



Community Environmental Advisory Commission

ACTION CALENDAR  
March 19, 2013

To: Honorable Mayor and Members of the City Council  
From: Community Environmental Advisory Commission  
Submitted by: Laura August, Chairperson, CEAC  
Subject: Watershed Management Plan and Measure M Recommendations

RECOMMENDATION

Authorize the City Manager to prioritize the expenditure of Measure M funds as follows:

1. Use scenario-based planning to guide allocation of Measure M funds that treat street and watershed objectives equitably, and that includes key stakeholders in the process, including the Community Environmental Advisory and Public Works Commissions.
2. Dedicate a portion of bond revenues toward staff to leverage Measure M funds and seek outside grants.
3. Implement cost effective green infrastructure (GI) and low impact development (LID) projects from Watershed Management Plan. It is not cost effective to allocate funds for large capital projects to maintain Aquatic Park.

SUMMARY

Streets and storm water are in need of repair. The CEAC supports a planning process that incorporates key stakeholders in the allocation of Measure M funds and encourages projects that simultaneously improve the quality of streets and the health of watersheds. At CEAC meetings, both UC-Berkeley and EBMUD have expressed interest in partnering with the City on federal and state grant applications. In regards to the Watershed Management Plan, the CEAC recommends the emphasis of green infrastructure and low impact development projects over capital intensive pipe enlargement. Considerations on the potential impacts of climate change (e.g. sea-level rise) are also needed before making major capital investments to Aquatic Park.

FISCAL IMPACTS OF RECOMMENDATION

The recommendations do not increase City expenditures, but address how current revenues can be best utilized.

CURRENT SITUATION AND ITS EFFECTS

The City's stormwater infrastructure consists of approximately 100 miles of pipelines and culverts that collect and convey stormwater to the San Francisco Bay. This system is nearly 80 years old and past its design lifetime. The City has developed a Watershed

Management Plan (WMP) to guide and budget capital improvements to the stormwater infrastructure, first released on October 25, 2011. On November 6, 2012, Measure M (the Street and Watershed-Related Improvements Bond) passed with 73% of the electorate approving. The CEAC has reviewed the WMP, considering both the environmental benefits and cost-effectiveness of proposed projects.

## BACKGROUND

The City of Berkeley covers an area of approximately 10.5 square miles and contains parts of 10 watersheds. These watersheds include the Cerrito, Wildcat, Marin, Codornices, Gilman, Schoolhouse, Strawberry, Temescal, Potter and Aquatic Park basin. The WMP addresses only the two largest: Potter and Cordonices. The Potter basin encompasses most of South Berkeley, ~2,700 acres, below University Avenue and UC-Berkeley. The Cordonices basin encompasses ~800 acres north of UC-Berkeley and south of Marin Avenue.

The storm drain system was built primarily to convey water away as quickly as possible to prevent flooding. Roadways, rooftops, and other paved surfaces exacerbate flooding by not allowing rainwater to percolate into the ground, increasing stormwater flows. This can lead to flooding as well as erosion of stream banks. Though the system was designed to handle a 10-year storm event (2" in 6 hours), hydraulic modeling of the Potter and Codornices watersheds predict approximately 11 and 14 million gallons of flooding in each, respectively. Flooding occurs in multiple locations in West Berkeley.<sup>1</sup>

In addition to flooding, stormwater quality is of concern. During the dry season, pollutants (e.g. oils/grease, heavy metals, pesticides, etc.) accumulate on city surfaces (e.g. streets). These pollutants get flushed when it rains, especially after the first major storm of the year. This adversely impacts water quality in Berkeley's waterways, as well as San Francisco Bay. Much of the storm drain infrastructure was constructed prior to when stormwater quality was a consideration, and therefore was not designed to remove pollutants before discharging to San Francisco Bay or Aquatic Park.

The WMP is intended to guide spending on capital improvements to the stormwater system by: protecting water quality, reducing urban flooding, preserving natural waterways and habitat, and reusing rainwater. Measure M was recently passed by the electorate, and raises \$30 million to improve both streets and watersheds. The CEAC reviewed the WMP and Measure M, and makes the following recommendations:

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<sup>1</sup> See <http://www.berkeleydailyplanet.com/issue/2006-01-10/article/23163?headline=West-Berkeley-Flood-Damage-Meeting-Set-By-Richard-Brenneman>. Furthermore it is important to note that if the current preferred option for the Aquatic Park Improvement Project (APIP) is approved, flooding will **increase** in the lower Potter watershed. CEAC's recommendation to fund green infrastructure rather than pipe enlargement is designed to reduce flooding impacts by reducing and slowing stormwater flows.

### *Why Scenario-Based Planning?*

In contrast to traditional approaches to planning which are based on past trends to project the future, scenario-based planning first seeks to understand the future and then develop plans to meet desirable outcomes. Because the future is uncertain, several probable scenarios are assessed and more than one pathway may be available. Why is this approach important for streets and watersheds? In a 2009 report, The Transportation Research Board of the National Academies of Science found:

*“The past several decades of historical regional climate patterns commonly used by transportation planners to guide their operations and investments may no longer be a reliable guide for future plans. In particular, future climate will include new classes (in terms of magnitude and frequency) of weather and climate.”<sup>2</sup>*

In particular they found that the greatest impact to transportation is in flooding from sea-level rise and storm surges of coastal roads, railways, etc. Expected increases in the frequency and intensity of hot days can impair the integrity of pavement through softening and lead to traffic-related rutting. Increases in intense storms may lead to increased erosion of roads and bridges, and damages from landslides.

Restoring the health of our coastal ecosystems is also critical, a key finding by the National Oceanic and Atmospheric Administration:

*“Coastal states and communities will need strategies to enable them to manage current stressors and the confounding impacts of a changing climate to conserve, protect, and restore coastal habitats. Easing the existing pressures on coastal environments to improve their resiliency is one method of coping with the adverse effects of climate change.”<sup>3</sup>*

As a coastal city, the consequences of climate change will be very real for Berkeley. It is imperative that the process for allocating Measure M funds make a down-payment on approaches that address this uncertain future. Solutions that integrate streets and watersheds are strongly encouraged. For example, the use of permeable pavement is promising and has been employed in several locales across the U.S. including Portland, neighboring El Cerrito, and the Port of Oakland. According to a report by the Public Works Commission, the initial costs are 50-60% higher than traditional pavement, but the lifetime is 3-5 times longer (50-100 years). Because streets cover ~20% of Berkeley's surface area, they are a significant contributor to increased stormwater flows. Permeable pavement reduces flooding by allowing rainwater to infiltrate into the ground, rather than run off quickly to low-lying areas downstream.

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<sup>2</sup> Transportation Research Board, Potential Impacts of Climate Change on U.S. Transportation. See <http://onlinepubs.trb.org/onlinepubs/sr/sr290.pdf>

<sup>3</sup> National Oceanic and Atmospheric Administration, Coastal Impacts, Adaptation, and Vulnerabilities. See [http://downloads.usgcrp.gov/NCA/technicalinputreports/Burkett\\_Davidson\\_Coasts\\_Final\\_.pdf](http://downloads.usgcrp.gov/NCA/technicalinputreports/Burkett_Davidson_Coasts_Final_.pdf)

### *Leveraging Measure M*

Measure M bond revenues should be leveraged by dedicating \$50,000/year for a 0.5 FTE position that will seek other funding sources to implement the critical elements of the Watershed Plan both after the bond revenues are exhausted. Funding from both state and federal grant programs is available<sup>4</sup>, and in-kind services such as volunteer cleanup and maintenance efforts can augment bond-funded projects. At previous CEAC meetings, both representatives of UC-Berkeley and EBMUD expressed interest in partnering with the City on grant applications, and the staff person hired with bond revenues can facilitate this coordination.

### *Green Infrastructure over Pipe Enlargement*

Green infrastructure (GI) and low impact development (LID) projects mimic the natural environment by allowing rainwater to collect and infiltrate through porous media. This can serve numerous purposes including: (1) remove pollutants, (2) decrease stormwater flow and flooding, and (3) replenish groundwater supplies. At a cost of ~\$0.5M per project, GI and LID can be a cost effective solution for improving water quality AND reducing flooding. Examples of such projects include rain gardens, permeable pavement, green roofs, and infiltration basins. Careful placement of GI/LID projects is needed to maximize benefits, and should be based on hydraulic modeling. In general, projects located in the upper watershed (i.e. at higher elevations near the Berkeley hills) can have a greater potential of reducing stormwater volumes and flooding downstream and improving water quality.

The WMP also suggests pipe enlargement projects and underground storage to reduce flooding in the Potter and Codornices watersheds. These projects are capital intensive and require extensive construction. Enlargement of the main trunkline in the Potter and Codornices watersheds is estimated to cost \$17M and \$6M, respectively. In addition to high costs, these projects do not guarantee reduced flooding, are potentially susceptible to earthquakes, and do not achieve any water quality improvement. Because smaller pipes connect drain inlets to the main trunklines, flooding will still occur if these smaller pipes become overwhelmed regardless of trunkline capacity during a major storm event. Given that Measure M only issues \$30M in bonds for streets and watersheds, the CEAC recommends emphasizing GI/LID over pipe enlargement projects in the WMP.

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<sup>4</sup> At the state level, funding is available from Proposition 84 funds. See [http://www.swrcb.ca.gov/water\\_issues/programs/grants\\_loans/prop84/index.shtml](http://www.swrcb.ca.gov/water_issues/programs/grants_loans/prop84/index.shtml), accessed January 21, 2013. At the federal level, funding is available through a partnership between the Environmental Protection Agency (EPA), the Housing and Urban Development Agency (HUD), and the Department of Transportation (DOT). See <http://www.epa.gov/dced/partnership/>, accessed January 21, 2013.

### *Aquatic Park*

The CEAC also recommends that effects of climate change, in particular sea-level rise, be considered before making major capital investments to maintain Aquatic Park. Sea levels are expected to rise by up to 66 inches by 2100, and potentially inundate I-80.<sup>5</sup> In addition, increasing trunkline capacity to bypass stormwater discharge into Aquatic Park (~\$17M) could have the unintended consequence of conveying pollution more efficiently to San Francisco Bay, adversely impacting Berkeley's shorelines. The CEAC believes a more cost-effective approach in the long-run to maintaining Aquatic Park is to build GI/LID projects that prevent pollution from entering the storm drains in the first place, restore habitats in the creeks entering the park, and increase tidal flows with the Bay (i.e. clear pipes underneath I-80).

CEAC took this vote on February 7, 2013

Action: Motioned/ Seconded/Carried (Gomberg/Torkelson)

Votes: Ayes: 5

Noes: None. Absent: None. Abstain: 1

### RATIONALE FOR RECOMMENDATION

The stormwater system is 80 years old and in need of major capital improvements. GI/LID projects such as permeable pavement can repair streets AND improve watersheds. Given limited financial resources, \$30M raised by Measure M, the funds need to be leveraged and spent in a cost effective manner. Whereas pipe enlargement addresses flooding only, GI/LID projects can achieve multiple benefits (flooding AND water quality) and be incorporated with streets. For this reason, the CEAC recommends that GI/LID (\$0.5M) be emphasized over pipe enlargement (\$6M-\$17M).

### ALTERNATIVE ACTIONS CONSIDERED

The CEAC reviewed a range of projects listed in the WMP and focused discussion on the proposed funding levels. The CEAC found the lowest funding level (\$2.1M y<sup>-1</sup>) insufficient. However, the CEAC believes the higher funding levels incorporate capital-intensive projects which are not cost-effective. The CEAC recommends a repackaging of projects which emphasizes GI/LID over pipe enlargement.

### CITY MANAGER

See companion report.

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<sup>5</sup> National Research Council, Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, 2012. See [http://www.nap.edu/catalog.php?record\\_id=13389](http://www.nap.edu/catalog.php?record_id=13389)

