

**CITY OF OAKLAND  
COUNCIL AGENDA REPORT**

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OFFICE OF THE CITY CLERK  
OAKLAND  
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TO: Office of the City Manager  
ATTN: Deborah Edgerly  
FROM: Public Works Agency  
DATE: April 27, 2004

RE: REPORT AND PRESENTATION ON THE STORM DRAINAGE MASTER PLAN DRAFT RECOMMENDATIONS AND REQUEST FOR DIRECTION FROM COUNCIL

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**SUMMARY**

This report and presentation provides a summary of the work completed under Oakland's Storm Drain Master Plan Study, key findings and recommendations for capital improvements to the storm drainage system. The report also addresses the Clean Water Program and ongoing storm drainage system maintenance and operations. A separate report and recommendation for funding the needed capital improvements and the ongoing operating costs of maintenance and the Clean Water Program will be presented at a later date.

The Storm Drain Master Plan (SDMP) study was initiated in response to many complaints from the public about flooding and other storm related problems in Oakland throughout 1990s. Its intent was to assess the existing conditions of Oakland's storm drainage infrastructure and recommend an overall management program for its development and improvements. After an extensive field inspection and condition assessment work, establishing a comprehensive digital inventory and building a hydraulic model, the study has released its recommendations for capital improvement and expanded maintenance programs.<sup>1</sup>

Key conclusions include the following:

- While much of Oakland's storm drainage system is in structurally sound condition, critical portions of the system are failing and the remainder is approaching the end of its serviceable life;
- Oakland's existing storm drainage asset has a replacement value of approximately \$1.1 billion;
- The system needs an additional investment of \$200 million in capital improvements;
- Existing maintenance levels are not sufficient to prevent maintenance-related flooding, erosion and other problems throughout the system, and an increase in the support of maintenance is recommended;
- Water quality and watershed protection programs mandated by federal and state law represent new fiscal demands upon the City.

The executive summary of the SDMP is included as Attachment "A".

The SDMP makes recommendations for a prioritized capital improvement program and maintenance of the storm drainage system, creeks and waterway protection. These are consistent with the Mayor / Council Goals and Citywide Objectives—**Maintain and Enhance Oakland's Physical Assets and Implement Programs that Protect and Conserve Natural Resources.**

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<sup>1</sup> CH2MHILL, selected through a formal qualification-based Request for Proposal process, is preparing the SDMP.

Staff will present a comprehensive report on the budgetary needs and funding opportunities to support needed storm drainage infrastructure improvements, continue implementing Oakland's Clean Water Program, and enhance the storm drainage maintenance needs in May.

Staff recommends that Council accept this report and direct staff to prepare funding alternatives for Council consideration, and prepare a Final Storm Drainage Master Plan for Council consideration in June.

## **FISCAL IMPACTS**

This is an informational report and there is no direct fiscal impact to existing City funds. This report outlines the costs of the proposed capital improvements and related program enhancements. A summary of funding alternatives and a recommendation for funding the program will be presented in May.

## **BACKGROUND**

The storm drainage system in Oakland consists of a collection of small and scattered networks of underground pipes and drainage structures interconnected with natural watercourses, flood control systems, Lake Merritt, and the San Francisco Bay.<sup>2</sup> In the Hills area, the storm drainage system is primarily an unimproved system as storm runoff mostly flows through street-swales, natural watercourses, and creeks. Below the hills, some areas of Oakland are served by well-planned but aging systems constructed when those neighborhoods were originally developed. Many other areas lack any significant drainage system.

Much of the system was constructed over a relatively short period between 60 and 70 years ago and has long suffered from inadequate resources to keep up with needed improvements. In recent years, demand and burden on the system have been increased by additional infill development. Both normal and El Nino type events have caused increasing instances of flooding, erosion and property damage. This has resulted in an urgent need to evaluate the City's overall storm drainage programs and policies and prepare a road map for its future development and needed improvements.

Following a dramatic increase in flooding and other storm related problems throughout Oakland, in 1997 the City Council appointed the Storm Drain Task Force (Task Force) and charged it with reviewing the City's storm drainage programs and policies and formulating needed revisions. The Task Force concluded its work late in 1999 and concluded that Oakland's storm drain system is aging and needs capital improvements, creek and watercourse enhancements, expanded maintenance, and water quality and development review programs. The Task Force also recommended that Oakland find a dedicated source of funding for storm drainage maintenance and capital improvements.

Following consideration of one funding proposal, the City Council established the Storm Drainage Finance Committee to review all potential sources of funding such a program. The committee's recommendations were presented to Council in spring 2001. The recommendations included consideration of a 100 million dollar bond to cover the capital improvement needs of the storm drainage system. After considering these

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<sup>2</sup> Flood control systems, consisting of many of the large trunk lines and creeks in Oakland, are owned and operated by the Alameda County Flood Control & Water Conservation District.

recommendations, the Council directed staff to initiate a comprehensive master plan in order to have a prioritized list of projects that would result in needed improvements to the system.

Following a formal qualifications-based selection process, the City contracted with CH2MHILL Consultants to perform a comprehensive engineering study of Oakland's storm drainage system. This report and the accompanying presentation focus on the recommendations for capital improvement projects, maintenance and related watershed management programs while providing a brief summary of the scope and extent of work culminating in the recommendations.

## **MASTER PLAN PROJECT DESCRIPTION**

Attachment "B" is a PowerPoint presentation that details the work completed and the recommendations included in the SDMP. The following is a summary of that work and recommendations.

The Context of the Study: The goal of the master plan is to establish the foundation for comprehensive management of the storm drain facilities, improve overall drainage conditions throughout Oakland, ensure longevity of the system at an appropriate level of service, enhance water quality and prevent excessive flooding events. It also provides the City with the necessary information and tools to support sustainable future land development planning and policies. Key objectives of the study include a comprehensive inventory and mapping of the existing public storm drainage facilities using Geographical Information System (GIS) technology, providing a computerized asset management system, building a hydraulic model to simulate storm events and assess the system's capacity, and developing a capital improvement program.

Inventory and Mapping: Oakland has kept records of its storm drainage system on various forms of paper maps since the early 1930's. A key component of this study was to review and correct those maps and move to a computerized mapping system. After collecting and reviewing existing system maps and data, the first task of the study was to field-verify the inventory information and construct a comprehensive digital inventory and mapping of the system. This was accomplished by conducting an extensive field inspection program, which included physical condition assessment and closed circuit television inspection of the structures and pipe network. A comprehensive digital inventory using GIS technology was developed. This inventory was coordinated with the Creek Mapping Project to provide for one continuous drainage network, which provided the basis for the next phases of the study—building a hydraulic model and identifying the needed capital improvements.

Building a Hydraulic Model: In order to predict the performance of a storm drainage system during storm events, a hydraulic model was used to simulate the flow of storm runoff through the storm drainage system and assess the hydraulic capacity of the system. Deficiencies in the system were identified, and proposed solutions can be tested to mitigate flooding problems. The model uses many factors such as zoning and land use, soil conditions, topography, and overall watershed characteristics to calculate the amount of storm water runoff from a given area.

An effective modeling effort must also take a regional approach incorporating data from the neighboring cities and providing continuity of results from rainfall in the hills through the City and out to the Bay, regardless of jurisdictions. For this purpose, the City and Alameda County Flood Control and Water

Conservation District have collaborated extensively in this effort, sharing data and coordinating modeling strategies.

Check with Known Problems: The consultants also held extensive interviews with staff from the PWA, CEDA, Parks and Recreation, and others and reviewed reports of actual flooding to develop a comprehensive list of known problem areas. This list of known problems was used to verify the results of the hydraulic model, as well as to help prioritize recommended capital improvements.

Develop and Prioritize a Capital Improvement Program: Following completion of the modeling work, a list of capital improvement projects was developed incorporating the results of capacity analysis and field condition assessment to address flooding and aging infrastructure needs. This list was prioritized based on industry standard prioritization methods provided by the consultant and modified for use in Oakland using local factors. These factors provided a project ranking based on a risk-benefit analysis of each project depending on the type of problem, location of impact, and the source of problem.<sup>3</sup> The level of protection against flooding provided by the recommended capital improvement program coincides with region-wide (the Alameda County Flood Control District) design guidelines and is based on the tributary area of storm facilities.<sup>4</sup>

Prepare Final Report: Major tasks of the SDMP study leading to the recommendations are complete. The next steps include customizing the computerized asset management system and GIS inventory maps, and preparing final report. The final report will detail the study's findings, approach and methodology, and recommendations. It will be released in June 2004 and staff will present it to the City Council for adoption at that time.

## KEY ISSUES AND IMPACTS

Capital Improvement Program: The Storm Drain Master Plan has identified and recommends a prioritized capital improvement program along with a long-term system rehabilitation and replacement program and expanded maintenance that require significant funding. The study concludes that Oakland's existing storm drainage asset is worth approximately 1.1 billion dollars (its replacement cost), and that it needs approximately \$200 million for system expansion, rehabilitation and capacity improvements. These needs are outlined as follows:

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<sup>3</sup> Rankings from the following three categories, listed from high to low in the order of priority, were compounded to prioritize projects: 1) Type of Problem; 2) Location of Impact; and 3) Source of Problem. Details of the prioritization system are outlined in Attachment "A".

<sup>4</sup> For facilities serving an area of less than 50 acres, the program provides protection against any storm event that has a 10 percent (one in 10) probability of recurring in any given year. For facilities serving an area of larger than 50 acres, the program provides protection against any storm event that has a 6.7 percent (one in 15) probability of recurring in any given year. These are sometimes referred to as 10- and 15-year storm events.

Program Component	Length	Portion of System By Length	CIP Need	Portion of System By Value
New Facilities	10,000	1.0%	\$ 11.0	1.0%
Increase Capacity to Reduce Flooding – High Priority	12,000	0.6%	\$ 18.1	1.7%
Increase Capacity to Reduce Flooding – Medium Priority	34,000	1.7%	\$ 53.4	4.9%
Increase Capacity to Reduce Flooding – Low Priority	50,000	2.5%	\$ 75.4	7.1%
Increase Capacity for Future Development	4,000	0.2%	\$ 4.6	0.5%
Replace Failing Pipes & Structures	30,000	1.0%	\$ 32.0	2.9%
Creek Revitalization	--	--	\$ 5.2	--
<b>Total *</b>	<b>140,000</b>	<b>7%</b>	<b>\$ 199.7</b>	<b>18.2%</b>

\* - Line items may not total exactly due to rounding.

This additional investment would a) improve overall drainage conditions throughout Oakland, b) protect and preserve the asset, c) ensure safe and sufficient infrastructure for the present and future, and d) reduce ongoing repair costs and avoid increased liability costs in the future. These recommended improvements are outlined in the SDMP and are recommended for implementation.

Oakland’s Clean Water Program and Annual Operations and Maintenance: In addition to the cost of recommended capital improvements and expanded maintenance, there are ongoing operating and maintenance programs that currently have funding challenges. These programs include ongoing storm drain system maintenance, water quality and watershed protection programs mandated by the Clean Water Act, Creek and Watershed Protection and Enhancement, Water Quality Resources Protection and Pollution Prevention, and Community Watershed Improvement Education and Assistance. The following is a summary of these programs, and their annual costs:

Program Description	Annual Cost
System Maintenance	\$ 2,885,000
Creeks and Watershed Protection & Enhancement <sup>(a)</sup>	\$ 275,000
Water Quality Resources Protection & Pollution Prevention <sup>(b)</sup>	\$ 700,000
Annual Payment to Alameda County, Clean Water Program Fees <sup>(c)</sup>	\$ 500,000
Community Watershed Improvement Education & Assistance <sup>(d)</sup>	\$ 225,000
Development compliance <sup>(e)</sup>	\$ 460,000
<b>Total</b>	<b>\$ 5,045,000</b>

(a) Illegal dumping prevention and enforcement, post-construction project monitoring and maintenance for creek revitalization projects

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- (b) Clean water and water quality regulatory activities – industrial and commercial inspection programs, enforcement, water quality monitoring, discharge and site controls and maintenance, watershed management planning, permitting fees
- (c) City share for jointly implemented water quality regulatory activities (mandated cost)
- (d) Technical assistance for residents, community education, workshops, manuals, training
- (e) Design, review, and oversight of public and private drainage improvements, storm water quality controls and implementation, construction monitoring, site design, source controls, pollution treatment, long-term monitoring maintenance and operations inspections

## **DISABILITY AND SENIOR CITIZEN ACCESS**

The Storm Drainage Master Plan recommends a capital improvement program, which will include opportunities to address disability and access issues in each of the capital improvement projects. Flooding at intersections, crosswalks and other locations presents a particular barrier to persons with disabilities. Improvements proposed in the Storm Drainage Master Plan will eliminate those barriers.

## **SUSTAINABLE OPPORTUNITIES**

Economic: The SDMP recommends a major capital improvement effort throughout all Oakland neighborhoods to improve existing storm drainage infrastructure, expand the drainage system where needed, and provide adequate funding for maintenance efforts. If the SDMP is adopted, projects constructed under the program will provide significant construction opportunities for local businesses and workers. Projects recommended in the SDMP will mitigate existing and future flooding and erosion problems throughout Oakland that impede economic activity in the private sector. Finally, implementation of the SDMP recommendations will enhance Oakland's management of this important asset.

Environmental: Projects recommended in the SDMP will be designed to enhance water quality through the reduction of erosion and sediment transfer; the focus on retaining natural watercourses; and the rehabilitation of existing drainage structures that currently cause erosion. The Clean Water Program has been successful in improving community ownership of creek resources in Oakland and has improved Oakland's efforts to continually improve water quality throughout the City.

Equity: The SDMP makes recommendations for capital improvements throughout all neighborhoods in Oakland. Implementation of the program will provide projects that eliminate flooding, much of which occurs in economically disadvantaged areas of the City. The Clean Water Program includes outreach and education activities to students and community members throughout Oakland.

## **RECOMMENDATION AND RATIONALE**

Staff recommends acceptance of this report. To adequately fund the capital improvements called for in the Draft Storm Drainage Master Plan, the Clean Water Program and storm drainage system maintenance, staff also requests direction to prepare a funding proposal for consideration by the Council in May. Staff also requests direction to finalize the Draft Storm Drainage Master Plan for adoption by the Council.

**ACTION REQUESTED OF THE CITY COUNCIL**

Staff recommends acceptance of this report, direction to present a funding proposal in May, and direction to finalize the Storm Drainage Master Plan.

Respectfully submitted,



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Director, Public Works Agency

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APPROVED AND FORWARDED TO  
THE PUBLIC WORKS COMMITTEE:

  
**OFFICE OF THE CITY MANAGER**