

**STATE OF CALIFORNIA  
REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION**

**STAFF SUMMARY REPORT: Mel Johnson  
MEETING DATE: May 13, 2026**

**ITEM: 3**

**Off-site Educational Walking Tour – Mission Bay Green Stormwater Infrastructure**

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**DISCUSSION**

This offsite educational walking tour in San Francisco's Mission Bay neighborhood is designed to show examples of green stormwater infrastructure and the low impact development design approach in a densely urbanized area. The tour will be led by Ken Kortkamp and Sarah Minick of the San Francisco Public Utilities Commission (SFPUC), who lead [SFPUC's stormwater program](#).

This staff summary report provides background on green stormwater infrastructure and low impact development requirements for municipal stormwater permittees in the San Francisco Bay Region.

**Background**

Urban development can significantly increase the rate of runoff and pollutant loading to receiving waters because impervious surfaces do not absorb water or remove pollutants in the same way as pervious vegetated surfaces. Low impact development is a key tool to address those impacts and reduce them compared to conventional "gray infrastructure" stormwater management. The goal of low impact development is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall. Low impact development guidance often refers to this as "slowing, spreading, and sinking" runoff into vegetated areas, rather than discharging it to pipes and then directly to receiving waters.

In 1994, the Water Board released staff recommendations supporting the low impact development design approach as a means of reducing the adverse impacts of urban runoff. Bay Area municipalities supported the implementation of those recommendations, leading to the 1997 publication of [Start at the Source: A Residential Site Planning and Design Guidance Manual for Stormwater Quality Protection](#). A [second edition of Start at the Source](#), published in 1999, and a [2000 Start at the Source Tools Handbook](#) broadened the initial document to include commercial and industrial properties and to provide additional support for implementation, including technical guidance, and sample specifications, ordinances, codes, and conditions of approval. During that period, work in Prince George's County, Maryland, Portland, Oregon, and

Puget Sound helped establish low impact development as key urban runoff management clean water tool, which has now been implemented broadly in the United States and worldwide. Examples include Philadelphia's [Green City, Clean Waters program](#) and China's [Sponge Cities Initiative](#).

As such, the Water Board, Bay Area municipalities, stormwater program managers, and developers have been leaders in and have been implementing low impact development for more than a quarter century.

Green stormwater infrastructure is a part of low impact development where stormwater infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. Examples of green stormwater infrastructure include bioretention systems (Figures 1 and 2 below), flow-through planters (Figure 3), green roofs (Figure 4), permeable pavement systems (Figure 5), and neighborhood- or regional-scale facilities (Figures 6 and 7).

To sustainably provide water quality benefits, green stormwater infrastructure clean water controls must be appropriately designed and maintained. Their substantial flexibility with respect to their shape, location, and the range of benefits they can provide, including non-water quality benefits like reduced urban temperatures and increased pedestrian safety, makes them a flexible tool that can be incorporated into new and redevelopment projects when they are considered as a part of a project's initial design.

San Francisco's Mission Bay neighborhood is an example of one of the most challenging places to implement green stormwater infrastructure because it is an ultra-urban high-density redevelopment setting. This urban context is typically one of the most-limited with respect to available space, and the neighborhood and the walking tour will include examples of green stormwater infrastructure implementation in fully-affordable, high-density residential projects, which have additional constraints including budget.

Municipal stormwater discharges are regulated as part of the National Pollutant Discharge Elimination System (NPDES) permit program. There are three separate NPDES stormwater permits that apply to municipalities in the San Francisco Bay Region:

1. Municipal Regional Stormwater Permit (MRP) (Order No. R2-2022-0018, as amended by Order No. R2-2023-0019)
2. Statewide General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (Order No. 2013-0001-DWQ; Small MS4 permit)
3. Statewide Municipal Stormwater Permit for the California Department of Transportation (Order No. 2022-0033-DWQ)

Each of these permits includes post-construction requirements with an emphasis on low impact development to address the water quality impacts associated with stormwater runoff in an urban environment.

The remainder of this staff summary report focuses on low impact development requirements in the MRP because it is the regionally adopted NPDES stormwater permit. While San Francisco is not a MRP permittee because most of the city has a combined sewer system, the Mission Bay neighborhood, where the walking tour will occur, has a municipal separate storm sewer system (MS4) that is regulated under the Small MS4 permit. Mission Bay provides relevant examples of how low impact development can be incorporated in densely urbanized areas throughout the San Francisco Bay Area because the low impact development features have been designed to meet objectives and standards similar to those required under the MRP, the Small MS4 permit, and Caltrans' statewide MS4 permit.

### **MRP Low Impact Development Requirements**

MRP Provision C.3 (New Development and Redevelopment) requires the use of low impact development stormwater control facilities that maximize infiltration, storage and detention, evapotranspiration, and biotreatment of stormwater runoff to address water quality impacts due to urban development. Permittees are required to use their planning and building review authority to require post-construction low impact development stormwater treatment and flow control facilities for specific categories of new development and redevelopment projects, known as Regulated Projects, when they exceed a certain size. A Regulated Project is a project that creates or replaces a threshold amount of impervious surface (e.g., 5,000 square feet, or about 1/8-acre, for most residential, commercial, and industrial projects, and 1 acre for road reconstruction projects), which triggers a requirement for municipalities to require low impact development to address that project's urban runoff impacts. These requirements are intended to address impacts to receiving waters by reducing runoff pollutant discharges and managing increases in runoff flows caused by the impervious surfaces.

Those requirements, which apply to significant new and re-development projects, do not address the substantial impacts from the Bay Area's existing impervious surfaces, including public roads and existing urban areas that are not being redeveloped. To address this, with the adoption of the MRP in 2022, the Water Board expanded the low impact development treatment requirements to require completion of a minimum amount of green stormwater infrastructure retrofit projects. Green stormwater infrastructure retrofit projects include projects like "green streets" that implement low impact development stormwater controls to treat runoff from areas of existing impervious surface, or in projects that would not otherwise be regulated under Provision C.3. The MRP requires a specified number of acres of existing impervious surface be controlled by implemented green stormwater infrastructure retrofit projects. This is also known as the "greened acres" requirement, with the idea that Permittees are gradually shifting the existing "gray" storm drainage system to a "green" one. The required level of effort for each Permittee over the permit term was determined based on population, and Permittees have the option to meet the green stormwater infrastructure retrofit

requirements individually or on a countywide basis. The MRP sets the expectation that the Permittees' work to implement green stormwater infrastructure retrofit projects will increase over time as the Permittees develop staff expertise through implementing retrofit projects and develop funding sources, progressively increasing their capacity to accelerate implementation.

MRP Provision C.3.j gave the MRP Permittees the option to form a Technical Working Group to discuss "long-term green infrastructure goals and recommend long-term percentage reductions in Permittees' impervious surfaces at individual, countywide, and regional scales." The Permittees formed the group and have used it to investigate best management practices, performance metrics, and linkages between green stormwater infrastructure implementation and efforts related to climate change impacts and resiliency. That is, to recognize intersections between green stormwater infrastructure and areas beyond water quality where green stormwater infrastructure provides benefits. The Technical Working Group has met six times since it was formed in September 2024, most recently in March 2026. The Technical Working Group developed a *Long-Term Green Stormwater Infrastructure Technical Working Group Summary and Recommendations Report* (Report), which was submitted to the Water Board in September 2025. The Report includes background; a summary of Technical Working Group discussion points and outcomes; permittee recommendations for long-term green stormwater infrastructure goals and framework; examples of project types; and next steps. Water Board staff generally agree with the overarching recommendations presented in the Report and are continuing to work with the Technical Working Group, using the Report's framework, to develop expectations for long-term green stormwater infrastructure goals to be implemented in the next iteration of the MRP.

Mission Bay provides an example of an integrated approach to water quality management in which clean water controls are providing additional benefits to the people who live, work, and recreate in the neighborhood. It is an example that MRP permittees may seek to emulate, adjusted for their community context, including as part of MRP Provision C.3.j retrofit requirements.



Figure 1: Bioswale adjacent to a bike path and roadway. Photo credit Long-Term Green Stormwater Infrastructure - *Technical Working Group Report*.



Figure 2: Bioswale managing stormwater runoff from a parking lot in San Jose. The swale has been located in the overhang space for parked cars. Photo credit Long-Term Green Stormwater Infrastructure - *Technical Working Group Report*.



Figure 3: Flow-through planter within a public walkway in San Francisco's Mission Bay neighborhood. Photo credit Mel Johnson.



Figure 4: Extensive Green Roof at Gap Corporate Headquarters, San Bruno. Photo credit William McDonough & Partners.



Figure 5: Pervious pavement installed in Berkeley to minimize runoff and pollutants from a streetscape before runoff enters a storm drain. Photo credit Long-Term Green Stormwater Infrastructure - *Technical Working Group Report*.



Figure 6: A building with a disconnected downspout to manage roof runoff by directing it to a vegetated surface. Photo credit Aiden Cecchetti.

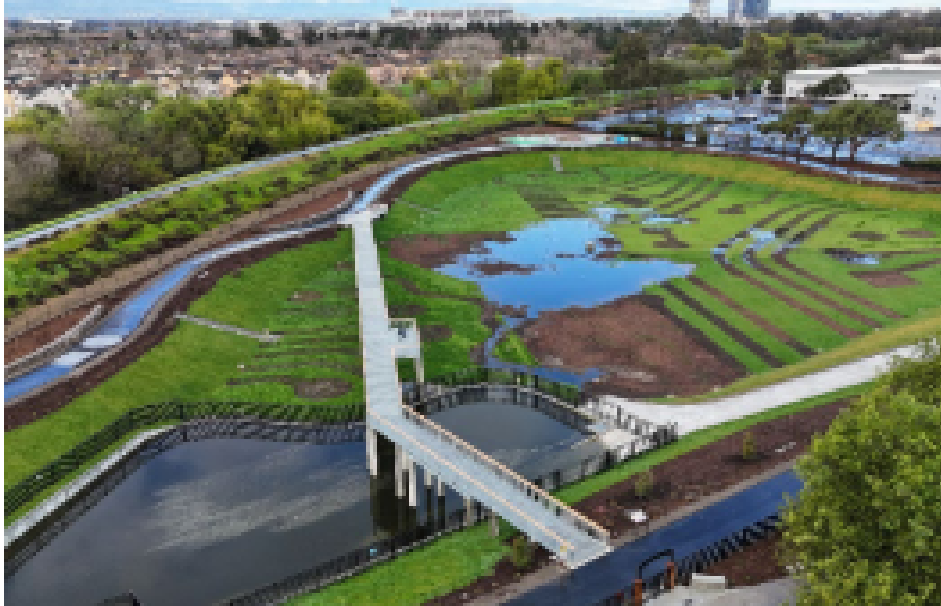


Figure 7: Riverview Storm Garden (bioretention basin and public park) in San Jose. Photo credit Long-Term Green Stormwater Infrastructure - *Technical Working Group Report*.