of the priority list included severity of potential damage to public and private property due to flooding, the need to keep open selected arterial highways for emergency access during flood periods, and availability of outside funding.

4.2. MITIGATION MEASURES AND DESIGN ALTERNATIVES

Parallel Storm Drain Systems

The addition of a parallel storm drain system was used as a mitigation measure when excessive flooding was identified in the vicinity of an existing storm drain system. The FHWA Urban Drainage Design Program (HY-22), determines the appropriate size storm drain pipes using the normal depth hydraulic calculations. Open channels were not considered in the analysis.

Storm Water Retention Facilities

Retention facilities have analyzed and sized. Other flow reducing methods such as infiltration controls or storm water reuse strategies. The retention basin capacity was analyzed for both the 10-year and 25-year storm events. An approximate hydrograph method analysis was used to calculate the retention basin facility based on the excess peak flows. A cost analysis was prepared to determine if retention facilities or other methods are economically feasible. The costs include consideration for right-of-way acquisition and the reduction in cost of downstream storm drain improvements due to the reduction in flow volume.

4.3. COORDINATION WITH CITY CIP

Future Street Widening, Road Extension and Storm Drain Projects

Whenever possible the storm drain improvement projects should be scheduled such that either the street improvement project follows the storm drain improvement project or that the recommended drainage improvement be incorporated into the street improvement project. It is critical that future storm drain improvement project schedules consider the City of Santa Monica yearly street rehabilitation jobs, etc. This will restricts utility cuts on newly paved streets. This will result in a complete project and avoid the trenching within a recently reconstructed or repaved street section.

4.4. OPERATIONS AND MAINTENANCE RECOMMENDATIONS

As discussed with City staff, the current operations and maintenance schedule of work for the storm drains and catch basin inlets will remain the same. The seasonal cleaning of the basins prior to the rain season and other routine maintenance and inspection efforts should continue to as planned to help prevent plugged storm drain facilities and maximize existing catch basin and storm drain capacities.

If retention basins are used as an alternative flow reducing methods, the City staff should implement year round maintenance schedules. The retention basins will require routine maintenance to be effective for the life of project. Typically, this maintenance includes regular removal of vegetation and trash and less frequently about every 5 to 10 years the removal of silts that have settled in the basins.

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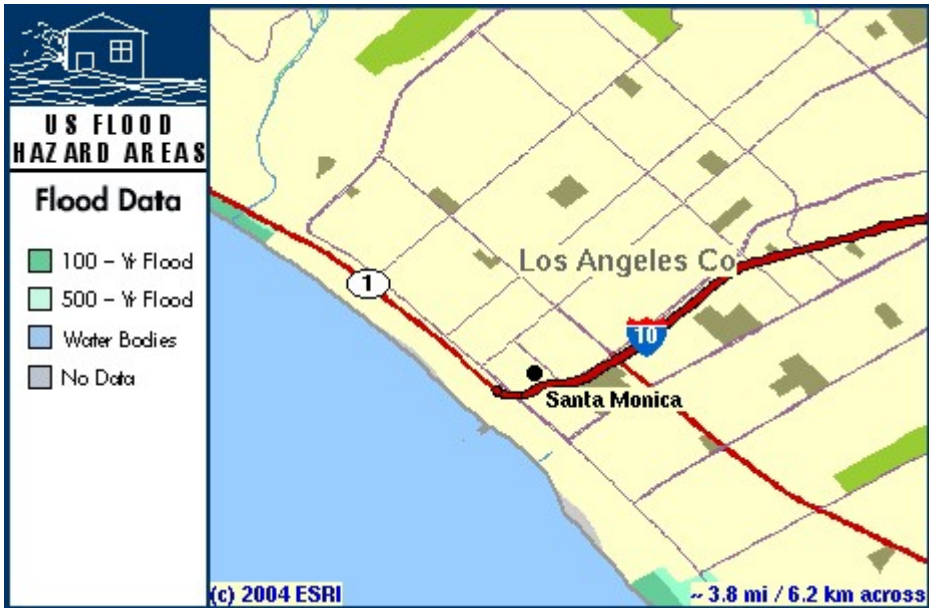
SECTION 5 – FLOOD ZONE ANALYSIS AND FEMA

5.1 FLOOD ZONE LIMITS

The Federal Emergency Management Agency (FEMA) - a former independent agency that became part of the new Department of Homeland Security in March 2003 - is tasked with responding to, planning for, recovering from and mitigating against flood and natural disasters. Flood maps tell us where the flood risks are based on local hydrology, topography, precipitation and flood protection measures. These maps delineate the 100- year flood limits. The limits of the 100-year flood plain are shown on atlas maps from the most recent FEMA Flood Insurance Flood Rate Maps.



SECTION 6 – CAPITAL IMPROVEMENT PROGRAM

6.1 PROPOSED STORM DRAIN SYSTEM IMPROVEMENTS 10 YEAR CIP AND 20 YEAR CIP

The goal of the Capital Improvement Program (CIP) is to provide the City of Santa Monica with a planning tool for scheduling and financing future storm drain improvement projects. The proposed Capital Improvement Project has scheduled the design and construction of the Priority projects over a 10-year period and a 20-yr period.

The Priority projects were ranked from 1 to 3 with The estimated total cost for all of the improvement projects for a 10-year storm event is approximately $27.5 million in 2004 dollars. The estimated total cost for all of the improvement projects for a 25-year storm event is approximately $31.7 million in 2004 dollars. The construction costs were based on the most current County unit costs. There was 40% contingency added for catch basin inlets, manholes, junction structures and other unknowns such as utility relocation. The design was estimated at 5% of the construction cost and the construction administration and inspection was also estimated at 15% of the construction cost.

The 10 Year and 20 Year CIP schedules are presented in the following Tables E -H. Costs were estimated for the proposed improvements on the basis of construction pricing as of January 2004. Construction costs and fees should be reviewed in the future for potential escalation of the costs based on the Engineering News Record's Construction Cost Index (ENR-CCI). Because most of the recommended facilities are located in the existing public right-of-way or easements, right-of-way acquisition costs were not included.

6.2 CAPITAL REPLACEMENT PROGRAM

The majority of the existing storm drain improvements were constructed between the years 1930 and 1970. The design life for the typical reinforced concrete storm drain is 50 to 100 years. The potential start of deterioration is between the years 1980 and 2020. Therefore the majority of the storm drain facilities in the City will be approaching and may have already approached their design life.

APPENDIX C

STORM DRAIN CONVEYANCE SYSTEM UPGRADES

APPENDIX C
STORM DRAIN CONVEYANCE SYSTEM UPGRADES

Proposed upgrades to the conveyance system are based on deficiencies revealed during the analysis of the existing storm drain system, described in Section 3, Analysis of Urban Runoff Conveyance System. According to this analysis, a pipe segment was designated deficient if it lacked sufficient capacity to convey the predicted inflows, based on upstream land uses, slopes, and soil data. Inflows were calculated for the 10-year and 25-year rain events, and resulting deficiencies were summarized.

The proposed solution to the conveyance deficiencies consists of adding a parallel pipe system to convey the excess flows. The costs developed for the parallel pipe system are based on increasing the total conveyance capacity to accommodate the 10-year storm, as required by the Los Angeles County Urban Flood control criteria. It is assumed that the balance of the 25-year and 10-year storms would be conveyed in the streets via curb and gutter, beneath the private property line.

Recommended conveyance upgrades have been prioritized based on the severity of the pipe's deficiency. Each pipe segment was ranked one, two, or three, with those ranked one being upgraded first. Pipes were assigned a one if they were 100 cfs or more deficient; a two if there were between 35 cfs and 99 cfs deficient; and a three if they were less than 35 cfs deficient.

Following are recommended storm drain conveyance system upgrade and associated cost for each basin.

AIRPORT BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Airport Basin include increasing the capacity of approximately 8,420 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-1. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-1. Airport Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost (2004 $)
23rd St.	Dewey St.	Navy St.	30"	450	$140,000
23rd St.	Pier St.	Pier Pl.	42"	160	$ 53,000
23rd St.	Pier Pl.	Oak St. Park	36"	1,300	$ 416,000
Ocean Park	23rd St.	Cloverfield Blvd.	48"	700	$ 238,000
Ocean Park	24th St.	25th St.	54"	300	$ 108,000
Ocean Park	25th St.	27th St.	36"	730	$ 234,000
Ocean Park	27th St.	29th St.	21"	710	$ 213,000

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost (2004 $)
Ocean Park	29th St.	30th St.	21"	400	$ 120,000
Ocean Park	30th St.	31st. St.	21"	720	$ 216,000
Ocean Park	23rd St.	22nd St.	18"	400	$ 96,000
Ocean Park	Marine Ave.	Navy St.	18"	350	$ 84,000
Ocean Park	Navy St.	Dewey St.	18"	350	$ 84,000
21st St.	Dewey St.	Hill St.	18"	1,850	$ 444,000
			TOTAL	**8,420**	**$ 2,447,000**

The cost to construct a parallel pipe system that would upgrade the Airport Basin storm drains to convey the 10-year rain event is approximately $2,447,000.

ASHLAND BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Ashland Basin include increasing the capacity of approximately 4,170 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-2. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-2. Ashland Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Ocean Ave.	Strand	Hollister	27"	300	$ 93,000
Barnard	Hollister	Wadsworth	30"	570	$ 177,000
Barnard	Wadsworth	Fraser	30"	500	$ 155,000
Barnard	Fraser	Ashland	27"	1,500	$ 465,000
Main St.	Ocean Park	Hill	33"	500	$ 160,000
Main St.	Hill	Ashland	36"	800	$ 256,000
			TOTAL	**4,170**	**$ 1,307,000**

The cost to construct a parallel pipe system that would upgrade the Ashland Basin storm drains to convey the 10-year rain event is approximately $1,307,000.

CENTINELA BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Centinela Basin include increasing the capacity of approximately 1,300 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-3. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-3. Centinela Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Between Homes on Dorchester Ave	Olympic Blvd.	Exposition Blvd.	18"	800	$ 192,000
Stewart St.	Kansas Ave	Yorkshire Ave.	18"	320	$ 77,000
Pico Blvd.	32nd St.	33rd St.	27"	180	$ 56,000
			TOTAL	**1,300**	**$ 325,000**

The cost to construct a parallel pipe system that would upgrade the Centinela Basin storm drains to convey the 10-year rain event is approximately $325,000.

GEORGINA BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Georgina Basin include increasing the capacity of approximately 4,905 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-4. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-4. Georgina Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Georgina	San Vicente	26th St.	33"	650	$ 208,000
Georgina	26th St.	25th St.	54"	600	$ 216,000
Georgina	25th St.	24th St.	33"	300	$ 96,000

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Georgina	24th St.	23rd St.	42"	320	$ 106,000
Georgina	23rd St.	22nd St.	72"	400	$ 192,000
Georgina	22nd St.	21st Place	66"	280	$ 112,000
Georgina	21st Place	21st St.	72"	350	$ 168,000
San Vicente	21st St.	20th St.	72"	400	$ 192,000
San Vicente	20th St.	19th St.	42"	350	$ 116,000
San Vicente	18th St.	17th St.	24"	500	$ 150,000
21st St.	Inlet pt.	San Vicente	18"	305	$ 73,000
20th St.	Inlet pt.	San Vicente	21"	330	$ 99,000
18th St.	Inlet pt.	San Vicente	18"	120	$ 29,000
			TOTAL	**4,905**	**$ 1,758,000**

The cost to construct a parallel pipe system that would upgrade the Georgina Basin storm drains to convey the 10-year rain event is approximately $1,758,000.

KENTER CANYON BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Kenter Canyon Basin include increasing the capacity of approximately 18,080 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-5. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-5. Kenter Canyon Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Alta Ave.	23rd St.	24th St.	18"	350	$ 84,000
Alta Ave.	24th St.	25th St.	36"	350	$ 112,000
Alta Ave.	25th St.	26th St.	27"	350	$ 109,000
Washington Ave.	Princeton	Harvard	18"	2,100	$ 505,000
California Ave.	24th St.	Chelsea	18"	370	$ 89,000
California Ave.	Chelsea	25th St.	27"	350	$ 109,000
Santa Monica Blvd.	5th St.	6th St.	33"	400	$ 128,000
Santa Monica Blvd.	6th St.	7th St.	18"	400	$ 96,000
Santa Monica Blvd.	9th St.	10th St.	60"	400	$ 152,000

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Santa Monica Blvd.	11th St.	12th St.	48"	400	$ 136,000
Santa Monica Blvd.	Euclid	14th St.	72"	400	$ 192,000
Santa Monica Blvd.	14th St.	15th St.	66"	400	$ 160,000
Santa Monica Blvd.	15th St.	16th St.	66"	400	$ 160,000
Santa Monica Blvd.	17th St.	18th St.	60"	400	$ 152,000
Santa Monica Blvd.	18th St.	19th St.	54"	400	$ 144,000
Santa Monica Blvd.	21st St.	23rd St.	42"	350	$ 116,000
Santa Monica Blvd.	26th St.	Princeton	18"	320	$ 77,000
Santa Monica Blvd.	Harvard	Yale	18"	320	$ 77,000
Broadway	Lincoln	9th St.	42"	400	$ 132,000
Broadway	10th St.	11th St.	36"	400	$ 128,000
Broadway	11th St.	12th St.	33"	400	$ 128,000
Broadway	12th St.	Euclid	30"	400	$ 124,000
Broadway	15th St.	16th St.	33"	400	$ 128,000
Broadway	16th St.	17th St.	36"	400	$ 128,000
Broadway	17th St.	18th St.	30"	400	$ 124,000
Broadway	19th St.	20th St.	18"	400	$ 96,000
Olympic Blvd.	16th St.	17th St.	18"	400	$ 96,000
Olympic Blvd.	18th St.	19th St.	18"	400	$ 96,000
Olympic Blvd.	20th St.	21st St.	18"	400	$ 96,000
4th	Santa Monica	Broadway	48"	680	$ 231,000
4th	Broadway	Colorado	54"	680	$ 245,000
4th	Colorado	I-10	60"	480	$ 183,000
Colorado	From east of 26th St.	City limits	24"	1,300	$ 402,000
Colorado	4th St.	5th St.	24"	500	$ 150,000
Lincoln Blvd.	Arizona	Santa Monica Blvd	33"	680	$ 218,000
14th	Arizona	Santa Monica Blvd	21"	680	$ 204,000
Stanford	Broadway	Santa Monica Blvd	18"	720	$ 173,000
Nebraska	Stanford	Stewert	54"	600	$ 216,000
Nebraska	Stanford	Berkeley	42"	300	$ 99,000
			TOTAL	**19,480**	**$ 5,995,000**

The cost to construct a parallel pipe system that would upgrade the Kenter Canyon Basin storm drains to convey the 10-year rain event is approximately $5,995,000.

LINCOLN BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Lincoln Basin include increasing the capacity of approximately 7,735 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-6. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-6. Lincoln Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Dewey St.	Rennie Ave.	7th St.	60"	850	$ 323,000
Dewey St.	7th St.	Ozone St.	66"	600	$ 240,000
Long Fellow	Ozone St.	Navy St.	30"	150	$ 47,000
Navy St.	Long Fellow	Lincoln Blvd.	78"	180	$ 101,000
Lincoln Blvd.	Navy St.	Ashland	27"	930	$ 289,000
Lincoln Blvd.	Ashland	Hill St.	66"	400	$ 160,000
Lincoln Blvd.	Hill St.	Ocean Park	36"	650	$ 208,000
Lincoln Blvd.	Ocean Park	Pine St.	36"	630	$ 202,000
Lincoln Blvd.	Pine St.	Cedar St.	36"	380	$ 122,000
Lincoln Blvd.	Cedar St.	Pearl St.	42"	420	$ 139,000
Pico Blvd.	Lincoln Blvd.	9th St.	42"	750	$ 248,000
Pico Blvd.	9th St.	11th St.	27"	472	$ 146,000
Ocean Park	10th St.	11th St.	33"	323	$ 103,000
11th St.	Pearl St.	Bay St.	18"	1,000	$ 240,000
			TOTAL	**7,735**	**$ 2,568,000**

The cost to construct a parallel pipe system that would upgrade the Lincoln Basin storm drains to convey the 10-year rain event is approximately $2,568,000.

MONTANA BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Montana Basin include increasing the capacity of approximately 10,225 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-7. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-7. Montana Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Montana Ave.	Junction Node	Ocean Ave.	48"	575	$ 196,000
Montana Ave.	2nd St.	4th St.	48"	850	$ 289,000
Montana Ave.	4th St.	Lincoln Blvd.	33"	1,400	$ 448,000
Montana Ave.	Lincoln Blvd.	10th St.	18"	800	$ 192,000
Montana Ave.	11th St.	12th St.	48"	500	$ 170,000
Montana Ave.	12th St.	16th St.	18"	700	$ 168,000
Montana Ave.	16th St.	17th St.	27"	350	$ 109,000
Montana Ave.	18th St.	19th St.	33"	400	$ 128,000
Montana Ave.	20th St.	21st St.	18"	480	$ 115,000
Montana Ave.	21st St.	21st Place	18"	320	$ 77,000
Montana Ave.	Palisades Beach Road	Ocean Ave.	48"	600	$ 204,000
Lincoln Blvd.	Alta Ave.	Utility Cover	42"	1,200	$ 396,000
Lincoln Blvd.	Utility Cover	Montana	18"	600	$ 144,000
11th St.	Alta Ave.	Montana	18"	850	$ 204,000
17th St.	Alta Ave.	Montana	21"	600	$ 180,000
			TOTAL	**10,225**	**$ 3,022,000**

The cost to construct a parallel pipe system that would upgrade the Montana Basin storm drains to convey the 10-year rain event is approximately $3,022,000.

PICO – 4TH STREET BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Pico – 4th Street Basin include increasing the capacity of approximately 2,770 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-8. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-8. Pico – 4th Street Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
4th St.	Pico Ave.	Bay St.	21"	350	$ 105,000
5th St.	Bay St.	Hollister St.	78"	1,500	$ 841,000
5th St.	Hollister St.	Ocean Park	72"	920	$ 442,000
			TOTAL	**2,770**	**$ 1,388,000**

The cost to construct a parallel pipe system that would upgrade the Pico – 4th Street Basin storm drains to convey the 10-year rain event is approximately $1,388,000.

PICO – CALTRANS BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Pico – Caltrans Basin include increasing the capacity of approximately 2,050 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-9. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-9. Pico – Caltrans Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Pico Blvd.	14th St.	16th St.	27"	750	$ 233,000
Cloverfield Blvd.	Virginia Ave.	Kansas Ave.	18"	700	$ 168,000
20th St.	Virginia Ave.	Pico Blvd.	27"	600	$ 186,000
			TOTAL	**2,050**	**$ 587,000**

The cost to construct a parallel pipe system that would upgrade the Pico – Caltrans Basin storm drains to convey the 10-year rain event is approximately $587,000.

PIER BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Pier Basin include increasing the capacity of approximately 3,440 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-10. The column called "Storm Drain Alignment" shows the

street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-10. Pier Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Santa Monica Ave.	3rd St.	2nd St.	18"	370	$89,000
Santa Monica Ave.	2nd. St.	Ocean Ave.	27"	400	$124,000
Ocean Ave.	Santa Monica Ave.	Broadway Ave.	33"	720	$231,000
3rd St.	Santa Monica Ave.	Broadway Ave.	33"	650	$208,000
Broadway Ave.	2nd. St.	Ocean Ave.	18"	380	$91,000
Ocean Ave.	Broadway Ave.	Colorado Ave.	24"	670	$201,000
Colorado Ave.	Ocean Ave.	2nd St.	24"	250	$75,000
			TOTAL	**3,440**	**$1,019,000**

The cost to construct a parallel pipe system that would upgrade the Pier Basin storm drains to convey the 10-year rain event is approximately $1,019,000.

SAN VICENTE BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the San Vicente Basin include increasing the capacity of approximately 600 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-11. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-11. San Vicente Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Ocean Ave.	San Vicente	Adelaide Dr.	27"	600	$ 186,000

The cost to construct a parallel pipe system that would upgrade the San Vicente Basin storm drains to convey the 10-year rain event is approximately $186,000.

WILSHIRE BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the Wilshire Basin include increasing the capacity of approximately 15,870 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-12. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-12. Wilshire Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Wilshire Blvd.	Ocean Ave.	3rd St.	24"	830	$ 249,000
Wilshire Blvd.	7th St.	Lincoln Blvd.	48"	450	$ 153,000
Wilshire Blvd.	16th St.	17th St.	78"	330	$ 185,000
Wilshire Blvd.	Out Fall	Palisades Beach Rd.	42"	600	$ 198,000
Wilshire Blvd.	Ocean Ave.	3rd St.	54"	800	$ 288,000
Wilshire Blvd.	3rd St.	4th St.	42"	400	$ 132,000
Wilshire Blvd.	6th St.	7th St.	24"	790	$ 237,000
Wilshire Blvd.	5th St.	6th St.	27"	400	$ 124,000
Wilshire Blvd.	4th St.	5th St.	42"	400	$ 132,000
4th St.	California	Wilshire Blvd.	24"	500	$ 150,000
14th St.	Washington	California	36"	700	$ 224,000
12th St.	Washington	California	21"	700	$ 210,000
10th St.	Washington	California	18"	700	$ 168,000
Lincoln St.	Washington	California	18"	700	$ 168,000
California	California	Wilshire Blvd.	42"	650	$ 215,000
California	Lincoln St.	9th St.	33"	360	$ 115,000
California	9th St.	11th St.	42"	800	$ 264,000
California	11th St.	12th St.	42"	400	$ 132,000
California	12th St.	Euclid	54"	670	$ 241,000
California	Euclid	14th St.	30"	220	$ 68,000
California	14th St.	15th St.	18"	570	$ 137,000
16th St.	Washington	California	21"	220	$ 66,000
17th St.	Washington	California	18"	700	$ 168,000
17th St.	California	Wilshire Blvd.	42"	630	$ 208,000
19th St.	Washington	California	18"	700	$ 168,000
California	17th St.	18th St.	48"	400	$ 136,000
California	18th St.	18th Court	24"	160	$ 48,000
California	18th Court	19th St.	33"	200	$ 64,000
California	19th St.	20th Court	24"	350	$ 105,000
California	20th Court	21st St.	18"	220	$ 53,000
California	21st St.	22nd St.	18"	320	$ 77,000

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
			TOTAL	**15,870**	**$ 4,887,000**

The cost to construct a parallel pipe system that would upgrade the Wilshire Basin storm drains to convey the 10-year rain event is approximately $4,887,000.

16TH STREET BASIN

The conveyance system upgrades necessary to provide Urban Flood protection in the 16th Street Basin include increasing the capacity of approximately 5,562 linear feet of storm drain by adding a parallel pipe system to the deficient sections. A tabular summary of the storm drain upgrades for the 10-year rain event is shown in Table C-13. The column called "Storm Drain Alignment" shows the street in which the deficient pipe segment is located, and "From" and "To" indicate the extent of the deficient segment. The required parallel pipe size is given in inches and the segment length in feet, and upgrade cost is shown in 2004 dollars. The details of the storm drain analysis are located in Appendix B.

Table C-13. 16th Street Basin Storm Drain Upgrades – 10-Year Storm

Storm Drain Alignment	From	To	Parallel Pipe Diameter (inches)	Length (feet)	Cost
Dewey Ave	16th St.	Robson St.	18"	580	$ 139,000
17th St.	Pier Ave.	Hill St.	30"	750	$ 233,000
16th St.	17th St.	Marine St.	48"	250	$ 85,000
16th St.	Marine St.	Lot 365/Marine St.	33"	206	$ 66,000
16th St.	Ashland Ave.	Oak St.	30"	500	$ 155,000
16th St.	Oak St.	Ocean Park	72"	350	$ 168,000
Ocean Park	16th St.	17th St.	42"	566	$ 187,000
Ocean Park	17th St.	18th St.	42"	570	$ 188,000
Ocean Park	18th St.	20th St.	42"	400	$ 132,000
Ocean Park	20th St.	21st St.	18"	440	$ 106,000
16th St.	Maple St.	Pearl St.	48"	950	$ 323,000
			TOTAL	**5,562**	**$ 1,783,000**

The cost to construct a parallel pipe system that would upgrade the 16th Street Basin storm drains to convey the 10-year rain event is approximately $1,783,000.

APPENDIX D

FINANCIAL ASSUMPTIONS AND COST OF SERVICE LOADS

Appendix D-1
Stormwater Fund 34 Current Assets

Asset Description	Improvements	Machinery and Equipment	Construction In Progress	Accumulated Depreciation	Net Book Value	Dept	Asset No.	Cost Account	Business Unit
Storm Treatment Plant Design	$0	$0	$290,061	$0	$290,061	500	40037	150025	C34039497
New City Accounting Software Sys	$0	$6,715	$0	($4,033)	$2,682	500	77331	150023	34661
Dry Weather Runoff Reclaim Fac.	$5,868,214	$0	$0	($293,411)	$5,574,803	760	110437	150022	C34039599
Stormwater System Improvements	$0	$0	$251,390	$0	$251,390	760	110461	150025	C34058801
GIS/Cad Workstations	$0	$29,035	$0	($11,614)	$17,421	760	110470	150023	C34085299
Storm Drain Improvements	$1,521,872	$0	$0	($126,554)	$1,395,319	760	110947	150022	C34055800
SMURRF Phase III	$0	$0	$838,931	$0	$838,931	760	126666	150025	C34055800
Total (a)	**$7,390,087**	**$29,035**	**$1,090,320**	**($431,578)**	**$8,077,864**				

Prepared by: Brian Johnson, Neal Shapiro
Asset values as of 6/30/2003 per R55120020.
a. The City CAFR lists the net book value as of 6/30/03 as $8.3 million.

Appendix D-2
Stormwater Fund O&M Allocations

Environmental Reimbursement Account 555660	Budget	Allocations
Advertising	$98,000	
Professional Services	$146,000	
Chemicals	$13,000	
Subtotal Non-labor O&M	$257,000	54%
Labor and Benefits	$ 221,000	46%
Total	$ 478,000	100%

Stormwater/Wastewater Account 578250		
O&M	$257,000	42%
Labor and Benefits	$ 357,000	58%
Total	$ 614,000	100%

Source: City staff reports on FY 2002-03 primary budgets by account.

Appendix D-3
Stormwater Expense Pollutant Allocations

		Budget Allocations			Load Type		Pollutant Allocations				
Descriptions	**Total FY 2002-03**	**Facilities**	**Labor & Benefits**	**Other O&M**	**Hydraulic**	**Pollutants**	**Nutrients**	**Solid Waste**	**Sediments**	**Toxics**	**Pathogens**
Account 34 274 Expenditures											
Direct payment to the Water Fund	$39,100				50%	50%		25%	50%	10%	15%
Bank Fees	$300				50%	50%		25%	50%	10%	15%
State Revolving Fund Interest	$115,309				50%	50%		25%	50%	10%	15%
1918 Main St Lease (Engineers)	$1,910				50%	50%		25%	50%	10%	15%
Total	$156,619										
Account 34 695 Interfund Transactions											
Engineering Transfer	$27,100	100%			50%	50%		25%	50%	10%	15%
SMURRF O&M Costs	$283,665		50%	50%		100%		25%	50%	10%	15%
Environmental Reimbursement	$558,085		46%	54%		100%		25%	50%	10%	15%
Stormwater/Wastewater	$838,545		58%	42%	50%	50%		25%	50%	10%	15%
Subtotal Transfer-out	$1,707,395										
Annual Depreciation	$204,585	100%			50%	50%		25%	50%	10%	15%
Total Expenses and Transfers	**$2,068,599**	11%	43%	38%	30%	70%	0%	25%	50%	10%	15%

Appendix D-4
Pollutant Loading Factors by Land Use Type

Land Use	Nutrient Sources					Toxics					
	Phosphate	Ammonia	Nitrate		Sediments	Lead	Cadmium	Mercury	Zinc	Copper	
Pollutant Loadings (kg/sq km-year)											
Residential	76.10	56.50	219.0		7,340	0.53	0.27	0.01	9.27	2.15	
Commercial	103.00	94.10	275.0		11,900	0.77	0.05	0.01	33.60	4.39	
Industrial	83.10	74.50	287.0		18,800	1.30	0.10	0.01	43.50	6.30	
Agriculture (row crops)	20.90	49.90	271.0		56,400	1.61	0.16	0.00	8.28	5.64	
Undisturbed	14.00	1.83	50.8		717	0.02	0.00	0.00	0.08	0.13	
Pollutant Load Coefficients (Units per Area)				**Nutrient Average**	**Sediment Average**						**Toxic Average**
Residential	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
Commercial	1.35	1.67	1.26	1.42	1.62	1.45	0.20	0.83	3.62	2.04	1.63
Industrial	1.09	1.32	1.31	1.24	2.56	2.45	0.37	2.33	4.69	2.93	2.56
Agriculture (row crops)	0.27	0.88	1.24	0.80	7.68	3.04	0.59	0.67	0.89	2.62	1.56
Undisturbed	0.18	0.03	0.23	0.15	0.10	0.04	0.01	0.33	0.01	0.06	0.09

Source: Modeling Storm Water Mass Emissions to the Southern California Bight, Ackerman and Schiff, Journal of Environmental Engineering, April 2003. Loads for chromium, DDT and nickel were excluded.

Appendix D-5
Pathogen Loading Reference by Land Use Type

Land Use	Pathogens Fecal Coliform	Total Coliform	Enterococcus	
Pollutant Loadings				
Residential	1.46E+04	7.56E+05	8.26E+03	
Commercial	3.20E+03	2.85E+05	2.00E+04	
Industry	1.07E+03	3.16E+04	2.45E+03	
Agriculture (row crops)	2.29E+04	2.02E+05	2.62E+04	
Undisturbed	5.90E+01	6.45E+03	3.82E+02	
Pathogen Load Coefficients (Load per Unit Area)				**Pathogen Average**
Residential	**1.00**	**1.00**	**1.00**	**1.00**
Commercial	0.22	0.38	2.42	1.01
Industry	0.07	0.04	0.30	0.14
Agriculture (row crops)	1.57	0.27	3.17	1.67
Undisturbed (grasslands)	0.00	0.01	0.05	0.02

Source: Modeling Arid, Urbanized Watersheds: Part II, Bacterial Runoff, Ackerman, December 2001

Appendix D-6
Refuse Loading Reference by Land Us

Santa Monica Parcel Area	Refuse Loads
Single Family Residential	**37%**
Commercial/Industrial/Apt	47%
Other	17%
Total	100%

Santa Monica Parcel Area	Area-based Loads
Single Family Residential	**1.0**
Commercial/Industrial/Apt	1.0
Other	1.0

Source: City of Carlsbad Regulatory Fee Study, 9/12/03. The weighting factors in the study were determined to be proportional to the loads removed from each customer class. The loads removed are represented by the refuse fee revenues.

Appendix D-7

Runoff and Pollutant Load Coefficient Summary

	Pollutant Load (per area)					
Class	**Nutrients**	**Solid Waste**	**Sediments**	**Toxics**	**Pathogens**	**Weighted Average**
Load Proportion (a)	0%	25%	50%	10%	15%	100%
Discharger						
Residential	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.0**
Commercial (b)	1.42	1.00	1.62	1.63	1.01	1.4
Manufacturing	1.24	1.00	2.56	2.56	0.14	1.8
Agricultural	0.80	na	7.68	1.56	1.67	4.2
Undisturbed	0.15	0.00	0.10	0.09	0.02	0.1

a. The load proportion represents the proportion of the Program costs allocable to the pollutant class.

b. Commercial dischargers include apartment complexes.

Appendix D-8
Load Characteristics Including Pollutants and Government Properties

Use Code	Definition	Program-based Loading Ratio: Runoff Factor (30%)	Runoff Ratios (30%)	Pollutant Factor (70%)	Billing Acreage	Updated Property Billing Units (SWPBU)	Updated Revenues
						Annual Rate ($/SWPBU):	$36
0100	Single Family Dwelling	0.4176	1.0	1.0	1,291	7,431	$267,516
010C	Condominium	0.8194	2.0	1.4	224	2,274	$81,866
010F	Cooperative MFD	0.6185	1.5	1.4	4	32	$1,166
0200	Double, Duplex	0.4176	1.0	1.4	89	733	$26,396
0300	Three-Unit	0.6815	1.6	1.4	85	810	$29,149
0400	Four-Unit	0.8194	2.0	1.4	93	949	$34,170
0500	Five Or More Apartments Or Units	0.8553	2.0	1.4	519	5,355	$192,764
0900	Mobile Home Parks	0.8194	2.0	1.4	5	47	$1,675
Subtotal Multi-family Residential				1.4	1,018	10,200	$367,185
Subtotal Residential					2,309	17,631	$634,701
1000	Open Commercial	0.4733	1.1	0.1	4	10	$365
1100	Stores	0.9086	2.2	1.4	68	719	$25,879
1200	Store Combinations (W Office Or Resid)	0.9086	2.2	1.4	59	622	$22,407
1300	Department Stores	0.9086	2.2	1.4	5	56	$2,031
1400	Supermarkets	0.9762	2.3	1.4	10	108	$3,906
1500	Shopping Centers (Community)	0.9578	2.3	1.4	10	113	$4,068
1600	Shopping Centers (Regional)	0.9461	2.3	1.4	6	64	$2,312
1700	Office Buildings	0.9086	2.2	1.4	157	1,655	$59,583
1800	Hotels And Motels	0.9578	2.3	1.4	26	282	$10,148
1900	Professional Buildings	0.9578	2.3	1.4	19	200	$7,217
2100	Restaurants And Cocktail Lounges	0.9461	2.3	1.4	21	225	$8,100
2300	Banks And Savings & Loans	0.9578	2.3	1.4	10	109	$3,917
2400	Service Shops	0.9461	2.3	1.4	4	39	$1,412
2500	Service Stations	0.9578	2.3	1.4	6	66	$2,381
2600	Auto, Rec & Constr. Equip., Sales & Svc	0.9461	2.3	1.4	45	481	$17,314
2700	Parking Lots (Comm-Use Properties)	0.9461	2.3	1.4	57	610	$21,949
Subtotal Commercial				1.4	506	5,361	$192,990
3100	Light Manufacturing	0.9086	2.2	1.8	76	960	$34,546
3200	Heavy Manufacturing	0.9086	2.2	1.8	10	129	$4,654
3300	Warehousing, Distribution, Storage	0.9086	2.2	1.8	28	350	$12,606
3600	Lumber Yards	0.9578	2.3	1.8	3	37	$1,340
3800	Parking Lots (Ind-Use Properties)	0.9086	2.2	1.8	6	80	$2,895
Subtotal Industrial				1.8	124	1,557	$56,041
6400	Clubs, Lodge Halls, Fraternal Orgs	0.9086	2.2	1.4	9	97	$3,502
7100	Churches	0.8194	2.0	1.4	21	214	$7,716
7200	Schools	0.8194	2.0	1.4	14	141	$5,083
7400	Hospitals	0.7435	1.8	1.4	9	88	$3,159
7500	Homes For Aged And Others	0.6815	1.6	1.4	9	86	$3,087
8100	Utilities	0.4733	1.1	1.4	7	60	$2,142
Varies	Miscellaneous Parcels	Varies		1.4	63	595	$21,422
Subtotal Institutional				1.4	132	1,281	$46,112
Total Stormwater Program Billing (Private Properties)					**3,071**	**25,829**	**$929,844**
Unknown Customers					454	4,460	$160,569
8800	Government-owned Properties (a)	0.9086	2.2	1.4	585	6,184	$222,620
Street Right of Ways, Freeways, Parks and Beachfronts					1,262	0	$0
Total City Area					**5,373**	**36,473**	**$1,313,033**

Source: City of Santa Monica billing database for FY 2003-04 and City GIS information for non-billed areas.
The accounts have been consolidated into specific and generic land use classifications as defined by the LA County Flood Control District. The runoff factors are based on District standards.
The annual Basic Fee (BF) is $36/PBU for non-governmental parcels, and less for non-City governmental parcels. Use Code 8800 is assumed to be City-owned parcels.
a. Government-owned properties (excluding the City's) are not charged for capital expenses, per City Ordinance.

Appendix D-9
Financial Assumptions

Description	FY 2003-04	FY 2004-05	FY 2005-06	FY 2006-07	FY 2007-08	FY 2008-09	FY 2009-10
CPI Inflators		2.35%	2.31%	2.62%	2.57%	2.18%	2.18%
COLA Inflation		2.85%	2.81%	3.12%	3.07%	2.68%	2.68%

Stormwater Fund 34 Reserves (b)	
Cash & Investments	$1,698,405
Plus Accounts Receivable	$16,317
Plus Tax Receivable	$6,421
Less Total Liabilities	($267,572)
Adjustments	($253,571)
6/30/03 Fund Ending Balance (c)	$1,200,000
Stormwater Fund 34 Obligations (c)	$4,396,995

Bonded Debt (municipal revenue bond or Certificate of Participation)	
Debt Term (years)	30
Cost of Issuance	2%
Municipal Bond Average Interest Rate	5.0%
Reserve Requirement (Years of Debt)	1

a. The capital cost escalations are based on the increase in 2003 for the Engineering News Record construction cost index (ENRCCI) for Los Angeles.

b. Prepared by: Brian Johnson, Neal Shapiro as of January 25, 2004 Per City CAFR for FY 2002/03

c. The City CAFR lists the cash and investments as of 6/30/03 as $1.2 million.

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