

Santa Monica Urban Runoff Recycling Facility

PHOTO: PETE FRIEDRICH, CITY OF SANTA MONICA



Discussion: Low Impact Development

Sustainable Watershed Paradigm Shift in Santa Monica

DEAN KUBANI, NEAL SHAPIRO, AND RICK T. VALTE

AGAINST THE BACKDROP OF THE PACIFIC OCEAN accentuated by the Santa Monica Pier stands the Santa Monica Urban Runoff Recycling Facility, also known as the SMURRF. The facility was built at the onset of the new millennium to harvest, treat, and reuse dry weather runoff and serves as a symbol of the City of Santa Monica's commitment to improving stormwater quality and reducing urban runoff.

Implementing low impact development (LID) in urbanized areas requires retrofitting of existing infrastructure, as well as taking advantage of redevelopment opportunities. LID should be approached from parcel to regional scales, as each contributes to current water quality impairments. Regional cooperative agreements are necessary to address roadways, "upstream" municipalities' inputs to "downstream" areas, and polishing of pollutants missed by smaller-scale projects. City-scale LID projects are necessary to address public buildings, parks, the transportation grid, and other public facilities, while parcel-scale LID ensures private landowners share the burden of meeting water quality objectives.

Legislation in the City of Santa Monica

This commitment dates back to 1992, when the City Council first approved the Urban Runoff Pollution Mitigation ordinance (the Urban Runoff ordinance), which required a 20% reduction in on-site urban runoff from new and retrofit development. The objective of this ordinance was to improve water quality at Santa Monica beaches. An epidemiology study along the

coast completed at the time identified public health risks related to bacteria in flowing storm drains that empty into Santa Monica Bay.

The ordinance established a list of appropriate best management practices (BMPs) with an emphasis on LID so that runoff from the property would be infiltrated on-site and kept out of the public storm sewer system, reducing runoff to the Bay.

After five years of implementation, the County of Los Angeles, as the Principal Permittee for the region's National Pollutant Discharge Elimination System (NPDES) permit, established the Standard Urban Stormwater Management Plan (SUSMP), to encourage further urban runoff management. The most significant change was a requirement to reduce site runoff by up to 80%, which for the Los Angeles area translated into capture of runoff from a 0.75 inch storm event. In response, the City updated its Urban Runoff ordinance in 2000 to include the 0.75 inch standard and further promote strategies to reduce impermeable surfaces and promote more permeable surfaces.

The City is now revising the Urban Runoff ordinance to include an emphasis on rainwater harvesting for direct non-potable uses, as well as infiltration, and to de-emphasize treat and release BMPs. For treat and release BMPs, the City is exploring numeric standards for pollutants of concern (bacteria, trash, and chlorinated organic chemicals) that cause impairment to the Santa Monica Bay and Ballona Creek.

Low Impact Development



Practicing What the City Preaches

Setting the example or living the law is how the City of Santa Monica wins over residents and businesses to a more sustainable watershed management path. In addition, raising the bar higher leads to further innovations and more sustainable practices. Establishing the Urban Runoff ordinance laid the foundation and put the City on a sustainable path for watershed management—reducing urban runoff pollution to Santa Monica Bay and harvesting runoff for non-potable use and reuse, which reduces dependence on limited groundwater or expensive imported water.

The next step after legislation was the creation of a watershed planning map, which established objectives for watershed management and a list of best management practices (BMPs) that are appropriate in the City's 13 sub-watersheds and that over time can be built through the City's Capital Improvement Projects (CIP) program. This map, the Santa Monica Watershed Management Plan, was approved by the City Council in 2006. The plan identifies specific projects for each sub-watershed to reduce urban runoff pollution and to harvest runoff for infiltration or direct non-potable uses. The plan anticipates completion of all the projects by 2025. After this plan was approved, the next step was to establish the City's stormwater priorities and implement relevant projects accordingly.

The City's 5-Year Low Impact Development (LID) action plan was approved by the City Council in early 2010. This plan establishes the most appropriate BMPs for the City, allocates funds for these categories and an annual budget for CIPs, and identifies approximate numbers of BMPs per year over five years.

The LID plan takes effect in fiscal year 2010-11 and has 12 major categories ranging from permeable driving surfaces to green streets—using infiltration—to rainwater harvesting for direct non-potable use, the pinnacle of sustainable strategies in which a local water resource is harvested and used in lieu of imported potable water resources.

Each year, the City resurfaces or reconstructs streets, alleys, and parking lots, presenting perfect opportunities to install LID BMPs such as permeable surfaces. Large street projects are ideal for conversion into green streets. Larger municipal projects, such as park retrofits or new residential and government facilities, have and will continue to have extensive BMPs, which also provide points for Leadership in Energy and Environmental Design (LEED) green building certification of the facilities. To date, the City has built numerous projects with LID

features, demonstrating its commitment to sustainable solutions to urban runoff pollution.

City Projects

Six recent projects demonstrate the dedication to LID practices for watershed management solutions. Parks are perfect land uses for not only collecting and infiltrating on-site runoff but also harvesting off-site runoff; park open spaces provide areas for large BMPs. Streets and parking lots offer ideal locations for runoff harvesting; paralleling streets or in parking lots are parkways or planters, which are potentially good locations for storing runoff. Sub-surface storage under parking lanes or parking stalls also offer plenty of open space. Large facilities can also provide space for BMPs.

Virginia Avenue Park (VAP) and Airport Park

In addition to upgrading and expanding park facilities, the VAP retrofit project used a number of BMPs in the parking lot—permeable pavers for parking stalls, trench drains to pick up runoff from asphalt parking areas, and perimeter sub-surface infiltration zones to capture parking lot runoff and excessive runoff from the park's landscapes (Figure 1). An overflow parking lot used a product called



Figure 3. Green Beach Parking & Recreational Space



Netlawn®, which is a permeable turf surface that vehicles can drive on. Airport Park was a new park project at the City’s airport completed in 2007. Similar to VAP, perimeter sub-surface infiltration zones surround the park and capture runoff for percolation. In addition to on-site runoff, runoff from adjacent plane parking lots is directed to the infiltration zones (Figure 2). The two parking lots are finished with porous asphalt.

Beach Green Parking Lot

With financial assistance from the State Water Resources Control Board, the City built a beach parking lot greening project (completed in May 2008) to demonstrate a strategy of replacing impervious asphalt with the permeable Netlawn® product. Using this product demonstrates how a beach parking lot can harvest and infiltrate runoff, keeping it out of the Bay while still serving as a parking lot as well as new recreational open space (Figure 3). In addition, replacing impervious asphalt with a permeable surface reduces the heat island effect. If found to be effective and economical, beach parking lots along the coastal zone of the country can be converted to beach green parking lots, serving multiple benefits in watershed management.

Bicknell Avenue Green Street

The City completed its first street greening project in mid-2009. With a grant from the State Water Resources Control Board and the Santa Monica Bay Restoration Commission, one block of a typical urban residential-commercial street was retrofitted with four BMPs to demonstrate that an LID strategy has merits when rebuilding existing or planning new streets. Pervious concrete replaced impermeable asphalt for the parking lanes, and sub-surface plastic concave chambers under the parking lanes receive the harvested runoff for infiltration. The parkways were doubled in size and depressed to receive gutter runoff for infiltration. In addition, gutter catch basins with filters screen the runoff to remove trash and debris before runoff is infiltrated. Instead of transportation-generated and roof runoff flowing unabated to the Bay, the runoff is now captured by the street and parkway elements and infiltrated into the ground (Figure 4).

Figure 4. Bicknell Avenue Green Street



Low Impact Development

Figure 5. Interior of SMURRF

PHOTO: KEN MCCOWN



Big Blue Bus Facility

The City's bus maintenance and storage facility has been completely renovated in two phases over many years. For each of the phases, underground filtering, storage, and infiltration systems were installed to capture all runoff from roofs and parking areas, keeping significant pollution out of the Bay and demonstrating how large government facilities can address runoff pollution.

Main Library

The most sustainable LID and BMP strategy is to harvest rainwater for direct non-potable uses. For the City's new Main Library, which was completed in January 2006, a 200,000-gallon cistern was constructed beneath the building and parking levels. Runoff from the roof and parking lot is filtered before being stored in the cistern. A pumping system distributes the stored water to the site's low-volume irrigation system and its associated climate-appropriate flora.

Regional Projects

Santa Monica has also joined with its neighboring cities to build BMPs to address runoff from multiple jurisdictions.

SMURRF

The Santa Monica Urban Runoff Recycling Facility was completed in early 2001. As beneficiaries of the project, the Cities of Santa Monica and Los Angeles shared 50% of

the construction costs, and the Cities share the ongoing operation and maintenance (O&M) costs and revenues. The SMURRF captures and treats dry weather urban runoff from the Pico-Kenter and Promenade/Pier drainage areas for reuse. Disinfected recycled water is pumped to a number of locations around Santa Monica for use in landscape irrigation and for toilet flushing (Figure 5). About 320,000 gallons per day are treated. The SMURRF is the first urban runoff treatment facility of its kind in the world.

Mar Vista Park

The project, completed in mid-2006, is located beneath Mar Vista Park in the City of Los Angeles, originally planned to be in the City of Santa Monica. The project consists of a two-stage treatment system that treats Santa Monica and Los Angeles dry and wet weather runoff. Treated water flows directly into the Ballona Creek on its way to the Bay. The treatment system has full capture screens for trash and includes a BMP to remove soluble pollutants through cartridges filled with different filtering media, to comply with Total Maximum Daily Load (TMDL) requirements.

The City of Santa Monica will also be participating in a new project at the City of Los Angeles Penmar Recreation Center, which is on the City's southern border and includes baseball fields and a golf course. Two City sub-watersheds flow under and through this recreation center on the way to the Bay. Los Angeles is building a

Figure 6. Residential Rain Barrel

PHOTO: SARAH WOODARD



phase one screening and separation and sanitary sewer diversion system, followed by phase two, a treatment and non-potable use system so that the retained runoff can be used for irrigation at an adjacent Santa Monica park.

Private Developments

In the 18 years of urban runoff mitigation through the City of Santa Monica's ordinance, more than 1,000 private BMP systems have been installed throughout the City and will continue to be installed in the years ahead. The City has more than 22,000 parcels that will be retrofitted over time until all parcels have BMPs mitigating runoff pollution. More than 80% of these BMPs are of the LID type.

With a new program to promote rain barrels (Figure 6) and cisterns, the City is encouraging property owners to harvest rainwater for direct non-potable uses, such as irrigation, toilet flushing, and clothes washing. Harvesting rainwater on-site for direct non-potable uses reduces potable water use and saves on water and wastewater discharge costs. This strategy is the ultimate sustainable, self-reliant solution. If all private parcels could capture most of the rainfall each year for uses on-site and if all buildings had the most efficient water features and climate-appropriate landscapes and low-volume irrigation systems, then the demand for limited potable water would be significantly reduced, along with a significant source of runoff pollution. LID strategies are simple and cost-effective multi-benefit solutions to two of the most serious problems facing California, water shortages and pollution.

DEAN KUBANI is the Director of City of Santa Monica's Office of Sustainability and the Environment. He has been with the City since 1994 and oversees all of the City's efforts related to water and energy efficiency, urban runoff, green building, hazardous materials, and sustainability.

NEAL SHAPIRO is the Senior Administrative Analyst and Watershed (Urban Runoff) Management Program Coordinator for the City of Santa Monica's Office of Sustainability and the Environment. He also serves as the supervisor for the Watershed section, overseeing the City's many programs, policies, and incentives to maximize water use efficiency indoors and outdoors.

RICK T. VALTE is the Watershed Program Manager in the City of Santa Monica's Public Works Department. Mr. Valte manages the City's Clean Beaches and Ocean parcel Tax Fund and the City's Storm Water Fund and oversees the City's capital improvement program for storm water quality improvement.