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CITY OF OAKLAND

AGENDA REPORT

TO: Office of the City Administrator
ATTN: Deanna J. Santana
FROM: Public Works Agency
DATE: October 25, 2011

RE: Informational Report On Options For Low Impact Development Street Design, Including Permeable Paving And Other Stormwater Runoff Mitigation Strategies In The City's Long-Term Paving And Streetscape Plans, To Include Analysis Of Regulatory Guidelines, Costs And Benefits, And Potential Funding Opportunities; And Receive A Presentation From The California Environmental Protection Agency, Regional Water Quality Control Board

SUMMARY

The Public Works Committee requested an Informational Report on the options for Low Impact Development (LID) street design, including permeable paving and other stormwater runoff mitigation strategies in the city's long-term paving and streetscape plans, to include analysis of regulatory guidelines, costs and benefits, and potential funding opportunities; and receive a presentation from the California Environmental Protection Agency, Regional Water Quality Control Board.

This is an informational report only and no action is requested of the City Council.

FISCAL IMPACT

Since this is an informational report only, no fiscal impacts are included.

BACKGROUND

In October 2009, the San Francisco Regional Water Quality Control Board adopted new stormwater regulations for counties and municipalities in the San Francisco Bay Area. Stormwater that falls onto impervious surfaces like streets, parking areas and rooftops, picks up pollutants and flows untreated to local creeks, lakes and the bay. In addition, it no longer infiltrates into the local soil but quickly leaves the site, increasing velocity and peak runoff, causing erosion and down stream flooding. The new stormwater regulations require cities to install Low Impact Development (LID) systems on new capital projects and to require it for new

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private development projects. The new regulations also encourage cities to install new green street projects.

The goal of LID is to mimic a site's predevelopment hydrology by minimizing disturbed areas and impervious cover, and then infiltrating, storing, detaining, evapo-transpiring, and/or bio-treating stormwater runoff close to the source. LID employs principles that preserve natural landscape features, minimize imperviousness and use vegetation to slow and filter stormwater in order to remove nutrients, pathogens and metals and to control peak runoff volumes. "Green Streets" combine several LID strategies in their design to not only use landscaping to filter stormwater runoff but also to create streetscapes that enhance the pedestrian environment, provide for traffic calming and introduce park-like elements into neighborhoods. Other benefits of LID technologies include combating heat island effect, habitat creation, and enhancing recreation opportunities.

Typical LID systems include:

- *Rain barrels and cisterns* – Rain barrels and cisterns can be used to both decrease the rate and volume of runoff by collecting rain during a storm event and then slowly releasing it over time and by storing water for reuse and irrigation.
- *Green roofs* – A green roof, also known as a "living roof," is a roof that is partially or completely covered with vegetation and a growing medium, planted over a waterproofing membrane.
- *Permeable pavement* – permeable pavements are hardscapes for automobiles that allow stormwater to infiltrate. Some of these surfaces include pervious concrete and porous asphalt, stone, brick and clay pavers, and porous gravel or vegetated turf with reinforcing grids.
- *Preserving undeveloped space* – Open space preservation includes purchasing lands and easements and site layout strategies to maximize the conservation and protection of connected environmentally sensitive areas.
- *Biotreatment* – biotreatment technologies promote the use of natural vegetation based systems for evapo-transpiration, infiltration, and bio-retention. These systems include rain gardens, vegetated and grassy swales, and flow through planter boxes and tree wells.

KEY ISSUES AND IMPACTS

While LID measures and green streets can improve water quality, create urban greenways, improve neighborhood livability and add attractive new amenities; replacing impervious surfaces with pervious paving and landscaping can present new challenges.

Vegetation based LID treatment systems can require watering during the dry season, weeding and replacing plants. As new LID measures are implemented, the City will need to find resources to provide at least minimal landscape maintenance. Landscaping maintenance needs can be partially mitigated by incorporating low growing, drought tolerant, and low maintenance

vegetation into LID designs. However, given the sizeable reduction in landscape maintenance resources in the last few years this could be a substantial challenge.

Permeable pavements for streets, such as porous concrete and asphalt, have feasibility and cost constraints. Permeable paving works as a stormwater treatment because it allows stormwater to drain through the paved surface and infiltrate fully into the soil below. Construction of a pervious street requires flat topography and about twice as much excavation and base rock as typical new street construction. Once constructed the porous surface also needs to be vacuumed once or twice per year in order to maintain the permeability. The cost of reconstructing existing streets with permeable pavements is up to twice the cost of traditional reconstruction and four to 14 times the cost of resurfacing work. Because of the feasibility, maintenance and costs concerns, porous pavements have only been used in large, new, private developments and typically only for parking areas, in lieu of constructing stormwater detention basins.

The City of Oakland's current pavement program is significantly under-funded and is aimed at pavement preservation rather than pavement reconstruction, emphasizing surface work such as slurry sealing, micro-surfacing and mill and overlay. This preservation approach is the only cost effective alternative when funds are so limited. It does not provide opportunities for replacing existing streets with permeable pavement. An alternative to porous streets is to look instead at more feasible and cost effective opportunities for using permeable paving technologies in combination with vegetation-based systems in parking lots, driveways and parking strips.

Despite the challenges the City of Oakland is currently implementing many efforts that include LID elements. These efforts include:

Rain Barrel Program – The City of Oakland is in the second year of implementing a three-year program to provide rain barrels to Oakland residents at a significantly reduced cost. The rain barrels can be used to capture and store roof runoff so that it can be released safely and slowly into the landscape which will help prevent erosion and damage to Oakland's hill slopes and creeks. The rain barrel program is fully funded by an American Recovery and Reinvestment Act grant.

Permeable Pavements – Porous concrete has been installed at two facilities in Oakland. One is along the perimeter of Lion Creek Crossings Park. The other is the valet parking strip in front of the Lake Merritt Boathouse. The City has also used permeable pavers in several locations including at Fire Station 18 and Cryer Boatworks in Union Point Park.

Property Preservation Program – As part of Measure DD, the City of Oakland developed a property preservation program to conserve ecologically sensitive lands and riparian habitats. The program has leveraged partnerships with local land trusts and the East Bay Regional Park District to preserve and protect over 80 acres of undeveloped Oak woodlands and riparian habitats throughout Oakland. Additionally, in 1997 the City of Oakland adopted the Creek

Protection Ordinance to help protect riparian corridors by requiring that new development be set back from the waterways.

Green roofs – The City has recently constructed two new small green roofs. One is on the garbage and recycling building at the Lake Merritt boathouse and the other is on the Flood Control District's mechanical building at the Lion Creek Restoration Project. Both of these projects were funded by Measure DD.

Bio-treatment – Bio-treatment components have been included in new City of Oakland capital projects. For example, at the new East Oakland Sports Center the roof and parking lot runoff is filtered through vegetated swales or flow through planters. At Lake Merritt, the new boathouse parking area and some of the adjacent street stormwater runoff is treated by a large vegetated swale prior to entering Lake Merritt. The upcoming Snow Park re-design project includes two rain gardens and two large vegetated swales. In West Oakland several pilot projects, including stormwater treatment, tree plantings and a small green street retrofit on San Pablo Ave. will be installed in the next few years.

In addition, many private developments have constructed LID projects. For example, several homes in Oakland have installed large underground cisterns for water re-use, the new Kaiser medical center has built-in tree well filters and rain gardens, the Habitat for Humanity Edes Ave. development constructed a bio-retention area, and for many years vegetated swales have been filtering pollutants from the Zhong Technologies parking lot next to the estuary. Future large development projects such as the Army base redevelopment and the zoo expansion are incorporating LID elements into their planning processes. For example, at the zoo vegetated swales, rain gardens, green roofs, and permeable paving will be constructed in the new California exhibit area.

Finally, on May 17, 2011, City Council approved Resolution No. 83354 C.M.S., to apply for and accept a \$250,000 Proposition 84 grant from the State of California, Urban Greening Planning Grant Program for the creation of an Oakland Urban Greening Retrofit Plan. The grant will be used to identify and evaluate City of Oakland LID opportunities and challenges to installing LID systems on City facilities and where appropriate, green streets in the public right of way, and will produce a strategic plan for implementation. The strategic plan will assist the City in obtaining future grant and mitigation funding opportunities for LID projects.

SUSTAINABLE OPPORTUNITIES

Economic: Low Impact Development (LID) projects can create new design and construction jobs.

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Environmental: Implementing LID projects will result in sensitive habitat and stormwater quality improvements.

Social Equity: Implementing LID projects will help beautify neighborhoods and create healthy communities.


DISABILITY AND SENIOR CITIZEN ACCESS

ADA requirements will be incorporated as appropriate with any potential future LID projects.

ACTION REQUESTED OF THE CITY COUNCIL

This is an informational report only and no action is requested of the City Council.

Respectfully submitted,



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Public Works Agency

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**APPROVED AND FORWARDED TO
THE PUBLIC WORKS COMMITTEE:**



Office of the City Administrator