San Ramon
CALIFORNIA



Green Infrastructure Plan

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Acronyms

ABAG	Association of Bay Area Governments
BASMAA	Bay Area Stormwater Management Agencies Association
CCCWP	Contra Costa Clean Water Program
CCW SWRP	Contra Costa Watersheds Stormwater Resource Plan
GI	Green Infrastructure
GIS	Geographic Information System
IRWMP	Integrated Regional Water Management Plan
MRP	Municipal Regional Stormwater Permit
MTC	Metropolitan Transportation Commission
NPDES	National Pollutant Discharge Elimination System
PCBs	Polychlorinated Biphenyls
RWQCB	California Regional Water Quality Control Board – San Francisco Bay Region
TMDL	Total Maximum Daily Load

1 Introduction and Overview

1.1 Regulatory Mandate

The City of San Ramon (City) is one of 76 local government entities subject to the requirements of the California Regional Water Quality Control Board for the San Francisco Bay Region's (RWQCB's) Municipal Regional Stormwater Permit (MRP). The MRP was last reissued in November 2015[1]. The MRP mandates implementation of a comprehensive program of stormwater control measures and actions designed to limit contributions of urban runoff pollutants to San Francisco Bay.

MRP Provision C.3.j.i. requires the City to prepare a Green Infrastructure Plan, to be submitted with its Annual Report to the RWQCB due September 30, 2019.

Green Infrastructure refers to the construction and retrofit of storm drainage to reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use bioretention and other natural systems to detain and treat runoff before it reaches our creeks and Bay. Green infrastructure facilities include, but are not limited to, pervious pavement, infiltration basins, bioretention facilities or "raingardens", green roofs, and rainwater harvesting systems. Green infrastructure can be incorporated into construction on new and previously developed parcels, as well as new and rebuilt streets, roads, and other infrastructure within the public right-of-way.

Water quality in San Francisco Bay is impaired by mercury and by polychlorinated biphenyls (PCBs). Sources of these pollutants include urban stormwater. By reducing and treating stormwater flows, green infrastructure reduces the quantity of these pollutants entering the Bay and will hasten the Bay's recovery.

Provisions C.11 and C.12 in the MRP require Contra Costa Permittees (Contra Costa County and its 19 cities and towns) to reduce estimated PCBs loading by 23 grams/year and estimated mercury loading by 9 grams/year using green infrastructure by June 30, 2020. Regionally, Permittees must also project the load reductions achieved via Green Infrastructure by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040.

"Provisions C.11 and C.12 in the MRP require Contra Costa Permittees (Contra Costa County and its 19 cities and towns) to reduce estimated PCBs loading by 23 grams/year and estimated mercury loading by 9 grams/year using Green Infrastructure by June 30, 2020."

[1] Order R2-2015-0049

1.1.1 Further Background on Mercury and PCBs in San Francisco Bay

The MRP pollutant-load reduction requirements are driven by Total Maximum Daily Load (TMDL) requirements adopted by the RWQCB for mercury (Resolution No. R2-2004-0082 and R2-2005-0060) and PCBs (Resolution No. R2-2008-0012). Each TMDL allocates allowable annual loads to San Francisco Bay (a Waste Load Allocation, or WLA) from identified sources, including from urban stormwater.

The mercury TMDL addresses two water quality objectives. The first, established to protect people who consume Bay fish, applies to fish large enough to be consumed by humans. The objective is 0.2 milligrams (mg) of mercury per kilogram (kg) of fish tissue (average wet weight concentration measured in the muscle tissue of fish large enough to be consumed by humans). The second objective, established to protect aquatic organisms and wildlife, applies to small fish (3-5 centimeters in length) commonly consumed by the California least tern, an endangered species. This objective is 0.03 mg mercury per kg fish (average wet weight concentration). To achieve the human health and wildlife fish tissue and bird egg monitoring targets and to attain water quality standards, the Bay-wide suspended sediment mercury concentration target is 0.2 mg mercury per kg dry sediment.

A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for the Bay to meet water quality standards. Reductions in sediment mercury concentrations are assumed to result in a proportional reduction in the total amount of mercury in the system, which will result in the achievement of target fish tissue and bird egg concentrations.

The PCBs TMDL was developed based on a fish tissue target of 10 nanograms (ng) of PCBs per gram (g) of fish tissue. This target is based on a cancer risk of one case per an exposed population of 100,000 for the 95th percentile San Francisco Bay Area sport and subsistence fisher consumer (32 g fish per day). A food web model was developed by San Francisco Estuary Institute (SFEI) to identify the sediment target concentration that would yield the fish tissue target; this sediment target was found to be 1 microgram (µg) of PCBs per kg of sediment.

Twenty percent of the estimated allowable PCB external load was allocated to urban stormwater runoff. The Bay Area-wide WLA for PCBs for urban stormwater is 2 kg/yr by 2030. This value was developed based on applying the required sediment concentration (1 µg/kg) to the estimated annual sediment load discharged from local tributaries.

1.2 Objectives and Vision

This Plan will guide a shift from conventional “collect and convey” storm drain infrastructure to more resilient, sustainable stormwater management systems that reduce runoff volumes, disperse runoff to vegetated areas, harvest and use runoff where feasible, promote infiltration and evapotranspiration, and use natural processes to detain and treat runoff. Green infrastructure features and facilities include, but are not limited to, pervious

pavement, infiltration basins, and bioretention facilities ("rain gardens"), green roofs, and rainwater harvesting systems.

As required by Provisions C.3.a. through C.3.i. in the MRP, these "Low Impact Development" practices are currently implemented on land development projects in the City. Specific methods and design criteria are spelled out in the Contra Costa Clean Water Program's (CCCWP's) *Stormwater C.3 Guidebook,* which the City has referenced in Chapter XII, Stormwater Management and Discharge Control.

This Plan details how similar methods will be incorporated to retrofit existing storm drainage infrastructure using green infrastructure facilities constructed on public and private parcels and within the public right-of-way.

- *Green infrastructure facilities previously constructed by the Permittee*

In keeping with the spirit of the Green Infrastructure Plan and avoiding missed opportunities staff has looked for locations where green infrastructure can be implemented and has implemented it where possible.

Dougherty Road Widening

In 2008, the City constructed the Dougherty Road (South) Widening project, between Fall Creek Road and Oak Valley Drive (CIP 5330, 5331 and 5333). The project included widening Dougherty Road from four lanes to six lanes (three lanes in each direction), a landscaped center median, a Class I bicycle path on the eastern side between the Contra Costa/Alameda County boundary and Old Ranch Road, and Class II bicycle lanes on both the eastern and western shoulders. The widening was part of a larger effort to improve the entire arterial transportation network within Dougherty Valley and accommodate projected traffic volumes along Dougherty Road. At that time, under Provision C.3(n) this project was exempt from implementing stormwater treatment. However, the City did include bioswales where feasible along the road right-of-way. In 2017, the City revisited the project, and modified the overflow inlets where feasible. The overflow inlets were previously designed to have side openings. These were removed so that stormwater infiltration into the soil media would be increased. The treated area is approximately 77,000 square feet.

City Center/Bollinger Widening Project

In 2018, Sunset Development constructed the City Center Bishop Ranch project. Located in the heart of Bishop Ranch, City Center Bishop Ranch features 300,000 square feet of downtown retail, dining and entertainment experiences. The project was required to meet current Provision C.3 requirements for stormwater treatment. In addition, portions of the existing street right-of-way adjacent to the site, that were being modified as part of the Bollinger Canyon Road widening project were designed to flow into the stormwater treatment facilities on site. The area of Bollinger Canyon Road that was treated is approximately 50,000 square feet.

1.3 Plan Context and Elements

1.3.1 Planning Context

- *Municipal geography*

  San Ramon is located in southern Contra Costa County in the East Bay region of the San Francisco Bay Area. The total area within the City boundary is approximately 18.73 square miles, and the San Ramon Planning Area encompasses 36.4 square miles. The City of San Ramon is surrounded by unincorporated Alameda County to the west, the Town of Danville and unincorporated Contra Costa County to the north, unincorporated Contra Costa County to the east, and the City of Dublin within Alameda County to the south. The San Ramon Valley, Dougherty Hills, and the Dougherty Valley are within the City limits, while the East Bay foothills are located to the west.

- *Demographics*

- The 2010 United States Census[18] reported that San Ramon had a population of 72,148. *California Department of Finance reported that San Ramon has a population of 83,179 as of May 1, 2019. San Ramon General Plan 2035 anticipates a buildout population of 96,174, based on a population correction associated with the 2010 Census, and a buildout labor force (jobs) of 57,667 for the San Ramon Planning Area.*

  The population density was 3,991.1 people per square mile (1,541.0/km²). The racial makeup of San Ramon was 38,639 (53.6%) White, 2,043 (2.8%) African American, 205 (0.3%) Native American, 25,713 (35.6%) Asian, 156 (0.2%) Pacific Islander, 1,536 (2.1%) from other races, and 3,856 (5.3%) from two or more races. Hispanic or Latino of any race were 6,250 persons (8.7%).

  The Census reported that 72,073 people (99.9% of the population) lived in households, 52 (0.1%) lived in non-institutionalized group quarters, and 23 (0%) were institutionalized.

  There were 25,284 households, out of which 11,988 (47.4%) had children under the age of 18 living in them, 16,318 (64.5%) were opposite-sex married couples living together, 1,997 (7.9%) had a female householder with no husband present, 850 (3.4%) had a male householder with no wife present. There were 1,067 (4.2%) unmarried opposite-sex partnerships, and 187 (0.7%) same-sex married couples or partnerships. 4,682 households (18.5%) were made up of individuals and 1,105 (4.4%) had someone living alone who was 65 years of age or older. The average household size was 2.85. There were 19,165 families (75.8% of all households); the average family size was 3.30.

  The population was spread out with 21,351 people (29.6%) under the age of 18, 3,557 people (4.9%) aged 18 to 24, 22,798 people (31.6%) aged 25 to 44, 18,815 people (26.1%) aged 45 to 64, and 5,627 people (7.8%) who were 65 years of age or older. The median age was 37.1 years. For every 100 females, there were 96.6 males. For every 100 females age 18 and over, there were 92.4 males.

  There were 26,222 housing units at an average density of 1,450.6 per square mile (560.1/km²), of which 25,284 were occupied and 18,056 (71.4%) of them were owner-occupied, and 7,228 (28.6%) were occupied by renters. The homeowner vacancy rate was 1.3%; the rental vacancy rate was 4.0%. 54,705 people (75.8% of the population) lived in owner-occupied housing units and 17,368 people (24.1%) lived in rental housing units.

  The median income for a household in the city was $119,297, and the median income for a family was $132,339. Males had a median income of $97,475 versus $70,083 for females. The per capita income for the city was $50,736. About 2.0% of families and 2.8% of the population were below the poverty line, including 2.9% of those under age 18 and 3.5% of those age 65 or over.

- *Economic and Social Trends*

The City of San Ramon estimated that the San Ramon Planning Area had approximately 45,994 jobs as of January 1 2014, representing a 14.9 % increase from 40,140 jobs in 2000, based on information extrapolated from the Association of Bay Area Governments' (ABAG's) Projections 2013, and the U.S. Census Bureau 5-year American Community Survey data for 2012. Among the larger industry groups in the City are financial and professional services (29 %); health, educational and recreational services (18 %); and manufacturing, wholesale and transportation trades (13 %).

Employment growth anticipated under the General Plan 2035 would consist of an employment mix that continues the City's strong "office park" character, while accommodating slightly higher proportions of population-serving jobs in retail, services, and other economic sectors. Planning Area employment is projected to increase to an estimated 57,667 jobs by 2035, a 25.4 % increase from 2014. Of the estimated 11,673 new jobs, the majority of job growth is estimated to be in the retail and services sectors as well as industries such as health services, information technology and public administration.

The Economic Development Strategic Plan (EDSP), as amended in 2019, establishes direction for San Ramon's short and long-term economic development. Through the EDSP, the City intends to build upon and diversify its current economic base by retaining, expanding, and attracting firms in key business sectors.

- *Development and Redevelopment Trends*

With little vacant land remaining for new development within the City limits, San Ramon has two basic philosophies to accommodate future growth. The first is through the continued annexation of adjacent unincorporated areas within the Urban Growth Boundary (UGB) into the City to accommodate any future housing needs, support the regional employment base, and meet the demand for municipal services. These areas include the balance of the Dougherty Valley Specific Plan, and several undeveloped parcels in the Westside and Northwest Specific Plans currently identified as housing opportunity sites. The second philosophy is to focus new growth inward through the intensification of land use density by encouraging infill and redevelopment projects within the existing urban areas defined by the UGB, which include the North Camino Ramon Specific Plan, Crow Canyon Specific Plan and City Center Project.

The Economic Development Strategic Plan also identifies the needs of completing the update to the Crow Canyon Specific Plan (CCSP) and initiating an update to the North Camino Ramon Specific Plan (NCRSP). The CCSP would be revised to strengthen retail by focusing on key nodes for neighborhood-serving retail. The NCRSP should be updated to encourage new retail on Crow Canyon Road, which is better suited as a retail location, and consider both horizontal and vertical mixed-use projects with a retail component.

- *Commitment and Actions for Sustainability*

The General Plan Open Space and Conservation Element consists water conservation and quality policies, and the City is a member of the Contra Costa Clean Water Program, which has been instrumental in developing Low Impact Development (LID) techniques for the reduction and treatment of storm water runoff from development projects. Accordingly, the City has been monitoring construction sites to ensure

adequate Best Management Practices (BMPs) are implemented to reduce water pollution during construction in compliance with the State General Construction Permit issued by the California State Water Resources Control Board. The applicable polices in the General Plan will be revised when the state and/or the regional policies are updated.

Furthermore, the General Plan Air Quality and Greenhouse Gas Element along with Climate Action Plan consists policies for sustainable strategies, and additional policies for the Green Infrastructure can be incorporated in this Element.

- *Staffing and Scope of Sustainability Programs*

  As part of the General Plan policy implementation, any necessary staffing will be provided as needed.

- *CEQA*

  All physical improvement projects associated with Green Infrastructure are likely subject to California Environmental Quality Act of 1970, as amended. A project level Initial Study is required for each project to determine the applicability of the CEQA analysis.

  According to the San Ramon Municipal Code, environmental review is required for various applications (Tentative Subdivision Map, Condominium Conversion) and at various phases (project submittal, prior to issuance of permits), to confirm compliance with the California Environmental Quality Act (CEQA).

  The City's Development Review Application and Subdivision Application, both available on the City's website, include reference to the required CEQA review.

1.3.2 Watersheds and Storm Drainage Infrastructure

- *Watersheds and Watershed Characteristics and Challenges*

  Upper Alameda Creek Watershed

  According to the Contra Costa Watersheds Stormwater Resource Plan, "one of the largest watersheds in the Bay Area, the Alameda Creek watershed stretches from the Mount Diablo foothills in the north to Mount Hamilton in the south. A little less than one tenth of the watershed is located in Contra Costa County, a region that encompasses the Cayetano, Alamo- Tassajara, and South San Ramon sub-watersheds. Nearly all of the City of San Ramon falls within the Upper Alameda Creek watershed, as does a small southern part of Danville. Most of land to the east is part of the unincorporated County.

  "The upper watershed area in southern Contra Costa County is only part of the headwaters of the massive Alameda Creek watershed. Most of the creek (and its watershed) is located in Alameda County, where it flows from the eastern boundary of the Alameda County (near Livermore) to where it reaches San Francisco Bay in the City of Fremont near Coyote Hills Regional Park and the San Francisco Bay National Wildlife Refuge.

"Land uses in the Cayetano sub-watershed consist of 95% agricultural lands and 5% open space, parks and recreation areas, and water. Land uses in the Alamo-Tassajara sub-watershed consist of 50% agricultural lands; 18% urban lands; and 32% open space, parks and recreation areas, and water. Land uses in the South San Ramon sub-watershed consist of 18% agricultural lands; 51% urban lands; and 31% open space, parks and recreation areas, and water.
Alameda Creek has a TMDL for diazinon."

Walnut Creek Watershed

According to the Contra Costa Watersheds Stormwater Resource Plan, "the Walnut Creek watershed encompasses the Grayson-Murderers, Concord, Pine-Galindo, San Ramon, and Las Trampas sub-watersheds. Draining the west side of Mount Diablo and the east side of the East Bay hills, Walnut Creek's major tributaries include San Ramon Creek, Bollinger Creek, Las Trampas Creek, Lafayette Creek, Grayson Creek, Murderer's Creek, Pine Creek, Tice Creek, and Galindo Creek. The Cities of Walnut Creek, Lafayette, Pleasant Hill and Danville lie completely within the boundaries of the Walnut Creek watershed, while the Cities of Concord, Martinez, and small areas of Moraga and San Ramon are partly within the watershed.

"Agriculture and livestock were previously important industries in the valleys of the Walnut Creek watershed. An increase in housing and commercial development along the creek created the need for improved flood control measures. Today, a stormwater drainage system reroutes surface waters from their original path through the valley. Land use and other physical factors have also affected the way surface and groundwater reach the creek channel.

"In 2014, the Flood Control District assumed management of the lowest four miles of Walnut Creek removed and began restoration planning. With the completion of a Project Study Report, the Flood Control District has begun the preparation of construction plans and environmental permits. The long-term vision for Lower Walnut Creek is "A sustainable channel that provides critical flood protection in a way that is more compatible with the plants and animals that call the creek home."
Land uses in the Walnut Creek watershed consist of 13% agricultural lands; 58% urban lands; and 29% open space, parks and recreation areas, and water.

"Walnut Creek has a TMDL for diazinon (SFBRWQCB, 2017)."

- *Major Drainages and Major Drainage Characteristics and Challenges*

The following drainages are identified in the San Ramon section of the Countywide Flood Insurance Study (FIS) provided by the Federal Emergency Management Agency (FEMA).

- San Ramon Creek
- South San Ramon Creek
- Alamo Creek
- West Branch Alamo Creek

- East Branch Alamo Creek
- San Catanio Creek

Other creeks include

- Bollinger Creek
- Coyote Creek

➢ *Storm Sewer System*

The City's storm sewer system is a network of storm drainpipes, inlets, natural creeks, improved channels, detention ponds, water quality ponds, bioretention facilities, and trash capture devices, both publicly and privately owned and maintained. The majority of the City (about 55 percent) and its associated storm drain system was developed by the Assessment Districts and Contra Costa County in the 1960s and 1970s. Major flood control facilities were constructed which were owned and maintained by the County. Some development of subdivisions incorporated natural creeks that were privately owned and may or may not have easements as well. The City incorporated in 1983, and major development continued into the 1980s and 1990s. The major flood control facilities were inherited by the City; however, a number of easements remained unaccepted and are retained by the property owner for maintenance. Drainage facilities at this time were designed to meet City standards.

Most of the Dougherty Valley (excluding the Gale 1 area and representing about 45 percent of the City area) was also developed by Contra Costa County in the 2000s, and annexed to the City later. This development included conventional storm drain system, some bio-swales, water quality ponds and detention basins. The Water Quality Ponds (WQP), were precursor to bioretention facilities that would later be required by the RWQCB as part of Provision C.3, and provide both retention and water quality benefits analogous to the later c3 requirements. The WQP collect the runoff from both City streets and the private development areas.

➢ *Storm Sewer Challenges (Pertinent to GI)*

As discussed above, due the varying nature of the City's storm sewer system network, it can be difficult to find feasible locations to install GI. First, it should be noted that when the Dougherty Valley was developed, WQPs were required to be installed. Because these facilities treat and detain stormwater runoff, in addition to providing full trash capture over the entire site they effectively act as Green Infrastructure devices installing additional GI in this area would be of limited benefit. Thus, the potential scope of installing GI in San Ramon has effectively been reduced to approximately55 percent of the City, less those areas already subject to recent treatment by C3 and similar devices.

➢ *Flood Zones*

The **Floodplain Boundaries** section of the current (2017) Flood Insurance Study (FIS) provided by the Federal Emergency Management Agency, states, that "To provide a national standard without regional discrimination, the 1-percent annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance flood is employed to indicate additional areas of flood risk in the community. For the stream studied in detail, the 1- and 0.2- percent annual chance

floodplains have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale and a contour interval as shown on Table 12, 'Topographic Map Information.'"

The **Floodways** section of the current (2017) FIS states that, "the floodways presented in this FIS were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections. The computed floodways are shown on the revised FIRM (Published Separately). In cases where the floodway and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

"The area between the floodway and 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1, "Floodway Schematic."

The **Principal Flood Problems** section of the current (2017) FIS state that "flooding in San Ramon is caused primarily by winter rains. Floods from San Ramon Creek have occurred in December 1955, April 1958, October 1962, and January 1963."

- *Flood Control Facilities*

  The existing flood protection measures section of the current (2017) FIS states that major channel improvements have been constructed along South San Ramon Creek beginning about 2,500 feet upstream of Alcosta Boulevard and extending upstream to its confluence with Coyote Creek.

- *Flood Control Development Policies*

  The City has adopted Chapter IV of the Municipal Code entitled Flood Insurance Program. The purpose of this section is to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by legally enforceable regulations applied uniformly throughout the community to all publicly and privately-owned land within flood prone areas.

- *Storm Sewer Opportunities (Pertinent to GI)*

  As with the most cities, the City of San Ramon has highly restricted opportunities for implementation of Green Infrastructure. Most of these are associated with limited right-of-way and limited funding compounded with the difficulties of maximizing the use of gravity flow from the existing storm drain system and the design of existing roadways. In San Ramon these restrictions are further limited by the relatively young age of the City and the associated slow pace of redevelopment. However, the City has identified limited areas where they City may be able to implement Green Infrastructure in conjunction with Capital Improvement Projects (as discussed later in this plan). Further opportunities may develop in association with redevelopment.

- *Recent and Planned Drainage Improvements*

  The City has a Capital Improvement Project (Deerwood Mill Creek CIP 5548K) to undertake major drainage improvements and repairs. Due to limited funding essentially all of the work under this project is maintenance of existing infrastructure. One project is associated with the daylighting of a 36-inch diameter storm drain pipe that had been previously damaged due to erosion. Can we name the project?

- *Funding for Maintenance and for Capital Improvements*

  Funding for the storm drain maintenance and new infrastructure is provided by several sources including:

  - *Countywide Stormwater Utility Area (SUA) Assessment District* This assessment is based on a $35 per Equivalent Runoff Unit (ERU) for eligible properties (most properties are assessed) in the City of San Ramon. It is collected by Contra Costa County. This is the sixteenth year that the City has assessed the maximum rate of $35/ERU. Total fees are approximately $1.3 million per year. The ERU is used to fund:
  - storm drain and catch basin maintenance and cleaning;
  - maintenance of flood control channels;
  - *maintenance of the stormwater quality ponds in the Dougherty Valley;*
  - other trash load reduction efforts;
  - participation in the Contra Costa Clean Water Program (CCCWP); and,
  - compliance with MRP.

  - *Drainage and Creek Mitigation Impact Fees* – these are local fees that are collected on new development and redevelopment and are restricted to use in specific areas of the western side of San Ramon. The combined fees collected each year vary and are between $50,000 and $250,000 per year.

  - General Fund: Projects are funded on an occasional basis from the Infrastructure Maintenance Fund which in turn is funded by the City's General Fund. Current funding is on the order of $100,000 per year.

1.3.3 Related Regional and Countywide Plans and Planning Documents

This Plan has been coordinated with the following regional stormwater documents:

- The Contra Costa Watersheds Stormwater Resource Plan (CCW SWRP). The CCW SWRP was funded by State Water Resources Control Board under a Proposition 1 Grant, with matching contributions provided by Contra Costa municipalities individually and collectively through the Contra Costa Clean Water Program (CCCWP). The CCW SWRP identified and prioritized potential multi-benefit stormwater management projects, including green infrastructure projects in watersheds and jurisdictions throughout Contra Costa County. Projects identified within the CCW SWRP are eligible to apply for future state funding. Many of the projects included in this Plan were drawn from the CCW SWRP project opportunity lists.

- The Contra Costa Countywide Reasonable Assurance Analysis (RAA). The RAA for Green Infrastructure is being prepared by Contra Costa municipalities collectively through the CCCWP and is consistent with guidance prepared by the Bay Area Stormwater Management Agencies Association (BASMAA). The RAA for Green Infrastructure uses a water quality model coupled with continuous simulation hydrologic output to estimate baseline loadings of pollutants and the reductions that might be achieved through green infrastructure implementation in 2020, 2030, and 2040 under various scenarios, which include implementation of projects identified in this Plan. Results pertinent to green infrastructure planning and implementation are discussed in Section 2 of this Plan. The RAA is included in this plan as Appendix B.

- The City of San Pablo and the City of Richmond have embarked on a Grant application for Alternative Compliance/Water Quality Trading in Contra Costa County. As of this writing the status of the grant success is unknown.

1.3.4 Related Local Planning Documents

Green infrastructure can be integrated into a wide diversity of public and private projects. Public projects can incorporate green infrastructure in streets, parks, schools, and other civic properties. In order to ensure that green infrastructure is considered and supported in the range of planning and design processes for these projects, the City has reviewed and/or updated the following planning documents to appropriately incorporate green infrastructure requirements:

Table 1. Documents Updated to Align with this Green Infrastructure Plan

Document	**Summary of Updates**	**Completion Date**
General Plan	Complete Streets included (reference)	2021
Crow Canyon Specific Plan	Include as part of Omega Hotel	Currently in review, 2020
Complete Streets	GI design guidelines included (reference)	July 2017
Standard Details and Specifications	Incorporate as needed	On-going
Engineering Design, Grading & Procedures Manual	Appendix I (Complete Streets) added, GI designs referenced	July 2017

- *Discussion of significant updates and how these updates have or will successfully integrate green infrastructure into local policies.*

  The General Plan was recently updated in 2010 to include implementation of Complete Streets in the Transportation Element. Reference is made to implementation of GI through the Engineering Design, Grading and Procedures Manual. Incorporation into the General Plan will provide the City the most flexibility to implement GI at the Specific Plan level, as well as at the entitlement stage of a project.

  The Crow Canyon Specific Plan is currently under review by the Planning Commission and is intended to implement GI. This would be the first required implementation of GI on a larger scale for the City.

Complete Streets guidelines were incorporated into the Engineering Design, Grading and Procedures Manual in 2017 to include references to designs which incorporate GI. Inclusion into the Design Guidelines provides the City the most leverage from a detailed design standpoint for implementing GI at the permit approval stage of a project.

- *Workplan identifying how the Permittee will ensure that green infrastructure and Low Impact Development are appropriately included in future plans.*
  Similar to how Stormwater Treatment requirements are reviewed as part of the planning process, the City will incorporate GI feasibility review as the time of project entitlement.

1.3.5 Outreach and Education

The City's Green Infrastructure Plan development process engaged a wide variety of stakeholders, including both government staff and community members who will live, work, and play near future green infrastructure projects. The Town also intends to engage relevant government staff and community members as projects move forward towards design and implementation.

The City's GI efforts have been ongoing since 2016

- 2016: The City conducted Green Infrastructure briefings with staff and provided several written updates to the City Council.
- April 2017: The City formed a Green Infrastructure Workgroup with representatives from key departments and divisions to review guidance developed by the Bay Area Stormwater Management Agencies Association to develop a Green Infrastructure Framework.
- May 24, 2017 the draft Green Infrastructure Framework was presented to the City of San Ramon Policy Subcommittee for discussion and comments.
- June 13, 2017: City staff presented the Green Infrastructure Framework Document to the City Council at a regularly scheduled public meeting. The Document was duly considered, approved and reported on in the 2016-17 Annual Report.
- 2017-18: Staff continued to update Council on the status of the development of Green Infrastructure requirements and the Plan during annual presentations of the Stormwater Program budget.
- September 26, 2018 – City staff participated in the Green Infrastructure Planning Workshop for Permittees.
- The City will participate in a countywide interagency process, convened by the CCCWP, to facilitate excellence and consistency in the design and construction of Green Infrastructure features and facilities. The City will:

  - Share with other Contra Costa municipalities, through the CCCWP, conceptual, preliminary, and final plans and specifications developed for Green Infrastructure projects.
  - Identify significant Green Infrastructure projects and issues encountered during design and construction of those projects and bring those projects and issues forth in online forums and in-person interagency workshops and meetings.

- Participate in evaluation and recommendation of design details and specifications for Green Infrastructure, where doing so furthers the purposes of countywide consistency and cost-efficiency, and quality of the built facilities.
- Participate, as a reviewer, in the drafting and updating of a Green Infrastructure Design Guide, the purpose of which will be to assist capital improvement projects staff in Contra Costa municipalities throughout the steps of project identification, evaluation, design, and construction.

1.3.6 Policies, Ordinances, and Legal Mechanisms

General Plan 2035 – Traffic and Circulation Element
Crow Canyon Specific Plan (currently being updated)
Engineering Design, Grading and Procedures Manual (07/2017)

2 Green Infrastructure Targets

Provisions C.11 and C.12 in the MRP require Contra Costa Permittees (Contra Costa County and its 19 cities and towns) to reduce estimated PCBs loading by 23 grams/year and estimated mercury loading by 9 grams/year using green infrastructure by June 30, 2020. Regionally, Permittees must also project the load reductions achieved via green infrastructure by 2020, 2030, and 2040, showing that collectively, reductions will amount to 3 kg/year PCBs and 10 kg/year mercury by 2040.

This planning process developed and assessed projections for the square footage of impervious surface to be retrofitted and treated with green infrastructure from private projects within the City's jurisdiction by 2020, 2030, and 2040. It also incorporates targets for the square footage of impervious surface to be retrofitted and treated with green infrastructure through potential public projects within the City's jurisdiction by 2020, 2030, and 2040.

2.1 Countywide Attainment Scenario

A "Countywide Attainment Scenario" was modeled as part of the RAA modeling to help Permittees with their GI Planning. The Contra Costa Countywide Reasonable Assurance Analysis (RAA), summarized in the Geosyntec Consultants draft memo to the CCCWP entitled, "Reasonable Assurance Analysis Countywide Attainment Strategy" dated May 1, 2019, attached as Appendix B, focused on PCBs while also evaluating opportunities for mercury reduction. The results of this analysis demonstrate that the public GI retrofit opportunities with the highest potential to reduce PCBs loads are concentrated within a small subset of Contra Costa Permittee area due to the pattern of pre-1980 industrial development within the region. Conversely, many Contra Costa Permittees have no or very few opportunities to contribute significantly toward achievement of PCBs loading reductions via implementation of GI in their communities.

Given the findings, it is likely that a countywide strategy would be the most efficient and effective way to achieve the PCB load reduction goals. However, a preliminary review of the legal and administrative requirements involved with implementing a countywide strategy indicates that they are complex and would require considerable effort to resolve. Additionally, it would require comprehensive dialogue in the public forum lead by the elected officials and ultimately overall agreement which is beyond the scope of this plan.

For the purposes of creating the local GI Plan, San Ramon prioritized their GI projects based on achieving other multiple benefits including controlling other stormwater pollutants, preserving and enhancing local stream hydrology, reducing localized flooding, increasing the resiliency of water supply, ancillary benefits that derive from adding landscaped areas within the urbanized environment, and mitigating the urban heat island effect.

2.2 Private Development Projections

To forecast private development, the City participated in a regional process coordinated through the CCCWP and shared with BASMAA member agencies. This process utilized the outputs of UrbanSim, a model developed by the Urban Analytics Lab at the University of California under contract to the Bay Area Metropolitan Transportation Commission (MTC). UrbanSim is a modeling system developed to support the need for analyzing the potential effects of land use policies and infrastructure investments on the development and character of cities and regions. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort.

MTC forecasts growth in households and jobs and uses the UrbanSim model to identify development and redevelopment sites to satisfy future demand. Model inputs include parcel-specific zoning and real estate data; model outputs show increases in households or jobs attributable to specific parcels. The methods and results of the Bay Area UrbanSim model have been approved by both MTC and Association of Bay Area Government [ABAG] Committees for use in transportation projections and the regional Plan Bay Area development process.

The CCCWP process used outputs from the Bay Area UrbanSim model to map parcels predicted to undergo development or redevelopment in each Contra Costa jurisdiction at each time increment specified in the MRP (2020, 2030, and 2040). The resulting maps were reviewed by local staff for consistency with the City's local knowledge and local planning and economic development initiatives. The maps were revised, and each revision documented.

It is assumed that multifamily residential and commercial/industrial developments will incorporate stormwater treatment facilities (typically bioretention) in accordance with MRP Provisions C.3.b., C.3.c., and C.3.d. Because of high land values, it is expected that more than 50% of the existing impervious area in each parcel will be replaced if a parcel is developed, and therefore the entire parcel will be subject to Provision C.3 requirements (that is, will be retrofit with Green Infrastructure), consistent with the "50% rule" requirements of MRP Provision C.3.b.

Existing impervious surface for each affected parcel was estimated using the 2011 National Land Cover Database. Estimates were spot-checked and revised based on local knowledge and available satellite imagery.

Based on these assumptions and the revised maps, the amounts of existing impervious surface forecast to be retrofit with green infrastructure via private development are as shown in Table 2.

Table 2. Estimates of Impervious Surface to be Retrofit via Private Development

Year	**Total Square Footage**
2020	120,982
2030	367,294
2040	2,448,232

2.3 Targets for Public Projects

Forecasted impervious surface to be retrofit via public projects is in two categories:

1. Estimated tributary impervious surface for Green Infrastructure Projects identified in this Plan.

2. Additional tributary impervious surface associated with projects yet to be identified. These projects are associated with general geographic areas (neighborhoods or blocks) but specific facility locations have not yet been identified.

These forecasts are summarized in Table 3.

Table 3. Estimates of Impervious Surface to Be Retrofit via Public Projects

Year	Square footage tributary to GI Projects included in this Plan	Additional square footage associated with projects yet to be identified	Total
2020	120,000	2,334,198	
2030	TBD 90,000 – 200,000 estimated	2,244,198 – 2,134,198	2,454,198
2040	TBD	TBD	2,454,198

2020 includes previously completed projects

2.4 Projected Load Reductions

As part of the RAA process, the estimates of projected private development (described in Section 2.2) and the general and specific locations of public projects (summarized in Section 2.3 and detailed in Chapter 3) will be incorporated into a water-quality model and projected pollutant load reductions will be developed for 2020, 2030, and 2040. Details of methods, inputs, and model outputs will be included in the RAA report.

3 Public Project Identification, Prioritization, and Mapping

3.1 Tools for Public Project Identification and Prioritization

The City of San Ramon utilized a number of tools to identify and prioritize potential public projects. The first process was the Contra Costa Watersheds Stormwater Resource Plan described briefly in sections 3.1.1 and 3.1.2 below.

- *CCW SWRP Overview*

The Contra Costa Watersheds (CCW) Stormwater Resource Plan (SWRP) was created to help build stormwater management projects and programs within Contra Costa County (County). The plan builds upon a foundation of support for and successful implementation of watershed protection programs, restoration projects, and low impact development throughout the County.

The CCW SWRP forms a connection between regional water quality and water resources planning goals. The CCW SWRP identifies projects that can support municipal GI planning and implementation driven by water quality regulations. The CCW SWRP also reflects the goals of and will be incorporated into Integrated Regional Water Management (IRWM) plans within the County, providing a link between stormwater and management of other water resources. The implementation of multiple benefit CCW SWRP projects will help protect and improve water bodies in the County, which provide important environmental, community, health, and economic benefits within the County. CCW SWRP also represents progress towards treating stormwater as a valuable local water resource.

The process for identifying project opportunities and then selecting ten potential projects for concept development is outlined below.

1. Identify projects – Potential projects were provided by the Permittees and other CCW SWRP stakeholders. Additional potential project locations were identified and catalogued using a geographic information system (GIS)-based opportunity analysis.
2. Score projects using an automated metrics-based evaluation – The CCW SWRP used a quantitative metrics-based multiple benefit evaluation, as required by the Storm Water Resource Plan Guidelines (SWRP Guidelines, SWRCB, 2015), to score potential projects. Multiple benefits evaluated included water quality, water supply, flood control, environmental and community benefits of projects. The scoring was automated using metrics based on available project attributes. These scores were then used to preliminarily rank the projects for each jurisdiction.
3. Rank projects based on input from CCCWP Permittees and the Technical Advisory Group (TAG) – Using the project scores along with other institutional knowledge, the CCCWP, jurisdictions, and Contra Costa Watersheds ES-7 August 2018 DRAFT Stormwater Resource Plan the TAG provided input on project ranking and prioritization of projects as required by the SWRP Guidelines.

4. Develop Project Concept Designs – Ten projects were selected for development of concept designs showing the project footprint, stormwater treatment facilities, projected PCBs and mercury load reductions and other benefits, and a cost estimate. The City of San Ramon's projects are not included in the list as they are an opportunity that only came available with the approval of the development project March 2019

- *Development of Initial Project Opportunity Lists*

The City identified its projects based on their ability to be built in the location and provide meaningful treatment as part of a development project.

The Contra Costa Clean Water Program (CCCWP) led the development of the CCW SWRP, on behalf of Contra Costa County Flood Control and Water Conservation District (Flood Control District), unincorporated Contra Costa County, the 19 incorporated cities and towns within Contra Costa County (Permittees), and other stakeholders. The CCW SWRP development involved a robust outreach program to engage and solicit feedback from the County's well-organized and empowered community groups and the public. A Technical Advisory Group (TAG), made up of representatives from state, regional, and local agencies as well as stakeholder groups, was also established to help guide the CCW SWRP development. The stakeholder developed potential project by gathering the following information for the SWRP:

Facility Name
Location with APN or GPS coordinates
Facility size and or volume
Other information such as assessment of benefits, the stage of planning/completion date and other descriptive information

- *Stakeholder Engagement Process*

The development of a successful CCW SWRP required the coordination and collaboration among municipalities, special districts, NGOs, other stakeholders within the County and the public, as well as government agencies, to gather data, identify project opportunities, and ensure that local goals and values are reflected in the document. A group of technical advisors, representing municipalities, watershed advocacy and planning groups, and disadvantaged communities was assembled into a technical advisory group (TAG) to help guide the development of the CCW SWRP. This section describes the roles of cooperating entities, the TAG, supporting entities, and the public as well as the CCW SWRP's relationship with existing and anticipated planning documents. Specific public education and outreach activities that were conducted during the CCW SWRP development process.

- *Project Opportunity Identification Tool*

A desktop project opportunity analysis was conducted in a GIS platform to identify opportunity locations for GI projects. The desktop GIS analysis entailed screening for publicly-owned parcels and rights-of-way (ROW) without physical feasibility constraints that would preclude implementation of a GI project. The process for identifying additional projects was as follows:

1. Identify publicly owned parcels
2. Screen identified publicly owned parcels
3. Identify right of way
4. Identify land uses
5. Screen all identified locations for physical feasibility

The projects identified through the GIS opportunity analysis and stakeholder GI projects process were categorized as parcel-based, regional, or ROW/green street projects.

- *CCW SWRP criteria for selecting/scoring multi-benefit projects*

The SWRP Guidelines require an assessment of water quality, water supply, flood management, environmental, and community benefits of potential CCW SWRP projects. The SWRP Guidelines divide these benefit categories into "main" and "additional" benefits

Table 4. Benefit Categories of Potential CCW SWRP Projects

Category	**Main Benefit**	**Additional Benefit**
Water Quality	• Increased filtration and/or treatment of runoff	• Nonpoint source pollution control • Reestablished natural water drainage and treatment
Water Supply	• Water supply reliability • Conjunctive use	• Water conservation
Flood Management	• Decreased flood risk by reducing runoff rate and/or volume	• Reduced sanitary sewer overflows
Environmental	• Environmental and habitat projection and improvement • Increased urban green space	• Reduced energy use, greenhouse gas emissions, or provides a carbon sink • Reestablishment of the natural hydrograph
Community	• Employment opportunities provided • Public education	• Community involvement • Enhance and/or create recreational and public use areas

Using the information compiled in the identified project opportunity database, each project received a score using the point system. A description of each scored project component is provided below:

Parcel area (for regional and parcel-based GI projects only) – This scoring component awarded more points for larger parcels, as it is easier to site a project on a larger parcel.

Slope – This scoring component is related to ease of construction and implementation. Flatter locations typically require less grading and hydraulic connection considerations and received more points.

Infiltration feasibility – More points were awarded to projects that overlie infiltrating soils, as retention of runoff through infiltration provides enhanced pollutant reduction, reestablishment of natural drainage, groundwater aquifer recharge potential, and reduction of runoff rates, among other beneficial outcomes.

PCBs/mercury yield classification in project drainage area – This scoring component is related to the influent TMDL pollutant loads. Facilities that are in areas with higher pollutant loading rates for PCBs and mercury have greater potential to reduce pollutant loads. An additional point was awarded to projects with a property within its assumed drainage area that is known to be a source of elevated PCBs loads to the storm drain system.

Removes pollutant loads from stormwater – Points were awarded to facilities designed as green infrastructure or treatment control facilities. More points were awarded to partially and fully infiltrating green infrastructure projects than non-infiltrating projects, as infiltration increases pollutant load reduction. An additional point was awarded for regional projects, as these projects would remove a larger pollutant load than a parcel-based or ROW project.

Augments water supply – Increasing points were awarded based on potential water supply provided. Projects located over infiltrating soils and overlying potential water supply aquifers that promote infiltration were given one point, while projects that are specifically designed to augment water supply were given two points.

Provides flood control benefits – Flood control facilities received points specific to providing flood control benefits. Green infrastructure projects (fully or partially infiltrating) were assumed to provide some flood control benefits, while projects specifically designed to address flooding issues were given more points**.**

Re-establishes natural water drainage systems or develops, restores, or enhances habitat and open space – Hydromodification control, stream restoration, and habitat restoration projects received points specific to providing these environmental benefits. Fully and partially infiltrating green infrastructure projects were given one point for providing hydrologic benefit.

Provides community enhancement and engagement – Projects that specifically provide public use areas or public education components with potential opportunities for community engagement and involvement were given points specific to providing community benefits.

- *Additional criteria used by municipal staff*

  Staff also considered the cost benefit as part of the "buildability" of the projects.

- *Prioritization Process*

  The scored project opportunity database was used to create opportunity checklists for each jurisdiction.

- *Local staff identification of additional projects*

  Staff added to the SWRP the projects that it already had a concept for or was a location that had potential to be "buildable." This effort will also identify in the field a scope concept for project identified as high potential for contribution to load reduction under the Countywide Attainment Scenario.

- *Integration with Storm Drain Master Plan*

  The City anticipates undertaking a storm drain inventory and long term maintenance plan in the near future. The first steps of the plan are anticipated to begin in FY 2019-20 pending funding and balancing other priorities. The first step will include verification and documentation of existing infrastructure locations and types. This data will be available to help better plan GI projects in the future.

- *Integration with Capital Improvement Project planning process*

  All project proposals are evaluated in the context of the City priorities. The highest priority is the maintenance of current facilities. After that new project proposals are evaluated based on funding available and the use of dedicated or restricted funding.

- *Integration with Complete Streets and other transportation planning processes*

  Where funding and right of way opportunities present themselves, green infrastructure will be examined for incorporation into transportation projects.

Maps and project lists are discussed in Section 4 of this plan.

3.2 Maps and Project Lists

The table shown below provides the project currently determined by the City to be feasible for inclusion in this GI Plan. Associated maps are included in Appendix A.

Table 5: City of San Ramon Proposed GI Projects

Description	2020	2030	2040
Old Crow Canyon Rd. Corridor Improvement (Crow Canyon to Hooper) Actual project has no identified completion date but GI elements may be included as an off-site mitigation for the non-regulated Crow Canyon Widening project. Design of GI element is 65% complete.		6,000	
Hampton Inn - Install GI Facilities along the Deerwood Drive frontage to treat Deerwood Drive. In planning approval process		8,500	
CIP 5327, 5328, 5329 5312, 5412 - Crow Canyon Rd. Widening 4 - 6 Lanes (West Branch to Dougherty). This is an off-site improvement project for the Dougherty Valley development. Some elements are under design.		75,000	

4 Early Implementation Projects

4.1 Review of Capital Improvement Projects

MRP Provision C.3.j.ii. requires that the City must prepare and maintain a list of public and private green infrastructure projects planned for implementation during the 2015- 2020 permit term, and public projects that have potential for green infrastructure measures. The City submitted an initial list with the FY 15-16 Annual Report to the RWQCB and updated the list in the FY 16-17 and FY 17-18 Annual Reports.

"The City submitted an initial project list with the FY15-16 Annual Report, and updated the list in the FY 16-17 and FY 17-18 Annual Reports.

The creation and maintenance of this list is supported by guidance developed by BASMAA: "Guidance for Identifying Green Infrastructure Potential in Municipal Capital Improvement Projects" (May 6, 2016). The BASMAA Guidance is attached to this document as Appendix C.

4.2 List of Projects Identified

The City of San Ramon has previously undertaken projects where possible. These projects are discussed in Section 1.2

CIP Projects with Green Infrastructure potential that were identified during 2015-2019 are listed in Table 6, along with their status and are shown on the Public Projects Map, Attachment A.

Table 6. Capital Improvement Projects with Green Infrastructure Potential (identified 2015-2019)

Project Name	Description	Potential Tributary Impervious Area (SF)	Project Status	Included in GI Plan (Y/N)	Map ID Number
CIP 5324 – Bollinger Canyon Rd Widening 8 lanes (Alcosta / SRVB)	Widen Bollinger Canyon Rd from Alcosta Blvd to San Ramon Valley Blvd to 8 lanes and extend/add turn lanes to satisfy traffic mitigation measures for the City Center development.	TBD	Completed	Y[1]	
Camino Ramon / Commons Shopping Center Intersection Improvements	This project will widen the driveway from the Commons Shopping Center onto Camino Ramon to provide for an exclusive right turn lane, a shared left and through lane, installation of a traffic signal, and restriping of the shopping center driveway. This project may have possible shopping center owner participation in cost contribution.	TBD	Not started	N	

Bollinger Canyon Rd. Bike Lane Project (Crow Canyon / Norris Canyon)	This project will provide for two Class II bike lanes between Crow Canyon Road and Norris Canyon Road, a distance of about 5,200 feet. This will be accomplished by widening four feet into the existing median strip in each direction. A Class III shared bike route currently exists.	TBD	Not started	TBD	1
Bollinger Canyon Rd. / Crow Canyon Rd. Intersection	This project will modify the intersection of Bollinger Canyon Rd. and Crow Canyon Rd to accommodate a right turn lane from southbound Bollinger Canyon Rd. to westbound Crow Canyon Rd	TBD	Not started	N	
Fostoria Way Widening (Camino Ramon to east City Limit) – Project 2 on Map	This project will construct a widened roadway complete with curb, gutter, sidewalk, and streetlights from Camino Ramon easterly to the City Limits past the Iron Horse Trail.	TBD	Not started	TBD	2
Alcosta Community Park (PG&E)	This project will acquire and develop the PG&E right-of- way from I-680 to Alcosta Boulevard as a park. The project will include ball fields, picnic areas, restrooms, on- site parking, trail system with fitness course, and children's play area.	TBD	Design not started	TBD	3
Crow Canyon Staging Area	This project will provide a staging area to be located on Crow Canyon Road opposite the San Ramon Service Center located at 5000 Crow Canyon Road. The project will tie together the extensive open space area/ridge line. The project design will be consistent with EBRPD requirements. The project will include parking for both horse trail and park, short-term corral, watering trough, and hitching posts. The project's landscaping will include hydroseeded meadow, with picnic area, and trees.	TBD	Design not started	TBD	4
Fostoria Way / Old Crow Canyon Rd. Creek Park	This project will provide a park trail along San Ramon Creek from a point approximately 500 feet north of Crow Canyon Road on Old Crow Canyon Road to the Fostoria overcrossing of I-680. The park will be part of a mini trail system along the creek in the historic San Ramon area. The trail will extend along San Ramon Creek from the Crow Canyon Gardens to the Fostoria overcrossing. The project will include access to San Ramon Creek.	TBD	Design not started	TBD[2]	5
Henry Ranch Park	This project will provide for a park to be constructed at the Henry Ranch site. The park will be eighteen acres total with approximately eight acres developed formally with fields, playground, parking lot and typical neighborhood amenities.	TBD	Design not started	N[3]	
San Catanio Creek Park– Project 6 on Map	This project will add a 4.75-acre park on the east side of Bollinger Canyon Road north of Norris Canyon Rd.	TBD	Design not started.	TBD[4]	6

Special Concrete Paving at Neighborhood Intersections	This project will provide for the construction of a special textured crosswalk paving at designated controlled intersections in the south of Montevideo Drive area. The following intersections have been identified as possible candidate locations: 1) Montevideo at Davona; 2) Montevideo at Toby; 3) Montevideo at Broadmoor; 4) Montevideo at Torreon; 5) Montevideo at Colima; 6) Davona at Westchester; 7) Davona at Pine Valley; 8) Davona at Westwood; 9) Davona at Blue Fox Way; 10) Broadmoor at Millbridge; 11) Pine Valley at Thunderbird; and 12) Broadmoor at Ascot.	TBD	Design not started	N	
San Ramon Valley Blvd. East Side Curb Installation (Norris to Montevideo) – Project 7 on Map	This project will provide for the installation of a concrete curb and gutter along the east side of San Ramon Valley Boulevard in the portion currently lacking curb and gutter.	TBD	Design not started	TBD	7
San Ramon Valley Blvd. / Hooper Dr. Traffic Signal	This project will provide a traffic signal and interconnect at the intersection of San Ramon Valley Boulevard and Hooper Drive (when warranted) to provide for the current traffic conditions during the peak hour travel periods. Conduit sleeves will be installed across Hooper Drive by the developer as part of roadway widening of Hooper Drive.	TBD	Design not started	N	
Camino Ramon / Commons Office Park Intersection Improvements	This project will provide for the widening of the driveway at the intersection of Camino Ramon and the Commons Office Park driveway to provide for a single entrance lane, a left/through exit lane, and a right turn only exit lane from the Commons Office Park Center, and the installation of a traffic signal.	TBD	Design not started	N	
Twin Creeks Dr. Extension (4 Lanes) - Crow Canyon to Old Crow Canyon	This project will extend Twin Creeks Drive north from Crow Canyon Road to Old Crow Canyon Road via a bridge over San Ramon Creek.	TBD	Design not started	C3	
Old Crow Canyon Rd. Corridor Improvement (Crow Canyon to Hooper)	This project will construct or widen the roadway to provide a 70-foot right of way complete with curb, gutter and sidewalk along Old Crow Canyon Road from Crow Canyon Road to Deerwood Road as well as Omega Road between Deerwood Road and Purdue Road.	6000	Design not started	Y[5]	
San Ramon Valley Blvd. Beautification (Crow Canyon Rd. to City Limits)	This project will improve the streetscape and landscape to beautify the pedestrian and visual environment on San Ramon Valley Boulevard from Crow Canyon Road to the northern City Limits. The project would include sidewalks along both sides of the roadway as well as tree plantings incorporated in the parking lane to create a staggered double-row of street trees.	TBD	Design not started	TBD	8

Crow Canyon Creekscape Improvement	This project will provide a neighborhood park and creekside trail system along San Ramon Creek from Crow Canyon Road on Old Crow Canyon Road. The park will be a passive recreation park with entrance plaza, benches, picnic tables and possible playground as well as trails that extend to a future trail system along San Ramon Creek and its tributary.	TBD	Design not started	TBD	9
Iron Horse Trail Landscaping & Beautification	This project will landscape sections on the Iron Horse Trail from the north City Limits to south City Limits. It will provide park benches	TBD		N	
Stagecoach Rd. Sidewalk Installation– Project 10 on Map	This project will construct approx. 2,096 LF of sidewalk along the west side of Stagecoach Road from Alcosta Blvd to the South City limits	TBD	Design not started	TBD	10
Forest Home Farms - Glass House Landscaping Phase II – Project 11 on Map	This project is the second phase of the landscaping around the picket fence at Glass House. The project includes the orchards on both the north and south side of the fence, nut trees on the north and fruit trees on the south. There are also pathways through the orchard, plantings along the creek and some lighting. This does not include the proposed vineyard at the back of the house.	TBD	Design not started	TBD	11
Bollinger Canyon Rd. / Iron Horse Trail Bicycle Pedestrian Overcrossing	The Iron Horse Trail is a regional non-motorized trail that runs north/south through the San Ramon Valley. The overcrossing will provide substantial improvements to on street traffic flow, improve safety, and accessibility for bicyclists and pedestrians.	TBD	Design not started	C3	
Crow Canyon Rd. / Iron Horse Trail Bicycle Pedestrian Overcrossing	The Iron Horse Trail is a regional non-motorized trail that runs north/south through the San Ramon Valley. The overcrossing will provide substantial improvements to on street traffic flow and improve safety, accessibility for bicyclists and pedestrians.	TBD	Design not started	C3	
Central Park Restoration and Improvements	This project will restore the aging park infrastructure as prioritized and planned in the Central Park Master Plan, site amenities and enhancements to existing park features. This will be a progressive multi-year, phased project relative to the long-range Parks Capital Maintenance and Renovation Plan. Once the projects from Master Plan are completed, future projects will be completed under Parks Amenities Project CIP 5584.	TBD	Design not started	N	
Sidewalk Repairs 2018/2019	This project provides for the repair and maintenance required on sidewalks, curbs and gutters that are identified as a tripping potential, or improvements are necessary for ADA compliance.	TBD	Design not started	N	

CIP 5553 – Pavement Management 2017	This project provides for street rehabilitation work in accordance with the City Pavement Management Program. Based on a long-range projection, each street is programmed for necessary rehabilitation. Street rehabilitation work will include slurry seal/micro seal, asphalt overlays, street reconstruction, etc.	TBD	Design not started	N	
San Ramon Valley Blvd. Median Landscape (Crow Canyon Road)	This project replaces the declining landscaping with colored stamped concrete on the narrow center medians on San Ramon Valley Boulevard from the Crow Canyon Road intersection going north approximately 200 feet, going south approximately 260 feet, and on Crow Canyon Road going east approximately 230 feet. The existing landscaping is irrigated with drop tubing and battery-operated valves, which requires a high level of maintenance and is substantially ineffective. During summer months much of the plant material stresses and dies resulting in an unsightly appearance. The medians planting surface is about two feet wide and some of it is at a steep angle making it difficult to keep enough water in the soil for the plants without it running off into the street and requiring traffic lane closures to safely access the medians for maintenance on this busy section of roadway.	TBD	Design not started	TBD	12
Sidewalk Repairs 2020/2021	This project provides for the repair and maintenance required on sidewalks, curbs and gutters that are identified as a tripping potential, or improvements necessary for ADA compliance.	TBD	Design not started	N	
Central Park Basketball Court	This project provides for the design and construction of a single lighted basketball court at Central Park. Project will be completed in two phases: Phase I, design; and Phase II, construction.	TBD	Design not started	TBD	13
Pavement Management 2021	This project provides for street rehabilitation work in accordance with the City Pavement Management Program. Based on long-range projections, each street is programmed for necessary rehabilitation. Street rehabilitation work will include slurry seal/micro seal, asphalt overlays, street reconstruction, etc.	TBD	Design not started	TBD	Not mapped
Pavement Management 2022 – not mapped	This project provides for street rehabilitation work in accordance with the City Pavement Management Program. Based on long-range projections, each street is programmed for necessary rehabilitation. Street rehabilitation work will include slurry seal/micro seal, asphalt overlays, street reconstruction, etc.	TBD	Design not started	TBD	Not mapped

Sidewalk Repairs 2022/2023 – not mapped	This project provides for the repair and maintenance required on sidewalks, curbs and gutters that are identified as a tripping potential, or improvements necessary for ADA compliance.	TBD	Design not started	N	
Crow Canyon Rd. / I-680 Northbound Off Ramp Improvements (C 2.9)	This project will construct one additional dedicated right turn lane to the northbound off ramp at the intersection of Crow Canyon Road and I-680.	TBD	Design not started	C3	
Crow Canyon Rd. / I-680 Southbound Off Ramp Improvements (C 2.10)	This project will widen and re-stripe the existing right turn lane to provide a shared right/left lane for the southbound off ramp at the intersection of Crow Canyon Road and I- 680.	TBD	Design not started	N	
Old Ranch Road Bicycle Path– Project 14 on Map	This project will construct a bicycle path from the Bent Creek Subdivision to Old Ranch Park (phase 1) and from Old Ranch Park to the Alcosta Senior & Community Center area (phase 2).	TBD	Design not started	TBD	14
Utility Undergrounding Program	This program will underground existing overhead utility facilities throughout the City of San Ramon. This program will provide for the undergrounding of all remaining overhead utility facilities in the City of San Ramon not otherwise provided for in other undergrounding projects already included in the CIP. Existing service connections on private property may have to be relocated underground by the property owners at their expense at the same time as each area is undergrounded.	TBD	Design not started	N	
CIP 5327, 5328, 5329 5312, 5412 - Crow Canyon Rd. Widening 4 - 6 Lanes (West Branch to Dougherty)	Construct 2 additional lanes on Crow Canyon Rd from the westerly boundary of the West Branch Subdivision to Dougherty Rd.	75,000	Beginning Design	Y[6]	
CIP 5391 – Summerwood Loop Paths Replacement	Maintenance and repair of deteriorated asphalt path	TBD	Ongoing	N	
CIP 5413 – Pedestrian Enhancement Devices	Install facilities to enhance awareness of pedestrians	TBD	Not started	N	
CIP 5423 – ADA and Safety Regulations for Playground	Install minor upgrades for ADA / safety requirements	TBD	Not started	N	
CIP 5488 – Street Landscape Planting Renovation	Citywide retrofit of existing street landscape	TBD	On going	N	
CIP 5498 – Camino Ramon / Bishop Dr. Right Turn Lane	Modify the existing right turn lane	TBD	Not started	N	
CIP 5544 – Pavement Repair – Stop Gap 18/19	Rehabilitation of minor asphalt failures	TBD	Not started	N	
CIP 5568 – Pavement Management 2019	Rehabilitation of roadway infrastructure	TBD	Beginning Design	N	
CIP 5576 – Crow Canyon Rd. Pavement Rehab	Rehabilitation of Crow Canyon Rd from Alcosta Blvd. to Dougherty Rd.	TBD	Beginning Design	N	
CIP 5579 – Pavement Management 2020	Rehabilitation of roadway infrastructure	TBD	Not started	TBD	Not mapped

CIP 5607 – Alcosta Blvd / Broadmoor Dr Median Modification	Install median island to restrict left turn and through movements from Broadmoor Dr and shopping center	TBD	Not started	N	
CIP 5602 – Alcosta Blvd Pavement Rehab	Rehabilitation of Alcosta Blvd.	TBD	Not started	TBD	15
CIP 5605 – Alcosta Senior and Community Center Landslide Repair	Landslide repair	TBD	Not started	N	
CIP 5325 – Bollinger Canyon Rd Widening Ph II	Widen Bollinger Canyon Road between Alcosta Blvd. and Canyon Lakes	TBD	Not started	N	
CIP 5548 – Citywide Drainage Infrastructure Repair	Install various drainage improvements as needed	TBD	Not started	N	
CIP 5478 – Fountain Repairs	Install various repairs	TBD	Not started	N	
Hampton Inn	Install GI Facilities along the Deerwood Drive frontage to treat Deerwood Drive	8,500	Planning Approvals	Y	

TBD = To Be Determined
C3 = Project likely triggers C3 requirements
1. Green Infrastructure was included where feasible
2. May be possible near Old Crow Canyon Road
3. Likely not possible as park is at the top of a hill.
4. Likely
5. An element is in 65% design, may be combined with other projects.
6. May be combined with Old Crow Canyon Road.
7. A storm drain day lighting project is being included as part of the project, as funding permits

3.3 Workplan for Completion

- Tasks and timeframes for constructing the projects identified in Section 4.2 as feasible or potentially feasible are indicated below:

Project	Tasks	Timeframe for implementation
Old Crow Canyon Road	Complete Final Design Construct	Estimated completion of construction 2022
Crow Canyon Road Widening – Phase 2, St George to Dougherty Road	Funding to be determined Design completed Construction	TBD
Hampton Inn – Deerwood Drive	Design to be completed Construction	Preliminary estimated completion 2022

5 Tracking and Mapping Public and Private Projects Over Time

5.1 Tools and Process

The CCCWP has developed a county-wide GIS platform for maintaining, analyzing, displaying, and reporting relevant municipal stormwater program data and information related to MRP Provisions C.10 (trash load reduction activities) and C.11/C.12 (mercury and PCBs source property identification and abatement screening activities). This tool is also used to track and report on GI project implementation.

The CCCWP's stormwater GIS platform features web maps and applications created using ESRI's ArcGIS Online (AGOL) for Organizations environment, which accesses GIS data, custom web services and reports that are hosted within an Amazon cloud service running ESRI's ArcGIS Server technology.

The C.3 Project Tracking and Load Reduction Accounting Tool within the CCCWP AGOL system is used to track and report on GI project implementation. It is currently used to track and map existing private and public projects incorporating GI; in the future it may also be used to map planned projects and will allow for ongoing review of opportunities for incorporating GI into existing and planned CIPs. The AGOL system can be used to develop maps that can be displayed on public-facing websites or distributed to the public. These maps can be developed to contain information regarding the GI project data input into the AGOL system.

5.2 Results

The C.3 Project Tracking and Load Reduction Accounting Tool is intended to be used to allow for estimates of potential project load reduction for PCBs and mercury and presently supports the BASMAA Interim Accounting Methodology for certain load reduction activities. In the future, the tool is planned to be updated with the RAA methodology developed for the County. That functionality is planned to be active by the end of the current permit term.

The City actively engages with the AGOL tool and maintain up-to-date City project data. The City currently conducts updates of the AGOL tool at an annual frequency.

6 Design Guidelines and Specifications

6.1 Guidelines for Streetscape and Project Design

- *Description of Guidelines*

  When determining design elements to be included in streetscape improvements and complete streets projects, project managers and designers will consult the National Association of City Transportation Officials (NACTO) Urban Street Stormwater Guide, the San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook, and other resources available on the CCCWP website. https://www.cccleanwater.org/construction-business/green-infrastructure/resources

6.2 Specifications and Typical Design Details

- *Description of Specifications and Typical Design Details*

  LID features and facilities will be designed and constructed in accordance with the applicable specifications and criteria in the Contra Costa Clean Water Program's Stormwater C.3 Guidebook. Additional details and specifications, as may be needed for design of street retrofit projects, may be adapted from the San Francisco Public Utilities Commission Stormwater Requirements and Design Guidelines Appendix B (Green Infrastructure Details), the Central Coast Low Impact Development Institute Bioretention Standard Details and Specifications, or other resources compiled by the CCCWP and available through their website.

6.3 Sizing Requirements

The City uses the sizing guidelines generated by the Bay Area Stormwater Management Agencies Association (BASMAA) report, Guidance for Sizing Green Infrastructure Facilities in Street Projects, attached as Appendix D.

MRP Provision C.3.d contains criteria for sizing stormwater treatment facilities. Facilities may be sized on the basis of flow, volume, or a combination of flow and volume. With adoption of the 2009 MRP, a third option for sizing stormwater treatment facilities was added to Provision C.3.d. This option states that "treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data." This option can also be used to develop sizing factors for facilities with a standard cross-section (i.e., where the volume available to detain runoff is proportional to facility surface area). To calculate sizing factors, inflows, storage, infiltration to groundwater, underdrain discharge, and overflows are tracked for each time-step during a long-term simulation. The continuous simulation is repeated, with variations in the treatment surface area, to determine the minimum area required for the facility to capture and treat 80% of the inflow during the simulation.

7 Funding Options

7.1 Funding Strategies Developed Regionally

The City is committed to the implementation of green infrastructure in future development, but also in retrofitting the existing infrastructure to move away from existing "gray" infrastructure. To that end the City will be working collaboratively with its co-permittees in the pursuit of funding and project opportunities that are aimed at creating green infrastructure. The primary purpose in participating in the Contra Costa Watersheds Stormwater Resources Plan (SWRP) development was to be eligible for state grant funds by having all potential projects in the SWRP. The BASMAA Roadmap for Funding of Sustainable Streets will be an important tool in the quest for funding.

BASMAA's "Roadmap for Funding of Sustainable Streets", April 2018 (Appendix E) states:
(The) "Roadmap, was developed to identify and remedy obstacles to funding for Sustainable Street projects, which are defined as projects that include both Complete Street improvements and green stormwater infrastructure, and that are maintained in a state of good or fair condition. The specific actions included in the Roadmap are designed to improve the capacity – both statewide and in the San Francisco Bay Area -- to fund Sustainable Street projects that support compliance with regional permit requirements to reduce pollutant loading to San Francisco Bay, while also helping to achieve the region's greenhouse gas reduction targets.

"To date, Sustainable Streets have faced funding obstacles due to the restrictions of various funding programs – which may not recognize the potential for overall cost savings that local agencies may achieve through multi-benefit Sustainable Streets projects. Some transportation grants may fund only some aspects of a Sustainable Street project, while resource grants may fund other aspects – and assembling multiple funding sources brings new challenges and costs to a project.

"Over the next 20 to 30 years, cities throughout the Bay Area, and in other parts of California, are required to invest in widespread construction of infrastructure projects that remove pollutants from stormwater runoff, in order to achieve water quality goals for San Francisco Bay. The cost is anticipated to parallel the costs to meet similar requirements in other parts of the state. For example, City of Los Angeles alone, over the next 20 to 30 years, has estimated that $7 to $9 billion dollars will be needed to implement the city's Water Quality Compliance Master Plan for Urban Runoff (Farfsing and Watson 2014). Sustainable Streets are designed to cost effectively deliver multiple benefits, including: climate change mitigation, air quality improvement, water quality improvement, localized flood control, and community benefits.

(The) "Roadmap presents specific actions intended to ease the financial burden local governments are facing by maximizing available resources and/or identifying new funding streams. The specific actions to fund Sustainable Streets are scheduled for the following timeframes:

- Immediate actions, such as addressing Sustainable Streets in grant solicitations
- Short-term actions, such as reviewing policies for better ways to fund Sustainable Streets
- Long-term solutions, including legislative engagement and/or advocacy regarding Sustainable Street"

7.2 Local Funding Strategies

It is noted that per the Permit Requirements, the sources of funding which the City is currently pursuing or will pursue for GI Project development should include an evaluation of prioritized funding options, including, but not limited to, alternative compliance funds, grant monies, new taxes and other levies, and other municipal/Permittee resources.

A first step to evaluating potential local funding strategies would be to work with the CCCWP to investigate the legislative constraints for the use of Contra Costa Transportation Authority sales tax revenue. An initial review indicates that the language of Public Utilities Code Division 19, Chapter 1, Section 180001 (e) stating that the funding is "…to be used to supplement and not replace existing local revenues for transportation purpose" would seem to exclude a Clean Water Act purpose of using the funds used for green infrastructure in conjunction with the pavement maintenance mandate. A second step would be to get a ruling from MTC if the Highway User Gas Tax Account (HUTA), Street and Highways Code Section 2101, could be used for Green Infrastructure. Those are the top priorities.

To fund projects, they are recommended for consideration based on the needs of the various operating departments and divisions (Entities). Each Entity is to provide a prioritized list along with any funding or grant information that may applicable. This is important because all projects compete for scarce funds. General Fund money is typically not available to any Capital Projects as those funds are dedicated to the operation of the general government, including Police operations.

Given the various sources of funds, projects are ranked by: 1. Health and safety need, 2. Maintenance of current facilities, 3. expansion of existing programs and 4. new programs. This is taken together with sources of funding, so a project that otherwise may not have a high a priority, has funding that cannot be used elsewhere is funded. This is true for transportation projects that variously have, Gas Tax, Measure C or J, traffic mitigation fee revenue or developer mitigation fees. The most flexible funding is saved to be committed last and restricted funds are programmed first. The flexible funds are used to fill in at the end in their applicable category.

In that context, projects have a scope of work developed and a preliminary plan, sometimes only schematic, is developed. For street projects the scope is based on the need and purpose of the project. If the project is a complete streets project, or a street beautification project, green infrastructure will be considered for incorporation considering a number of factors. First is the need being addressed, the second is whether there is eligible funding for the scope of work. The third is the available right of way for the project. Many projects in the developed commercial area are constrained to pavement rehabilitation.

8 Adaptive Management

8.1 Process for Plan Updates

The process to update the plan will be to review what has happened and what has changed as the City moves into the budgeting period. This will be the time to:

- Update the new development commitments that are subject to C.3
- Make any necessary changes to the "UrbanSim" model to reflect more current future projections
- Add any completed public projects
- Update the CIP list for newly developed desired projects

8.2 Pursuing Future Funding Sources

Pursuing future funding resources will have challenges. As the BASMAA "Roadmap" reports:

"Because each funding programs has historically focused on only one or a few of the multiple benefits provided by Sustainable Streets, local agencies have encountered challenges in funding Sustainable Streets projects including:

- **Ineligible components of Sustainable Streets projects:** Green infrastructure may be ineligible for funding by transportation grants; transportation facilities may be ineligible for funding by resource agency grants.
- **Ineligible activities:** Some grants may not cover all project phases, such as planning or short-term maintenance.
- **Inability to use other grants as matching funds:** Matching funds must cover eligible activities; therefore, grant funding for GI components of a Sustainable Street project may not "count" as a match for a transportation grant, and vice versa.
- **Funding cycles of grants are not coordinated:** Projects that must assemble funding from multiple grants may have difficulty finding two applicable grants that will be available at the same time.
- **Costs of tracking and applying for grants**: Local agencies often lack the resources to track grant opportunities, prepare applications, and "repackage" the same project to apply for multiple grants.
- **Costs of administering and reporting on grants**: Obtaining multiple grants for a single project adds substantial administrative requirements due to separate record-keeping and reporting.
- **Scoring approaches may penalize multiple-benefit projects**: Sustainable Streets projects may not score competitively for grants that seek the most cost-effective transportation solution, due to the inclusion of ineligible costs."

With guidance of the Roadmap, a Roadmap Committee will follow three pathways; Pathway 1 – Prioritize Sustainable Street in Funding Resources, Pathway 2 – Improve Conditions for Projects that Are Funded by Multiple Grants, and Pathway 3 – Pursue Additional Funding Options.

Pathway 1 is to "… maximize the ability of each funding source to fund both transportation and green stormwater infrastructure improvements -- reflecting the integration of transportation and resource benefits in Sustainable Streets …. A number of the actions are specific to the State Water Resources Control Board's Storm Water Grant

Program (SWGP) and the Metropolitan Transportation Commission's One Bay Area Grant Program (OBAG)." The Pathway also looks to "… recommend requirements for interagency collaboration and or participation by key agencies in actions that promote widespread implementation of sustainable streets, recognizing that requirements have been needed for interagency collaboration …"

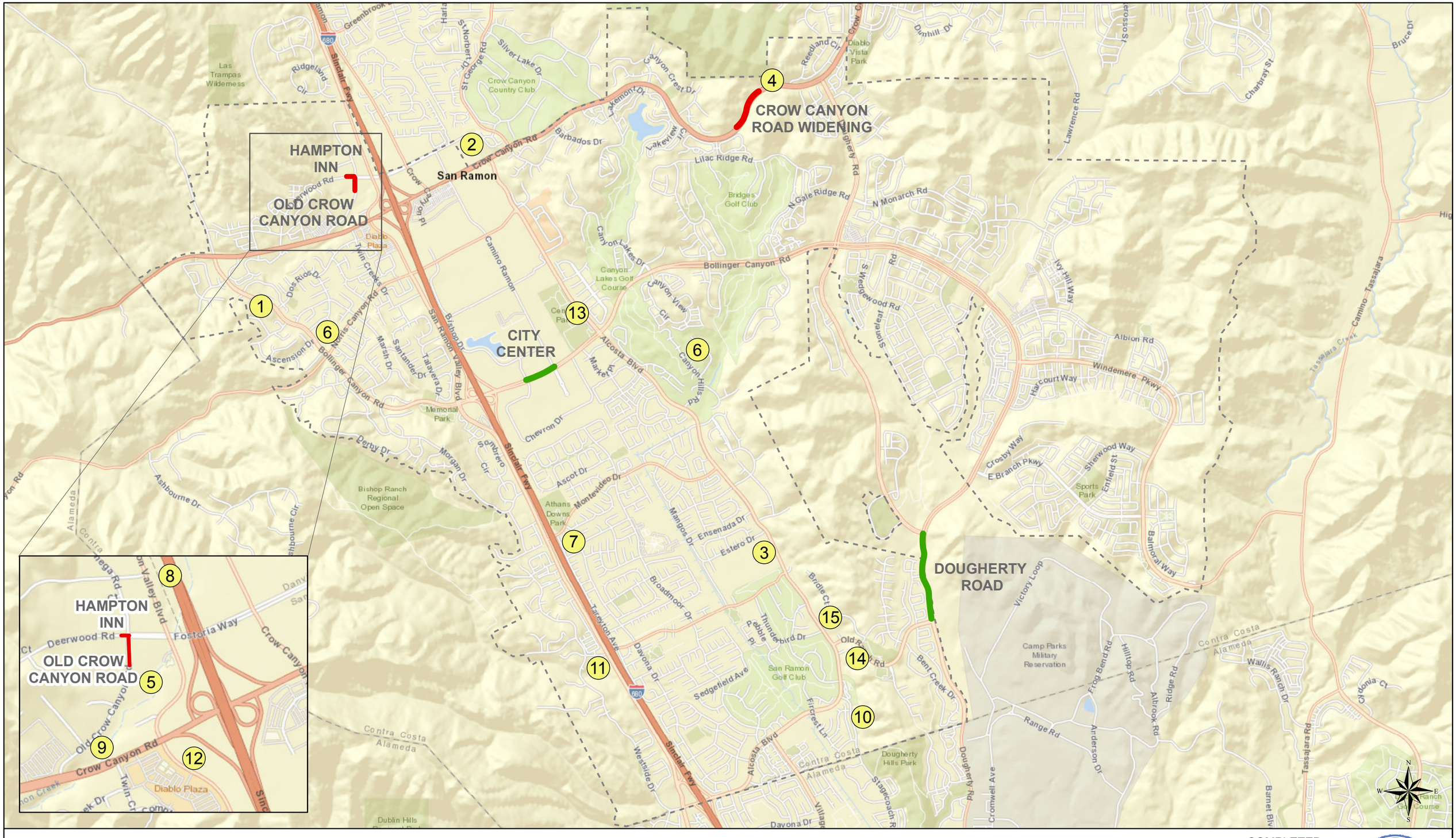
Pathway 2 seeks to improve conditions for projects with multiple funding sources. The goal is to remove obstacles that agencies have encountered to obtain multiple grants for a single sustainable streets project.

Pathway 3 is intended to find ways to "… improve conditions for local agencies to fund Sustainable Streets projects with a range of funding options, including fees and loans, and the funding of pavement rehabilitation projects, through sources identified in Senate Bill 1 (SB 1), the Road Repair and Accountability Act of 2017, which was signed into law on April 28, 2017."

8.3 Alternative Compliance and Credit Trading Investigations

Alternative compliance will need to be carefully reviewed for both the opportunity to achieve compliance but also to be aware of funding use restraints when working collaboratively. Determining whether the Permittees would collectively pursue Alternative Compliance will be a lengthy process requiring a comprehensive dialogue in the public forum lead by the elected officials. Further, commitment to the implementation of any alternative compliance scenarios would necessarily require overall agreement and is beyond the scope of this plan.

Nonetheless, the Geosyntec Consultants May 1, 2019 memo to the CCCWP entitled "Reasonable Assurance Analysis Countywide Attainment Strategy" details preliminary findings, a countywide attainment scenario and strategy. The memo is attached as Appendix B.



CITY OF SAN RAMON

PUBLIC WORKS - ENGINEERING SERVICES

2401 CROW CANYON RD SAN RAMON, CA 94583

Public Projects Map

APPENDIX A

(#) PROJECTS UNDER REVIEW

COMPLETED PROJECTS

PLANNED PROJECTS

CITY LIMIT

Geosyntec consultants

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DRAFT Memorandum

Date:	May 1, 2019
To:	Courtney Riddle and Lucile Paquette, Contra Costa Clean Water Program
Copy:	Dan Cloak, Dan Cloak Environmental Consulting
From:	Lisa Austin, Principal; Kelly Havens, Senior Engineer; and Austin Orr, Professional Engineer
Subject:	Reasonable Assurance Analysis Countywide Attainment Strategy Geosyntec Project Number: WW2407

1. BACKGROUND

1.1 Regulatory Requirements

Provisions C.11/12.c.ii.(2) of the Municipal Regional Permit (MRP) require Permittees to prepare Reasonable Assurance Analyses (RAA) for mercury and PCBs, respectively, that achieve the following objectives:

a) Quantify the relationship between areal extent of green infrastructure (GI) implementation and load reductions, taking into consideration the scale of contamination of the treated area as well as the pollutant removal effectiveness of likely GI strategies;

b) Estimate the amount and characteristics of land area that will be treated through GI by 2020, 2030, and 2040;

c) Estimate the amount of load reductions that will result from GI implementation by 2020, 2030, and 2040; and

d) Quantitatively demonstrate that PCBs reductions of at least 0.5 kg/yr and mercury reductions of 1.7 kg/yr will be realized within Contra Costa County by 2040 through implementation of GI projects.

1.2 Preliminary RAA Findings

Geosyntec Consultants (Geosyntec) is conducting RAA modeling for the Contra Costa Clean Water Program (CCCWP) as required by the MRP for submittal with the 2020 Annual Report. In

Fiscal Year 2018/19, Geosyntec conducted RAA modeling to assist the Permittees with GI planning[1].

As part of the preliminary RAA modeling conducted to assist Permittees with GI Planning, a "Countywide Attainment Scenario" was modeled which examined PCBs loads reduced by each project opportunity incorporated in the Contra Costa Watersheds Storm Water Resource Plan (CCW SWRP). This scenario focused on PCBs, consistent with the MRP's emphasis on measures designed to reduce PCBs, while also evaluating opportunities for mercury reduction. CCCWP has drafted this Countywide Attainment Scenario memorandum to summarize these results and further the Permittees' group discussion of how PCBs load reduction goals could be achieved on a countywide basis.

The results of this analysis demonstrate that the public GI retrofit opportunities that have the highest potential to reduce PCBs loads are concentrated within a small subset of Contra Costa Permittee area due to the pattern of pre-1980 industrial development within the region. (Note that GI implementation feasibility was not field-evaluated as part of development of the CCW SWRP, thus the feasibility of implementation for these potential project locations has yet to receive a site-specific evaluation.) Conversely, many Contra Costa Permittees have no or very few opportunities to contribute significantly toward achievement of countywide PCBs loading reductions via implementation of GI in their communities. Further, if load reductions are not achieved on a regional or countywide scale, and load reductions are allocated at a local level (by population), these Permittees would not be able to achieve those load reduction allocations due to a lack of opportunity.

Thus, given these findings, the Contra Costa Permittees, collectively, believe that a countywide strategy would be the best way to achieve the PCBs load reduction goals in a more efficient and effective manner. For the purposes of creating their local GI Plans, Contra Costa Permittees have prioritized their GI projects based on achieving other multiple benefits. These other benefits include controlling other stormwater pollutants, preserving and enhancing local stream hydrology, reducing localized flooding, helping communities adapt to climate change by increasing the resiliency of water supply, ancillary benefits that derive from adding landscaped areas within the urbanized environment, and mitigating the urban heat island effect.

This Countywide Attainment Strategy memorandum is referenced in the Permittees' GI Plans for information only, and it does not represent, in any way, an intent to implement the strategy or any

[1] The results of this RAA modeling are preliminary. The CCCWP is in the process, in collaboration with BASMAA, of having the RAA modeling approach peer-reviewed. The RAA modeling results are subject to revision depending on the outcome of the peer review process.

of the projects listed herein. For projects for which potential implementation will be pursued, refer to each Permittee's individual GI Plan project list and prioritization.

This memorandum describes the approach used to model the Countywide Attainment scenario and presents the results of the analysis, in addition to potential next steps for Contra Costa County Permittees to implement projects collectively in an effort to meet the load reduction requirements included in the MRP.

2. COUNTYWIDE ATTAINMENT SCENARIO METHODOLOGY

2.1 Methodology Overview

To conduct the RAA Countywide Attainment Scenario modeling, calculations were performed, and inputs procured or developed, as follows:

1. Baseline modeling was conducted to estimate the baseline (i.e., 2003) load of PCBs and mercury for Contra Costa County.
2. Using the resulting baseline load, calculations were performed to establish the MRP-required load reduction through GI for 2040.
3. GIS inputs were obtained or finalized for existing redevelopment and public GI projects and future private (i.e., C.3.d) projects, as follows:
    a. New development and redevelopment projects from 2003 – 2018 were compiled from existing AGOL[2] project data, and
    b. UrbanSim[3] redevelopment projections for 2020, 2030, and 2040 were confirmed or revised by the Permittees.
4. The GI load reduction model was applied to the existing development (through 2018) and predicted future private redevelopment (2019 – 2040) to assess the PCBs loads reduced by these projects.

[2] The CCCWP's stormwater GIS platform, created using ESRI's ArcGIS Online (AGOL) for Organizations environment. The *C.3 Project Tracking and Load Reduction Accounting Tool* is used for tracking GI projects implemented under C.3 within the CCCWP AGOL system.

[3] A model developed by the Urban Analytics Lab at the University of California under contract to the Bay Area MTC. The Bay Area's application of UrbanSim was developed specifically to support the development of Plan Bay Area, the Bay Area's Sustainable Communities planning effort. MTC forecasts growth in households and jobs and uses the UrbanSim model to identify development and redevelopment sites to satisfy future demand. This model was applied to Contra Costa County to project new and redevelopment for the RAA model timeframes.

5. A countywide PCBs public retrofit load reduction goal was then calculated by subtracting the load reduced by the existing and projected future private redevelopment load from the countywide goal established in Step 2.

6. The GI load reduction model was applied to the CCW SWRP project opportunities list to assess PCBs loads reduced by each project opportunity.

Additional detail is provided in the following sections.

2.2 Baseline Modeling

The countywide baseline model was developed as described in the *Quantitative Relationship Between GI Implementation and PCBs/Mercury Load Reductions* report (CCCWP, 2018).

A GIS analysis was conducted to apportion the modeled baseline load to areas above and below dams, within the San Francisco Bay Regional Water Quality Control Board (Region 2) versus Central Valley Regional Water Quality Control Board (Region 5), and other NPDES permittee area (i.e., parcels associated with individual NPDES permits, Industrial General Permit facilities, and Phase 2 permittee areas). The TMDLs were calculated for all urban areas draining to San Francisco Bay (thus only Region 2) and for areas below dams (as it is assumed that the dams capture sediments and prevent them from carrying pollutants to the Bay). Additionally, the parcel area associated with other NPDES permits was removed to estimate the baseline load attributable to the MS4 permit area only. Thus, the baseline countywide PCBs load below dams, within Region 2, was used to establish the PCBs load reduction goal for the MS4 permit area.

The results of the baseline modeling are presented in Table 1 below. The baseline countywide load used to establish the PCBs load reduction goal for the Permittee area is shown in bold.

Table 1: RAA Baseline PCBs Load Allocation Table (grams)

RWQCB Region	Above/Below Dam	Permit	Baseline Load PCBs (grams)
Region 2	**Below Dam**	**MRP**	**1,581.0**
		NPDES	776.7
		Phase 2	13.7
	Above Dam	MRP	41.4
		NPDES	0.1
		Phase 2	0
Region 5	Below Dam	MRP	133.0
		NPDES	14.8
		Phase 2	0.6
	Above Dam	MRP	1.0
		NPDES	0
		Phase 2	0
		Total	2,562.2

2.3 Load Reduction Goal Calculations

Calculations were conducted to develop the load reduction goals for 2020, 2030, and 2040, as described in the *Bay Area RAA Guidance Document* (BASMAA, 2017). The calculation methodology is summarized below.

TMDL Attainment Load Reduction (2030)

LR_{goal} = Baseline – WLA (kg/yr)

Where:

LR_{goal} = The load reduction goal (kg/yr)

Baseline = The baseline pollutant loading as calculated through the RAA

WLA = The population-based wasteload allocation

The TMDL population-based wasteload allocations for Contra Costa County is provided Table 2.

Table 2: TMDL Population-Based Wasteload Allocations for Contra Costa County

Stormwater Improvement Goal	Mercury (kg/yr)	PCBs (kg/yr)
Contra Costa County	11	0.3

Per the equation above, the revised load reduction goal for Contra Costa County is 1.281 kg/yr.

MRP Load Reduction through GI by 2040

The PCBs load reduction required to be achieved through GI by 2040 (i.e., 3 kg/yr MRP area-wide or 0.5 kg/yr for Contra Costa County) should be adjusted to reflect the RAA-calculated baseline load (i.e., 1.581 kg/yr). The MRP load reduction requirement for GI for all permittees (3 kg/yr) represents 20.8% of the overall required TMDL load reduction. Therefore, the adjusted countywide load reduction through GI can be calculated as:

$$LR_{MRP, GI, 2040} = LR_{goal} * 20.8\%$$

The adjusted countywide PCBs load reduction goal through GI by 2040 was calculated to be 0.266 kg/yr.

2.4 Finalize GIS Inputs for Existing and Future Redevelopment

New development and redevelopment projects completed between 2003 – 2018 were compiled from the existing AGOL project data entered by the Permittees into their respective AGOL C.3 Tracking Tool databases.

UrbanSim redevelopment projections for 2020, 2030, and 2040, as confirmed or revised by the Permittees, were used to model future C.3 projects. The UrbanSim projections for 2020 only included parcels that were predicted to have been redeveloped from 2019 – 2020.

2.5 Develop Countywide Attainment Scenario

The 2040 PCBs load reduction goal for the Countywide Attainment scenario is calculated as the countywide load reduction goal (0.266 kg/yr) minus the load reduced by the current, projected private, and planned CIP/public retrofit GI projects through 2040. Table 3 indicates the remaining load reduction target for 2040 is approximately 56 grams per year.

Table 3: Load Reduction Goal for Contra Costa Countywide Attainment Scenario

PCBs 2040 Load Reduction Goal (kg/yr)	PCBs Load Reduction Achieved by Public and Private GI 2003 -2020 (kg/yr)	Projected PCBs Load Reduction Achieved by Public and Private GI 2003 - 2030 (kg/yr)	Projected PCBs Load Reduction Achieved by Public and Private GI 2003 - 2040 (kg/yr)	Load Reduction Target for Public GI by 2040 PCBs (kg/yr)
0.266	0.118	0.133	0.211	0.056

The baseline model produces a PCBs and mercury "load production" GIS layer that estimates the load corresponding with each parcel and ROW segment within the county (note that individual parcel loadings are representative of the 'average tendency' of loading for similar parcels). This "load production" layer was combined in GIS with the public retrofit project opportunities (parcels, regional project drainage areas, and ROW segments) listed in the CCW SWRP to estimate the potential load reduced by each project opportunity, assuming standard bioretention treatment.

3. COUNTYWIDE ATTAINMENT SCENARIO RESULTS

The modeled load reduction associated with each project opportunity from the CCW SWRP that is not included as a planned GI project in a Permittee's GI Plan are listed in the table included in Attachment 1. This table only includes those projects achieving at least 0.01 grams of PCBs load reduction per year, based on the model output. For each project opportunity, the total area and impervious area treated[4], baseline PCBs yield, and PCBs loads reduced are presented.

[4] The SWRP did not include delineation of actual off-site tributary drainage areas for the regional project opportunities. Therefore, the pollutant load reduction for these projects was calculated for this Countywide Attainment scenario using the project opportunity parcel area only and the estimated load reduction is less than it would be for the full tributary area.

To achieve the load reduction goal through GI by 2040 of 56 grams per year would require treating, at a minimum, 350 acres of the highest-load-producing project area in 170 projects across the county (pending feasibility evaluations, and requiring implementation primarily focused in a few Permittee jurisdictions) and would require much more area and projects using less-load-reducing projects.

4. COUNTYWIDE ATTAINMENT STRATEGY

To allow for the most efficient implementation of GI to achieve the MRP-stipulated load reduction goal, some Contra Costa Permittees have been actively investigating ways that communities without opportunities to reduce PCBs via GI might potentially fund GI projects in communities that do have such opportunities. This has included consideration of funding streams derived from new developments (for example, in-lieu fees charged when only a portion of on-site C.3 compliance is achieved). However, the legal and administrative requirements are complex, would require considerable effort to resolve, and may not ultimately be resolvable.

The Permittees will continue to consider how to balance the goals of efficient PCBs load reduction via GI (which has been demonstrated to be highly location-specific, and not obtainable by all Permittees) versus the other benefits of GI. This consideration will include participation, with Water Board staff, in ongoing discussions of GI and PCBs load reduction requirements that may be included in MRP 3.0. The Permittees, collectively, will also consider the outcomes of these discussions when preparing the "reasonable assurance analysis to demonstrate quantitatively that PCBs reductions of 3 kg/year will be realized by 2040 through implementation of green infrastructure projects," which is due in September 2020 as specified in Provision C.12.iii.(3).

Because resources are limited, there will ultimately be trade-offs between the goals of PCBs load reduction via GI versus the other benefits of GI. In the majority of Contra Costa communities, which have few or no locations where PCB loads could be efficiently reduced via GI, the pursuit of a potential Countywide Attainment Strategy would require trade-offs, including minimizing the opportunities to build community engagement and local support for GI. A similar trade-off exists within the communities that do have locations where PCBs loads could be efficiently reduced via GI, as the highest-ranked load-reduction locations rarely coincide with locations where other benefits to the community would be maximized.

5. REFERENCES

Bay Area Stormwater Management Agencies Association (BASMAA), 2017. Bay Area Reasonable Assurance Analysis Guidance Document. Prepared by Geosyntec Consultants and Paradigm Environmental for BASMAA. June 30, 2017.

Contra Costa Clean Water Program (CCCWP), 2018. Quantitative Relationship Between Green Infrastructure Implementation and PCBs/Mercury Load Reductions. Prepared by Geosyntec Consultants for the CCCWP. August 22, 2018.

* * * * *

Attachment 1
Countywide Attainment Scenario
Load Reduction Results Table

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Clayton	2	ROW_4341	ROW Opportunity	26.22	12.30	47%	0.001	0.072
Clayton	2	Parcel_283666	Parcel-Based Opportunity	6.77	2.04	30%	0.002	0.034
Clayton	2	ROW_3872	ROW Opportunity	2.82	1.25	44%	0.003	0.026
Clayton	2	ROW_11618	ROW Opportunity	1.61	0.77	48%	0.004	0.022
Clayton	2	ROW_5783	ROW Opportunity	1.29	0.56	43%	0.005	0.021
Clayton	2	ROW_12947	ROW Opportunity	1.05	0.43	41%	0.004	0.017
Clayton	2	ROW_11934	ROW Opportunity	10.54	5.01	48%	0.001	0.015
Clayton	2	ROW_13056	ROW Opportunity	8.81	3.84	44%	0.001	0.014
Clayton	2	ROW_13758	ROW Opportunity	5.93	1.49	25%	0.001	0.012
Clayton	2	ROW_19397	ROW Opportunity	5.73	2.58	45%	0.001	0.010
Concord	2	Parcel_376303	Parcel-Based Opportunity	494.22	25.30	5%	0.004	8.822
Concord	2	Parcel_376306	Parcel-Based Opportunity	208.83	10.65	5%	0.004	3.719
Concord	2	Parcel_177920	Parcel-Based Opportunity	18.60	14.13	76%	0.041	3.276
Concord	2	Parcel_324333	Parcel-Based Opportunity	163.95	8.57	5%	0.003	1.752
Concord	2	ROW_16900	ROW Opportunity	20.40	9.18	45%	0.016	1.300
Concord	2	ROW_21618	ROW Opportunity	37.07	24.40	66%	0.008	1.039
Concord	2	Parcel_184135	Parcel-Based Opportunity	5.35	3.96	74%	0.041	0.920
Concord	2	ROW_21616	ROW Opportunity	27.30	18.24	67%	0.008	0.799
Concord	2	ROW_1201	ROW Opportunity	20.53	13.24	64%	0.010	0.746
Concord	2	Parcel_192657	Parcel-Based Opportunity	5.89	3.00	51%	0.029	0.722
Concord	2	Parcel_244879	Parcel-Based Opportunity	66.94	3.41	5%	0.003	0.722
Concord	2	ROW_5707	ROW Opportunity	18.71	11.09	59%	0.009	0.650
Concord	2	ROW_17557	ROW Opportunity	5.80	3.71	64%	0.023	0.558
Concord	2	ROW_1712	ROW Opportunity	12.97	8.30	64%	0.010	0.500
Concord	2	ROW_7508	ROW Opportunity	5.32	3.73	70%	0.021	0.454
Concord	2	ROW_4583	ROW Opportunity	4.46	3.26	73%	0.024	0.437
Concord	2	ROW_20084	ROW Opportunity	2.97	2.10	71%	0.027	0.328
Concord	2	ROW_5817	ROW Opportunity	3.19	2.16	68%	0.023	0.295
Concord	2	Parcel_338478	Parcel-Based Opportunity	38.88	1.98	5%	0.002	0.292
Concord	2	ROW_19024	ROW Opportunity	2.48	1.34	54%	0.028	0.291
Concord	2	Parcel_191035	Regional Opportunity	2.32	1.16	50%	0.028	0.278
Concord	2	ROW_8864	ROW Opportunity	1.38	0.97	70%	0.037	0.214
Concord	2	ROW_5806	ROW Opportunity	7.28	4.91	67%	0.008	0.213
Concord	2	ROW_15327	ROW Opportunity	31.55	17.19	54%	0.002	0.211
Concord	2	ROW_4439	ROW Opportunity	1.97	1.40	71%	0.025	0.205
Concord	2	ROW_7624	ROW Opportunity	6.85	4.66	68%	0.008	0.204
Concord	2	ROW_9455	ROW Opportunity	4.02	2.74	68%	0.013	0.190
Concord	2	ROW_3954	ROW Opportunity	1.94	1.42	73%	0.024	0.185
Concord	2	ROW_21113	ROW Opportunity	48.19	24.40	51%	0.002	0.182
Concord	2	Parcel_186608	Regional Opportunity	1.06	0.73	69%	0.038	0.171
Concord	2	ROW_8938	ROW Opportunity	1.26	1.03	82%	0.032	0.169
Concord	2	Parcel_229694	Parcel-Based Opportunity	6.43	3.65	57%	0.007	0.166
Concord	2	Parcel_235175	Parcel-Based Opportunity	6.15	3.59	58%	0.007	0.160
Concord	2	ROW_2934	ROW Opportunity	5.33	3.63	68%	0.008	0.159
Concord	2	ROW_12379	ROW Opportunity	5.60	3.63	65%	0.008	0.157
Concord	2	ROW_7623	ROW Opportunity	1.90	1.39	73%	0.020	0.155
Concord	2	Parcel_205735	Parcel-Based Opportunity	4.42	3.53	80%	0.010	0.154
Concord	2	Parcel_198247	Parcel-Based Opportunity	5.13	3.94	77%	0.009	0.153
Concord	2	ROW_4349	ROW Opportunity	1.39	1.03	74%	0.025	0.141
Concord	2	ROW_11894	ROW Opportunity	16.04	9.24	58%	0.003	0.139
Concord	2	ROW_10734	ROW Opportunity	2.73	1.85	68%	0.013	0.136
Concord	2	ROW_19586	ROW Opportunity	32.40	16.40	51%	0.002	0.136
Concord	2	ROW_11140	ROW Opportunity	0.69	0.57	83%	0.045	0.132
Concord	2	ROW_4621	ROW Opportunity	21.49	10.65	50%	0.002	0.130
Concord	2	Parcel_240615	Parcel-Based Opportunity	14.13	8.79	62%	0.003	0.122
Concord	2	ROW_16782	ROW Opportunity	10.53	5.42	51%	0.004	0.122
Concord	2	Parcel_242414	Parcel-Based Opportunity	4.67	2.72	58%	0.007	0.121
Concord	2	ROW_10221	ROW Opportunity	14.29	7.61	53%	0.003	0.118
Concord	2	ROW_14417	ROW Opportunity	7.27	4.56	63%	0.005	0.113
Concord	2	ROW_20964	ROW Opportunity	9.96	4.91	49%	0.004	0.112
Concord	2	ROW_17558	ROW Opportunity	0.91	0.61	67%	0.029	0.109
Concord	2	Parcel_232269	Parcel-Based Opportunity	3.76	2.45	65%	0.008	0.108
Concord	2	ROW_14842	ROW Opportunity	15.90	7.68	48%	0.002	0.108
Concord	2	ROW_4342	ROW Opportunity	43.01	22.81	53%	0.001	0.106
Concord	2	ROW_545	ROW Opportunity	12.27	5.54	45%	0.003	0.106
Concord	2	ROW_1200	ROW Opportunity	9.75	5.67	58%	0.004	0.105
Concord	2	Parcel_203140	Parcel-Based Opportunity	3.46	2.29	66%	0.008	0.100
Concord	2	ROW_18045	ROW Opportunity	13.09	7.25	55%	0.003	0.099
Concord	2	ROW_14001	ROW Opportunity	12.47	6.86	55%	0.003	0.094
Concord	2	ROW_21494	ROW Opportunity	29.51	15.04	51%	0.001	0.094
Concord	2	ROW_8159	ROW Opportunity	9.23	5.02	54%	0.003	0.094
Concord	2	ROW_12852	ROW Opportunity	22.99	12.35	54%	0.002	0.092
Concord	2	ROW_12856	ROW Opportunity	2.03	1.22	60%	0.011	0.088
Concord	2	ROW_15146	ROW Opportunity	5.50	3.01	55%	0.005	0.084
Concord	2	ROW_4608	ROW Opportunity	4.23	2.67	63%	0.006	0.084
Concord	2	ROW_7622	ROW Opportunity	1.50	1.10	73%	0.015	0.084
Concord	2	ROW_1470	ROW Opportunity	1.70	1.14	67%	0.013	0.081
Concord	2	Parcel_247239	Regional Opportunity	2.44	1.71	70%	0.009	0.077
Concord	2	ROW_4619	ROW Opportunity	13.13	6.40	49%	0.002	0.076
Concord	2	ROW_8157	ROW Opportunity	13.11	7.08	54%	0.002	0.076
Concord	2	ROW_6819	ROW Opportunity	1.92	1.26	66%	0.011	0.075
Concord	2	Parcel_144216	Parcel-Based Opportunity	40.90	18.50	45%	0.001	0.074
Concord	2	ROW_4618	ROW Opportunity	18.48	9.41	51%	0.002	0.074
Concord	2	Parcel_231090	Parcel-Based Opportunity	3.71	1.58	43%	0.006	0.073
Concord	2	ROW_13705	ROW Opportunity	11.05	5.52	50%	0.002	0.071
Concord	2	ROW_1577	ROW Opportunity	2.98	1.51	51%	0.007	0.071
Concord	2	Parcel_192425	Parcel-Based Opportunity	0.48	0.28	58%	0.033	0.067
Concord	2	Parcel_291299	Parcel-Based Opportunity	40.01	16.11	40%	0.001	0.066
Concord	2	ROW_1474	ROW Opportunity	7.02	3.51	50%	0.003	0.066
Concord	2	ROW_20692	ROW Opportunity	4.78	2.17	45%	0.004	0.064
Concord	2	ROW_5673	ROW Opportunity	11.65	5.87	50%	0.002	0.063
Concord	2	ROW_4514	ROW Opportunity	4.22	2.32	55%	0.005	0.062
Concord	2	ROW_12217	ROW Opportunity	9.08	4.78	53%	0.002	0.058
Concord	2	ROW_21132	ROW Opportunity	2.04	1.36	67%	0.008	0.058

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Concord	2	Parcel_214703	Parcel-Based Opportunity	3.81	1.22	32%	0.004	0.057
Concord	2	ROW_11820	ROW Opportunity	2.06	1.02	50%	0.008	0.057
Concord	2	ROW_6785	ROW Opportunity	2.52	1.66	66%	0.007	0.056
Concord	2	Parcel_190759	Regional Opportunity	1.26	1.11	88%	0.012	0.055
Concord	2	Parcel_251412	Parcel-Based Opportunity	3.12	1.06	34%	0.005	0.054
Concord	2	Parcel_376302	Parcel-Based Opportunity	42.06	12.85	31%	0.001	0.054
Concord	2	ROW_4137	ROW Opportunity	7.10	3.61	51%	0.003	0.053
Concord	2	ROW_13078	ROW Opportunity	4.96	2.60	52%	0.003	0.052
Concord	2	ROW_9759	ROW Opportunity	1.82	1.20	66%	0.008	0.051
Concord	2	ROW_13704	ROW Opportunity	9.77	5.13	53%	0.002	0.050
Concord	2	ROW_5392	ROW Opportunity	0.92	0.65	71%	0.014	0.050
Concord	2	ROW_4966	ROW Opportunity	6.49	2.88	44%	0.003	0.049
Concord	2	Parcel_290823	Regional Opportunity	1.29	1.10	85%	0.010	0.048
Concord	2	planned_203	Planned Creek/Marsh Restoration	131.53	18.22	14%	0.000	0.048
Concord	2	ROW_20635	ROW Opportunity	5.04	2.60	52%	0.003	0.048
Concord	2	Parcel_214282	Parcel-Based Opportunity	30.73	11.51	37%	0.001	0.047
Concord	2	ROW_7731	ROW Opportunity	2.11	1.48	70%	0.007	0.047
Concord	2	ROW_8996	ROW Opportunity	2.02	1.16	57%	0.007	0.046
Concord	2	Parcel_233711	Regional Opportunity	1.41	1.00	71%	0.009	0.044
Concord	2	ROW_6856	ROW Opportunity	15.51	7.43	48%	0.001	0.044
Concord	2	ROW_12679	ROW Opportunity	7.36	3.68	50%	0.002	0.043
Concord	2	ROW_4968	ROW Opportunity	15.10	7.32	48%	0.001	0.043
Concord	2	ROW_13077	ROW Opportunity	6.74	3.68	55%	0.002	0.042
Concord	2	ROW_14213	ROW Opportunity	3.96	2.09	53%	0.004	0.042
Concord	2	ROW_2389	ROW Opportunity	7.58	3.81	50%	0.002	0.041
Concord	2	ROW_9299	ROW Opportunity	2.01	1.31	65%	0.006	0.040
Concord	2	ROW_1445	ROW Opportunity	15.65	7.47	48%	0.001	0.039
Concord	2	ROW_19589	ROW Opportunity	1.50	0.88	59%	0.007	0.039
Concord	2	ROW_20799	ROW Opportunity	9.69	4.87	50%	0.002	0.039
Concord	2	ROW_8514	ROW Opportunity	2.14	1.69	79%	0.006	0.039
Concord	2	ROW_14399	ROW Opportunity	1.15	0.88	77%	0.009	0.038
Concord	2	ROW_8633	ROW Opportunity	2.16	1.19	55%	0.005	0.038
Concord	2	Parcel_206674	Regional Opportunity	1.53	0.90	59%	0.007	0.037
Concord	2	ROW_1496	ROW Opportunity	9.68	4.76	49%	0.002	0.037
Concord	2	ROW_11474	ROW Opportunity	13.96	6.70	48%	0.001	0.036
Concord	2	ROW_2707	ROW Opportunity	3.07	1.72	56%	0.004	0.036
Concord	2	ROW_19429	ROW Opportunity	2.86	1.57	55%	0.004	0.035
Concord	2	ROW_7830	ROW Opportunity	5.91	2.96	50%	0.002	0.035
Concord	2	ROW_8405	ROW Opportunity	0.88	0.57	65%	0.011	0.035
Concord	2	ROW_14485	ROW Opportunity	3.31	1.63	49%	0.003	0.034
Concord	2	ROW_15145	ROW Opportunity	3.60	1.90	53%	0.003	0.034
Concord	2	Parcel_143398	Parcel-Based Opportunity	17.79	8.05	45%	0.001	0.032
Concord	2	ROW_10594	ROW Opportunity	12.05	5.90	49%	0.001	0.032
Concord	2	ROW_14712	ROW Opportunity	2.42	1.43	59%	0.004	0.032
Concord	2	ROW_19358	ROW Opportunity	10.05	5.04	50%	0.001	0.032
Concord	2	ROW_19557	ROW Opportunity	0.29	0.17	59%	0.026	0.032
Concord	2	ROW_3955	ROW Opportunity	3.56	1.78	50%	0.003	0.032
Concord	2	planned_422	Planned Unlined Bioretention	2.14	1.20	56%	0.004	0.030
Concord	2	ROW_12567	ROW Opportunity	14.87	7.28	49%	0.001	0.030
Concord	2	ROW_13167	ROW Opportunity	11.13	5.31	48%	0.001	0.030
Concord	2	ROW_18933	ROW Opportunity	1.85	1.04	56%	0.005	0.030
Concord	2	ROW_686	ROW Opportunity	3.34	1.70	51%	0.003	0.030
Concord	2	ROW_7347	ROW Opportunity	1.22	0.93	76%	0.007	0.030
Concord	2	Parcel_189589	Regional Opportunity	1.31	0.64	49%	0.006	0.029
Concord	2	ROW_12422	ROW Opportunity	2.70	1.38	51%	0.004	0.029
Concord	2	ROW_9241	ROW Opportunity	1.67	0.80	48%	0.005	0.029
Concord	2	Parcel_215855	Regional Opportunity	1.37	0.61	45%	0.006	0.028
Concord	2	ROW_13981	ROW Opportunity	3.75	1.83	49%	0.002	0.028
Concord	2	ROW_330	ROW Opportunity	7.40	3.68	50%	0.002	0.028
Concord	2	ROW_4033	ROW Opportunity	3.71	1.78	48%	0.003	0.028
Concord	2	Parcel_231516	Regional Opportunity	1.44	0.59	41%	0.005	0.027
Concord	2	ROW_14000	ROW Opportunity	1.10	0.63	57%	0.007	0.027
Concord	2	ROW_4609	ROW Opportunity	1.62	1.09	67%	0.005	0.027
Concord	2	ROW_6347	ROW Opportunity	1.82	0.92	51%	0.004	0.027
Concord	2	ROW_6349	ROW Opportunity	7.25	3.95	54%	0.002	0.027
Concord	2	ROW_9635	ROW Opportunity	3.66	1.68	46%	0.003	0.027
Concord	2	ROW_11942	ROW Opportunity	2.12	1.16	55%	0.004	0.026
Concord	2	ROW_14482	ROW Opportunity	2.43	1.00	41%	0.003	0.026
Concord	2	ROW_15994	ROW Opportunity	7.13	3.36	47%	0.001	0.026
Concord	2	ROW_1867	ROW Opportunity	3.65	1.92	53%	0.003	0.026
Concord	2	ROW_2690	ROW Opportunity	4.41	2.49	56%	0.002	0.026
Concord	2	ROW_4136	ROW Opportunity	3.43	1.60	47%	0.003	0.026
Concord	2	Parcel_208247	Regional Opportunity	0.79	0.57	72%	0.009	0.025
Concord	2	ROW_1535	ROW Opportunity	3.62	2.07	57%	0.002	0.025
Concord	2	ROW_15747	ROW Opportunity	1.16	0.75	65%	0.006	0.025
Concord	2	ROW_16947	ROW Opportunity	13.34	6.33	47%	0.001	0.025
Concord	2	ROW_663	ROW Opportunity	3.78	1.89	50%	0.002	0.025
Concord	2	Parcel_228202	Regional Opportunity	0.75	0.54	72%	0.009	0.024
Concord	2	ROW_18838	ROW Opportunity	1.39	0.79	57%	0.005	0.024
Concord	2	ROW_18934	ROW Opportunity	1.22	0.76	62%	0.006	0.024
Concord	2	ROW_20559	ROW Opportunity	10.08	4.59	46%	0.001	0.024
Concord	2	ROW_20591	ROW Opportunity	5.62	3.00	53%	0.002	0.024
Concord	2	ROW_21160	ROW Opportunity	12.09	5.95	49%	0.001	0.024
Concord	2	ROW_7875	ROW Opportunity	8.98	4.45	50%	0.001	0.024
Concord	2	ROW_9740	ROW Opportunity	9.01	4.21	47%	0.001	0.024
Concord	2	Parcel_214996	Parcel-Based Opportunity	8.68	5.91	68%	0.001	0.023
Concord	2	ROW_12594	ROW Opportunity	1.04	0.65	63%	0.007	0.023
Concord	2	ROW_12595	ROW Opportunity	1.05	0.64	61%	0.006	0.023
Concord	2	ROW_1269	ROW Opportunity	3.07	1.61	52%	0.003	0.023
Concord	2	ROW_15782	ROW Opportunity	1.11	0.70	63%	0.006	0.023
Concord	2	ROW_19980	ROW Opportunity	1.29	0.65	50%	0.005	0.023
Concord	2	ROW_20290	ROW Opportunity	2.46	1.49	61%	0.003	0.023
Concord	2	ROW_20752	ROW Opportunity	2.19	1.61	74%	0.004	0.023
Concord	2	ROW_7581	ROW Opportunity	1.16	0.71	61%	0.006	0.023

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Concord	2	ROW_8121	ROW Opportunity	8.21	3.76	46%	0.001	0.023
Concord	2	Parcel_140573	Parcel-Based Opportunity	9.15	5.56	61%	0.001	0.022
Concord	2	Parcel_196927	Regional Opportunity	0.93	0.65	70%	0.007	0.022
Concord	2	Parcel_231203	Parcel-Based Opportunity	14.55	5.28	36%	0.001	0.022
Concord	2	planned_421	Planned Unlined Bioretention	2.87	1.58	55%	0.003	0.022
Concord	2	ROW_1178	ROW Opportunity	4.47	2.20	49%	0.002	0.022
Concord	2	ROW_7635	ROW Opportunity	2.74	1.32	48%	0.003	0.022
Concord	2	Parcel_148570	Parcel-Based Opportunity	10.29	5.19	50%	0.001	0.021
Concord	2	ROW_1480	ROW Opportunity	1.83	1.02	56%	0.004	0.021
Concord	2	ROW_16608	ROW Opportunity	10.91	5.23	48%	0.001	0.021
Concord	2	ROW_231	ROW Opportunity	1.44	0.80	56%	0.004	0.021
Concord	2	ROW_6904	ROW Opportunity	8.33	3.99	48%	0.001	0.021
Concord	2	Parcel_282436	Parcel-Based Opportunity	11.78	4.88	41%	0.001	0.020
Concord	2	Parcel_298561	Parcel-Based Opportunity	38.95	5.79	15%	0.000	0.020
Concord	2	ROW_2388	ROW Opportunity	5.15	2.44	47%	0.002	0.020
Concord	2	ROW_272	ROW Opportunity	3.17	1.68	53%	0.002	0.020
Concord	2	ROW_5431	ROW Opportunity	11.51	5.65	49%	0.001	0.020
Concord	2	ROW_6270	ROW Opportunity	10.98	5.38	49%	0.001	0.020
Concord	2	ROW_6428	ROW Opportunity	3.11	1.75	56%	0.002	0.020
Concord	2	ROW_7665	ROW Opportunity	4.31	2.22	52%	0.002	0.020
Concord	2	Parcel_220285	Parcel-Based Opportunity	9.96	4.72	47%	0.001	0.019
Concord	2	ROW_12020	ROW Opportunity	4.76	2.29	48%	0.002	0.019
Concord	2	ROW_12340	ROW Opportunity	8.43	4.07	48%	0.001	0.019
Concord	2	ROW_16428	ROW Opportunity	8.29	3.98	48%	0.001	0.019
Concord	2	ROW_3778	ROW Opportunity	1.34	0.88	66%	0.005	0.019
Concord	2	ROW_472	ROW Opportunity	0.82	0.45	55%	0.007	0.019
Concord	2	Parcel_186686	Regional Opportunity	0.75	0.45	60%	0.007	0.018
Concord	2	Parcel_202503	Parcel-Based Opportunity	5.94	4.60	77%	0.001	0.018
Concord	2	Parcel_209956	Regional Opportunity	0.66	0.42	64%	0.008	0.018
Concord	2	ROW_16285	ROW Opportunity	4.76	2.23	47%	0.002	0.018
Concord	2	ROW_17122	ROW Opportunity	7.41	3.30	45%	0.001	0.018
Concord	2	ROW_4335	ROW Opportunity	9.00	4.52	50%	0.001	0.018
Concord	2	ROW_4353	ROW Opportunity	9.22	4.47	48%	0.001	0.018
Concord	2	ROW_4354	ROW Opportunity	4.55	2.23	49%	0.002	0.018
Concord	2	ROW_6786	ROW Opportunity	0.62	0.41	66%	0.008	0.018
Concord	2	Parcel_166238	Parcel-Based Opportunity	7.81	3.85	49%	0.001	0.017
Concord	2	Parcel_167541	Regional Opportunity	0.73	0.37	51%	0.006	0.017
Concord	2	Parcel_204041	Parcel-Based Opportunity	0.49	0.42	86%	0.010	0.017
Concord	2	Parcel_238207	Parcel-Based Opportunity	9.03	4.20	47%	0.001	0.017
Concord	2	Parcel_288737	Regional Opportunity	0.93	0.40	43%	0.005	0.017
Concord	2	ROW_13364	ROW Opportunity	9.62	4.24	44%	0.001	0.017
Concord	2	ROW_13763	ROW Opportunity	1.83	1.14	62%	0.003	0.017
Concord	2	ROW_14442	ROW Opportunity	1.54	0.81	53%	0.004	0.017
Concord	2	ROW_17045	ROW Opportunity	8.58	4.24	49%	0.001	0.017
Concord	2	ROW_18989	ROW Opportunity	1.44	0.71	49%	0.004	0.017
Concord	2	ROW_4337	ROW Opportunity	8.58	4.26	50%	0.001	0.017
Concord	2	ROW_5444	ROW Opportunity	7.67	3.18	41%	0.001	0.017
Concord	2	ROW_5808	ROW Opportunity	1.41	0.85	60%	0.004	0.017
Concord	2	ROW_7088	ROW Opportunity	5.53	2.70	49%	0.001	0.017
Concord	2	ROW_8374	ROW Opportunity	6.24	2.74	44%	0.001	0.017
Concord	2	Parcel_189945	Parcel-Based Opportunity	9.41	4.05	43%	0.001	0.016
Concord	2	Parcel_209201	Regional Opportunity	0.96	0.36	38%	0.005	0.016
Concord	2	Parcel_231117	Parcel-Based Opportunity	9.30	3.93	42%	0.001	0.016
Concord	2	ROW_11295	ROW Opportunity	1.02	0.63	62%	0.005	0.016
Concord	2	ROW_13815	ROW Opportunity	4.98	2.54	51%	0.001	0.016
Concord	2	ROW_14488	ROW Opportunity	2.78	1.40	50%	0.002	0.016
Concord	2	ROW_16235	ROW Opportunity	4.82	2.25	47%	0.001	0.016
Concord	2	ROW_18426	ROW Opportunity	5.82	3.22	55%	0.001	0.016
Concord	2	ROW_19300	ROW Opportunity	6.58	3.21	49%	0.001	0.016
Concord	2	ROW_3418	ROW Opportunity	8.49	3.91	46%	0.001	0.016
Concord	2	Parcel_149994	Parcel-Based Opportunity	10.00	3.69	37%	0.001	0.015
Concord	2	Parcel_193540	Parcel-Based Opportunity	7.39	3.59	49%	0.001	0.015
Concord	2	Parcel_200676	Parcel-Based Opportunity	5.03	3.86	77%	0.001	0.015
Concord	2	Parcel_210557	Regional Opportunity	0.59	0.34	58%	0.007	0.015
Concord	2	Parcel_211022	Parcel-Based Opportunity	7.84	3.86	49%	0.001	0.015
Concord	2	Parcel_228429	Parcel-Based Opportunity	8.15	3.64	45%	0.001	0.015
Concord	2	ROW_10926	ROW Opportunity	8.71	4.01	46%	0.001	0.015
Concord	2	ROW_12001	ROW Opportunity	6.33	4.11	65%	0.001	0.015
Concord	2	ROW_12464	ROW Opportunity	6.99	3.40	49%	0.001	0.015
Concord	2	ROW_14169	ROW Opportunity	7.12	3.63	51%	0.001	0.015
Concord	2	ROW_14214	ROW Opportunity	1.27	0.73	57%	0.004	0.015
Concord	2	ROW_14589	ROW Opportunity	8.26	3.76	46%	0.001	0.015
Concord	2	ROW_15996	ROW Opportunity	1.51	0.82	54%	0.003	0.015
Concord	2	ROW_16812	ROW Opportunity	3.85	1.82	47%	0.002	0.015
Concord	2	ROW_16832	ROW Opportunity	4.69	2.13	45%	0.001	0.015
Concord	2	ROW_19307	ROW Opportunity	5.38	3.83	71%	0.001	0.015
Concord	2	ROW_21441	ROW Opportunity	7.99	3.70	46%	0.001	0.015
Concord	2	ROW_4958	ROW Opportunity	5.71	2.74	48%	0.001	0.015
Concord	2	ROW_5672	ROW Opportunity	2.80	1.35	48%	0.002	0.015
Concord	2	ROW_7089	ROW Opportunity	5.57	2.70	48%	0.001	0.015
Concord	2	ROW_9096	ROW Opportunity	7.26	3.76	52%	0.001	0.015
Concord	2	Parcel_198111	Regional Opportunity	1.88	0.30	16%	0.003	0.014
Concord	2	Parcel_205796	Regional Opportunity	0.51	0.35	69%	0.008	0.014
Concord	2	Parcel_212241	Parcel-Based Opportunity	10.42	3.26	31%	0.001	0.014
Concord	2	Parcel_245777	Regional Opportunity	0.52	0.31	60%	0.008	0.014
Concord	2	Parcel_306186	Regional Opportunity	9.66	3.42	35%	0.001	0.014
Concord	2	planned_423	Planned Unlined Bioretention	0.45	0.32	71%	0.009	0.014
Concord	2	ROW_10430	ROW Opportunity	3.97	1.89	48%	0.001	0.014
Concord	2	ROW_11163	ROW Opportunity	0.60	0.49	82%	0.007	0.014
Concord	2	ROW_11347	ROW Opportunity	7.18	3.36	47%	0.001	0.014
Concord	2	ROW_13157	ROW Opportunity	10.52	4.40	42%	0.001	0.014
Concord	2	ROW_15822	ROW Opportunity	4.36	2.16	50%	0.001	0.014
Concord	2	ROW_17904	ROW Opportunity	2.21	1.14	52%	0.002	0.014
Concord	2	ROW_19257	ROW Opportunity	4.31	3.48	81%	0.001	0.014

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Concord	2	ROW_5809	ROW Opportunity	0.74	0.49	66%	0.006	0.014
Concord	2	ROW_9449	ROW Opportunity	5.91	2.94	50%	0.001	0.014
Concord	2	Parcel_172659	Parcel-Based Opportunity	8.26	3.21	39%	0.001	0.013
Concord	2	Parcel_176235	Parcel-Based Opportunity	0.43	0.29	67%	0.009	0.013
Concord	2	Parcel_198956	Regional Opportunity	1.88	0.31	16%	0.002	0.013
Concord	2	Parcel_200446	Regional Opportunity	1.05	0.58	55%	0.004	0.013
Concord	2	Parcel_202662	Parcel-Based Opportunity	4.54	3.47	76%	0.001	0.013
Concord	2	Parcel_203482	Parcel-Based Opportunity	0.44	0.28	64%	0.008	0.013
Concord	2	Parcel_207366	Parcel-Based Opportunity	0.44	0.35	80%	0.009	0.013
Concord	2	Parcel_245349	Parcel-Based Opportunity	0.50	0.29	58%	0.007	0.013
Concord	2	Parcel_283640	Parcel-Based Opportunity	8.85	3.17	36%	0.001	0.013
Concord	2	ROW_13215	ROW Opportunity	10.87	4.95	46%	0.000	0.013
Concord	2	ROW_15854	ROW Opportunity	6.90	3.41	49%	0.001	0.013
Concord	2	ROW_3470	ROW Opportunity	3.85	1.96	51%	0.001	0.013
Concord	2	ROW_425	ROW Opportunity	3.93	1.83	47%	0.001	0.013
Concord	2	ROW_6675	ROW Opportunity	3.24	1.53	47%	0.002	0.013
Concord	2	ROW_9266	ROW Opportunity	3.06	1.20	39%	0.002	0.013
Concord	2	Parcel_304455	Parcel-Based Opportunity	9.99	2.87	29%	0.001	0.012
Concord	2	ROW_10746	ROW Opportunity	5.86	2.84	48%	0.001	0.012
Concord	2	ROW_12239	ROW Opportunity	6.14	3.06	50%	0.001	0.012
Concord	2	ROW_12681	ROW Opportunity	6.89	3.12	45%	0.001	0.012
Concord	2	ROW_13166	ROW Opportunity	2.36	1.19	50%	0.002	0.012
Concord	2	ROW_14679	ROW Opportunity	6.33	3.08	49%	0.001	0.012
Concord	2	ROW_17761	ROW Opportunity	3.82	2.04	53%	0.001	0.012
Concord	2	ROW_18425	ROW Opportunity	2.25	1.39	62%	0.002	0.012
Concord	2	ROW_19367	ROW Opportunity	5.72	2.91	51%	0.001	0.012
Concord	2	ROW_19741	ROW Opportunity	15.61	6.71	43%	0.000	0.012
Concord	2	ROW_311	ROW Opportunity	4.66	2.30	49%	0.001	0.012
Concord	2	ROW_4967	ROW Opportunity	6.62	3.00	45%	0.001	0.012
Concord	2	ROW_7274	ROW Opportunity	5.67	2.85	50%	0.001	0.012
Concord	2	ROW_9397	ROW Opportunity	6.20	3.03	49%	0.001	0.012
Concord	2	Parcel_205395	Parcel-Based Opportunity	0.41	0.29	71%	0.008	0.011
Concord	2	ROW_1026	ROW Opportunity	6.02	2.70	45%	0.001	0.011
Concord	2	ROW_10444	ROW Opportunity	1.27	0.76	60%	0.003	0.011
Concord	2	ROW_13801	ROW Opportunity	3.61	1.92	53%	0.001	0.011
Concord	2	ROW_14604	ROW Opportunity	6.37	2.78	44%	0.001	0.011
Concord	2	ROW_15422	ROW Opportunity	3.73	1.82	49%	0.001	0.011
Concord	2	ROW_16761	ROW Opportunity	5.65	2.77	49%	0.001	0.011
Concord	2	ROW_19961	ROW Opportunity	5.36	2.71	51%	0.001	0.011
Concord	2	ROW_20887	ROW Opportunity	1.92	1.00	52%	0.002	0.011
Concord	2	ROW_2166	ROW Opportunity	4.72	3.21	68%	0.001	0.011
Concord	2	ROW_4343	ROW Opportunity	5.13	2.65	52%	0.001	0.011
Concord	2	ROW_6655	ROW Opportunity	5.76	2.88	50%	0.001	0.011
Concord	2	ROW_7547	ROW Opportunity	1.93	1.08	56%	0.002	0.011
Concord	2	ROW_840	ROW Opportunity	4.32	2.13	49%	0.001	0.011
Concord	2	ROW_9171	ROW Opportunity	5.93	2.70	46%	0.001	0.011
Concord	2	ROW_9371	ROW Opportunity	5.95	2.73	46%	0.001	0.011
Concord	2	Parcel_219241	Parcel-Based Opportunity	5.43	2.56	47%	0.001	0.010
Concord	2	ROW_10733	ROW Opportunity	0.86	0.41	48%	0.004	0.010
Concord	2	ROW_11477	ROW Opportunity	5.28	2.53	48%	0.001	0.010
Concord	2	ROW_13104	ROW Opportunity	2.83	1.42	50%	0.002	0.010
Concord	2	ROW_1509	ROW Opportunity	5.06	2.54	50%	0.001	0.010
Concord	2	ROW_17227	ROW Opportunity	3.24	2.61	81%	0.001	0.010
Concord	2	ROW_18867	ROW Opportunity	0.57	0.30	53%	0.005	0.010
Concord	2	ROW_18875	ROW Opportunity	5.49	2.53	46%	0.001	0.010
Concord	2	ROW_1942	ROW Opportunity	5.76	2.61	45%	0.001	0.010
Concord	2	ROW_4931	ROW Opportunity	5.95	2.64	44%	0.001	0.010
Concord	2	ROW_6969	ROW Opportunity	1.44	0.74	51%	0.003	0.010
Concord	2	ROW_7644	ROW Opportunity	3.34	2.69	81%	0.001	0.010
Concord	2	ROW_8954	ROW Opportunity	3.65	1.80	49%	0.001	0.010
Concord	2	ROW_9917	ROW Opportunity	5.57	2.54	46%	0.001	0.010
Danville	2	ROW_16936	ROW Opportunity	26.83	15.18	57%	0.009	0.752
Danville	2	ROW_3153	ROW Opportunity	22.64	11.45	51%	0.005	0.352
Danville	2	ROW_19015	ROW Opportunity	21.63	9.10	42%	0.004	0.264
Danville	2	ROW_10363	ROW Opportunity	15.72	7.19	46%	0.006	0.255
Danville	2	ROW_8645	ROW Opportunity	6.22	3.02	49%	0.012	0.252
Danville	2	ROW_5779	ROW Opportunity	29.66	12.29	41%	0.003	0.236
Danville	2	ROW_15495	ROW Opportunity	5.40	2.73	51%	0.013	0.235
Danville	2	ROW_6494	ROW Opportunity	13.53	5.65	42%	0.003	0.123
Danville	2	ROW_7569	ROW Opportunity	4.67	1.77	38%	0.008	0.114
Danville	2	ROW_20439	ROW Opportunity	5.29	2.56	48%	0.007	0.105
Danville	2	ROW_6553	ROW Opportunity	22.66	7.42	33%	0.002	0.101
Danville	2	ROW_10751	ROW Opportunity	6.96	2.81	40%	0.005	0.088
Danville	2	Parcel_3595	Regional Opportunity	1.32	0.94	71%	0.018	0.081
Danville	2	ROW_16231	ROW Opportunity	1.61	0.79	49%	0.013	0.071
Danville	2	ROW_11030	ROW Opportunity	4.72	1.69	36%	0.005	0.063
Danville	2	ROW_2419	ROW Opportunity	1.41	0.74	52%	0.014	0.063
Danville	2	Parcel_84842	Regional Opportunity	2.50	1.28	51%	0.007	0.061
Danville	2	ROW_15065	ROW Opportunity	3.30	1.46	44%	0.006	0.061
Danville	2	ROW_8646	ROW Opportunity	1.33	0.71	53%	0.013	0.058
Danville	2	planned_56	Planned Creek/Marsh Restoration	28.05	7.45	27%	0.001	0.054
Danville	2	ROW_13678	ROW Opportunity	1.73	0.69	40%	0.009	0.051
Danville	2	ROW_6273	ROW Opportunity	1.21	0.60	50%	0.012	0.049
Danville	2	ROW_4229	ROW Opportunity	1.02	0.47	46%	0.013	0.043
Danville	2	ROW_7541	ROW Opportunity	4.06	1.59	39%	0.004	0.043
Danville	2	ROW_8647	ROW Opportunity	1.24	0.61	49%	0.011	0.042
Danville	2	ROW_11350	ROW Opportunity	4.15	1.41	34%	0.003	0.035
Danville	2	ROW_5386	ROW Opportunity	10.48	3.17	30%	0.001	0.032
Danville	2	ROW_17662	ROW Opportunity	4.65	1.54	33%	0.003	0.030
Danville	2	ROW_8243	ROW Opportunity	17.78	6.46	36%	0.001	0.028
Danville	2	ROW_1278	ROW Opportunity	2.38	1.11	47%	0.004	0.027
Danville	2	ROW_20482	ROW Opportunity	4.27	1.25	29%	0.002	0.026
Danville	2	ROW_6485	ROW Opportunity	27.58	10.93	40%	0.000	0.026
Danville	2	ROW_7899	ROW Opportunity	5.60	1.66	30%	0.002	0.026

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Danville	2	ROW_14380	ROW Opportunity	10.15	3.63	36%	0.001	0.025
Danville	2	ROW_2772	ROW Opportunity	8.71	2.89	33%	0.001	0.025
Danville	2	ROW_5569	ROW Opportunity	8.89	2.11	24%	0.001	0.025
Danville	2	ROW_6880	ROW Opportunity	4.97	1.50	30%	0.002	0.025
Danville	2	ROW_17254	ROW Opportunity	0.58	0.26	45%	0.012	0.024
Danville	2	ROW_3171	ROW Opportunity	9.06	3.83	42%	0.001	0.024
Danville	2	ROW_10398	ROW Opportunity	8.60	2.53	29%	0.001	0.023
Danville	2	ROW_18078	ROW Opportunity	4.08	1.19	29%	0.002	0.023
Danville	2	ROW_4663	ROW Opportunity	14.21	5.41	38%	0.001	0.023
Danville	2	ROW_6934	ROW Opportunity	7.87	2.54	32%	0.001	0.023
Danville	2	ROW_12934	ROW Opportunity	9.74	3.39	35%	0.001	0.021
Danville	2	ROW_16006	ROW Opportunity	3.00	1.95	65%	0.003	0.020
Danville	2	ROW_21104	ROW Opportunity	3.41	0.72	21%	0.002	0.020
Danville	2	ROW_13883	ROW Opportunity	5.95	1.96	33%	0.001	0.018
Danville	2	ROW_3169	ROW Opportunity	27.83	11.62	42%	0.000	0.018
Danville	2	Parcel_7023	Parcel-Based Opportunity	4.47	2.08	47%	0.002	0.017
Danville	2	ROW_19889	ROW Opportunity	2.38	0.83	35%	0.003	0.017
Danville	2	ROW_4459	ROW Opportunity	4.95	1.71	35%	0.001	0.017
Danville	2	ROW_6502	ROW Opportunity	3.58	1.36	38%	0.002	0.017
Danville	2	ROW_20045	ROW Opportunity	6.37	1.75	27%	0.001	0.016
Danville	2	ROW_7490	ROW Opportunity	5.22	2.31	44%	0.001	0.016
Danville	2	ROW_8595	ROW Opportunity	10.06	3.71	37%	0.001	0.016
Danville	2	Parcel_2847	Parcel-Based Opportunity	0.35	0.16	46%	0.012	0.015
Danville	2	ROW_10387	ROW Opportunity	4.17	1.86	45%	0.002	0.015
Danville	2	ROW_13940	ROW Opportunity	6.12	2.31	38%	0.001	0.015
Danville	2	Parcel_2825	Parcel-Based Opportunity	0.35	0.14	40%	0.011	0.014
Danville	2	ROW_3111	ROW Opportunity	6.77	1.67	25%	0.001	0.014
Danville	2	ROW_7016	ROW Opportunity	3.24	0.99	31%	0.002	0.014
Danville	2	ROW_10801	ROW Opportunity	10.37	3.70	36%	0.001	0.013
Danville	2	ROW_8639	ROW Opportunity	5.23	1.56	30%	0.001	0.013
Danville	2	ROW_12473	ROW Opportunity	2.77	0.92	33%	0.002	0.012
Danville	2	ROW_13144	ROW Opportunity	6.32	2.32	37%	0.001	0.012
Danville	2	ROW_14418	ROW Opportunity	7.93	2.81	35%	0.001	0.012
Danville	2	ROW_3170	ROW Opportunity	17.87	7.49	42%	0.000	0.012
Danville	2	ROW_8231	ROW Opportunity	3.49	1.32	38%	0.002	0.012
Danville	2	ROW_9408	ROW Opportunity	3.29	1.31	40%	0.002	0.012
Danville	2	Parcel_2786	Parcel-Based Opportunity	0.34	0.13	38%	0.009	0.011
Danville	2	Parcel_7198	Regional Opportunity	2.07	1.46	71%	0.003	0.011
Danville	2	ROW_11870	ROW Opportunity	3.31	0.88	27%	0.002	0.011
Danville	2	ROW_12945	ROW Opportunity	3.98	1.15	29%	0.001	0.011
Danville	2	ROW_3876	ROW Opportunity	2.83	1.65	58%	0.002	0.011
Danville	2	ROW_7424	ROW Opportunity	1.50	1.04	69%	0.003	0.011
Danville	2	Parcel_8521	Regional Opportunity	0.89	0.19	21%	0.003	0.010
Danville	2	ROW_2262	ROW Opportunity	4.76	1.72	36%	0.001	0.010
Danville	2	ROW_3224	ROW Opportunity	6.67	2.37	36%	0.001	0.010
El Cerrito	2	ROW_57	ROW Opportunity	20.16	12.24	61%	0.008	0.521
El Cerrito	2	ROW_55	ROW Opportunity	8.61	5.54	64%	0.008	0.227
El Cerrito	2	ROW_15171	ROW Opportunity	5.98	3.48	58%	0.010	0.215
El Cerrito	2	planned_99	Planned Unlined Bioretention	3.97	2.99	75%	0.011	0.152
El Cerrito	2	ROW_17243	ROW Opportunity	5.47	3.28	60%	0.007	0.129
El Cerrito	2	planned_131	Planned Unlined Bioretention	10.94	5.84	53%	0.004	0.113
El Cerrito	2	Parcel_120972	Parcel-Based Opportunity	4.68	2.01	43%	0.006	0.100
El Cerrito	2	ROW_9948	ROW Opportunity	3.37	2.16	64%	0.008	0.083
El Cerrito	2	Parcel_121635	Parcel-Based Opportunity	2.11	1.58	75%	0.010	0.071
El Cerrito	2	ROW_3506	ROW Opportunity	4.25	2.52	59%	0.006	0.070
El Cerrito	2	planned_98	Planned Unlined Bioretention	14.94	10.23	68%	0.002	0.068
El Cerrito	2	ROW_10275	ROW Opportunity	2.52	1.58	63%	0.008	0.065
El Cerrito	2	Parcel_120393	Parcel-Based Opportunity	2.79	1.19	43%	0.006	0.060
El Cerrito	2	planned_122	Planned Unlined Bioretention	2.79	1.19	43%	0.006	0.060
El Cerrito	2	ROW_9949	ROW Opportunity	8.99	5.41	60%	0.003	0.056
El Cerrito	2	ROW_20173	ROW Opportunity	1.18	0.68	58%	0.012	0.053
El Cerrito	2	ROW_3882	ROW Opportunity	7.74	4.70	61%	0.003	0.053
El Cerrito	2	ROW_6997	ROW Opportunity	2.01	1.26	63%	0.008	0.053
El Cerrito	2	ROW_5240	ROW Opportunity	14.23	7.45	52%	0.002	0.051
El Cerrito	2	ROW_12667	ROW Opportunity	7.60	4.07	54%	0.003	0.048
El Cerrito	2	ROW_15194	ROW Opportunity	2.45	1.67	68%	0.006	0.044
El Cerrito	2	Parcel_108912	Parcel-Based Opportunity	19.52	10.10	52%	0.001	0.042
El Cerrito	2	ROW_13601	ROW Opportunity	9.94	5.69	57%	0.002	0.038
El Cerrito	2	ROW_18539	ROW Opportunity	3.28	1.97	60%	0.004	0.038
El Cerrito	2	ROW_4566	ROW Opportunity	9.09	4.81	53%	0.002	0.037
El Cerrito	2	Parcel_128153	Parcel-Based Opportunity	2.55	1.76	69%	0.005	0.036
El Cerrito	2	planned_389	Planned Creek/Marsh Restoration	1.00	0.66	66%	0.011	0.035
El Cerrito	2	ROW_9950	ROW Opportunity	2.05	1.31	64%	0.006	0.035
El Cerrito	2	Parcel_133358	Regional Opportunity	1.27	0.75	59%	0.008	0.034
El Cerrito	2	ROW_13602	ROW Opportunity	7.52	4.21	56%	0.002	0.033
El Cerrito	2	ROW_11539	ROW Opportunity	0.79	0.54	68%	0.011	0.029
El Cerrito	2	ROW_13367	ROW Opportunity	8.37	4.33	52%	0.002	0.029
El Cerrito	2	ROW_3041	ROW Opportunity	1.55	0.94	61%	0.006	0.029
El Cerrito	2	ROW_6936	ROW Opportunity	9.70	5.56	57%	0.001	0.029
El Cerrito	2	ROW_1264	ROW Opportunity	6.94	3.84	55%	0.002	0.028
El Cerrito	2	ROW_2251	ROW Opportunity	4.66	2.74	59%	0.003	0.028
El Cerrito	2	Parcel_118487	Parcel-Based Opportunity	1.00	0.55	55%	0.008	0.027
El Cerrito	2	planned_89	Planned Unlined Bioretention	80.88	5.47	7%	0.000	0.026
El Cerrito	2	ROW_20541	ROW Opportunity	1.08	0.66	61%	0.008	0.026
El Cerrito	2	ROW_16009	ROW Opportunity	1.55	0.96	62%	0.005	0.025
El Cerrito	2	ROW_15096	ROW Opportunity	6.18	3.20	52%	0.002	0.024
El Cerrito	2	ROW_6938	ROW Opportunity	6.31	3.67	58%	0.002	0.024
El Cerrito	2	Parcel_129420	Parcel-Based Opportunity	9.98	5.33	53%	0.001	0.023
El Cerrito	2	Parcel_137929	Parcel-Based Opportunity	5.49	2.41	44%	0.002	0.023
El Cerrito	2	ROW_10958	ROW Opportunity	7.39	4.41	60%	0.001	0.023
El Cerrito	2	ROW_15895	ROW Opportunity	9.74	5.57	57%	0.001	0.023
El Cerrito	2	ROW_20026	ROW Opportunity	0.68	0.54	79%	0.010	0.023
El Cerrito	2	ROW_15894	ROW Opportunity	9.10	5.36	59%	0.001	0.022
El Cerrito	2	ROW_11691	ROW Opportunity	5.62	3.28	58%	0.002	0.021

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El Cerrito	2	ROW_20328	ROW Opportunity	4.46	2.50	56%	0.002	0.021
El Cerrito	2	ROW_3523	ROW Opportunity	5.21	2.90	56%	0.002	0.021
El Cerrito	2	ROW_539	ROW Opportunity	6.98	3.97	57%	0.001	0.021
El Cerrito	2	ROW_10929	ROW Opportunity	5.36	3.22	60%	0.002	0.018
El Cerrito	2	ROW_11011	ROW Opportunity	4.83	2.80	58%	0.002	0.018
El Cerrito	2	ROW_14649	ROW Opportunity	0.60	0.40	67%	0.009	0.018
El Cerrito	2	ROW_6691	ROW Opportunity	7.35	4.29	58%	0.001	0.018
El Cerrito	2	ROW_10097	ROW Opportunity	6.15	3.70	60%	0.001	0.017
El Cerrito	2	ROW_15535	ROW Opportunity	4.95	2.77	56%	0.002	0.017
El Cerrito	2	ROW_20028	ROW Opportunity	0.50	0.39	78%	0.010	0.017
El Cerrito	2	ROW_20526	ROW Opportunity	4.64	2.70	58%	0.002	0.017
El Cerrito	2	ROW_6694	ROW Opportunity	6.59	3.78	57%	0.001	0.017
El Cerrito	2	planned_130	Planned Unlined Bioretention	0.45	0.37	82%	0.011	0.016
El Cerrito	2	ROW_6234	ROW Opportunity	1.67	0.95	57%	0.003	0.016
El Cerrito	2	ROW_6998	ROW Opportunity	2.36	1.37	58%	0.003	0.016
El Cerrito	2	Parcel_134601	Parcel-Based Opportunity	5.18	3.92	76%	0.001	0.015
El Cerrito	2	ROW_16809	ROW Opportunity	4.87	2.71	56%	0.002	0.015
El Cerrito	2	ROW_21519	ROW Opportunity	3.43	2.17	63%	0.002	0.015
El Cerrito	2	ROW_3495	ROW Opportunity	0.56	0.36	64%	0.008	0.015
El Cerrito	2	ROW_6367	ROW Opportunity	0.63	0.42	67%	0.007	0.015
El Cerrito	2	ROW_6911	ROW Opportunity	3.73	2.13	57%	0.002	0.015
El Cerrito	2	ROW_15196	ROW Opportunity	0.57	0.35	61%	0.007	0.014
El Cerrito	2	ROW_16545	ROW Opportunity	1.24	0.82	66%	0.004	0.014
El Cerrito	2	ROW_5254	ROW Opportunity	1.74	1.09	63%	0.003	0.014
El Cerrito	2	ROW_7864	ROW Opportunity	5.06	2.85	56%	0.001	0.014
El Cerrito	2	ROW_10953	ROW Opportunity	4.85	2.82	58%	0.001	0.013
El Cerrito	2	ROW_10955	ROW Opportunity	4.39	2.60	59%	0.001	0.013
El Cerrito	2	ROW_13600	ROW Opportunity	0.67	0.42	63%	0.006	0.013
El Cerrito	2	ROW_4340	ROW Opportunity	5.48	3.03	55%	0.001	0.013
El Cerrito	2	ROW_4650	ROW Opportunity	0.62	0.37	60%	0.007	0.013
El Cerrito	2	Parcel_376467	Parcel-Based Opportunity	5.15	2.93	57%	0.001	0.012
El Cerrito	2	ROW_10802	ROW Opportunity	4.97	2.88	58%	0.001	0.012
El Cerrito	2	ROW_13910	ROW Opportunity	0.48	0.28	58%	0.008	0.012
El Cerrito	2	ROW_1672	ROW Opportunity	5.53	3.07	56%	0.001	0.012
El Cerrito	2	ROW_5917	ROW Opportunity	4.58	2.67	58%	0.001	0.012
El Cerrito	2	ROW_6511	ROW Opportunity	3.16	1.88	59%	0.002	0.012
El Cerrito	2	ROW_9947	ROW Opportunity	0.92	0.61	66%	0.004	0.012
El Cerrito	2	Parcel_140018	Parcel-Based Opportunity	0.39	0.05	13%	0.008	0.011
El Cerrito	2	ROW_10930	ROW Opportunity	3.54	2.10	59%	0.001	0.011
El Cerrito	2	ROW_6968	ROW Opportunity	0.48	0.36	75%	0.007	0.011
El Cerrito	2	ROW_9065	ROW Opportunity	2.03	1.20	59%	0.002	0.011
El Cerrito	2	Parcel_120884	Regional Opportunity	0.59	0.21	36%	0.005	0.010
El Cerrito	2	ROW_15090	ROW Opportunity	4.58	2.54	55%	0.001	0.010
Hercules	2	Parcel_253834	Parcel-Based Opportunity	6.24	3.65	58%	0.034	0.860
Hercules	2	Parcel_258137	Parcel-Based Opportunity	11.26	2.85	25%	0.015	0.661
Hercules	2	ROW_1743	ROW Opportunity	11.16	4.37	39%	0.013	0.535
Hercules	2	ROW_15756	ROW Opportunity	4.43	2.04	46%	0.028	0.522
Hercules	2	ROW_13267	ROW Opportunity	3.21	1.44	45%	0.027	0.369
Hercules	2	ROW_20166	ROW Opportunity	8.49	3.53	42%	0.011	0.360
Hercules	2	ROW_16990	ROW Opportunity	5.25	1.32	25%	0.016	0.333
Hercules	2	Parcel_257979	Parcel-Based Opportunity	5.62	1.27	23%	0.013	0.303
Hercules	2	ROW_16634	ROW Opportunity	3.21	1.39	43%	0.022	0.290
Hercules	2	ROW_16909	ROW Opportunity	15.96	6.87	43%	0.005	0.260
Hercules	2	ROW_16911	ROW Opportunity	3.92	1.61	41%	0.016	0.247
Hercules	2	ROW_16090	ROW Opportunity	2.62	1.05	40%	0.022	0.243
Hercules	2	Parcel_257367	Parcel-Based Opportunity	3.87	0.86	22%	0.014	0.224
Hercules	2	ROW_14290	ROW Opportunity	6.27	2.06	33%	0.009	0.223
Hercules	2	ROW_6342	ROW Opportunity	2.63	0.75	29%	0.019	0.206
Hercules	2	ROW_19139	ROW Opportunity	3.17	0.80	25%	0.015	0.195
Hercules	2	ROW_18985	ROW Opportunity	21.38	7.42	35%	0.003	0.173
Hercules	2	Parcel_258157	Regional Opportunity	2.96	0.60	20%	0.014	0.168
Hercules	2	ROW_10622	ROW Opportunity	1.33	0.63	47%	0.028	0.160
Hercules	2	ROW_10623	ROW Opportunity	2.15	1.01	47%	0.017	0.153
Hercules	2	ROW_15482	ROW Opportunity	1.75	0.48	27%	0.020	0.141
Hercules	2	ROW_20676	ROW Opportunity	1.62	0.73	45%	0.021	0.140
Hercules	2	ROW_20171	ROW Opportunity	1.96	0.83	42%	0.016	0.125
Hercules	2	ROW_15483	ROW Opportunity	5.37	1.35	25%	0.006	0.115
Hercules	2	Parcel_257429	Regional Opportunity	1.90	0.43	23%	0.015	0.111
Hercules	2	ROW_1748	ROW Opportunity	1.51	0.38	25%	0.018	0.108
Hercules	2	Parcel_256321	Parcel-Based Opportunity	2.36	0.25	11%	0.010	0.097
Hercules	2	ROW_19622	ROW Opportunity	2.25	0.81	36%	0.011	0.095
Hercules	2	ROW_1435	ROW Opportunity	1.57	0.35	22%	0.014	0.086
Hercules	2	ROW_13170	ROW Opportunity	0.60	0.27	45%	0.026	0.067
Hercules	2	Parcel_257692	Regional Opportunity	1.04	0.24	23%	0.015	0.064
Hercules	2	ROW_1791	ROW Opportunity	1.59	0.35	22%	0.009	0.058
Hercules	2	ROW_7393	ROW Opportunity	1.06	0.36	34%	0.014	0.057
Hercules	2	ROW_7699	ROW Opportunity	0.56	0.19	34%	0.023	0.054
Hercules	2	ROW_17257	ROW Opportunity	0.40	0.21	53%	0.030	0.052
Hercules	2	ROW_10624	ROW Opportunity	0.39	0.17	44%	0.027	0.044
Hercules	2	ROW_7341	ROW Opportunity	0.35	0.15	43%	0.026	0.039
Hercules	2	ROW_11067	ROW Opportunity	7.45	2.66	36%	0.002	0.035
Hercules	2	ROW_1079	ROW Opportunity	0.90	0.39	43%	0.010	0.033
Hercules	2	ROW_6380	ROW Opportunity	0.41	0.24	59%	0.018	0.029
Hercules	2	ROW_365	ROW Opportunity	0.21	0.11	52%	0.029	0.026
Hercules	2	Parcel_257844	Parcel-Based Opportunity	0.43	0.10	23%	0.015	0.025
Hercules	2	ROW_11619	ROW Opportunity	0.42	0.12	29%	0.015	0.024
Hercules	2	Parcel_257823	Parcel-Based Opportunity	0.37	0.08	22%	0.015	0.022
Hercules	2	Parcel_257685	Parcel-Based Opportunity	0.34	0.08	24%	0.015	0.020
Hercules	2	Parcel_260776	Parcel-Based Opportunity	11.52	2.65	23%	0.001	0.019
Hercules	2	ROW_19683	ROW Opportunity	0.49	0.17	35%	0.010	0.019
Hercules	2	Parcel_254443	Parcel-Based Opportunity	8.83	1.56	18%	0.001	0.016
Hercules	2	ROW_2481	ROW Opportunity	0.15	0.07	47%	0.022	0.014
Hercules	2	Parcel_255602	Parcel-Based Opportunity	13.98	5.74	41%	0.000	0.013
Hercules	2	ROW_21077	ROW Opportunity	1.10	0.21	19%	0.003	0.012

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Hercules	2	ROW_17543	ROW Opportunity	0.12	0.04	33%	0.022	0.011
Hercules	2	Parcel_253250	Parcel-Based Opportunity	0.32	0.10	31%	0.008	0.010
Lafayette	2	ROW_8037	ROW Opportunity	4.09	2.48	61%	0.014	0.183
Lafayette	2	ROW_2243	ROW Opportunity	1.43	1.06	74%	0.032	0.167
Lafayette	2	ROW_12876	ROW Opportunity	6.73	3.27	49%	0.008	0.153
Lafayette	2	ROW_151	ROW Opportunity	3.55	2.15	61%	0.014	0.153
Lafayette	2	ROW_397	ROW Opportunity	10.95	2.47	23%	0.004	0.132
Lafayette	2	ROW_10450	ROW Opportunity	2.88	1.58	55%	0.013	0.126
Lafayette	2	ROW_8546	ROW Opportunity	30.28	4.86	16%	0.002	0.126
Lafayette	2	ROW_8982	ROW Opportunity	8.86	3.34	38%	0.004	0.097
Lafayette	2	ROW_2803	ROW Opportunity	2.21	1.37	62%	0.012	0.079
Lafayette	2	Parcel_375734	Parcel-Based Opportunity	29.49	9.07	31%	0.001	0.077
Lafayette	2	ROW_235	ROW Opportunity	2.40	1.49	62%	0.011	0.075
Lafayette	2	Parcel_22842	Parcel-Based Opportunity	26.65	4.08	15%	0.001	0.061
Lafayette	2	Parcel_38918	Parcel-Based Opportunity	17.79	6.51	37%	0.001	0.056
Lafayette	2	ROW_5749	ROW Opportunity	2.62	1.31	50%	0.007	0.051
Lafayette	2	ROW_16160	ROW Opportunity	13.26	2.44	18%	0.002	0.050
Lafayette	2	ROW_18657	ROW Opportunity	1.15	0.72	63%	0.013	0.045
Lafayette	2	ROW_6188	ROW Opportunity	2.68	1.13	42%	0.006	0.042
Lafayette	2	ROW_8493	ROW Opportunity	5.88	1.11	19%	0.003	0.041
Lafayette	2	Parcel_45274	Regional Opportunity	0.74	0.44	59%	0.016	0.040
Lafayette	2	ROW_12869	ROW Opportunity	11.00	2.85	26%	0.002	0.039
Lafayette	2	ROW_12445	ROW Opportunity	4.44	0.97	22%	0.003	0.037
Lafayette	2	ROW_17249	ROW Opportunity	4.54	1.96	43%	0.003	0.037
Lafayette	2	ROW_18068	ROW Opportunity	1.26	0.64	51%	0.010	0.037
Lafayette	2	ROW_15000	ROW Opportunity	1.59	0.80	50%	0.007	0.036
Lafayette	2	ROW_7204	ROW Opportunity	0.97	0.35	36%	0.011	0.034
Lafayette	2	ROW_17831	ROW Opportunity	14.18	3.00	21%	0.001	0.033
Lafayette	2	ROW_21105	ROW Opportunity	1.83	0.76	42%	0.006	0.030
Lafayette	2	Parcel_376452	Parcel-Based Opportunity	9.70	3.28	34%	0.001	0.029
Lafayette	2	Parcel_40931	Parcel-Based Opportunity	6.84	3.62	53%	0.002	0.029
Lafayette	2	Parcel_43618	Parcel-Based Opportunity	7.13	3.51	49%	0.002	0.029
Lafayette	2	ROW_18408	ROW Opportunity	7.32	1.94	27%	0.002	0.029
Lafayette	2	ROW_3774	ROW Opportunity	0.85	0.48	56%	0.011	0.029
Lafayette	2	ROW_7943	ROW Opportunity	9.50	1.66	17%	0.001	0.029
Lafayette	2	ROW_8461	ROW Opportunity	0.61	0.39	64%	0.015	0.029
Lafayette	2	ROW_13640	ROW Opportunity	2.39	0.70	29%	0.004	0.028
Lafayette	2	planned_546	Planned Creek/Marsh Restoration	2.12	0.60	28%	0.005	0.027
Lafayette	2	ROW_19821	ROW Opportunity	13.08	2.06	16%	0.001	0.027
Lafayette	2	ROW_8508	ROW Opportunity	1.56	0.60	38%	0.006	0.027
Lafayette	2	ROW_20225	ROW Opportunity	1.46	0.47	32%	0.006	0.026
Lafayette	2	ROW_11383	ROW Opportunity	8.22	1.99	24%	0.001	0.022
Lafayette	2	ROW_680	ROW Opportunity	1.59	0.67	42%	0.005	0.022
Lafayette	2	ROW_9300	ROW Opportunity	1.68	0.70	42%	0.005	0.022
Lafayette	2	ROW_12963	ROW Opportunity	5.60	1.60	29%	0.002	0.021
Lafayette	2	ROW_2256	ROW Opportunity	0.32	0.25	78%	0.020	0.021
Lafayette	2	Parcel_41948	Regional Opportunity	0.54	0.21	39%	0.011	0.020
Lafayette	2	ROW_155	ROW Opportunity	2.84	1.02	36%	0.003	0.020
Lafayette	2	ROW_2070	ROW Opportunity	2.66	1.20	45%	0.003	0.020
Lafayette	2	ROW_21071	ROW Opportunity	0.48	0.22	46%	0.012	0.018
Lafayette	2	ROW_14991	ROW Opportunity	0.74	0.22	30%	0.007	0.017
Lafayette	2	ROW_20798	ROW Opportunity	1.38	0.59	43%	0.005	0.017
Lafayette	2	ROW_18029	ROW Opportunity	5.83	1.14	20%	0.001	0.015
Lafayette	2	ROW_20971	ROW Opportunity	0.57	0.22	39%	0.008	0.015
Lafayette	2	Parcel_40526	Parcel-Based Opportunity	0.40	0.12	30%	0.010	0.014
Lafayette	2	ROW_7898	ROW Opportunity	7.71	1.06	14%	0.001	0.014
Lafayette	2	ROW_18768	ROW Opportunity	4.41	1.13	26%	0.001	0.013
Lafayette	2	ROW_2955	ROW Opportunity	3.77	0.91	24%	0.002	0.013
Lafayette	2	Parcel_43103	Parcel-Based Opportunity	8.38	2.44	29%	0.001	0.012
Lafayette	2	ROW_14844	ROW Opportunity	3.47	0.54	16%	0.002	0.012
Lafayette	2	ROW_20581	ROW Opportunity	2.06	0.66	32%	0.002	0.012
Lafayette	2	ROW_3114	ROW Opportunity	4.89	1.20	25%	0.001	0.012
Lafayette	2	Parcel_104404	Parcel-Based Opportunity	7.73	0.73	9%	0.001	0.011
Lafayette	2	ROW_11327	ROW Opportunity	5.07	1.07	21%	0.001	0.011
Lafayette	2	ROW_13216	ROW Opportunity	5.56	0.90	16%	0.001	0.011
Lafayette	2	ROW_16250	ROW Opportunity	2.49	0.97	39%	0.002	0.011
Lafayette	2	ROW_16635	ROW Opportunity	5.34	0.92	17%	0.001	0.011
Lafayette	2	ROW_18973	ROW Opportunity	3.41	0.90	26%	0.001	0.011
Lafayette	2	ROW_9365	ROW Opportunity	3.71	1.19	32%	0.001	0.011
Lafayette	2	ROW_2177	ROW Opportunity	4.87	0.90	18%	0.001	0.010
Lafayette	2	ROW_4253	ROW Opportunity	0.63	0.32	51%	0.005	0.010
Lafayette	2	ROW_5759	ROW Opportunity	4.91	0.98	20%	0.001	0.010
Martinez	2	planned_7	Planned Creek/Marsh Restoration	94.31	39.77	42%	0.018	6.741
Martinez	2	ROW_11847	ROW Opportunity	18.15	11.75	65%	0.030	2.289
Martinez	2	ROW_9312	ROW Opportunity	15.70	8.30	53%	0.019	1.200
Martinez	2	Parcel_256879	Parcel-Based Opportunity	4.53	3.61	80%	0.045	0.840
Martinez	2	Parcel_258271	Regional Opportunity	11.25	3.16	28%	0.016	0.738
Martinez	2	ROW_2615	ROW Opportunity	4.67	2.85	61%	0.029	0.568
Martinez	2	ROW_17609	ROW Opportunity	3.03	1.75	58%	0.034	0.432
Martinez	2	ROW_1199	ROW Opportunity	10.11	5.56	55%	0.009	0.350
Martinez	2	ROW_12654	ROW Opportunity	2.07	1.21	58%	0.034	0.301
Martinez	2	Parcel_224745	Parcel-Based Opportunity	12.27	5.56	45%	0.006	0.275
Martinez	2	Parcel_256618	Regional Opportunity	1.53	1.15	75%	0.042	0.271
Martinez	2	ROW_9751	ROW Opportunity	3.95	1.31	33%	0.016	0.264
Martinez	2	ROW_1704	ROW Opportunity	2.43	1.03	42%	0.025	0.262
Martinez	2	ROW_613	ROW Opportunity	44.88	20.72	46%	0.002	0.257
Martinez	2	Parcel_257598	Parcel-Based Opportunity	4.12	0.90	22%	0.014	0.241
Martinez	2	ROW_11018	ROW Opportunity	1.72	0.97	56%	0.033	0.238
Martinez	2	ROW_2610	ROW Opportunity	2.98	0.86	29%	0.017	0.219
Martinez	2	ROW_6722	ROW Opportunity	3.14	1.29	41%	0.017	0.214
Martinez	2	ROW_7179	ROW Opportunity	6.44	3.23	50%	0.008	0.194
Martinez	2	ROW_14509	ROW Opportunity	5.63	2.94	52%	0.009	0.175
Martinez	2	ROW_12653	ROW Opportunity	1.13	0.68	60%	0.035	0.165
Martinez	2	ROW_1198	ROW Opportunity	20.20	10.22	51%	0.003	0.158

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Martinez	2	Parcel_257469	Parcel-Based Opportunity	1.47	0.63	43%	0.025	0.155
Martinez	2	ROW_2021	ROW Opportunity	3.08	1.19	39%	0.012	0.154
Martinez	2	Parcel_257037	Parcel-Based Opportunity	1.31	0.60	46%	0.027	0.148
Martinez	2	ROW_11846	ROW Opportunity	1.07	0.66	62%	0.032	0.140
Martinez	2	ROW_6258	ROW Opportunity	1.28	0.54	42%	0.025	0.138
Martinez	2	ROW_13093	ROW Opportunity	19.22	8.75	46%	0.003	0.135
Martinez	2	ROW_15102	ROW Opportunity	1.17	0.49	42%	0.026	0.126
Martinez	2	ROW_12899	ROW Opportunity	23.68	11.07	47%	0.002	0.123
Martinez	2	ROW_6843	ROW Opportunity	7.57	3.72	49%	0.005	0.119
Martinez	2	ROW_12656	ROW Opportunity	1.13	0.45	40%	0.024	0.114
Martinez	2	Parcel_259273	Parcel-Based Opportunity	53.06	7.74	15%	0.001	0.110
Martinez	2	planned_375	Planned Unlined Bioretention	0.69	0.47	68%	0.036	0.104
Martinez	2	Parcel_256439	Parcel-Based Opportunity	6.52	4.34	67%	0.005	0.101
Martinez	2	ROW_11617	ROW Opportunity	6.23	3.68	59%	0.005	0.098
Martinez	2	ROW_3734	ROW Opportunity	10.53	5.59	53%	0.003	0.090
Martinez	2	ROW_4932	ROW Opportunity	2.88	1.64	57%	0.008	0.089
Martinez	2	ROW_15103	ROW Opportunity	0.78	0.33	42%	0.026	0.085
Martinez	2	Parcel_257604	Parcel-Based Opportunity	5.42	1.42	26%	0.004	0.080
Martinez	2	ROW_7416	ROW Opportunity	0.97	0.55	57%	0.020	0.078
Martinez	2	ROW_2023	ROW Opportunity	6.59	0.76	12%	0.003	0.076
Martinez	2	ROW_12901	ROW Opportunity	3.64	1.75	48%	0.005	0.070
Martinez	2	ROW_20611	ROW Opportunity	5.63	3.27	58%	0.004	0.069
Martinez	2	ROW_2910	ROW Opportunity	0.47	0.34	72%	0.035	0.069
Martinez	2	Parcel_229067	Regional Opportunity	2.22	1.53	69%	0.008	0.068
Martinez	2	ROW_14854	ROW Opportunity	1.55	1.06	68%	0.012	0.067
Martinez	2	ROW_10676	ROW Opportunity	2.73	1.61	59%	0.007	0.065
Martinez	2	ROW_7853	ROW Opportunity	7.02	3.11	44%	0.003	0.064
Martinez	2	ROW_15451	ROW Opportunity	4.14	2.09	50%	0.005	0.062
Martinez	2	ROW_19814	ROW Opportunity	0.70	0.24	34%	0.021	0.062
Martinez	2	ROW_629	ROW Opportunity	5.08	1.83	36%	0.004	0.060
Martinez	2	ROW_12109	ROW Opportunity	0.35	0.24	69%	0.039	0.058
Martinez	2	Parcel_259114	Parcel-Based Opportunity	9.40	2.23	24%	0.002	0.056
Martinez	2	ROW_11811	ROW Opportunity	3.12	1.63	52%	0.005	0.054
Martinez	2	Parcel_256442	Regional Opportunity	1.80	1.30	72%	0.008	0.053
Martinez	2	Parcel_251682	Parcel-Based Opportunity	32.13	8.78	27%	0.001	0.045
Martinez	2	Parcel_256990	Regional Opportunity	1.38	0.32	23%	0.008	0.043
Martinez	2	ROW_6892	ROW Opportunity	1.90	1.20	63%	0.006	0.040
Martinez	2	Parcel_232523	Regional Opportunity	1.40	0.76	54%	0.007	0.039
Martinez	2	ROW_15020	ROW Opportunity	9.04	2.92	32%	0.002	0.039
Martinez	2	ROW_8221	ROW Opportunity	6.16	3.05	50%	0.002	0.039
Martinez	2	ROW_3856	ROW Opportunity	20.44	8.96	44%	0.001	0.034
Martinez	2	ROW_610	ROW Opportunity	15.31	6.60	43%	0.001	0.034
Martinez	2	planned_372	Planned Unlined Bioretention	1.66	0.92	55%	0.006	0.033
Martinez	2	Parcel_256108	Regional Opportunity	0.92	0.73	79%	0.010	0.032
Martinez	2	Parcel_258236	Parcel-Based Opportunity	0.33	0.22	67%	0.024	0.032
Martinez	2	Parcel_222314	Regional Opportunity	1.35	0.61	45%	0.006	0.030
Martinez	2	ROW_6905	ROW Opportunity	1.95	0.94	48%	0.005	0.030
Martinez	2	Parcel_255702	Regional Opportunity	0.92	0.66	72%	0.009	0.029
Martinez	2	Parcel_256354	Regional Opportunity	0.89	0.65	73%	0.009	0.029
Martinez	2	ROW_8871	ROW Opportunity	2.44	1.23	50%	0.004	0.028
Martinez	2	Parcel_256320	Regional Opportunity	0.91	0.61	67%	0.008	0.027
Martinez	2	Parcel_256422	Regional Opportunity	0.76	0.50	66%	0.010	0.027
Martinez	2	ROW_6891	ROW Opportunity	7.35	3.61	49%	0.002	0.027
Martinez	2	Parcel_253376	Regional Opportunity	1.62	0.94	58%	0.005	0.026
Martinez	2	Parcel_254721	Regional Opportunity	1.16	0.53	46%	0.006	0.024
Martinez	2	Parcel_224949	Regional Opportunity	0.86	0.49	57%	0.008	0.023
Martinez	2	Parcel_237827	Regional Opportunity	0.71	0.52	73%	0.009	0.023
Martinez	2	Parcel_253818	Parcel-Based Opportunity	13.01	5.66	44%	0.001	0.023
Martinez	2	Parcel_256502	Parcel-Based Opportunity	0.42	0.31	74%	0.014	0.023
Martinez	2	ROW_7604	ROW Opportunity	2.87	1.45	51%	0.003	0.023
Martinez	2	ROW_14857	ROW Opportunity	17.86	8.48	47%	0.000	0.022
Martinez	2	ROW_20289	ROW Opportunity	7.12	3.17	45%	0.001	0.022
Martinez	2	ROW_7211	ROW Opportunity	6.08	2.85	47%	0.002	0.022
Martinez	2	Parcel_258083	Parcel-Based Opportunity	35.65	4.18	12%	0.000	0.021
Martinez	2	Parcel_243866	Parcel-Based Opportunity	14.00	5.43	39%	0.001	0.020
Martinez	2	ROW_2025	ROW Opportunity	9.51	4.84	51%	0.001	0.020
Martinez	2	Parcel_223914	Regional Opportunity	0.85	0.39	46%	0.006	0.019
Martinez	2	Parcel_258983	Regional Opportunity	122.27	7.70	6%	0.000	0.019
Martinez	2	ROW_14205	ROW Opportunity	6.33	3.34	53%	0.001	0.019
Martinez	2	ROW_20345	ROW Opportunity	5.01	2.30	46%	0.002	0.019
Martinez	2	ROW_9574	ROW Opportunity	1.17	0.62	53%	0.005	0.019
Martinez	2	Parcel_255585	Regional Opportunity	0.57	0.42	74%	0.009	0.018
Martinez	2	ROW_16176	ROW Opportunity	9.36	4.21	45%	0.001	0.018
Martinez	2	ROW_631	ROW Opportunity	3.69	1.73	47%	0.002	0.018
Martinez	2	Parcel_225041	Regional Opportunity	0.74	0.35	47%	0.007	0.017
Martinez	2	ROW_6965	ROW Opportunity	3.36	1.76	52%	0.002	0.017
Martinez	2	ROW_9879	ROW Opportunity	0.73	0.41	56%	0.007	0.017
Martinez	2	Parcel_253606	Parcel-Based Opportunity	0.49	0.36	73%	0.009	0.016
Martinez	2	Parcel_255151	Regional Opportunity	0.55	0.35	64%	0.008	0.016
Martinez	2	planned_376	Planned Unlined Bioretention	0.53	0.37	70%	0.009	0.016
Martinez	2	Parcel_225722	Parcel-Based Opportunity	0.34	0.06	18%	0.011	0.015
Martinez	2	ROW_12471	ROW Opportunity	5.06	2.37	47%	0.001	0.015
Martinez	2	ROW_12911	ROW Opportunity	4.33	2.19	51%	0.002	0.015
Martinez	2	ROW_12492	ROW Opportunity	5.90	2.58	44%	0.001	0.014
Martinez	2	ROW_14285	ROW Opportunity	3.17	1.67	53%	0.002	0.014
Martinez	2	ROW_14410	ROW Opportunity	0.55	0.30	55%	0.007	0.014
Martinez	2	ROW_1464	ROW Opportunity	1.92	0.74	39%	0.003	0.014
Martinez	2	ROW_20556	ROW Opportunity	1.78	0.79	44%	0.003	0.014
Martinez	2	ROW_7828	ROW Opportunity	1.92	0.94	49%	0.003	0.014
Martinez	2	ROW_9180	ROW Opportunity	1.23	0.59	48%	0.004	0.014
Martinez	2	Parcel_255587	Parcel-Based Opportunity	0.37	0.29	78%	0.010	0.013
Martinez	2	ROW_12005	ROW Opportunity	1.77	0.96	54%	0.003	0.013
Martinez	2	ROW_4933	ROW Opportunity	2.81	1.45	52%	0.002	0.013
Martinez	2	Parcel_214775	Parcel-Based Opportunity	9.97	2.81	28%	0.001	0.012

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Martinez	2	Parcel_238844	Parcel-Based Opportunity	14.31	3.94	28%	0.000	0.012
Martinez	2	ROW_14540	ROW Opportunity	0.51	0.25	49%	0.007	0.012
Martinez	2	ROW_15897	ROW Opportunity	3.30	1.73	52%	0.002	0.012
Martinez	2	ROW_20804	ROW Opportunity	4.55	2.34	51%	0.001	0.012
Martinez	2	ROW_4230	ROW Opportunity	1.56	0.52	33%	0.003	0.012
Martinez	2	ROW_6703	ROW Opportunity	0.74	0.43	58%	0.005	0.012
Martinez	2	Parcel_240285	Parcel-Based Opportunity	11.54	3.74	32%	0.000	0.011
Martinez	2	Parcel_252998	Parcel-Based Opportunity	8.29	4.83	58%	0.000	0.011
Martinez	2	Parcel_255494	Parcel-Based Opportunity	0.28	0.25	89%	0.011	0.011
Martinez	2	Parcel_256903	Parcel-Based Opportunity	0.23	0.11	48%	0.013	0.011
Martinez	2	planned_373	Planned Unlined Bioretention	1.59	0.50	31%	0.002	0.011
Martinez	2	ROW_12317	ROW Opportunity	0.64	0.34	53%	0.005	0.011
Martinez	2	ROW_16580	ROW Opportunity	1.80	0.75	42%	0.002	0.011
Martinez	2	ROW_20704	ROW Opportunity	5.72	2.55	45%	0.001	0.011
Martinez	2	Parcel_255781	Parcel-Based Opportunity	0.46	0.23	50%	0.006	0.010
Martinez	2	ROW_19347	ROW Opportunity	0.79	0.42	53%	0.004	0.010
Moraga	2	ROW_17250	ROW Opportunity	11.07	3.64	33%	0.016	0.647
Moraga	2	planned_1316	Planned Unlined Bioretention	2.98	1.05	35%	0.026	0.293
Moraga	2	Parcel_10950	Regional Opportunity	1.14	0.34	30%	0.041	0.185
Moraga	2	Parcel_10961	Regional Opportunity	1.15	0.30	26%	0.037	0.170
Moraga	2	ROW_12878	ROW Opportunity	4.53	1.88	42%	0.008	0.111
Moraga	2	Parcel_26092	Parcel-Based Opportunity	38.99	10.31	26%	0.001	0.106
Moraga	2	ROW_12881	ROW Opportunity	11.85	3.71	31%	0.003	0.072
Moraga	2	Parcel_12163	Parcel-Based Opportunity	43.07	7.49	17%	0.001	0.069
Moraga	2	Parcel_13537	Parcel-Based Opportunity	50.27	8.81	18%	0.000	0.067
Moraga	2	Parcel_7723	Parcel-Based Opportunity	24.01	5.65	24%	0.001	0.056
Moraga	2	ROW_3145	ROW Opportunity	19.33	5.50	28%	0.001	0.049
Moraga	2	ROW_10626	ROW Opportunity	13.66	3.97	29%	0.001	0.041
Moraga	2	ROW_4748	ROW Opportunity	14.73	3.93	27%	0.001	0.041
Moraga	2	ROW_3392	ROW Opportunity	10.09	4.09	41%	0.002	0.032
Moraga	2	Parcel_6384	Parcel-Based Opportunity	9.48	3.19	34%	0.002	0.030
Moraga	2	ROW_19295	ROW Opportunity	9.79	2.99	31%	0.001	0.030
Moraga	2	ROW_15965	ROW Opportunity	9.83	3.12	32%	0.001	0.028
Moraga	2	ROW_16744	ROW Opportunity	10.16	2.83	28%	0.001	0.027
Moraga	2	ROW_16992	ROW Opportunity	8.35	2.44	29%	0.001	0.023
Moraga	2	planned_150	Planned Creek/Marsh Restoration	9.22	0.93	10%	0.001	0.015
Moraga	2	Parcel_12154	Parcel-Based Opportunity	7.49	1.19	16%	0.001	0.013
Moraga	2	ROW_3874	ROW Opportunity	4.29	1.72	40%	0.001	0.013
Moraga	2	Parcel_12566	Parcel-Based Opportunity	19.96	2.68	13%	0.000	0.012
Moraga	2	Parcel_13376	Parcel-Based Opportunity	9.49	0.66	7%	0.001	0.012
Moraga	2	Parcel_13461	Parcel-Based Opportunity	4.70	1.31	28%	0.001	0.012
Moraga	2	ROW_20532	ROW Opportunity	3.80	1.22	32%	0.002	0.012
Moraga	2	ROW_5547	ROW Opportunity	4.78	1.26	26%	0.001	0.012
Moraga	2	ROW_5710	ROW Opportunity	4.70	1.16	25%	0.001	0.012
Moraga	2	Parcel_9225	Parcel-Based Opportunity	6.43	1.25	19%	0.001	0.011
Moraga	2	ROW_20599	ROW Opportunity	3.96	1.17	30%	0.001	0.011
Moraga	2	ROW_3147	ROW Opportunity	3.36	1.24	37%	0.002	0.011
Moraga	2	Parcel_3748	Parcel-Based Opportunity	8.12	0.56	7%	0.001	0.010
Moraga	2	ROW_12598	ROW Opportunity	3.52	1.17	33%	0.001	0.010
Orinda	2	ROW_21614	ROW Opportunity	31.32	10.62	34%	0.002	0.104
Orinda	2	Parcel_44823	Parcel-Based Opportunity	16.20	4.76	29%	0.001	0.046
Orinda	2	Parcel_46205	Parcel-Based Opportunity	22.26	2.96	13%	0.001	0.041
Orinda	2	ROW_9556	ROW Opportunity	15.77	2.91	18%	0.001	0.034
Orinda	2	Parcel_13835	Parcel-Based Opportunity	11.63	3.16	27%	0.001	0.030
Orinda	2	Parcel_49552	Parcel-Based Opportunity	28.42	2.67	9%	0.000	0.029
Orinda	2	Parcel_29088	Parcel-Based Opportunity	6.41	1.86	29%	0.001	0.018
Orinda	2	ROW_1107	ROW Opportunity	7.07	1.26	18%	0.001	0.018
Orinda	2	ROW_11198	ROW Opportunity	11.30	1.45	13%	0.001	0.018
Orinda	2	ROW_19957	ROW Opportunity	9.06	1.12	12%	0.001	0.017
Orinda	2	ROW_9077	ROW Opportunity	7.88	1.15	15%	0.001	0.017
Orinda	2	ROW_4721	ROW Opportunity	6.01	1.19	20%	0.001	0.015
Orinda	2	Parcel_47119	Parcel-Based Opportunity	10.58	0.76	7%	0.001	0.014
Orinda	2	Parcel_36062	Parcel-Based Opportunity	3.19	1.35	42%	0.002	0.013
Orinda	2	ROW_7202	ROW Opportunity	5.07	0.93	18%	0.001	0.011
Pinole	2	Parcel_254723	Parcel-Based Opportunity	4.41	2.14	49%	0.030	0.532
Pinole	2	ROW_16912	ROW Opportunity	10.96	5.87	54%	0.008	0.283
Pinole	2	ROW_19218	ROW Opportunity	7.85	3.87	49%	0.006	0.158
Pinole	2	ROW_14911	ROW Opportunity	4.68	2.63	56%	0.009	0.147
Pinole	2	ROW_14916	ROW Opportunity	9.85	4.50	46%	0.005	0.141
Pinole	2	ROW_20585	ROW Opportunity	1.13	0.71	63%	0.027	0.122
Pinole	2	ROW_1018	ROW Opportunity	2.13	1.30	61%	0.008	0.059
Pinole	2	ROW_15540	ROW Opportunity	8.95	3.99	45%	0.003	0.059
Pinole	2	Parcel_230897	Regional Opportunity	2.72	1.22	45%	0.006	0.056
Pinole	2	ROW_15484	ROW Opportunity	0.95	0.39	41%	0.014	0.052
Pinole	2	ROW_18207	ROW Opportunity	0.78	0.47	60%	0.017	0.050
Pinole	2	ROW_14605	ROW Opportunity	2.38	1.39	58%	0.006	0.047
Pinole	2	Parcel_230869	Regional Opportunity	1.51	0.94	62%	0.009	0.044
Pinole	2	Parcel_232274	Parcel-Based Opportunity	22.08	9.87	45%	0.001	0.040
Pinole	2	ROW_6874	ROW Opportunity	9.82	4.43	45%	0.002	0.038
Pinole	2	ROW_7727	ROW Opportunity	0.61	0.33	54%	0.014	0.033
Pinole	2	Parcel_221780	Regional Opportunity	3.09	1.00	32%	0.003	0.032
Pinole	2	ROW_7150	ROW Opportunity	2.17	1.19	55%	0.005	0.030
Pinole	2	Parcel_245647	Regional Opportunity	0.88	0.67	76%	0.010	0.029
Pinole	2	Parcel_247794	Parcel-Based Opportunity	0.30	0.08	27%	0.019	0.023
Pinole	2	Parcel_245383	Regional Opportunity	0.65	0.49	75%	0.010	0.022
Pinole	2	ROW_12194	ROW Opportunity	3.86	1.94	50%	0.002	0.022
Pinole	2	ROW_3363	ROW Opportunity	5.11	2.55	50%	0.002	0.022
Pinole	2	ROW_5887	ROW Opportunity	13.54	5.22	39%	0.001	0.022
Pinole	2	ROW_5599	ROW Opportunity	1.98	1.15	58%	0.004	0.021
Pinole	2	Parcel_243023	Parcel-Based Opportunity	9.49	5.01	53%	0.001	0.020
Pinole	2	ROW_15034	ROW Opportunity	1.70	0.94	55%	0.004	0.020
Pinole	2	ROW_13497	ROW Opportunity	6.04	3.06	51%	0.001	0.019
Pinole	2	ROW_17159	ROW Opportunity	7.51	3.24	43%	0.001	0.019
Pinole	2	Parcel_219618	Parcel-Based Opportunity	13.15	4.37	33%	0.001	0.018

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Pinole	2	Parcel_247475	Parcel-Based Opportunity	0.12	0.08	67%	0.038	0.018
Pinole	2	ROW_5886	ROW Opportunity	4.30	2.40	56%	0.002	0.018
Pinole	2	ROW_1742	ROW Opportunity	4.13	1.95	47%	0.002	0.017
Pinole	2	ROW_11596	ROW Opportunity	0.67	0.39	58%	0.007	0.016
Pinole	2	ROW_15440	ROW Opportunity	1.90	0.96	51%	0.003	0.016
Pinole	2	ROW_4012	ROW Opportunity	1.39	0.72	52%	0.004	0.016
Pinole	2	ROW_306	ROW Opportunity	1.68	0.94	56%	0.003	0.015
Pinole	2	ROW_1017	ROW Opportunity	0.97	0.42	43%	0.005	0.014
Pinole	2	ROW_13999	ROW Opportunity	0.44	0.22	50%	0.009	0.014
Pinole	2	ROW_293	ROW Opportunity	2.06	1.13	55%	0.003	0.014
Pinole	2	ROW_15441	ROW Opportunity	0.57	0.38	67%	0.007	0.013
Pinole	2	ROW_15478	ROW Opportunity	1.37	0.77	56%	0.003	0.013
Pinole	2	ROW_16159	ROW Opportunity	1.46	0.86	59%	0.003	0.013
Pinole	2	Parcel_244914	Parcel-Based Opportunity	0.42	0.28	67%	0.009	0.012
Pinole	2	Parcel_249339	Regional Opportunity	0.52	0.26	50%	0.007	0.012
Pinole	2	ROW_14913	ROW Opportunity	3.64	1.88	52%	0.002	0.012
Pinole	2	ROW_16077	ROW Opportunity	1.72	0.80	47%	0.003	0.012
Pinole	2	ROW_7141	ROW Opportunity	1.41	0.78	55%	0.003	0.012
Pinole	2	ROW_1021	ROW Opportunity	1.11	0.49	44%	0.003	0.011
Pinole	2	ROW_14440	ROW Opportunity	1.13	0.42	37%	0.003	0.011
Pinole	2	ROW_4571	ROW Opportunity	5.72	2.53	44%	0.001	0.011
Pinole	2	Parcel_246543	Parcel-Based Opportunity	0.40	0.23	58%	0.008	0.010
Pinole	2	Parcel_249605	Parcel-Based Opportunity	4.61	0.72	16%	0.001	0.010
Pinole	2	ROW_646	ROW Opportunity	4.57	2.48	54%	0.001	0.010
Pittsburg	2	Parcel_352273	Parcel-Based Opportunity	22.24	7.16	32%	0.020	1.973
Pittsburg	2	ROW_6199	ROW Opportunity	17.07	9.41	55%	0.023	1.681
Pittsburg	2	ROW_13238	ROW Opportunity	17.62	9.84	56%	0.016	1.119
Pittsburg	2	ROW_11361	ROW Opportunity	11.26	7.09	63%	0.019	0.890
Pittsburg	2	ROW_7663	ROW Opportunity	8.79	5.55	63%	0.024	0.887
Pittsburg	2	ROW_4315	ROW Opportunity	3.78	2.84	75%	0.040	0.661
Pittsburg	2	ROW_14954	ROW Opportunity	7.36	4.19	57%	0.020	0.642
Pittsburg	2	ROW_2265	ROW Opportunity	3.43	2.47	72%	0.038	0.568
Pittsburg	2	ROW_14958	ROW Opportunity	4.91	3.47	71%	0.026	0.548
Pittsburg	2	Parcel_366531	Parcel-Based Opportunity	6.87	2.53	37%	0.015	0.449
Pittsburg	2	ROW_14798	ROW Opportunity	3.48	2.15	62%	0.028	0.412
Pittsburg	2	ROW_1954	ROW Opportunity	2.50	1.71	68%	0.037	0.401
Pittsburg	2	ROW_11359	ROW Opportunity	13.31	7.75	58%	0.007	0.342
Pittsburg	2	ROW_3090	ROW Opportunity	5.95	3.72	63%	0.014	0.342
Pittsburg	2	Parcel_356238	Parcel-Based Opportunity	10.36	3.44	33%	0.008	0.326
Pittsburg	2	ROW_7525	ROW Opportunity	2.93	1.85	63%	0.026	0.326
Pittsburg	2	Parcel_350839	Parcel-Based Opportunity	14.33	6.63	46%	0.006	0.316
Pittsburg	2	ROW_6215	ROW Opportunity	2.16	1.40	65%	0.033	0.310
Pittsburg	2	ROW_6741	ROW Opportunity	2.05	1.30	63%	0.034	0.304
Pittsburg	2	ROW_9457	ROW Opportunity	1.88	1.26	67%	0.036	0.296
Pittsburg	2	ROW_17711	ROW Opportunity	1.60	1.28	80%	0.042	0.292
Pittsburg	2	ROW_7526	ROW Opportunity	5.46	3.95	72%	0.013	0.279
Pittsburg	2	ROW_8562	ROW Opportunity	2.35	1.45	62%	0.027	0.275
Pittsburg	2	ROW_20368	ROW Opportunity	6.68	4.19	63%	0.010	0.251
Pittsburg	2	Parcel_367743	Regional Opportunity	2.24	1.01	45%	0.025	0.247
Pittsburg	2	ROW_8561	ROW Opportunity	7.93	4.62	58%	0.008	0.236
Pittsburg	2	ROW_1955	ROW Opportunity	1.47	0.99	67%	0.036	0.231
Pittsburg	2	ROW_6257	ROW Opportunity	21.27	11.80	55%	0.003	0.231
Pittsburg	2	ROW_21116	ROW Opportunity	8.88	4.83	54%	0.007	0.228
Pittsburg	2	ROW_6280	ROW Opportunity	5.74	3.46	60%	0.010	0.227
Pittsburg	2	ROW_11974	ROW Opportunity	1.43	0.96	67%	0.036	0.226
Pittsburg	2	ROW_8563	ROW Opportunity	12.59	7.66	61%	0.005	0.220
Pittsburg	2	ROW_9582	ROW Opportunity	2.15	1.25	58%	0.023	0.212
Pittsburg	2	Parcel_349390	Parcel-Based Opportunity	6.79	4.68	69%	0.008	0.207
Pittsburg	2	ROW_6226	ROW Opportunity	4.40	2.71	62%	0.011	0.194
Pittsburg	2	ROW_7859	ROW Opportunity	7.77	4.29	55%	0.007	0.191
Pittsburg	2	ROW_6505	ROW Opportunity	3.76	2.13	57%	0.011	0.170
Pittsburg	2	ROW_15499	ROW Opportunity	1.44	1.06	74%	0.027	0.169
Pittsburg	2	ROW_18481	ROW Opportunity	1.15	0.71	62%	0.033	0.166
Pittsburg	2	ROW_3328	ROW Opportunity	1.31	0.78	60%	0.029	0.165
Pittsburg	2	ROW_3327	ROW Opportunity	1.14	0.65	57%	0.031	0.154
Pittsburg	2	Parcel_363475	Parcel-Based Opportunity	7.77	3.26	42%	0.005	0.150
Pittsburg	2	ROW_8520	ROW Opportunity	3.06	1.75	57%	0.011	0.135
Pittsburg	2	ROW_11360	ROW Opportunity	7.80	4.64	59%	0.005	0.133
Pittsburg	2	ROW_6737	ROW Opportunity	0.93	0.57	61%	0.033	0.133
Pittsburg	2	ROW_20440	ROW Opportunity	1.02	0.53	52%	0.028	0.126
Pittsburg	2	ROW_2855	ROW Opportunity	24.34	12.97	53%	0.002	0.117
Pittsburg	2	ROW_6736	ROW Opportunity	0.84	0.50	60%	0.032	0.117
Pittsburg	2	ROW_6237	ROW Opportunity	2.47	1.38	56%	0.011	0.110
Pittsburg	2	Parcel_362143	Regional Opportunity	0.99	0.41	41%	0.026	0.109
Pittsburg	2	ROW_4561	ROW Opportunity	4.16	2.43	58%	0.007	0.108
Pittsburg	2	ROW_18479	ROW Opportunity	0.76	0.45	59%	0.032	0.106
Pittsburg	2	Parcel_373150	Parcel-Based Opportunity	5.22	2.26	43%	0.005	0.103
Pittsburg	2	ROW_15210	ROW Opportunity	11.75	7.22	61%	0.003	0.093
Pittsburg	2	Parcel_367785	Regional Opportunity	1.98	1.79	90%	0.011	0.078
Pittsburg	2	ROW_21076	ROW Opportunity	0.54	0.34	63%	0.033	0.078
Pittsburg	2	ROW_3879	ROW Opportunity	7.88	4.73	60%	0.003	0.075
Pittsburg	2	ROW_8564	ROW Opportunity	9.90	5.38	54%	0.003	0.074
Pittsburg	2	Parcel_361465	Parcel-Based Opportunity	9.00	2.11	23%	0.002	0.072
Pittsburg	2	ROW_5091	ROW Opportunity	19.64	10.50	53%	0.001	0.072
Pittsburg	2	ROW_20894	ROW Opportunity	1.00	0.63	63%	0.017	0.071
Pittsburg	2	ROW_11324	ROW Opportunity	1.53	1.00	65%	0.012	0.070
Pittsburg	2	ROW_17896	ROW Opportunity	0.57	0.34	60%	0.028	0.070
Pittsburg	2	ROW_9581	ROW Opportunity	1.45	0.88	61%	0.012	0.070
Pittsburg	2	Parcel_362407	Regional Opportunity	2.93	1.49	51%	0.006	0.068
Pittsburg	2	ROW_1336	ROW Opportunity	3.78	2.22	59%	0.005	0.068
Pittsburg	2	Parcel_371128	Parcel-Based Opportunity	14.11	3.86	27%	0.002	0.067
Pittsburg	2	Parcel_362118	Regional Opportunity	2.29	1.41	62%	0.008	0.063
Pittsburg	2	ROW_7571	ROW Opportunity	10.34	5.77	56%	0.002	0.063
Pittsburg	2	ROW_15487	ROW Opportunity	2.36	1.45	61%	0.007	0.062

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Pittsburg	2	ROW_6193	ROW Opportunity	3.97	2.52	63%	0.005	0.060
Pittsburg	2	Parcel_362980	Parcel-Based Opportunity	29.43	14.40	49%	0.001	0.058
Pittsburg	2	ROW_1284	ROW Opportunity	0.36	0.25	69%	0.036	0.057
Pittsburg	2	ROW_5206	ROW Opportunity	3.75	2.42	65%	0.005	0.057
Pittsburg	2	ROW_15053	ROW Opportunity	2.48	1.28	52%	0.006	0.055
Pittsburg	2	Parcel_374906	Parcel-Based Opportunity	6.68	4.37	65%	0.003	0.054
Pittsburg	2	ROW_18482	ROW Opportunity	0.42	0.22	52%	0.029	0.054
Pittsburg	2	Parcel_356104	Regional Opportunity	2.28	1.53	67%	0.007	0.053
Pittsburg	2	Parcel_370086	Regional Opportunity	1.37	1.18	86%	0.010	0.052
Pittsburg	2	ROW_6195	ROW Opportunity	6.47	3.95	61%	0.003	0.052
Pittsburg	2	Parcel_362426	Regional Opportunity	1.89	1.15	61%	0.007	0.051
Pittsburg	2	ROW_434	ROW Opportunity	0.36	0.23	64%	0.033	0.051
Pittsburg	2	ROW_11734	ROW Opportunity	3.49	2.06	59%	0.004	0.050
Pittsburg	2	Parcel_358872	Regional Opportunity	1.52	1.10	72%	0.009	0.048
Pittsburg	2	ROW_17448	ROW Opportunity	2.84	1.45	51%	0.005	0.047
Pittsburg	2	ROW_3086	ROW Opportunity	0.45	0.29	64%	0.023	0.045
Pittsburg	2	Parcel_363463	Regional Opportunity	2.26	0.96	42%	0.005	0.044
Pittsburg	2	ROW_16768	ROW Opportunity	0.36	0.19	53%	0.028	0.044
Pittsburg	2	Parcel_363309	Parcel-Based Opportunity	6.78	2.01	30%	0.002	0.043
Pittsburg	2	ROW_810	ROW Opportunity	0.26	0.18	69%	0.037	0.043
Pittsburg	2	Parcel_371346	Parcel-Based Opportunity	0.24	0.18	75%	0.039	0.041
Pittsburg	2	ROW_5831	ROW Opportunity	3.02	1.89	63%	0.004	0.041
Pittsburg	2	ROW_6214	ROW Opportunity	3.42	2.08	61%	0.004	0.041
Pittsburg	2	ROW_5428	ROW Opportunity	4.76	2.60	55%	0.003	0.037
Pittsburg	2	ROW_6228	ROW Opportunity	4.44	2.89	65%	0.003	0.037
Pittsburg	2	ROW_11833	ROW Opportunity	3.89	2.24	58%	0.003	0.036
Pittsburg	2	ROW_762	ROW Opportunity	6.64	3.55	53%	0.002	0.036
Pittsburg	2	Parcel_372570	Regional Opportunity	1.35	0.77	57%	0.007	0.035
Pittsburg	2	ROW_18594	ROW Opportunity	8.91	5.04	57%	0.002	0.035
Pittsburg	2	Parcel_374691	Parcel-Based Opportunity	11.06	5.22	47%	0.001	0.034
Pittsburg	2	ROW_18048	ROW Opportunity	4.41	2.71	61%	0.003	0.034
Pittsburg	2	Parcel_368250	Parcel-Based Opportunity	0.32	0.18	56%	0.024	0.033
Pittsburg	2	ROW_1733	ROW Opportunity	1.96	0.93	47%	0.005	0.033
Pittsburg	2	Parcel_348794	Parcel-Based Opportunity	20.29	7.64	38%	0.001	0.032
Pittsburg	2	ROW_2115	ROW Opportunity	1.76	0.97	55%	0.005	0.032
Pittsburg	2	ROW_17251	ROW Opportunity	8.95	5.16	58%	0.001	0.031
Pittsburg	2	ROW_394	ROW Opportunity	1.85	1.05	57%	0.005	0.031
Pittsburg	2	ROW_15726	ROW Opportunity	3.11	1.83	59%	0.003	0.030
Pittsburg	2	ROW_21525	ROW Opportunity	5.44	2.94	54%	0.002	0.030
Pittsburg	2	ROW_20465	ROW Opportunity	38.58	20.17	52%	0.000	0.029
Pittsburg	2	Parcel_361545	Parcel-Based Opportunity	18.57	6.68	36%	0.001	0.028
Pittsburg	2	ROW_14014	ROW Opportunity	1.80	0.94	52%	0.005	0.028
Pittsburg	2	ROW_15496	ROW Opportunity	2.11	1.33	63%	0.004	0.028
Pittsburg	2	ROW_3866	ROW Opportunity	1.39	0.66	47%	0.006	0.028
Pittsburg	2	ROW_6218	ROW Opportunity	1.32	0.86	65%	0.006	0.028
Pittsburg	2	Parcel_351544	Parcel-Based Opportunity	13.19	6.68	51%	0.001	0.027
Pittsburg	2	Parcel_358992	Parcel-Based Opportunity	3.66	2.32	63%	0.003	0.027
Pittsburg	2	Parcel_374956	Parcel-Based Opportunity	7.22	2.76	38%	0.002	0.027
Pittsburg	2	ROW_2172	ROW Opportunity	3.63	2.26	62%	0.003	0.027
Pittsburg	2	ROW_1734	ROW Opportunity	4.43	2.52	57%	0.002	0.026
Pittsburg	2	ROW_20003	ROW Opportunity	12.36	6.63	54%	0.001	0.026
Pittsburg	2	Parcel_342146	Parcel-Based Opportunity	12.50	6.01	48%	0.001	0.025
Pittsburg	2	ROW_6217	ROW Opportunity	1.01	0.70	69%	0.007	0.025
Pittsburg	2	Parcel_348459	Parcel-Based Opportunity	12.96	5.96	46%	0.001	0.024
Pittsburg	2	Parcel_372876	Regional Opportunity	1.32	0.53	40%	0.005	0.024
Pittsburg	2	Parcel_373402	Regional Opportunity	1.03	0.53	51%	0.006	0.024
Pittsburg	2	ROW_11064	ROW Opportunity	3.96	2.19	55%	0.002	0.024
Pittsburg	2	ROW_14856	ROW Opportunity	3.11	1.80	58%	0.002	0.024
Pittsburg	2	ROW_16225	ROW Opportunity	4.64	2.66	57%	0.002	0.024
Pittsburg	2	ROW_20398	ROW Opportunity	0.77	0.43	56%	0.008	0.024
Pittsburg	2	Parcel_352244	Parcel-Based Opportunity	10.05	5.65	56%	0.001	0.023
Pittsburg	2	Parcel_362344	Parcel-Based Opportunity	14.44	5.98	41%	0.001	0.023
Pittsburg	2	ROW_11358	ROW Opportunity	1.06	0.49	46%	0.006	0.023
Pittsburg	2	ROW_11872	ROW Opportunity	2.97	1.69	57%	0.003	0.023
Pittsburg	2	ROW_12501	ROW Opportunity	4.54	2.65	58%	0.002	0.023
Pittsburg	2	ROW_20394	ROW Opportunity	1.63	0.97	60%	0.004	0.023
Pittsburg	2	ROW_20627	ROW Opportunity	4.36	2.57	59%	0.002	0.023
Pittsburg	2	ROW_2826	ROW Opportunity	4.45	2.57	58%	0.002	0.023
Pittsburg	2	ROW_4032	ROW Opportunity	2.50	1.16	46%	0.003	0.023
Pittsburg	2	ROW_6219	ROW Opportunity	1.46	0.92	63%	0.005	0.023
Pittsburg	2	Parcel_366285	Parcel-Based Opportunity	26.81	4.81	18%	0.000	0.022
Pittsburg	2	ROW_894	ROW Opportunity	4.26	2.49	58%	0.002	0.022
Pittsburg	2	Parcel_336890	Parcel-Based Opportunity	9.19	5.25	57%	0.001	0.021
Pittsburg	2	Parcel_357792	Regional Opportunity	1.23	1.04	85%	0.006	0.021
Pittsburg	2	ROW_11969	ROW Opportunity	0.49	0.26	53%	0.011	0.021
Pittsburg	2	ROW_14500	ROW Opportunity	0.21	0.12	57%	0.024	0.021
Pittsburg	2	ROW_6695	ROW Opportunity	1.68	0.92	55%	0.004	0.021
Pittsburg	2	Parcel_355971	Parcel-Based Opportunity	0.38	0.12	32%	0.012	0.020
Pittsburg	2	Parcel_364979	Parcel-Based Opportunity	10.21	5.56	54%	0.001	0.020
Pittsburg	2	Parcel_367368	Parcel-Based Opportunity	11.66	4.87	42%	0.001	0.020
Pittsburg	2	Parcel_372224	Regional Opportunity	0.54	0.37	69%	0.010	0.020
Pittsburg	2	ROW_12237	ROW Opportunity	8.69	4.66	54%	0.001	0.020
Pittsburg	2	ROW_1520	ROW Opportunity	2.90	1.59	55%	0.002	0.019
Pittsburg	2	ROW_3686	ROW Opportunity	2.00	0.51	26%	0.003	0.019
Pittsburg	2	ROW_6221	ROW Opportunity	1.24	0.79	64%	0.005	0.019
Pittsburg	2	ROW_8940	ROW Opportunity	6.24	4.08	65%	0.001	0.019
Pittsburg	2	ROW_14011	ROW Opportunity	0.79	0.44	56%	0.006	0.018
Pittsburg	2	ROW_20795	ROW Opportunity	3.72	2.00	54%	0.002	0.018
Pittsburg	2	ROW_5463	ROW Opportunity	0.90	0.54	60%	0.006	0.018
Pittsburg	2	ROW_6045	ROW Opportunity	0.75	0.42	56%	0.007	0.018
Pittsburg	2	ROW_6805	ROW Opportunity	0.65	0.36	55%	0.008	0.018
Pittsburg	2	Parcel_348698	Regional Opportunity	0.48	0.40	83%	0.010	0.017
Pittsburg	2	Parcel_372393	Regional Opportunity	0.60	0.37	62%	0.008	0.017
Pittsburg	2	Parcel_374571	Regional Opportunity	0.54	0.38	70%	0.009	0.017

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Pittsburg	2	ROW_11603	ROW Opportunity	1.42	0.34	24%	0.003	0.017
Pittsburg	2	ROW_14658	ROW Opportunity	5.25	3.04	58%	0.001	0.017
Pittsburg	2	ROW_20383	ROW Opportunity	5.64	3.31	59%	0.001	0.017
Pittsburg	2	ROW_21083	ROW Opportunity	7.55	4.13	55%	0.001	0.017
Pittsburg	2	ROW_4764	ROW Opportunity	1.16	0.71	61%	0.005	0.017
Pittsburg	2	ROW_5824	ROW Opportunity	2.16	1.07	50%	0.003	0.017
Pittsburg	2	Parcel_359451	Parcel-Based Opportunity	11.40	4.60	40%	0.001	0.016
Pittsburg	2	Parcel_364198	Parcel-Based Opportunity	10.22	3.89	38%	0.001	0.016
Pittsburg	2	ROW_11370	ROW Opportunity	0.33	0.21	64%	0.013	0.016
Pittsburg	2	ROW_17388	ROW Opportunity	1.59	0.88	55%	0.003	0.016
Pittsburg	2	ROW_5853	ROW Opportunity	1.28	0.74	58%	0.004	0.016
Pittsburg	2	ROW_6194	ROW Opportunity	2.19	1.29	59%	0.002	0.016
Pittsburg	2	ROW_6238	ROW Opportunity	0.61	0.36	59%	0.007	0.016
Pittsburg	2	Parcel_349343	Regional Opportunity	1.12	0.32	29%	0.004	0.015
Pittsburg	2	ROW_13380	ROW Opportunity	0.48	0.23	48%	0.008	0.015
Pittsburg	2	ROW_17358	ROW Opportunity	6.93	3.73	54%	0.001	0.015
Pittsburg	2	ROW_3583	ROW Opportunity	6.04	3.35	55%	0.001	0.015
Pittsburg	2	ROW_6223	ROW Opportunity	2.68	1.66	62%	0.002	0.015
Pittsburg	2	ROW_9712	ROW Opportunity	6.85	3.87	56%	0.001	0.015
Pittsburg	2	ROW_9726	ROW Opportunity	6.75	3.66	54%	0.001	0.015
Pittsburg	2	Parcel_368854	Parcel-Based Opportunity	0.36	0.31	86%	0.011	0.014
Pittsburg	2	ROW_11832	ROW Opportunity	1.52	0.86	57%	0.003	0.014
Pittsburg	2	ROW_11900	ROW Opportunity	3.22	1.71	53%	0.002	0.014
Pittsburg	2	ROW_17755	ROW Opportunity	3.00	1.60	53%	0.002	0.014
Pittsburg	2	Parcel_351110	Parcel-Based Opportunity	107.94	43.80	41%	0.000	0.013
Pittsburg	2	Parcel_358978	Parcel-Based Opportunity	0.25	0.18	72%	0.013	0.013
Pittsburg	2	Parcel_361603	Parcel-Based Opportunity	0.48	0.31	65%	0.008	0.013
Pittsburg	2	Parcel_371237	Parcel-Based Opportunity	0.43	0.30	70%	0.009	0.013
Pittsburg	2	planned_431	Planned Unlined Bioretention	0.48	0.31	65%	0.008	0.013
Pittsburg	2	ROW_11357	ROW Opportunity	3.17	1.95	62%	0.002	0.013
Pittsburg	2	ROW_12433	ROW Opportunity	6.02	3.27	54%	0.001	0.013
Pittsburg	2	ROW_1329	ROW Opportunity	8.23	4.37	53%	0.001	0.013
Pittsburg	2	Parcel_372099	Parcel-Based Opportunity	0.41	0.26	63%	0.008	0.012
Pittsburg	2	ROW_10175	ROW Opportunity	6.76	3.47	51%	0.001	0.012
Pittsburg	2	ROW_12638	ROW Opportunity	0.12	0.07	58%	0.025	0.012
Pittsburg	2	ROW_15237	ROW Opportunity	2.52	1.28	51%	0.002	0.012
Pittsburg	2	ROW_20371	ROW Opportunity	5.02	3.02	60%	0.001	0.012
Pittsburg	2	ROW_20402	ROW Opportunity	3.81	2.21	58%	0.001	0.012
Pittsburg	2	ROW_20411	ROW Opportunity	4.81	2.95	61%	0.001	0.012
Pittsburg	2	ROW_20801	ROW Opportunity	3.20	1.94	61%	0.002	0.012
Pittsburg	2	ROW_5843	ROW Opportunity	5.08	3.01	59%	0.001	0.012
Pittsburg	2	ROW_6299	ROW Opportunity	5.53	2.99	54%	0.001	0.012
Pittsburg	2	ROW_6474	ROW Opportunity	3.61	1.94	54%	0.001	0.012
Pittsburg	2	Parcel_353346	Parcel-Based Opportunity	7.56	2.47	33%	0.001	0.011
Pittsburg	2	ROW_1196	ROW Opportunity	1.56	0.85	54%	0.002	0.011
Pittsburg	2	ROW_14319	ROW Opportunity	5.30	2.79	53%	0.001	0.011
Pittsburg	2	ROW_15497	ROW Opportunity	0.90	0.77	86%	0.004	0.011
Pittsburg	2	ROW_16028	ROW Opportunity	5.20	2.77	53%	0.001	0.011
Pittsburg	2	ROW_20374	ROW Opportunity	3.94	2.27	58%	0.001	0.011
Pittsburg	2	ROW_2952	ROW Opportunity	5.23	2.80	54%	0.001	0.011
Pittsburg	2	ROW_9735	ROW Opportunity	4.76	2.79	59%	0.001	0.011
Pleasant Hill	2	ROW_19233	ROW Opportunity	2.08	1.67	80%	0.043	0.382
Pleasant Hill	2	ROW_4670	ROW Opportunity	17.32	8.32	48%	0.005	0.280
Pleasant Hill	2	ROW_19166	ROW Opportunity	30.21	13.52	45%	0.003	0.239
Pleasant Hill	2	Parcel_198405	Parcel-Based Opportunity	96.46	48.68	50%	0.001	0.203
Pleasant Hill	2	Parcel_181521	Parcel-Based Opportunity	9.56	4.74	50%	0.006	0.193
Pleasant Hill	2	ROW_2970	ROW Opportunity	9.37	5.99	64%	0.006	0.181
Pleasant Hill	2	ROW_9267	ROW Opportunity	3.51	1.89	54%	0.012	0.170
Pleasant Hill	2	ROW_20243	ROW Opportunity	2.99	1.93	65%	0.013	0.148
Pleasant Hill	2	ROW_8317	ROW Opportunity	12.17	5.45	45%	0.003	0.111
Pleasant Hill	2	ROW_15010	ROW Opportunity	21.53	8.73	41%	0.002	0.110
Pleasant Hill	2	ROW_12076	ROW Opportunity	2.39	1.40	59%	0.012	0.106
Pleasant Hill	2	ROW_4673	ROW Opportunity	4.72	2.27	48%	0.006	0.103
Pleasant Hill	2	Parcel_150985	Regional Opportunity	0.77	0.41	53%	0.030	0.098
Pleasant Hill	2	ROW_4671	ROW Opportunity	5.14	2.67	52%	0.006	0.098
Pleasant Hill	2	Parcel_161733	Parcel-Based Opportunity	3.53	2.11	60%	0.008	0.094
Pleasant Hill	2	Parcel_142700	Parcel-Based Opportunity	3.60	2.10	58%	0.007	0.093
Pleasant Hill	2	ROW_17670	ROW Opportunity	6.18	3.50	57%	0.004	0.084
Pleasant Hill	2	ROW_5047	ROW Opportunity	3.17	1.88	59%	0.007	0.084
Pleasant Hill	2	Parcel_186000	Parcel-Based Opportunity	4.15	1.73	42%	0.005	0.079
Pleasant Hill	2	ROW_13734	ROW Opportunity	8.72	3.90	45%	0.003	0.079
Pleasant Hill	2	Parcel_185324	Parcel-Based Opportunity	4.04	1.69	42%	0.005	0.077
Pleasant Hill	2	ROW_12853	ROW Opportunity	4.72	2.76	58%	0.005	0.072
Pleasant Hill	2	ROW_2494	ROW Opportunity	14.34	6.19	43%	0.002	0.072
Pleasant Hill	2	ROW_6872	ROW Opportunity	1.64	0.99	60%	0.012	0.072
Pleasant Hill	2	ROW_6671	ROW Opportunity	3.95	1.92	49%	0.005	0.067
Pleasant Hill	2	ROW_13220	ROW Opportunity	3.76	2.25	60%	0.005	0.062
Pleasant Hill	2	Parcel_189822	Parcel-Based Opportunity	26.23	15.34	58%	0.001	0.061
Pleasant Hill	2	ROW_4672	ROW Opportunity	2.09	1.06	51%	0.008	0.060
Pleasant Hill	2	Parcel_173214	Regional Opportunity	2.92	1.24	42%	0.006	0.059
Pleasant Hill	2	ROW_4280	ROW Opportunity	2.43	1.23	51%	0.007	0.058
Pleasant Hill	2	ROW_4377	ROW Opportunity	9.02	4.33	48%	0.002	0.056
Pleasant Hill	2	ROW_5054	ROW Opportunity	2.66	1.53	58%	0.006	0.055
Pleasant Hill	2	planned_143	Planned Water Quality Basin	38.26	17.06	45%	0.001	0.054
Pleasant Hill	2	Parcel_146724	Parcel-Based Opportunity	30.26	12.96	43%	0.001	0.053
Pleasant Hill	2	Parcel_155831	Regional Opportunity	1.32	1.23	93%	0.011	0.053
Pleasant Hill	2	ROW_4886	ROW Opportunity	2.01	1.26	63%	0.007	0.048
Pleasant Hill	2	ROW_19602	ROW Opportunity	1.97	1.24	63%	0.007	0.047
Pleasant Hill	2	ROW_8079	ROW Opportunity	14.00	3.93	28%	0.001	0.045
Pleasant Hill	2	ROW_8193	ROW Opportunity	9.91	3.96	40%	0.002	0.045
Pleasant Hill	2	ROW_13735	ROW Opportunity	2.08	1.04	50%	0.006	0.040
Pleasant Hill	2	Parcel_142400	Regional Opportunity	1.85	0.83	45%	0.006	0.039
Pleasant Hill	2	ROW_13554	ROW Opportunity	6.29	2.86	45%	0.002	0.039
Pleasant Hill	2	Parcel_185980	Regional Opportunity	1.25	0.79	63%	0.008	0.035

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Pleasant Hill	2	ROW_14564	ROW Opportunity	7.82	3.13	40%	0.002	0.035
Pleasant Hill	2	Parcel_131105	Regional Opportunity	1.45	0.72	50%	0.007	0.034
Pleasant Hill	2	ROW_17048	ROW Opportunity	1.65	0.76	46%	0.006	0.034
Pleasant Hill	2	ROW_7753	ROW Opportunity	3.18	1.28	40%	0.003	0.034
Pleasant Hill	2	ROW_9560	ROW Opportunity	0.50	0.19	38%	0.017	0.034
Pleasant Hill	2	Parcel_185990	Regional Opportunity	1.68	0.71	42%	0.005	0.032
Pleasant Hill	2	ROW_11390	ROW Opportunity	7.82	3.29	42%	0.002	0.031
Pleasant Hill	2	ROW_9880	ROW Opportunity	3.49	1.47	42%	0.003	0.029
Pleasant Hill	2	Parcel_156974	Parcel-Based Opportunity	9.89	3.33	34%	0.001	0.028
Pleasant Hill	2	ROW_13741	ROW Opportunity	1.00	0.63	63%	0.008	0.028
Pleasant Hill	2	ROW_13736	ROW Opportunity	4.01	1.82	45%	0.002	0.027
Pleasant Hill	2	ROW_19478	ROW Opportunity	1.79	0.76	42%	0.004	0.027
Pleasant Hill	2	ROW_6668	ROW Opportunity	4.38	1.90	43%	0.002	0.027
Pleasant Hill	2	Parcel_149937	Regional Opportunity	2.29	1.03	45%	0.004	0.026
Pleasant Hill	2	Parcel_131108	Regional Opportunity	0.82	0.54	66%	0.008	0.024
Pleasant Hill	2	Parcel_187984	Parcel-Based Opportunity	23.59	5.41	23%	0.000	0.024
Pleasant Hill	2	ROW_20206	ROW Opportunity	11.06	5.11	46%	0.001	0.023
Pleasant Hill	2	ROW_2045	ROW Opportunity	2.31	1.12	48%	0.003	0.022
Pleasant Hill	2	ROW_4500	ROW Opportunity	3.13	1.84	59%	0.003	0.022
Pleasant Hill	2	ROW_6670	ROW Opportunity	1.70	0.79	46%	0.004	0.022
Pleasant Hill	2	ROW_11085	ROW Opportunity	3.49	1.68	48%	0.002	0.021
Pleasant Hill	2	ROW_12762	ROW Opportunity	3.17	1.40	44%	0.002	0.021
Pleasant Hill	2	ROW_287	ROW Opportunity	1.37	0.44	32%	0.004	0.021
Pleasant Hill	2	ROW_4178	ROW Opportunity	7.51	3.18	42%	0.001	0.021
Pleasant Hill	2	Parcel_168841	Regional Opportunity	0.97	0.44	45%	0.006	0.020
Pleasant Hill	2	ROW_15029	ROW Opportunity	3.85	1.58	41%	0.002	0.019
Pleasant Hill	2	ROW_17703	ROW Opportunity	4.38	1.92	44%	0.002	0.019
Pleasant Hill	2	ROW_5754	ROW Opportunity	1.34	0.80	60%	0.004	0.019
Pleasant Hill	2	Parcel_167223	Parcel-Based Opportunity	10.92	4.29	39%	0.001	0.018
Pleasant Hill	2	ROW_12009	ROW Opportunity	2.27	1.14	50%	0.003	0.018
Pleasant Hill	2	ROW_17057	ROW Opportunity	2.52	1.13	45%	0.002	0.018
Pleasant Hill	2	ROW_4611	ROW Opportunity	0.64	0.40	63%	0.008	0.018
Pleasant Hill	2	ROW_6669	ROW Opportunity	1.68	0.82	49%	0.003	0.018
Pleasant Hill	2	Parcel_155751	Regional Opportunity	1.57	0.26	17%	0.003	0.017
Pleasant Hill	2	ROW_15355	ROW Opportunity	0.64	0.38	59%	0.008	0.017
Pleasant Hill	2	ROW_15358	ROW Opportunity	3.11	1.40	45%	0.002	0.017
Pleasant Hill	2	ROW_3210	ROW Opportunity	7.85	3.33	42%	0.001	0.017
Pleasant Hill	2	Parcel_155321	Regional Opportunity	0.56	0.36	64%	0.008	0.016
Pleasant Hill	2	ROW_11244	ROW Opportunity	6.29	2.71	43%	0.001	0.016
Pleasant Hill	2	ROW_12046	ROW Opportunity	9.42	3.82	41%	0.001	0.016
Pleasant Hill	2	ROW_1343	ROW Opportunity	1.64	0.72	44%	0.003	0.016
Pleasant Hill	2	ROW_533	ROW Opportunity	2.07	0.90	43%	0.003	0.016
Pleasant Hill	2	Parcel_178916	Parcel-Based Opportunity	3.76	2.58	69%	0.002	0.015
Pleasant Hill	2	ROW_5767	ROW Opportunity	2.66	1.19	45%	0.002	0.015
Pleasant Hill	2	ROW_5966	ROW Opportunity	3.55	1.52	43%	0.002	0.015
Pleasant Hill	2	planned_144	Planned Unlined Swale	13.98	6.95	50%	0.000	0.014
Pleasant Hill	2	planned_145	Planned Unlined Swale	13.97	6.95	50%	0.000	0.014
Pleasant Hill	2	planned_146	Planned Unlined Bioretention	13.97	6.95	50%	0.000	0.014
Pleasant Hill	2	ROW_13223	ROW Opportunity	1.24	0.62	50%	0.004	0.014
Pleasant Hill	2	ROW_1583	ROW Opportunity	0.88	0.41	47%	0.005	0.014
Pleasant Hill	2	ROW_1578	ROW Opportunity	0.11	0.06	55%	0.028	0.013
Pleasant Hill	2	ROW_21619	ROW Opportunity	0.42	0.30	71%	0.009	0.013
Pleasant Hill	2	ROW_9265	ROW Opportunity	3.88	1.63	42%	0.001	0.013
Pleasant Hill	2	ROW_9827	ROW Opportunity	0.83	0.55	66%	0.005	0.013
Pleasant Hill	2	Parcel_160193	Parcel-Based Opportunity	7.87	2.98	38%	0.001	0.012
Pleasant Hill	2	ROW_16415	ROW Opportunity	6.78	2.96	44%	0.001	0.012
Pleasant Hill	2	ROW_19765	ROW Opportunity	5.47	2.26	41%	0.001	0.012
Pleasant Hill	2	ROW_20458	ROW Opportunity	1.53	0.73	48%	0.003	0.012
Pleasant Hill	2	ROW_20779	ROW Opportunity	1.73	0.65	38%	0.002	0.012
Pleasant Hill	2	ROW_6601	ROW Opportunity	2.26	1.12	50%	0.002	0.012
Pleasant Hill	2	Parcel_140820	Parcel-Based Opportunity	6.41	2.61	41%	0.001	0.011
Pleasant Hill	2	Parcel_156885	Regional Opportunity	1.48	0.76	51%	0.003	0.011
Pleasant Hill	2	ROW_20849	ROW Opportunity	6.60	2.63	40%	0.001	0.011
Pleasant Hill	2	ROW_4526	ROW Opportunity	1.86	0.90	48%	0.002	0.011
Pleasant Hill	2	ROW_5980	ROW Opportunity	2.92	1.23	42%	0.002	0.011
Pleasant Hill	2	ROW_6634	ROW Opportunity	6.62	2.81	42%	0.001	0.011
Pleasant Hill	2	Parcel_176573	Parcel-Based Opportunity	4.87	2.62	54%	0.001	0.010
Pleasant Hill	2	Parcel_182562	Parcel-Based Opportunity	5.49	2.50	46%	0.001	0.010
Pleasant Hill	2	ROW_1108	ROW Opportunity	6.39	2.49	39%	0.001	0.010
Richmond	2	ROW_20822	ROW Opportunity	39.83	15.26	38%	0.035	5.536
Richmond	2	Parcel_129049	Parcel-Based Opportunity	22.09	16.69	76%	0.043	3.838
Richmond	2	Parcel_127810	Parcel-Based Opportunity	42.57	8.26	19%	0.018	3.044
Richmond	2	ROW_3504	ROW Opportunity	23.46	15.79	67%	0.030	2.744
Richmond	2	ROW_7696	ROW Opportunity	16.17	10.80	67%	0.034	2.163
Richmond	2	Parcel_123788	Parcel-Based Opportunity	11.85	7.18	61%	0.042	1.971
Richmond	2	Parcel_120807	Parcel-Based Opportunity	9.67	6.99	72%	0.049	1.882
Richmond	2	Parcel_124519	Parcel-Based Opportunity	19.03	5.78	30%	0.024	1.772
Richmond	2	GIP_00181 / ROW_8576	ROW Opportunity (aspirational)	15.12	9.82	65%	0.028	1.643
Richmond	2	GIP_00144 / planned_485	Parcel-Based Opportunity (aspirational)	17.80	11.62	65%	0.022	1.526
Richmond	2	ROW_11830	ROW Opportunity	12.26	7.59	62%	0.029	1.377
Richmond	2	GIP_00128 / planned_175	Parcel-Based Opportunity (aspirational)	12.22	6.77	55%	0.026	1.249
Richmond	2	planned_499	Planned Creek/Marsh Restoration	14.17	5.11	36%	0.022	1.243
Richmond	2	Parcel_128990	Parcel-Based Opportunity	6.86	5.17	75%	0.043	1.191
Richmond	2	Parcel_125155	Parcel-Based Opportunity	6.08	4.04	66%	0.047	1.140
Richmond	2	Parcel_163241	Parcel-Based Opportunity	7.34	4.87	66%	0.038	1.127
Richmond	2	ROW_13188	ROW Opportunity	10.46	6.45	62%	0.024	0.978
Richmond	2	GIP_00136 / planned_469	Parcel-Based Opportunity (aspirational)	7.99	4.10	51%	0.030	0.968
Richmond	2	ROW_7811	ROW Opportunity	7.27	4.20	58%	0.031	0.908
Richmond	2	ROW_21445	ROW Opportunity	6.74	4.73	70%	0.034	0.902
Richmond	2	ROW_20428	ROW Opportunity	8.97	5.45	61%	0.026	0.900
Richmond	2	ROW_16598	ROW Opportunity	5.68	3.88	68%	0.038	0.858
Richmond	2	ROW_13906	ROW Opportunity	10.89	7.33	67%	0.021	0.852
Richmond	2	ROW_20478	ROW Opportunity	5.90	3.53	60%	0.035	0.838
Richmond	2	ROW_15751	ROW Opportunity	5.55	3.33	60%	0.037	0.817

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Richmond	2	ROW_2597	ROW Opportunity	6.82	3.55	52%	0.030	0.815
Richmond	2	ROW_12288	ROW Opportunity	4.84	3.24	67%	0.039	0.758
Richmond	2	Parcel_170010	Parcel-Based Opportunity	4.52	3.14	69%	0.041	0.737
Richmond	2	ROW_10536	ROW Opportunity	4.37	2.57	59%	0.042	0.737
Richmond	2	Parcel_113348	Parcel-Based Opportunity	6.69	1.91	29%	0.028	0.694
Richmond	2	ROW_11839	ROW Opportunity	4.37	2.51	57%	0.039	0.691
Richmond	2	ROW_3732	ROW Opportunity	5.46	4.24	78%	0.032	0.685
Richmond	2	ROW_16560	ROW Opportunity	3.78	2.59	69%	0.044	0.672
Richmond	2	ROW_6855	ROW Opportunity	3.69	2.65	72%	0.041	0.607
Richmond	2	ROW_8567	ROW Opportunity	3.74	2.04	55%	0.040	0.602
Richmond	2	ROW_14144	ROW Opportunity	3.21	2.59	81%	0.046	0.586
Richmond	2	ROW_11498	ROW Opportunity	21.21	14.65	69%	0.008	0.577
Richmond	2	ROW_3742	ROW Opportunity	3.63	2.47	68%	0.039	0.577
Richmond	2	GIP_00180 / ROW_5241	ROW Opportunity (aspirational)	21.59	14.60	68%	0.008	0.574
Richmond	2	ROW_18209	ROW Opportunity	3.51	2.46	70%	0.040	0.567
Richmond	2	ROW_15876	ROW Opportunity	5.16	2.25	44%	0.027	0.566
Richmond	2	ROW_17007	ROW Opportunity	3.15	1.90	60%	0.043	0.546
Richmond	2	ROW_8889	ROW Opportunity	7.45	5.28	71%	0.020	0.542
Richmond	2	Parcel_118976	Parcel-Based Opportunity	7.69	1.60	21%	0.017	0.537
Richmond	2	ROW_20886	ROW Opportunity	2.41	1.89	78%	0.053	0.515
Richmond	2	ROW_16532	ROW Opportunity	3.19	2.11	66%	0.039	0.499
Richmond	2	ROW_15749	ROW Opportunity	4.74	2.94	62%	0.027	0.497
Richmond	2	ROW_7809	ROW Opportunity	11.56	3.25	28%	0.011	0.496
Richmond	2	Parcel_114973	Regional Opportunity	2.84	1.61	57%	0.042	0.471
Richmond	2	ROW_18134	ROW Opportunity	3.07	1.56	51%	0.038	0.469
Richmond	2	ROW_8456	ROW Opportunity	2.87	1.60	56%	0.040	0.459
Richmond	2	ROW_17719	ROW Opportunity	2.63	1.56	59%	0.042	0.446
Richmond	2	ROW_15166	ROW Opportunity	2.88	1.95	68%	0.038	0.445
Richmond	2	ROW_6827	ROW Opportunity	2.89	2.10	73%	0.037	0.429
Richmond	2	ROW_12287	ROW Opportunity	2.82	1.98	70%	0.038	0.424
Richmond	2	ROW_1670	ROW Opportunity	19.48	13.28	68%	0.007	0.422
Richmond	2	ROW_14670	ROW Opportunity	3.12	1.33	43%	0.033	0.410
Richmond	2	Parcel_159148	Regional Opportunity	2.48	1.76	71%	0.041	0.407
Richmond	2	ROW_1342	ROW Opportunity	12.99	5.89	45%	0.009	0.401
Richmond	2	ROW_6275	ROW Opportunity	3.46	1.24	36%	0.029	0.401
Richmond	2	ROW_16455	ROW Opportunity	2.53	1.71	68%	0.038	0.384
Richmond	2	GIP_00122 / Parcel_152787	Regional Opportunity (aspirational)	2.53	1.64	65%	0.037	0.380
Richmond	2	Parcel_171579	Parcel-Based Opportunity	3.65	2.87	79%	0.027	0.380
Richmond	2	ROW_4530	ROW Opportunity	3.12	1.81	58%	0.030	0.380
Richmond	2	ROW_4590	ROW Opportunity	2.11	1.33	63%	0.045	0.376
Richmond	2	ROW_20441	ROW Opportunity	5.49	3.04	55%	0.018	0.374
Richmond	2	GIP_00147 / planned_491	Parcel-Based Opportunity (aspirational)	3.12	1.99	64%	0.030	0.369
Richmond	2	ROW_16485	ROW Opportunity	2.63	1.92	73%	0.035	0.369
Richmond	2	ROW_11379	ROW Opportunity	2.04	1.65	81%	0.045	0.368
Richmond	2	ROW_15485	ROW Opportunity	2.06	1.37	67%	0.044	0.363
Richmond	2	ROW_355	ROW Opportunity	2.64	1.88	71%	0.034	0.354
Richmond	2	ROW_3738	ROW Opportunity	2.58	1.82	71%	0.034	0.346
Richmond	2	Parcel_114963	Parcel-Based Opportunity	4.22	1.02	24%	0.021	0.345
Richmond	2	ROW_1767	ROW Opportunity	1.96	1.18	60%	0.044	0.343
Richmond	2	Parcel_153008	Parcel-Based Opportunity	10.59	7.84	74%	0.010	0.340
Richmond	2	Parcel_126231	Regional Opportunity	1.65	1.47	89%	0.050	0.334
Richmond	2	ROW_14678	ROW Opportunity	6.63	4.45	67%	0.014	0.333
Richmond	2	ROW_15193	ROW Opportunity	6.84	4.72	69%	0.014	0.333
Richmond	2	ROW_15752	ROW Opportunity	2.85	1.93	68%	0.029	0.328
Richmond	2	ROW_16472	ROW Opportunity	2.17	1.54	71%	0.037	0.324
Richmond	2	ROW_15877	ROW Opportunity	4.92	2.81	57%	0.017	0.323
Richmond	2	ROW_9595	ROW Opportunity	2.77	2.08	75%	0.029	0.312
Richmond	2	ROW_3292	ROW Opportunity	2.05	1.67	81%	0.038	0.306
Richmond	2	ROW_3744	ROW Opportunity	3.85	2.44	63%	0.020	0.299
Richmond	2	planned_487	Planned Unlined Bioretention	22.60	15.02	66%	0.005	0.296
Richmond	2	ROW_17305	ROW Opportunity	1.92	0.98	51%	0.038	0.295
Richmond	2	planned_496	Planned Creek/Marsh Restoration	3.90	2.25	58%	0.020	0.294
Richmond	2	GIP_00140 / planned_479	Parcel-Based Opportunity (aspirational)	12.83	8.77	68%	0.007	0.291
Richmond	2	ROW_333	ROW Opportunity	9.12	6.07	67%	0.009	0.290
Richmond	2	ROW_3883	ROW Opportunity	8.72	5.79	66%	0.010	0.282
Richmond	2	ROW_6859	ROW Opportunity	2.12	0.59	28%	0.033	0.279
Richmond	2	ROW_9722	ROW Opportunity	1.69	1.17	69%	0.041	0.276
Richmond	2	ROW_16528	ROW Opportunity	2.22	1.27	57%	0.031	0.273
Richmond	2	Parcel_115416	Regional Opportunity	1.53	0.93	61%	0.044	0.270
Richmond	2	ROW_17316	ROW Opportunity	1.73	0.90	52%	0.039	0.268
Richmond	2	ROW_12193	ROW Opportunity	5.91	4.11	70%	0.013	0.264
Richmond	2	ROW_7332	ROW Opportunity	1.62	1.25	77%	0.041	0.263
Richmond	2	ROW_11831	ROW Opportunity	1.49	1.14	77%	0.044	0.262
Richmond	2	Parcel_167791	Parcel-Based Opportunity	3.42	2.71	79%	0.020	0.261
Richmond	2	ROW_6828	ROW Opportunity	1.71	1.18	69%	0.038	0.261
Richmond	2	ROW_12952	ROW Opportunity	3.16	1.44	46%	0.021	0.259
Richmond	2	ROW_12328	ROW Opportunity	2.62	0.81	31%	0.024	0.258
Richmond	2	ROW_14807	ROW Opportunity	2.63	1.88	71%	0.026	0.255
Richmond	2	ROW_156	ROW Opportunity	4.72	3.23	68%	0.015	0.255
Richmond	2	ROW_13420	ROW Opportunity	5.29	3.71	70%	0.013	0.252
Richmond	2	ROW_6274	ROW Opportunity	4.20	2.48	59%	0.016	0.252
Richmond	2	ROW_16487	ROW Opportunity	1.47	1.09	74%	0.042	0.249
Richmond	2	ROW_9163	ROW Opportunity	3.60	2.25	63%	0.018	0.245
Richmond	2	planned_495	Planned Water Quality Basin	1.91	1.10	58%	0.032	0.242
Richmond	2	ROW_15892	ROW Opportunity	14.20	7.48	53%	0.005	0.239
Richmond	2	ROW_1795	ROW Opportunity	1.37	1.03	75%	0.043	0.239
Richmond	2	ROW_18184	ROW Opportunity	1.61	0.80	50%	0.037	0.238
Richmond	2	Parcel_116238	Parcel-Based Opportunity	1.29	0.82	64%	0.045	0.234
Richmond	2	ROW_11883	ROW Opportunity	1.42	0.98	69%	0.041	0.231
Richmond	2	planned_497	Planned Creek/Marsh Restoration	1.59	0.97	61%	0.036	0.230
Richmond	2	ROW_1792	ROW Opportunity	1.33	0.97	73%	0.042	0.227
Richmond	2	ROW_6971	ROW Opportunity	1.62	1.15	71%	0.035	0.224
Richmond	2	ROW_18110	ROW Opportunity	2.22	1.56	70%	0.026	0.223
Richmond	2	ROW_16442	ROW Opportunity	3.16	0.67	21%	0.017	0.220

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Richmond	2	ROW_18395	ROW Opportunity	2.05	0.89	43%	0.026	0.213
Richmond	2	ROW_15167	ROW Opportunity	1.76	1.21	69%	0.030	0.211
Richmond	2	ROW_16436	ROW Opportunity	1.97	1.36	69%	0.027	0.211
Richmond	2	ROW_16535	ROW Opportunity	2.13	1.38	65%	0.025	0.211
Richmond	2	ROW_16488	ROW Opportunity	1.32	0.96	73%	0.039	0.209
Richmond	2	Parcel_110613	Regional Opportunity	1.25	0.72	58%	0.042	0.208
Richmond	2	ROW_17259	ROW Opportunity	1.63	0.69	42%	0.032	0.207
Richmond	2	ROW_15285	ROW Opportunity	1.06	0.71	67%	0.048	0.205
Richmond	2	ROW_1765	ROW Opportunity	1.21	0.71	59%	0.042	0.204
Richmond	2	ROW_863	ROW Opportunity	1.39	0.86	62%	0.036	0.204
Richmond	2	planned_531	Planned Water Quality Basin	75.78	38.92	51%	0.001	0.202
Richmond	2	ROW_16441	ROW Opportunity	2.29	1.59	69%	0.023	0.202
Richmond	2	ROW_5443	ROW Opportunity	1.01	0.88	87%	0.049	0.200
Richmond	2	Parcel_111210	Regional Opportunity	1.27	0.90	71%	0.040	0.197
Richmond	2	ROW_4125	ROW Opportunity	2.29	1.49	65%	0.022	0.197
Richmond	2	ROW_13349	ROW Opportunity	1.13	0.84	74%	0.043	0.196
Richmond	2	ROW_1468	ROW Opportunity	2.21	1.56	71%	0.023	0.196
Richmond	2	ROW_6857	ROW Opportunity	1.59	0.64	40%	0.031	0.196
Richmond	2	ROW_14518	ROW Opportunity	1.76	1.15	65%	0.028	0.195
Richmond	2	ROW_1731	ROW Opportunity	1.11	0.83	75%	0.044	0.193
Richmond	2	ROW_3731	ROW Opportunity	1.22	0.82	67%	0.040	0.191
Richmond	2	Parcel_162407	Regional Opportunity	1.21	0.82	68%	0.039	0.190
Richmond	2	ROW_289	ROW Opportunity	1.43	0.78	55%	0.033	0.188
Richmond	2	ROW_1770	ROW Opportunity	8.43	5.33	63%	0.007	0.187
Richmond	2	ROW_15757	ROW Opportunity	1.18	0.64	54%	0.039	0.186
Richmond	2	GIP_00165 / planned_534	Parcel-Based Opportunity (aspirational)	2.20	1.33	60%	0.022	0.183
Richmond	2	ROW_318	ROW Opportunity	2.13	1.41	66%	0.022	0.183
Richmond	2	Parcel_134412	Parcel-Based Opportunity	4.34	3.50	81%	0.012	0.181
Richmond	2	ROW_11890	ROW Opportunity	0.99	0.79	80%	0.046	0.181
Richmond	2	Parcel_198059	Parcel-Based Opportunity	6.65	3.60	54%	0.008	0.180
Richmond	2	ROW_17324	ROW Opportunity	1.23	0.80	65%	0.036	0.178
Richmond	2	Parcel_166327	Regional Opportunity	2.29	1.75	76%	0.020	0.174
Richmond	2	ROW_2766	ROW Opportunity	1.36	0.86	63%	0.032	0.174
Richmond	2	ROW_15468	ROW Opportunity	1.02	0.75	74%	0.042	0.171
Richmond	2	ROW_16520	ROW Opportunity	1.38	0.79	57%	0.031	0.171
Richmond	2	ROW_16913	ROW Opportunity	16.07	8.93	56%	0.004	0.171
Richmond	2	Parcel_169252	Regional Opportunity	1.01	0.72	71%	0.042	0.169
Richmond	2	ROW_161	ROW Opportunity	1.86	1.31	70%	0.024	0.169
Richmond	2	ROW_17298	ROW Opportunity	0.91	0.59	65%	0.046	0.168
Richmond	2	ROW_1749	ROW Opportunity	0.97	0.72	74%	0.043	0.168
Richmond	2	ROW_16840	ROW Opportunity	6.87	4.81	70%	0.008	0.166
Richmond	2	ROW_14810	ROW Opportunity	0.89	0.58	65%	0.046	0.165
Richmond	2	ROW_70	ROW Opportunity	3.96	2.77	70%	0.012	0.165
Richmond	2	ROW_20040	ROW Opportunity	2.45	1.53	62%	0.018	0.164
Richmond	2	ROW_21242	ROW Opportunity	1.27	0.83	65%	0.032	0.160
Richmond	2	Parcel_169551	Parcel-Based Opportunity	3.47	2.76	80%	0.013	0.157
Richmond	2	Parcel_238663	Parcel-Based Opportunity	50.69	7.21	14%	0.001	0.156
Richmond	2	ROW_3740	ROW Opportunity	1.92	1.15	60%	0.021	0.156
Richmond	2	Parcel_120883	Regional Opportunity	0.95	0.54	57%	0.040	0.154
Richmond	2	ROW_16482	ROW Opportunity	1.10	0.73	66%	0.035	0.154
Richmond	2	ROW_9124	ROW Opportunity	8.76	4.50	51%	0.006	0.154
Richmond	2	ROW_16456	ROW Opportunity	1.03	0.65	63%	0.037	0.151
Richmond	2	ROW_7328	ROW Opportunity	7.44	4.86	65%	0.006	0.149
Richmond	2	Parcel_112907	Regional Opportunity	2.04	0.43	21%	0.018	0.147
Richmond	2	ROW_176	ROW Opportunity	0.99	0.68	69%	0.037	0.147
Richmond	2	ROW_16976	ROW Opportunity	0.83	0.62	75%	0.043	0.146
Richmond	2	Parcel_193343	Parcel-Based Opportunity	0.62	0.27	44%	0.058	0.145
Richmond	2	planned_527	Planned Unlined Bioretention	4.44	3.26	73%	0.010	0.143
Richmond	2	ROW_20689	ROW Opportunity	0.90	0.49	54%	0.040	0.143
Richmond	2	ROW_16452	ROW Opportunity	0.92	0.62	67%	0.038	0.142
Richmond	2	ROW_1766	ROW Opportunity	0.85	0.49	58%	0.041	0.141
Richmond	2	ROW_3022	ROW Opportunity	1.28	0.85	66%	0.028	0.141
Richmond	2	ROW_173	ROW Opportunity	2.06	1.39	67%	0.018	0.140
Richmond	2	ROW_233	ROW Opportunity	4.88	3.24	66%	0.009	0.139
Richmond	2	ROW_344	ROW Opportunity	3.21	2.36	74%	0.012	0.139
Richmond	2	ROW_6305	ROW Opportunity	0.95	0.58	61%	0.036	0.138
Richmond	2	Parcel_144553	Parcel-Based Opportunity	4.24	3.16	75%	0.010	0.137
Richmond	2	ROW_2543	ROW Opportunity	0.87	0.46	53%	0.039	0.137
Richmond	2	planned_484	Planned Unlined Bioretention	3.36	2.28	68%	0.011	0.136
Richmond	2	ROW_20415	ROW Opportunity	1.09	0.78	72%	0.031	0.135
Richmond	2	ROW_11849	ROW Opportunity	4.83	3.30	68%	0.008	0.134
Richmond	2	GIP_00166 / planned_535	Parcel-Based Opportunity (aspirational)	4.59	3.21	70%	0.009	0.133
Richmond	2	Parcel_225180	Parcel-Based Opportunity	4.05	3.00	74%	0.010	0.133
Richmond	2	ROW_10967	ROW Opportunity	0.87	0.44	51%	0.038	0.133
Richmond	2	ROW_17276	ROW Opportunity	0.72	0.47	65%	0.046	0.133
Richmond	2	ROW_3965	ROW Opportunity	0.72	0.47	65%	0.046	0.133
Richmond	2	Parcel_172178	Parcel-Based Opportunity	3.68	2.88	78%	0.010	0.129
Richmond	2	ROW_16559	ROW Opportunity	0.85	0.56	66%	0.038	0.129
Richmond	2	ROW_7673	ROW Opportunity	1.89	0.92	49%	0.018	0.128
Richmond	2	ROW_9823	ROW Opportunity	0.70	0.54	77%	0.045	0.126
Richmond	2	ROW_16531	ROW Opportunity	3.40	2.29	67%	0.011	0.125
Richmond	2	ROW_17258	ROW Opportunity	0.77	0.43	56%	0.040	0.125
Richmond	2	ROW_20486	ROW Opportunity	4.18	2.56	61%	0.009	0.124
Richmond	2	Parcel_155701	Regional Opportunity	0.77	0.53	69%	0.039	0.123
Richmond	2	ROW_17037	ROW Opportunity	4.87	3.10	64%	0.008	0.123
Richmond	2	ROW_3505	ROW Opportunity	0.88	0.62	70%	0.035	0.123
Richmond	2	ROW_12830	ROW Opportunity	1.15	0.73	63%	0.027	0.121
Richmond	2	ROW_74	ROW Opportunity	2.79	1.80	65%	0.012	0.120
Richmond	2	ROW_16434	ROW Opportunity	1.25	0.88	70%	0.025	0.119
Richmond	2	ROW_6803	ROW Opportunity	1.00	0.69	69%	0.030	0.119
Richmond	2	ROW_226	ROW Opportunity	3.03	2.02	67%	0.011	0.117
Richmond	2	ROW_15830	ROW Opportunity	8.70	6.19	71%	0.005	0.115
Richmond	2	ROW_15989	ROW Opportunity	4.07	2.72	67%	0.008	0.112
Richmond	2	ROW_17301	ROW Opportunity	0.65	0.48	74%	0.043	0.112

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Richmond	2	ROW_168	ROW Opportunity	5.27	3.69	70%	0.007	0.110
Richmond	2	ROW_291	ROW Opportunity	0.71	0.46	65%	0.038	0.110
Richmond	2	ROW_11622	ROW Opportunity	7.40	4.72	64%	0.005	0.109
Richmond	2	Parcel_125476	Regional Opportunity	0.74	0.37	50%	0.036	0.108
Richmond	2	ROW_11840	ROW Opportunity	0.65	0.37	57%	0.041	0.107
Richmond	2	ROW_15750	ROW Opportunity	1.48	0.80	54%	0.019	0.107
Richmond	2	ROW_4528	ROW Opportunity	1.18	0.55	47%	0.023	0.107
Richmond	2	ROW_4784	ROW Opportunity	0.68	0.50	74%	0.039	0.107
Richmond	2	ROW_16464	ROW Opportunity	3.55	2.42	68%	0.009	0.106
Richmond	2	Parcel_196459	Parcel-Based Opportunity	0.43	0.19	44%	0.058	0.101
Richmond	2	ROW_10962	ROW Opportunity	0.54	0.35	65%	0.045	0.100
Richmond	2	ROW_17311	ROW Opportunity	0.62	0.43	69%	0.040	0.100
Richmond	2	ROW_6267	ROW Opportunity	0.66	0.42	64%	0.037	0.100
Richmond	2	ROW_15881	ROW Opportunity	11.64	6.16	53%	0.003	0.097
Richmond	2	ROW_11062	ROW Opportunity	2.50	1.26	50%	0.011	0.096
Richmond	2	ROW_1732	ROW Opportunity	0.52	0.33	63%	0.046	0.096
Richmond	2	Parcel_129221	Regional Opportunity	0.56	0.33	59%	0.042	0.095
Richmond	2	Parcel_163884	Regional Opportunity	0.60	0.41	68%	0.039	0.095
Richmond	2	Parcel_212172	Parcel-Based Opportunity	3.35	2.09	62%	0.009	0.095
Richmond	2	planned_463	Planned Unlined Bioretention	3.35	2.09	62%	0.008	0.095
Richmond	2	ROW_15232	ROW Opportunity	0.63	0.46	73%	0.038	0.095
Richmond	2	ROW_8095	ROW Opportunity	5.10	2.61	51%	0.006	0.095
Richmond	2	ROW_3104	ROW Opportunity	0.60	0.46	77%	0.039	0.094
Richmond	2	ROW_5507	ROW Opportunity	0.52	0.32	62%	0.045	0.094
Richmond	2	GIP_00121 / Parcel_144341	Regional Opportunity (aspirational)	2.87	2.15	75%	0.010	0.093
Richmond	2	ROW_9164	ROW Opportunity	0.62	0.40	65%	0.037	0.093
Richmond	2	ROW_17006	ROW Opportunity	1.13	0.60	53%	0.022	0.092
Richmond	2	ROW_73	ROW Opportunity	0.59	0.40	68%	0.039	0.092
Richmond	2	planned_199	Planned Creek/Marsh Restoration	3.43	1.93	56%	0.008	0.091
Richmond	2	ROW_11378	ROW Opportunity	3.08	1.99	65%	0.009	0.091
Richmond	2	ROW_16846	ROW Opportunity	0.61	0.44	72%	0.037	0.091
Richmond	2	ROW_187	ROW Opportunity	1.62	1.06	65%	0.015	0.091
Richmond	2	ROW_17720	ROW Opportunity	0.53	0.32	60%	0.043	0.090
Richmond	2	ROW_5467	ROW Opportunity	0.76	0.29	38%	0.030	0.090
Richmond	2	ROW_254	ROW Opportunity	7.15	4.85	68%	0.004	0.088
Richmond	2	ROW_3103	ROW Opportunity	0.47	0.38	81%	0.047	0.088
Richmond	2	Parcel_119238	Parcel-Based Opportunity	3.39	1.91	56%	0.008	0.087
Richmond	2	ROW_16465	ROW Opportunity	0.60	0.44	73%	0.036	0.087
Richmond	2	Parcel_110802	Regional Opportunity	0.82	0.25	30%	0.026	0.085
Richmond	2	Parcel_170769	Regional Opportunity	2.46	1.96	80%	0.010	0.085
Richmond	2	ROW_2596	ROW Opportunity	1.62	1.11	69%	0.015	0.085
Richmond	2	ROW_5180	ROW Opportunity	0.47	0.29	62%	0.045	0.085
Richmond	2	ROW_16552	ROW Opportunity	3.51	2.33	66%	0.007	0.084
Richmond	2	Parcel_155487	Regional Opportunity	3.02	1.80	60%	0.008	0.083
Richmond	2	ROW_16445	ROW Opportunity	1.04	0.70	67%	0.021	0.083
Richmond	2	ROW_6721	ROW Opportunity	0.50	0.36	72%	0.041	0.083
Richmond	2	Parcel_116278	Regional Opportunity	0.91	0.24	26%	0.022	0.082
Richmond	2	Parcel_117353	Regional Opportunity	2.33	0.81	35%	0.010	0.082
Richmond	2	ROW_21198	ROW Opportunity	0.41	0.29	71%	0.050	0.082
Richmond	2	ROW_15197	ROW Opportunity	0.50	0.35	70%	0.040	0.081
Richmond	2	Parcel_119884	Regional Opportunity	0.64	0.27	42%	0.032	0.080
Richmond	2	ROW_116	ROW Opportunity	2.56	1.74	68%	0.009	0.080
Richmond	2	ROW_200	ROW Opportunity	5.74	3.95	69%	0.005	0.080
Richmond	2	ROW_9162	ROW Opportunity	4.57	3.10	68%	0.006	0.080
Richmond	2	Parcel_124307	Regional Opportunity	0.46	0.28	61%	0.043	0.079
Richmond	2	Parcel_165219	Regional Opportunity	1.77	1.40	79%	0.013	0.078
Richmond	2	ROW_21073	ROW Opportunity	3.56	2.16	61%	0.007	0.078
Richmond	2	ROW_2162	ROW Opportunity	9.38	6.41	68%	0.003	0.078
Richmond	2	ROW_9937	ROW Opportunity	2.83	1.11	39%	0.008	0.078
Richmond	2	GIP_00153 / planned_512	Parcel-Based Opportunity (aspirational)	4.34	2.92	67%	0.006	0.077
Richmond	2	ROW_16538	ROW Opportunity	1.07	0.58	54%	0.019	0.077
Richmond	2	ROW_20633	ROW Opportunity	4.94	2.89	59%	0.005	0.077
Richmond	2	ROW_16467	ROW Opportunity	2.66	1.79	67%	0.009	0.076
Richmond	2	ROW_16496	ROW Opportunity	4.37	2.90	66%	0.006	0.076
Richmond	2	Parcel_375479	Parcel-Based Opportunity	68.51	8.98	13%	0.000	0.075
Richmond	2	ROW_13581	ROW Opportunity	0.59	0.26	44%	0.032	0.075
Richmond	2	ROW_10098	ROW Opportunity	6.38	4.15	65%	0.004	0.074
Richmond	2	ROW_1830	ROW Opportunity	1.38	0.93	67%	0.015	0.074
Richmond	2	ROW_82	ROW Opportunity	0.80	0.60	75%	0.024	0.074
Richmond	2	ROW_92	ROW Opportunity	4.38	3.00	68%	0.006	0.073
Richmond	2	ROW_12125	ROW Opportunity	5.50	3.66	67%	0.005	0.072
Richmond	2	Parcel_115970	Regional Opportunity	0.55	0.12	22%	0.032	0.070
Richmond	2	Parcel_144098	Regional Opportunity	1.08	0.98	91%	0.018	0.070
Richmond	2	ROW_2164	ROW Opportunity	1.27	0.90	71%	0.015	0.070
Richmond	2	ROW_16394	ROW Opportunity	0.51	0.23	45%	0.034	0.069
Richmond	2	ROW_16563	ROW Opportunity	4.10	2.78	68%	0.006	0.069
Richmond	2	ROW_16866	ROW Opportunity	3.52	2.37	67%	0.006	0.069
Richmond	2	ROW_7810	ROW Opportunity	0.59	0.27	46%	0.029	0.069
Richmond	2	Parcel_115590	Regional Opportunity	0.98	0.21	21%	0.017	0.068
Richmond	2	Parcel_116661	Regional Opportunity	0.52	0.13	25%	0.033	0.068
Richmond	2	ROW_16544	ROW Opportunity	4.83	3.31	69%	0.005	0.068
Richmond	2	ROW_16480	ROW Opportunity	1.96	1.32	67%	0.010	0.067
Richmond	2	ROW_195	ROW Opportunity	5.26	3.67	70%	0.005	0.067
Richmond	2	ROW_11623	ROW Opportunity	5.63	3.78	67%	0.004	0.066
Richmond	2	ROW_5903	ROW Opportunity	0.39	0.28	72%	0.042	0.066
Richmond	2	ROW_9784	ROW Opportunity	0.50	0.22	44%	0.033	0.066
Richmond	2	Parcel_129781	Parcel-Based Opportunity	0.46	0.22	48%	0.036	0.065
Richmond	2	Parcel_174262	Parcel-Based Opportunity	2.11	1.19	56%	0.009	0.065
Richmond	2	ROW_17728	ROW Opportunity	0.42	0.22	52%	0.039	0.065
Richmond	2	ROW_2163	ROW Opportunity	3.02	2.13	71%	0.007	0.065
Richmond	2	ROW_16504	ROW Opportunity	0.99	0.61	62%	0.017	0.064
Richmond	2	ROW_17527	ROW Opportunity	9.09	4.79	53%	0.003	0.064
Richmond	2	ROW_20751	ROW Opportunity	0.72	0.52	72%	0.023	0.064
Richmond	2	ROW_8571	ROW Opportunity	3.24	2.28	70%	0.006	0.064

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Richmond	2	GIP_00171 / ROW_16561	ROW Opportunity (aspirational)	4.64	3.09	67%	0.005	0.063
Richmond	2	Parcel_117968	Regional Opportunity	0.56	0.24	43%	0.028	0.063
Richmond	2	ROW_147	ROW Opportunity	0.82	0.56	68%	0.020	0.062
Richmond	2	ROW_21231	ROW Opportunity	0.41	0.21	51%	0.037	0.062
Richmond	2	GIP_00125 / planned_138	Parcel-Based Opportunity (aspirational)	39.35	14.16	36%	0.001	0.061
Richmond	2	Parcel_154186	Parcel-Based Opportunity	0.39	0.26	67%	0.039	0.061
Richmond	2	ROW_105	ROW Opportunity	2.41	1.61	67%	0.008	0.061
Richmond	2	ROW_1763	ROW Opportunity	0.34	0.21	62%	0.044	0.061
Richmond	2	ROW_3733	ROW Opportunity	0.47	0.25	53%	0.032	0.061
Richmond	2	ROW_6864	ROW Opportunity	0.36	0.26	72%	0.042	0.061
Richmond	2	ROW_15878	ROW Opportunity	3.44	1.96	57%	0.006	0.060
Richmond	2	ROW_19023	ROW Opportunity	1.43	0.96	67%	0.012	0.060
Richmond	2	ROW_9166	ROW Opportunity	0.45	0.28	62%	0.033	0.060
Richmond	2	Parcel_118569	Parcel-Based Opportunity	0.46	0.19	41%	0.031	0.059
Richmond	2	ROW_15195	ROW Opportunity	6.51	4.28	66%	0.003	0.059
Richmond	2	ROW_18037	ROW Opportunity	4.29	2.74	64%	0.005	0.059
Richmond	2	ROW_2697	ROW Opportunity	2.39	1.65	69%	0.008	0.059
Richmond	2	ROW_1794	ROW Opportunity	0.32	0.25	78%	0.046	0.058
Richmond	2	ROW_19952	ROW Opportunity	0.87	0.59	68%	0.018	0.058
Richmond	2	ROW_20453	ROW Opportunity	0.55	0.39	71%	0.027	0.058
Richmond	2	Parcel_116468	Parcel-Based Opportunity	0.74	0.29	39%	0.019	0.057
Richmond	2	Parcel_133667	Parcel-Based Opportunity	25.54	14.75	58%	0.001	0.057
Richmond	2	ROW_16116	ROW Opportunity	0.32	0.20	63%	0.044	0.057
Richmond	2	ROW_16539	ROW Opportunity	1.03	0.59	57%	0.015	0.057
Richmond	2	ROW_886	ROW Opportunity	9.50	6.34	67%	0.003	0.057
Richmond	2	ROW_16475	ROW Opportunity	2.52	1.67	66%	0.007	0.056
Richmond	2	ROW_4147	ROW Opportunity	0.75	0.48	64%	0.020	0.056
Richmond	2	ROW_9755	ROW Opportunity	0.36	0.24	67%	0.038	0.056
Richmond	2	ROW_17721	ROW Opportunity	0.32	0.19	59%	0.044	0.055
Richmond	2	ROW_3294	ROW Opportunity	0.50	0.34	68%	0.028	0.055
Richmond	2	ROW_16486	ROW Opportunity	0.67	0.40	60%	0.021	0.054
Richmond	2	ROW_18476	ROW Opportunity	1.55	1.08	70%	0.010	0.054
Richmond	2	Parcel_150073	Regional Opportunity	1.80	1.20	67%	0.009	0.053
Richmond	2	ROW_13891	ROW Opportunity	0.41	0.18	44%	0.032	0.053
Richmond	2	Parcel_176154	Parcel-Based Opportunity	27.12	13.35	49%	0.001	0.052
Richmond	2	ROW_18074	ROW Opportunity	3.67	2.41	66%	0.005	0.052
Richmond	2	Parcel_236849	Parcel-Based Opportunity	260.54	3.37	1%	0.000	0.051
Richmond	2	ROW_18477	ROW Opportunity	2.41	1.65	68%	0.007	0.051
Richmond	2	ROW_9129	ROW Opportunity	3.29	1.38	42%	0.005	0.051
Richmond	2	Parcel_118639	Parcel-Based Opportunity	0.45	0.10	22%	0.028	0.050
Richmond	2	Parcel_150614	Regional Opportunity	2.05	1.74	85%	0.008	0.049
Richmond	2	ROW_13905	ROW Opportunity	3.58	2.15	60%	0.005	0.049
Richmond	2	ROW_21154	ROW Opportunity	2.44	1.79	73%	0.007	0.049
Richmond	2	ROW_11838	ROW Opportunity	0.29	0.17	59%	0.041	0.048
Richmond	2	ROW_3859	ROW Opportunity	7.00	4.53	65%	0.003	0.048
Richmond	2	Parcel_255238	Parcel-Based Opportunity	611.35	20.49	3%	0.000	0.047
Richmond	2	ROW_20475	ROW Opportunity	1.12	0.76	68%	0.012	0.047
Richmond	2	ROW_9125	ROW Opportunity	2.59	0.93	36%	0.005	0.047
Richmond	2	ROW_98	ROW Opportunity	2.55	1.75	69%	0.006	0.047
Richmond	2	ROW_15754	ROW Opportunity	0.35	0.22	63%	0.033	0.046
Richmond	2	ROW_16440	ROW Opportunity	0.58	0.41	71%	0.021	0.046
Richmond	2	ROW_16512	ROW Opportunity	1.89	1.24	66%	0.008	0.046
Richmond	2	ROW_3979	ROW Opportunity	11.15	7.70	69%	0.002	0.046
Richmond	2	ROW_3728	ROW Opportunity	0.28	0.19	68%	0.040	0.045
Richmond	2	ROW_7216	ROW Opportunity	2.32	1.56	67%	0.006	0.045
Richmond	2	Parcel_132474	Regional Opportunity	1.13	0.87	77%	0.011	0.044
Richmond	2	Parcel_149687	Regional Opportunity	1.43	1.00	70%	0.009	0.044
Richmond	2	planned_326	Planned Creek/Marsh Restoration	2.22	0.57	26%	0.006	0.044
Richmond	2	ROW_14433	ROW Opportunity	1.36	0.88	65%	0.010	0.044
Richmond	2	ROW_247	ROW Opportunity	13.62	8.74	64%	0.002	0.044
Richmond	2	ROW_5190	ROW Opportunity	0.35	0.14	40%	0.031	0.044
Richmond	2	ROW_785	ROW Opportunity	6.19	3.83	62%	0.003	0.044
Richmond	2	ROW_9939	ROW Opportunity	0.37	0.14	38%	0.029	0.044
Richmond	2	GIP_00112 / Parcel_133196	Regional Opportunity (aspirational)	1.20	1.00	83%	0.011	0.043
Richmond	2	planned_296	Planned Creek/Marsh Restoration	83.80	11.53	14%	0.000	0.043
Richmond	2	ROW_17312	ROW Opportunity	0.27	0.14	52%	0.040	0.043
Richmond	2	ROW_8642	ROW Opportunity	3.74	2.42	65%	0.004	0.043
Richmond	2	GIP_00120 / Parcel_143826	Regional Opportunity (aspirational)	1.04	0.89	86%	0.012	0.042
Richmond	2	GIP_00179 / ROW_3507	ROW Opportunity (aspirational)	9.06	5.66	62%	0.002	0.042
Richmond	2	Parcel_188482	Parcel-Based Opportunity	7.05	3.25	46%	0.002	0.042
Richmond	2	ROW_13417	ROW Opportunity	5.44	3.72	68%	0.003	0.042
Richmond	2	ROW_16211	ROW Opportunity	8.14	5.41	66%	0.002	0.042
Richmond	2	ROW_175	ROW Opportunity	3.50	2.49	71%	0.004	0.042
Richmond	2	Parcel_113228	Parcel-Based Opportunity	0.23	0.14	61%	0.044	0.041
Richmond	2	Parcel_149904	Regional Opportunity	1.45	0.91	63%	0.008	0.041
Richmond	2	Parcel_211565	Regional Opportunity	1.57	0.88	56%	0.008	0.041
Richmond	2	ROW_16555	ROW Opportunity	3.26	2.17	67%	0.004	0.041
Richmond	2	GIP_00123 / Parcel_152927	Regional Opportunity (aspirational)	3.09	1.99	64%	0.005	0.040
Richmond	2	Parcel_139167	Regional Opportunity	0.87	0.70	80%	0.013	0.040
Richmond	2	ROW_100	ROW Opportunity	3.68	2.57	70%	0.004	0.040
Richmond	2	ROW_10892	ROW Opportunity	0.90	0.53	59%	0.012	0.040
Richmond	2	ROW_14676	ROW Opportunity	1.05	0.73	70%	0.011	0.040
Richmond	2	ROW_2159	ROW Opportunity	3.17	2.21	70%	0.004	0.040
Richmond	2	ROW_245	ROW Opportunity	12.24	7.96	65%	0.002	0.040
Richmond	2	ROW_273	ROW Opportunity	9.08	6.04	67%	0.002	0.040
Richmond	2	ROW_66	ROW Opportunity	1.53	1.13	74%	0.008	0.040
Richmond	2	Parcel_116652	Parcel-Based Opportunity	0.23	0.13	57%	0.042	0.039
Richmond	2	ROW_16507	ROW Opportunity	1.11	0.73	66%	0.010	0.039
Richmond	2	ROW_248	ROW Opportunity	6.87	4.50	66%	0.002	0.039
Richmond	2	ROW_11363	ROW Opportunity	9.37	6.08	65%	0.002	0.038
Richmond	2	ROW_126	ROW Opportunity	1.73	1.12	65%	0.007	0.038
Richmond	2	ROW_15753	ROW Opportunity	0.77	0.46	60%	0.014	0.038
Richmond	2	ROW_16503	ROW Opportunity	2.40	1.57	65%	0.005	0.038
Richmond	2	ROW_16557	ROW Opportunity	3.91	2.61	67%	0.004	0.038

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Richmond	2	ROW_212	ROW Opportunity	7.21	4.69	65%	0.002	0.038
Richmond	2	ROW_257	ROW Opportunity	9.16	6.03	66%	0.002	0.038
Richmond	2	ROW_69	ROW Opportunity	1.85	1.26	68%	0.007	0.038
Richmond	2	GIP_00145 / planned_486	Parcel-Based Opportunity (aspirational)	5.73	3.84	67%	0.003	0.037
Richmond	2	Parcel_375480	Parcel-Based Opportunity	39.00	23.68	61%	0.000	0.037
Richmond	2	ROW_16208	ROW Opportunity	2.13	1.44	68%	0.006	0.037
Richmond	2	ROW_16518	ROW Opportunity	2.48	1.62	65%	0.005	0.037
Richmond	2	ROW_211	ROW Opportunity	4.70	3.08	66%	0.003	0.037
Richmond	2	Parcel_126574	Regional Opportunity	0.58	0.15	26%	0.016	0.036
Richmond	2	ROW_11885	ROW Opportunity	0.22	0.15	68%	0.041	0.036
Richmond	2	ROW_19949	ROW Opportunity	0.81	0.55	68%	0.013	0.036
Richmond	2	Parcel_133977	Regional Opportunity	1.28	0.66	52%	0.008	0.035
Richmond	2	Parcel_137626	Regional Opportunity	1.25	0.75	60%	0.008	0.035
Richmond	2	Parcel_146294	Parcel-Based Opportunity	14.14	9.02	64%	0.001	0.035
Richmond	2	Parcel_195923	Parcel-Based Opportunity	0.15	0.06	40%	0.059	0.035
Richmond	2	ROW_16433	ROW Opportunity	1.10	0.75	68%	0.009	0.035
Richmond	2	ROW_16437	ROW Opportunity	3.09	2.10	68%	0.004	0.035
Richmond	2	ROW_16443	ROW Opportunity	3.11	2.01	65%	0.004	0.035
Richmond	2	ROW_246	ROW Opportunity	0.43	0.31	72%	0.022	0.035
Richmond	2	ROW_3755	ROW Opportunity	0.29	0.11	38%	0.030	0.035
Richmond	2	Parcel_234570	Parcel-Based Opportunity	21.31	2.72	13%	0.001	0.034
Richmond	2	ROW_11014	ROW Opportunity	5.98	3.95	66%	0.002	0.034
Richmond	2	ROW_15831	ROW Opportunity	9.53	6.34	67%	0.002	0.034
Richmond	2	ROW_17021	ROW Opportunity	0.48	0.20	42%	0.019	0.034
Richmond	2	ROW_283	ROW Opportunity	6.12	4.23	69%	0.002	0.034
Richmond	2	ROW_56	ROW Opportunity	1.53	1.09	71%	0.007	0.034
Richmond	2	Parcel_111332	Parcel-Based Opportunity	0.26	0.11	42%	0.032	0.033
Richmond	2	Parcel_120275	Regional Opportunity	1.53	0.52	34%	0.006	0.033
Richmond	2	Parcel_154534	Parcel-Based Opportunity	0.21	0.14	67%	0.039	0.033
Richmond	2	ROW_191	ROW Opportunity	1.46	1.08	74%	0.007	0.033
Richmond	2	ROW_21542	ROW Opportunity	8.21	5.22	64%	0.002	0.033
Richmond	2	ROW_239	ROW Opportunity	10.01	6.58	66%	0.002	0.033
Richmond	2	ROW_6159	ROW Opportunity	6.69	4.35	65%	0.002	0.033
Richmond	2	ROW_85	ROW Opportunity	0.84	0.56	67%	0.011	0.033
Richmond	2	GIP_00148 / planned_492	Parcel-Based Opportunity (aspirational)	2.50	1.76	70%	0.005	0.032
Richmond	2	ROW_243	ROW Opportunity	9.52	6.21	65%	0.002	0.032
Richmond	2	ROW_282	ROW Opportunity	5.99	4.14	69%	0.002	0.032
Richmond	2	GIP_00146 / planned_488	Parcel-Based Opportunity (aspirational)	2.69	1.81	67%	0.004	0.031
Richmond	2	Parcel_119762	Regional Opportunity	1.08	0.35	32%	0.008	0.031
Richmond	2	Parcel_125511	Parcel-Based Opportunity	0.17	0.11	65%	0.047	0.031
Richmond	2	Parcel_142243	Regional Opportunity	0.79	0.65	82%	0.012	0.031
Richmond	2	Parcel_207080	Parcel-Based Opportunity	11.36	4.54	40%	0.001	0.031
Richmond	2	ROW_19630	ROW Opportunity	2.57	0.92	36%	0.004	0.031
Richmond	2	ROW_259	ROW Opportunity	7.70	5.06	66%	0.002	0.031
Richmond	2	ROW_298	ROW Opportunity	5.20	3.55	68%	0.003	0.031
Richmond	2	ROW_323	ROW Opportunity	5.79	3.97	69%	0.002	0.031
Richmond	2	ROW_16432	ROW Opportunity	0.17	0.13	76%	0.042	0.030
Richmond	2	ROW_16444	ROW Opportunity	1.83	1.25	68%	0.005	0.030
Richmond	2	ROW_16533	ROW Opportunity	0.59	0.36	61%	0.014	0.030
Richmond	2	ROW_5978	ROW Opportunity	1.46	0.86	59%	0.007	0.030
Richmond	2	ROW_80	ROW Opportunity	0.96	0.68	71%	0.009	0.030
Richmond	2	Parcel_198527	Parcel-Based Opportunity	7.70	0.55	7%	0.002	0.029
Richmond	2	ROW_11807	ROW Opportunity	9.05	5.81	64%	0.001	0.029
Richmond	2	ROW_12123	ROW Opportunity	8.06	5.15	64%	0.002	0.029
Richmond	2	ROW_12145	ROW Opportunity	8.39	5.45	65%	0.002	0.029
Richmond	2	ROW_21089	ROW Opportunity	2.88	1.39	48%	0.003	0.029
Richmond	2	GIP_00159 / planned_519	Parcel-Based Opportunity (aspirational)	7.69	5.20	68%	0.002	0.028
Richmond	2	Parcel_120253	Parcel-Based Opportunity	0.33	0.14	42%	0.021	0.028
Richmond	2	Parcel_150301	Regional Opportunity	0.90	0.66	73%	0.009	0.028
Richmond	2	ROW_10074	ROW Opportunity	9.03	5.68	63%	0.001	0.028
Richmond	2	ROW_10718	ROW Opportunity	7.91	4.98	63%	0.002	0.028
Richmond	2	ROW_16439	ROW Opportunity	1.16	0.76	66%	0.008	0.028
Richmond	2	ROW_16546	ROW Opportunity	2.59	1.81	70%	0.004	0.028
Richmond	2	ROW_7714	ROW Opportunity	6.37	4.16	65%	0.002	0.028
Richmond	2	GIP_00157 / planned_517	Parcel-Based Opportunity (aspirational)	6.85	4.64	68%	0.002	0.027
Richmond	2	ROW_13419	ROW Opportunity	1.62	1.06	65%	0.006	0.027
Richmond	2	ROW_16451	ROW Opportunity	5.28	3.42	65%	0.002	0.027
Richmond	2	ROW_16525	ROW Opportunity	1.21	0.69	57%	0.007	0.027
Richmond	2	ROW_20279	ROW Opportunity	6.17	4.13	67%	0.002	0.027
Richmond	2	ROW_241	ROW Opportunity	7.41	4.90	66%	0.002	0.027
Richmond	2	ROW_280	ROW Opportunity	6.70	4.42	66%	0.002	0.027
Richmond	2	ROW_7716	ROW Opportunity	5.73	3.73	65%	0.002	0.027
Richmond	2	Parcel_150205	Regional Opportunity	0.89	0.61	69%	0.009	0.026
Richmond	2	Parcel_375468	Parcel-Based Opportunity	0.97	0.09	9%	0.009	0.026
Richmond	2	ROW_11626	ROW Opportunity	0.14	0.09	64%	0.044	0.026
Richmond	2	ROW_16463	ROW Opportunity	6.46	4.31	67%	0.002	0.026
Richmond	2	ROW_238	ROW Opportunity	0.20	0.14	70%	0.033	0.026
Richmond	2	ROW_7717	ROW Opportunity	2.09	1.39	67%	0.004	0.026
Richmond	2	ROW_8365	ROW Opportunity	9.43	5.05	54%	0.001	0.026
Richmond	2	ROW_8849	ROW Opportunity	6.28	4.11	65%	0.002	0.026
Richmond	2	ROW_9165	ROW Opportunity	0.31	0.19	61%	0.021	0.026
Richmond	2	ROW_9347	ROW Opportunity	8.44	5.50	65%	0.001	0.026
Richmond	2	Parcel_227484	Parcel-Based Opportunity	150.23	0.93	1%	0.000	0.025
Richmond	2	ROW_12098	ROW Opportunity	3.92	2.44	62%	0.003	0.025
Richmond	2	ROW_13064	ROW Opportunity	12.19	6.07	50%	0.001	0.025
Richmond	2	ROW_169	ROW Opportunity	0.64	0.50	78%	0.011	0.025
Richmond	2	ROW_190	ROW Opportunity	1.00	0.73	73%	0.008	0.025
Richmond	2	ROW_207	ROW Opportunity	0.87	0.60	69%	0.009	0.025
Richmond	2	ROW_252	ROW Opportunity	5.36	3.50	65%	0.002	0.025
Richmond	2	ROW_16476	ROW Opportunity	0.55	0.32	58%	0.012	0.024
Richmond	2	ROW_16495	ROW Opportunity	2.25	1.50	67%	0.004	0.024
Richmond	2	ROW_188	ROW Opportunity	1.08	0.78	72%	0.007	0.024
Richmond	2	ROW_9992	ROW Opportunity	2.54	1.65	65%	0.003	0.024
Richmond	2	GIP_00111 / Parcel_132965	Regional Opportunity (aspirational)	0.59	0.46	78%	0.011	0.023

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Richmond	2	GIP_00114 / Parcel_133558	Regional Opportunity (aspirational)	0.63	0.52	83%	0.011	0.023
Richmond	2	GIP_00131 / planned_186	Parcel-Based Opportunity (aspirational)	18.01	5.20	29%	0.001	0.023
Richmond	2	GIP_00135 / planned_468	Parcel-Based Opportunity (aspirational)	18.01	5.20	29%	0.001	0.023
Richmond	2	GIP_00161 / planned_521	Parcel-Based Opportunity (aspirational)	5.57	3.75	67%	0.002	0.023
Richmond	2	planned_174	Planned Unlined Swale	0.69	0.47	68%	0.010	0.023
Richmond	2	ROW_11010	ROW Opportunity	5.64	3.65	65%	0.002	0.023
Richmond	2	ROW_11852	ROW Opportunity	0.88	0.58	66%	0.008	0.023
Richmond	2	ROW_128	ROW Opportunity	3.64	2.51	69%	0.003	0.023
Richmond	2	ROW_14749	ROW Opportunity	1.79	0.86	48%	0.004	0.023
Richmond	2	ROW_16490	ROW Opportunity	2.47	1.59	64%	0.003	0.023
Richmond	2	ROW_216	ROW Opportunity	5.26	3.39	64%	0.002	0.023
Richmond	2	ROW_284	ROW Opportunity	4.68	3.14	67%	0.002	0.023
Richmond	2	ROW_345	ROW Opportunity	7.17	4.37	61%	0.001	0.023
Richmond	2	ROW_4274	ROW Opportunity	0.75	0.51	68%	0.009	0.023
Richmond	2	ROW_59	ROW Opportunity	1.06	0.68	64%	0.007	0.023
Richmond	2	ROW_7798	ROW Opportunity	3.24	2.02	62%	0.003	0.023
Richmond	2	ROW_862	ROW Opportunity	0.62	0.49	79%	0.011	0.023
Richmond	2	GIP_00113 / Parcel_133528	Regional Opportunity (aspirational)	0.61	0.50	82%	0.011	0.022
Richmond	2	GIP_00164 / planned_529	Parcel-Based Opportunity (aspirational)	8.35	3.96	47%	0.001	0.022
Richmond	2	Parcel_177214	Parcel-Based Opportunity	11.57	5.65	49%	0.001	0.022
Richmond	2	Parcel_197712	Parcel-Based Opportunity	0.34	0.05	15%	0.017	0.022
Richmond	2	Parcel_231444	Parcel-Based Opportunity	9.82	5.16	53%	0.001	0.022
Richmond	2	planned_514	Planned Unlined Swale	0.26	0.17	65%	0.022	0.022
Richmond	2	ROW_14348	ROW Opportunity	4.73	2.85	60%	0.002	0.022
Richmond	2	ROW_16540	ROW Opportunity	3.11	1.96	63%	0.003	0.022
Richmond	2	ROW_16547	ROW Opportunity	3.20	2.06	64%	0.003	0.022
Richmond	2	ROW_4556	ROW Opportunity	4.85	2.97	61%	0.002	0.022
Richmond	2	ROW_6276	ROW Opportunity	0.11	0.08	73%	0.051	0.022
Richmond	2	ROW_6850	ROW Opportunity	5.70	3.79	66%	0.002	0.022
Richmond	2	ROW_7554	ROW Opportunity	4.93	2.93	59%	0.002	0.022
Richmond	2	ROW_8344	ROW Opportunity	2.79	1.43	51%	0.003	0.022
Richmond	2	ROW_9354	ROW Opportunity	4.61	2.81	61%	0.002	0.022
Richmond	2	Parcel_136865	Regional Opportunity	0.56	0.40	71%	0.011	0.021
Richmond	2	Parcel_142495	Regional Opportunity	1.67	1.01	60%	0.004	0.021
Richmond	2	Parcel_150789	Regional Opportunity	0.68	0.49	72%	0.009	0.021
Richmond	2	ROW_16459	ROW Opportunity	3.83	2.58	67%	0.002	0.021
Richmond	2	ROW_20540	ROW Opportunity	1.86	1.20	65%	0.004	0.021
Richmond	2	ROW_4128	ROW Opportunity	0.53	0.40	75%	0.011	0.021
Richmond	2	ROW_4276	ROW Opportunity	1.18	0.85	72%	0.006	0.021
Richmond	2	ROW_4470	ROW Opportunity	5.90	3.81	65%	0.002	0.021
Richmond	2	ROW_68	ROW Opportunity	3.20	2.16	68%	0.003	0.021
Richmond	2	Parcel_164500	Regional Opportunity	1.15	0.45	39%	0.005	0.020
Richmond	2	planned_187	Planned Unlined Bioretention	0.48	0.29	60%	0.012	0.020
Richmond	2	ROW_12816	ROW Opportunity	5.38	3.23	60%	0.002	0.020
Richmond	2	ROW_13418	ROW Opportunity	2.49	1.71	69%	0.003	0.020
Richmond	2	ROW_16450	ROW Opportunity	5.38	3.61	67%	0.002	0.020
Richmond	2	ROW_16677	ROW Opportunity	4.69	2.78	59%	0.002	0.020
Richmond	2	ROW_18208	ROW Opportunity	1.75	1.14	65%	0.004	0.020
Richmond	2	ROW_1991	ROW Opportunity	7.58	4.72	62%	0.001	0.020
Richmond	2	ROW_20007	ROW Opportunity	6.72	4.21	63%	0.001	0.020
Richmond	2	ROW_501	ROW Opportunity	5.00	3.06	61%	0.002	0.020
Richmond	2	ROW_6847	ROW Opportunity	5.45	3.61	66%	0.002	0.020
Richmond	2	ROW_7333	ROW Opportunity	3.29	2.13	65%	0.003	0.020
Richmond	2	ROW_7747	ROW Opportunity	4.04	2.68	66%	0.002	0.020
Richmond	2	ROW_9126	ROW Opportunity	1.07	0.38	36%	0.005	0.020
Richmond	2	GIP_00126 / planned_141	Parcel-Based Opportunity (aspirational)	18.40	3.20	17%	0.000	0.019
Richmond	2	Parcel_196851	Parcel-Based Opportunity	4.96	0.08	2%	0.002	0.019
Richmond	2	ROW_12536	ROW Opportunity	2.88	1.31	45%	0.003	0.019
Richmond	2	ROW_16534	ROW Opportunity	1.86	1.27	68%	0.004	0.019
Richmond	2	ROW_17129	ROW Opportunity	10.19	4.51	44%	0.001	0.019
Richmond	2	ROW_3972	ROW Opportunity	0.65	0.40	62%	0.009	0.019
Richmond	2	ROW_6954	ROW Opportunity	0.73	0.55	75%	0.008	0.019
Richmond	2	GIP_00118 / Parcel_140096	Parcel-Based Opportunity (aspirational)	6.62	4.81	73%	0.001	0.018
Richmond	2	GIP_00152 / planned_511	Parcel-Based Opportunity (aspirational)	2.00	1.36	68%	0.003	0.018
Richmond	2	GIP_00162 / planned_522	Parcel-Based Opportunity (aspirational)	5.90	4.00	68%	0.001	0.018
Richmond	2	Parcel_126885	Regional Opportunity	1.12	0.39	35%	0.005	0.018
Richmond	2	Parcel_151124	Parcel-Based Opportunity	0.47	0.35	74%	0.011	0.018
Richmond	2	Parcel_151604	Regional Opportunity	0.50	0.42	84%	0.011	0.018
Richmond	2	Parcel_152942	Regional Opportunity	0.52	0.42	81%	0.010	0.018
Richmond	2	ROW_160	ROW Opportunity	4.58	3.15	69%	0.002	0.018
Richmond	2	ROW_16470	ROW Opportunity	2.55	1.66	65%	0.003	0.018
Richmond	2	ROW_20777	ROW Opportunity	1.92	1.28	67%	0.003	0.018
Richmond	2	ROW_213	ROW Opportunity	5.91	3.79	64%	0.001	0.018
Richmond	2	ROW_2915	ROW Opportunity	4.41	2.90	66%	0.002	0.018
Richmond	2	ROW_2928	ROW Opportunity	3.99	2.40	60%	0.002	0.018
Richmond	2	ROW_3295	ROW Opportunity	0.13	0.06	46%	0.035	0.018
Richmond	2	ROW_4531	ROW Opportunity	0.29	0.15	52%	0.016	0.018
Richmond	2	ROW_6066	ROW Opportunity	0.37	0.11	30%	0.013	0.018
Richmond	2	ROW_67	ROW Opportunity	1.78	1.28	72%	0.004	0.018
Richmond	2	Parcel_209985	Parcel-Based Opportunity	7.78	4.24	54%	0.001	0.017
Richmond	2	planned_489	Planned Unlined Bioretention	1.91	1.34	70%	0.003	0.017
Richmond	2	ROW_16453	ROW Opportunity	4.49	2.90	65%	0.002	0.017
Richmond	2	ROW_16524	ROW Opportunity	0.17	0.12	71%	0.027	0.017
Richmond	2	ROW_16920	ROW Opportunity	0.89	0.46	52%	0.006	0.017
Richmond	2	ROW_17076	ROW Opportunity	4.77	2.85	60%	0.002	0.017
Richmond	2	ROW_290	ROW Opportunity	1.30	0.94	72%	0.005	0.017
Richmond	2	ROW_4396	ROW Opportunity	2.92	1.91	65%	0.002	0.017
Richmond	2	GIP_00141 / planned_480	Parcel-Based Opportunity (aspirational)	3.92	2.68	68%	0.002	0.016
Richmond	2	Parcel_150106	Parcel-Based Opportunity	0.47	0.36	77%	0.010	0.016
Richmond	2	Parcel_50787	Parcel-Based Opportunity	0.13	0.09	69%	0.032	0.016
Richmond	2	planned_94	Planned Creek/Marsh Restoration	4.16	2.12	51%	0.002	0.016
Richmond	2	ROW_115	ROW Opportunity	3.74	2.52	67%	0.002	0.016
Richmond	2	ROW_1385	ROW Opportunity	0.62	0.34	55%	0.008	0.016
Richmond	2	ROW_250	ROW Opportunity	2.22	1.47	66%	0.003	0.016

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Richmond	2	ROW_314	ROW Opportunity	4.06	2.72	67%	0.002	0.016
Richmond	2	ROW_3741	ROW Opportunity	0.59	0.40	68%	0.008	0.016
Richmond	2	ROW_4398	ROW Opportunity	3.21	2.08	65%	0.002	0.016
Richmond	2	ROW_4866	ROW Opportunity	5.85	3.86	66%	0.001	0.016
Richmond	2	GIP_00124 / planned_137	Parcel-Based Opportunity (aspirational)	9.66	3.71	38%	0.001	0.015
Richmond	2	Parcel_160376	Parcel-Based Opportunity	4.81	4.00	83%	0.001	0.015
Richmond	2	ROW_12101	ROW Opportunity	1.93	1.31	68%	0.003	0.015
Richmond	2	ROW_16447	ROW Opportunity	3.16	2.13	67%	0.002	0.015
Richmond	2	ROW_16479	ROW Opportunity	0.89	0.59	66%	0.006	0.015
Richmond	2	ROW_17605	ROW Opportunity	7.60	3.45	45%	0.001	0.015
Richmond	2	ROW_18926	ROW Opportunity	4.43	2.72	61%	0.002	0.015
Richmond	2	ROW_20542	ROW Opportunity	0.72	0.51	71%	0.007	0.015
Richmond	2	ROW_20895	ROW Opportunity	0.46	0.22	48%	0.009	0.015
Richmond	2	ROW_21152	ROW Opportunity	4.90	3.36	69%	0.002	0.015
Richmond	2	ROW_258	ROW Opportunity	0.55	0.39	71%	0.008	0.015
Richmond	2	ROW_6047	ROW Opportunity	4.81	3.21	67%	0.001	0.015
Richmond	2	ROW_78	ROW Opportunity	0.84	0.63	75%	0.006	0.015
Richmond	2	ROW_81	ROW Opportunity	1.73	1.19	69%	0.003	0.015
Richmond	2	ROW_93	ROW Opportunity	5.91	3.85	65%	0.001	0.015
Richmond	2	Parcel_136418	Regional Opportunity	0.51	0.31	61%	0.008	0.014
Richmond	2	Parcel_139156	Regional Opportunity	2.90	1.37	47%	0.002	0.014
Richmond	2	Parcel_139599	Parcel-Based Opportunity	5.30	3.53	67%	0.001	0.014
Richmond	2	Parcel_143456	Parcel-Based Opportunity	0.42	0.32	76%	0.010	0.014
Richmond	2	Parcel_143637	Regional Opportunity	0.71	0.32	45%	0.006	0.014
Richmond	2	Parcel_191941	Parcel-Based Opportunity	7.01	0.25	4%	0.000	0.014
Richmond	2	Parcel_375481	Parcel-Based Opportunity	4.63	2.18	47%	0.002	0.014
Richmond	2	Parcel_47763	Parcel-Based Opportunity	4.66	2.90	62%	0.001	0.014
Richmond	2	ROW_11012	ROW Opportunity	2.36	1.46	62%	0.002	0.014
Richmond	2	ROW_129	ROW Opportunity	0.42	0.29	69%	0.010	0.014
Richmond	2	ROW_14437	ROW Opportunity	13.77	3.20	23%	0.000	0.014
Richmond	2	ROW_16491	ROW Opportunity	1.26	0.81	64%	0.004	0.014
Richmond	2	ROW_16494	ROW Opportunity	2.27	1.51	67%	0.003	0.014
Richmond	2	ROW_16611	ROW Opportunity	1.02	0.78	76%	0.005	0.014
Richmond	2	ROW_19951	ROW Opportunity	4.44	2.66	60%	0.002	0.014
Richmond	2	ROW_20316	ROW Opportunity	2.88	1.90	66%	0.002	0.014
Richmond	2	ROW_286	ROW Opportunity	2.29	1.57	69%	0.003	0.014
Richmond	2	ROW_89	ROW Opportunity	1.38	0.90	65%	0.004	0.014
Richmond	2	ROW_9417	ROW Opportunity	2.08	1.34	64%	0.003	0.014
Richmond	2	GIP_00127 / planned_171	Parcel-Based Opportunity (aspirational)	16.16	2.93	18%	0.000	0.013
Richmond	2	GIP_00138 / planned_475	Parcel-Based Opportunity (aspirational)	16.16	2.93	18%	0.000	0.013
Richmond	2	GIP_00149 / planned_508	Parcel-Based Opportunity (aspirational)	3.47	2.33	67%	0.002	0.013
Richmond	2	GIP_00175 / ROW_17569	ROW Opportunity (aspirational)	2.96	1.75	59%	0.002	0.013
Richmond	2	Parcel_112290	Regional Opportunity	1.12	0.16	14%	0.005	0.013
Richmond	2	Parcel_155750	Parcel-Based Opportunity	0.43	0.30	70%	0.009	0.013
Richmond	2	ROW_12140	ROW Opportunity	0.81	0.58	72%	0.006	0.013
Richmond	2	ROW_163	ROW Opportunity	5.21	3.41	65%	0.001	0.013
Richmond	2	ROW_194	ROW Opportunity	4.22	2.78	66%	0.001	0.013
Richmond	2	ROW_2595	ROW Opportunity	1.07	0.42	39%	0.004	0.013
Richmond	2	ROW_6848	ROW Opportunity	2.21	1.46	66%	0.002	0.013
Richmond	2	ROW_7330	ROW Opportunity	5.35	3.48	65%	0.001	0.013
Richmond	2	ROW_8151	ROW Opportunity	4.36	2.94	67%	0.001	0.013
Richmond	2	GIP_00160 / planned_520	Parcel-Based Opportunity (aspirational)	2.35	1.60	68%	0.002	0.012
Richmond	2	Parcel_147723	Parcel-Based Opportunity	0.34	0.27	79%	0.010	0.012
Richmond	2	Parcel_150072	Parcel-Based Opportunity	0.36	0.27	75%	0.010	0.012
Richmond	2	Parcel_211418	Parcel-Based Opportunity	9.02	2.38	26%	0.001	0.012
Richmond	2	Parcel_225370	Parcel-Based Opportunity	25.07	3.05	12%	0.000	0.012
Richmond	2	Parcel_375470	Parcel-Based Opportunity	57.79	1.88	3%	0.000	0.012
Richmond	2	ROW_132	ROW Opportunity	1.65	1.13	68%	0.003	0.012
Richmond	2	ROW_13338	ROW Opportunity	1.01	0.70	69%	0.004	0.012
Richmond	2	ROW_14167	ROW Opportunity	4.84	3.18	66%	0.001	0.012
Richmond	2	ROW_14369	ROW Opportunity	0.27	0.09	33%	0.012	0.012
Richmond	2	ROW_16466	ROW Opportunity	3.17	2.13	67%	0.002	0.012
Richmond	2	ROW_16474	ROW Opportunity	2.85	1.84	65%	0.002	0.012
Richmond	2	ROW_16502	ROW Opportunity	2.06	1.33	65%	0.002	0.012
Richmond	2	ROW_204	ROW Opportunity	4.79	3.07	64%	0.001	0.012
Richmond	2	ROW_253	ROW Opportunity	4.86	3.10	64%	0.001	0.012
Richmond	2	ROW_281	ROW Opportunity	0.38	0.28	74%	0.010	0.012
Richmond	2	ROW_4277	ROW Opportunity	0.43	0.27	63%	0.008	0.012
Richmond	2	ROW_5573	ROW Opportunity	1.06	0.63	59%	0.004	0.012
Richmond	2	ROW_6101	ROW Opportunity	4.34	2.67	62%	0.001	0.012
Richmond	2	ROW_6558	ROW Opportunity	1.87	1.00	53%	0.002	0.012
Richmond	2	ROW_7748	ROW Opportunity	4.34	2.86	66%	0.001	0.012
Richmond	2	ROW_913	ROW Opportunity	0.22	0.10	45%	0.015	0.012
Richmond	2	ROW_9680	ROW Opportunity	2.49	1.58	63%	0.002	0.012
Richmond	2	GIP_00133 / planned_193	Parcel-Based Opportunity (aspirational)	0.97	0.27	28%	0.004	0.011
Richmond	2	GIP_00150 / planned_509	Parcel-Based Opportunity (aspirational)	3.02	2.04	68%	0.002	0.011
Richmond	2	GIP_00151 / planned_510	Parcel-Based Opportunity (aspirational)	2.11	1.43	68%	0.002	0.011
Richmond	2	Parcel_112193	Parcel-Based Opportunity	0.18	0.07	39%	0.016	0.011
Richmond	2	Parcel_116931	Parcel-Based Opportunity	11.22	0.40	4%	0.000	0.011
Richmond	2	Parcel_121594	Parcel-Based Opportunity	3.20	1.53	48%	0.002	0.011
Richmond	2	Parcel_128233	Parcel-Based Opportunity	3.85	2.80	73%	0.001	0.011
Richmond	2	Parcel_145759	Parcel-Based Opportunity	0.34	0.25	74%	0.010	0.011
Richmond	2	Parcel_149557	Parcel-Based Opportunity	0.35	0.25	71%	0.009	0.011
Richmond	2	Parcel_150416	Parcel-Based Opportunity	0.32	0.27	84%	0.011	0.011
Richmond	2	Parcel_152538	Parcel-Based Opportunity	0.37	0.26	70%	0.009	0.011
Richmond	2	Parcel_167393	Parcel-Based Opportunity	4.98	2.79	56%	0.001	0.011
Richmond	2	Parcel_243861	Parcel-Based Opportunity	33.58	2.75	8%	0.000	0.011
Richmond	2	ROW_111	ROW Opportunity	3.22	2.10	65%	0.002	0.011
Richmond	2	ROW_11660	ROW Opportunity	0.34	0.18	53%	0.010	0.011
Richmond	2	ROW_13123	ROW Opportunity	1.20	0.83	69%	0.003	0.011
Richmond	2	ROW_14811	ROW Opportunity	0.29	0.19	66%	0.011	0.011
Richmond	2	ROW_16446	ROW Opportunity	1.36	0.89	65%	0.003	0.011
Richmond	2	ROW_16468	ROW Opportunity	3.10	2.04	66%	0.002	0.011
Richmond	2	ROW_16483	ROW Opportunity	2.83	1.77	63%	0.002	0.011

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Richmond	2	ROW_19203	ROW Opportunity	3.74	2.18	58%	0.001	0.011
Richmond	2	ROW_19688	ROW Opportunity	4.52	2.76	61%	0.001	0.011
Richmond	2	ROW_20469	ROW Opportunity	2.29	1.56	68%	0.002	0.011
Richmond	2	ROW_249	ROW Opportunity	4.36	2.85	65%	0.001	0.011
Richmond	2	ROW_322	ROW Opportunity	4.52	3.02	67%	0.001	0.011
Richmond	2	ROW_3981	ROW Opportunity	2.93	1.87	64%	0.002	0.011
Richmond	2	ROW_4397	ROW Opportunity	3.99	2.39	60%	0.001	0.011
Richmond	2	ROW_9967	ROW Opportunity	5.27	2.53	48%	0.001	0.011
Richmond	2	GIP_00115 / Parcel_135904	Parcel-Based Opportunity (aspirational)	8.78	2.30	26%	0.001	0.010
Richmond	2	planned_490	Planned Unlined Bioretention	3.29	2.20	67%	0.001	0.010
Richmond	2	ROW_106	ROW Opportunity	2.85	1.90	67%	0.002	0.010
Richmond	2	ROW_12330	ROW Opportunity	0.08	0.04	50%	0.032	0.010
Richmond	2	ROW_14072	ROW Opportunity	1.98	1.16	59%	0.002	0.010
Richmond	2	ROW_16841	ROW Opportunity	3.01	1.97	65%	0.002	0.010
Richmond	2	ROW_17073	ROW Opportunity	3.30	2.03	62%	0.002	0.010
Richmond	2	ROW_17322	ROW Opportunity	0.62	0.22	35%	0.005	0.010
Richmond	2	ROW_3014	ROW Opportunity	0.11	0.07	64%	0.025	0.010
Richmond	2	GIP_00110 / Parcel_109368	Parcel-Based Opportunity (aspirational)	3.40	2.17	64%	0.001	0.009
Richmond	2	GIP_00169 / ROW_15040	ROW Opportunity (aspirational)	1.55	0.99	64%	0.003	0.009
Richmond	2	GIP_00172 / ROW_16800	ROW Opportunity (aspirational)	3.21	1.91	60%	0.001	0.008
Richmond	2	GIP_00130 / planned_185	Parcel-Based Opportunity (aspirational)	6.84	1.74	25%	0.001	0.007
Richmond	2	GIP_00134 / planned_467	Parcel-Based Opportunity (aspirational)	6.84	1.74	25%	0.001	0.007
Richmond	2	GIP_00143 / planned_482	Parcel-Based Opportunity (aspirational)	2.83	1.88	66%	0.001	0.007
Richmond	2	GIP_00168 / ROW_12341	ROW Opportunity (aspirational)	2.99	1.76	59%	0.001	0.007
Richmond	2	GIP_00156 / planned_516	Parcel-Based Opportunity (aspirational)	2.16	1.44	67%	0.001	0.006
Richmond	2	GIP_00176 / ROW_2981	ROW Opportunity (aspirational)	2.42	1.41	58%	0.001	0.006
Richmond	2	GIP_00117 / Parcel_137234	Regional Opportunity (aspirational)	2.25	0.99	44%	0.001	0.004
Richmond	2	GIP_00119 / Parcel_140108	Regional Opportunity (aspirational)	1.53	1.06	69%	0.001	0.004
Richmond	2	GIP_00154 / planned_513	Parcel-Based Opportunity (aspirational)	1.69	1.13	67%	0.001	0.004
Richmond	2	GIP_00132 / planned_192	Parcel-Based Opportunity (aspirational)	2.19	0.73	33%	0.001	0.003
Richmond	2	GIP_00137 / planned_474	Parcel-Based Opportunity (aspirational)	2.19	0.73	33%	0.001	0.003
Richmond	2	GIP_00155 / planned_515	Parcel-Based Opportunity (aspirational)	1.39	0.94	68%	0.001	0.003
Richmond	2	GIP_00158 / planned_518	Parcel-Based Opportunity (aspirational)	1.02	0.69	68%	0.001	0.003
Richmond	2	GIP_00163 / planned_525	Parcel-Based Opportunity (aspirational)	1.23	0.77	63%	0.001	0.003
Richmond	2	GIP_00116 / Parcel_136910	Regional Opportunity (aspirational)	0.65	0.27	42%	0.001	0.001
Richmond	2	GIP_00129 / planned_184	Parcel-Based Opportunity (aspirational)	0.01	0.01	100%	0.002	0.000
San Pablo	2	GIP_10057 / ROW_7812	ROW Opportunity (aspirational)	7.18	4.82	67%	0.038	1.114
San Pablo	2	ROW_16921	ROW Opportunity	12.99	7.46	57%	0.008	0.353
San Pablo	2	planned_36	Planned Flood Control Basin	38.92	17.91	46%	0.002	0.256
San Pablo	2	planned_162	Planned Unlined Bioretention	53.22	35.34	66%	0.002	0.246
San Pablo	2	ROW_16388	ROW Opportunity	7.27	5.13	71%	0.010	0.245
San Pablo	2	planned_302	Planned Creek/Marsh Restoration	3.18	1.46	46%	0.019	0.235
San Pablo	2	ROW_20797	ROW Opportunity	1.05	0.93	89%	0.051	0.214
San Pablo	2	ROW_7812	ROW Opportunity	1.06	0.70	66%	0.038	0.162
San Pablo	2	ROW_16905	ROW Opportunity	5.86	3.97	68%	0.007	0.138
San Pablo	2	ROW_16907	ROW Opportunity	7.77	5.24	67%	0.005	0.126
San Pablo	2	ROW_16903	ROW Opportunity	4.25	2.88	68%	0.008	0.119
San Pablo	2	ROW_6559	ROW Opportunity	12.76	7.53	59%	0.003	0.114
San Pablo	2	planned_304	Planned Creek/Marsh Restoration	28.94	14.49	50%	0.002	0.105
San Pablo	2	GIP_10065 / SD_MasterPlan	ROW Opportunity (aspirational)	29.73	19.48	66%	0.001	0.094
San Pablo	2	ROW_4126	ROW Opportunity	0.60	0.43	72%	0.038	0.092
San Pablo	2	ROW_19846	ROW Opportunity	6.35	3.77	59%	0.004	0.076
San Pablo	2	ROW_2698	ROW Opportunity	8.13	5.52	68%	0.003	0.074
San Pablo	2	ROW_2767	ROW Opportunity	1.26	0.75	60%	0.015	0.070
San Pablo	2	GIP_10055 / ROW_11891	ROW Opportunity (aspirational)	7.98	5.43	68%	0.003	0.068
San Pablo	2	ROW_189	ROW Opportunity	3.45	2.35	68%	0.006	0.068
San Pablo	2	ROW_2769	ROW Opportunity	5.25	2.83	54%	0.004	0.063
San Pablo	2	ROW_7219	ROW Opportunity	1.16	0.79	68%	0.014	0.061
San Pablo	2	ROW_9756	ROW Opportunity	3.58	2.30	64%	0.006	0.060
San Pablo	2	ROW_6033	ROW Opportunity	7.68	5.03	65%	0.003	0.055
San Pablo	2	ROW_77	ROW Opportunity	0.39	0.30	77%	0.034	0.052
San Pablo	2	ROW_4227	ROW Opportunity	4.63	2.97	64%	0.004	0.047
San Pablo	2	ROW_192	ROW Opportunity	3.68	2.55	69%	0.004	0.045
San Pablo	2	ROW_18421	ROW Opportunity	9.68	6.08	63%	0.002	0.039
San Pablo	2	ROW_786	ROW Opportunity	5.66	3.27	58%	0.003	0.039
San Pablo	2	ROW_16914	ROW Opportunity	2.49	1.66	67%	0.005	0.037
San Pablo	2	ROW_16014	ROW Opportunity	5.29	3.53	67%	0.003	0.036
San Pablo	2	ROW_18397	ROW Opportunity	2.76	1.78	64%	0.004	0.035
San Pablo	2	ROW_4228	ROW Opportunity	2.60	1.68	65%	0.005	0.035
San Pablo	2	GIP_10056 / ROW_18927	ROW Opportunity (aspirational)	6.33	4.23	67%	0.002	0.033
San Pablo	2	ROW_18924	ROW Opportunity	0.25	0.19	76%	0.033	0.032
San Pablo	2	ROW_16015	ROW Opportunity	1.34	0.88	66%	0.007	0.031
San Pablo	2	ROW_15641	ROW Opportunity	4.30	2.76	64%	0.003	0.030
San Pablo	2	ROW_4668	ROW Opportunity	2.52	1.68	67%	0.004	0.030
San Pablo	2	ROW_12843	ROW Opportunity	2.13	1.52	71%	0.005	0.029
San Pablo	2	ROW_167	ROW Opportunity	6.95	4.63	67%	0.002	0.028
San Pablo	2	ROW_6930	ROW Opportunity	0.90	0.64	71%	0.009	0.028
San Pablo	2	ROW_15350	ROW Opportunity	1.12	0.66	59%	0.007	0.027
San Pablo	2	ROW_19954	ROW Opportunity	3.17	2.07	65%	0.003	0.027
San Pablo	2	ROW_20000	ROW Opportunity	1.97	1.36	69%	0.005	0.027
San Pablo	2	ROW_165	ROW Opportunity	5.88	3.79	64%	0.002	0.026
San Pablo	2	ROW_17042	ROW Opportunity	5.45	3.63	67%	0.002	0.025
San Pablo	2	ROW_11891	ROW Opportunity	1.83	1.26	69%	0.005	0.024
San Pablo	2	ROW_12558	ROW Opportunity	8.04	4.68	58%	0.001	0.023
San Pablo	2	ROW_16390	ROW Opportunity	1.74	1.08	62%	0.005	0.023
San Pablo	2	ROW_4473	ROW Opportunity	1.50	0.88	59%	0.005	0.022
San Pablo	2	Parcel_177888	Regional Opportunity	0.72	0.48	67%	0.009	0.021
San Pablo	2	ROW_12611	ROW Opportunity	2.08	1.46	70%	0.004	0.021
San Pablo	2	ROW_4651	ROW Opportunity	1.36	0.86	63%	0.005	0.021
San Pablo	2	ROW_21121	ROW Opportunity	4.48	2.81	63%	0.002	0.020
San Pablo	2	ROW_52	ROW Opportunity	3.36	1.97	59%	0.002	0.020
San Pablo	2	Parcel_174149	Regional Opportunity	1.30	0.40	31%	0.004	0.019
San Pablo	2	planned_155	Planned Creek/Marsh Restoration	0.31	0.18	58%	0.016	0.019
San Pablo	2	ROW_10495	ROW Opportunity	2.74	1.83	67%	0.003	0.019

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San Pablo	2	ROW_4471	ROW Opportunity	1.20	0.64	53%	0.005	0.019
San Pablo	2	planned_325	Planned Unlined Bioretention	5.36	1.64	31%	0.001	0.018
San Pablo	2	ROW_11364	ROW Opportunity	0.57	0.40	70%	0.009	0.018
San Pablo	2	ROW_11808	ROW Opportunity	0.75	0.49	65%	0.008	0.018
San Pablo	2	ROW_125	ROW Opportunity	4.82	3.00	62%	0.002	0.018
San Pablo	2	ROW_12612	ROW Opportunity	2.24	1.38	62%	0.003	0.018
San Pablo	2	ROW_171	ROW Opportunity	3.11	1.99	64%	0.002	0.018
San Pablo	2	ROW_18927	ROW Opportunity	0.12	0.08	67%	0.039	0.018
San Pablo	2	ROW_65	ROW Opportunity	6.84	4.46	65%	0.001	0.018
San Pablo	2	ROW_13089	ROW Opportunity	1.15	0.81	70%	0.005	0.016
San Pablo	2	ROW_16916	ROW Opportunity	0.68	0.48	71%	0.007	0.016
San Pablo	2	ROW_2963	ROW Opportunity	3.78	2.51	66%	0.002	0.016
San Pablo	2	Parcel_190737	Parcel-Based Opportunity	11.43	3.64	32%	0.001	0.015
San Pablo	2	ROW_108	ROW Opportunity	3.27	2.07	63%	0.002	0.015
San Pablo	2	ROW_14830	ROW Opportunity	3.59	2.40	67%	0.002	0.015
San Pablo	2	ROW_170	ROW Opportunity	4.03	2.63	65%	0.002	0.015
San Pablo	2	ROW_19776	ROW Opportunity	2.43	1.55	64%	0.002	0.014
San Pablo	2	planned_172	Planned Unlined Swale	2.97	1.38	46%	0.002	0.013
San Pablo	2	planned_303	Planned Creek/Marsh Restoration	2.48	1.06	43%	0.002	0.013
San Pablo	2	planned_342	Planned Creek/Marsh Restoration	3.00	1.41	47%	0.002	0.013
San Pablo	2	planned_343	Planned Habitat Restoration	3.01	1.41	47%	0.002	0.013
San Pablo	2	planned_413	Planned Unlined Bioretention	2.97	1.38	46%	0.002	0.013
San Pablo	2	ROW_16389	ROW Opportunity	1.15	0.78	68%	0.004	0.013
San Pablo	2	ROW_3087	ROW Opportunity	3.36	2.28	68%	0.002	0.013
San Pablo	2	ROW_2765	ROW Opportunity	0.45	0.32	71%	0.008	0.012
San Pablo	2	ROW_7319	ROW Opportunity	0.65	0.48	74%	0.006	0.012
San Pablo	2	planned_159	Planned Flood Control	0.94	0.44	47%	0.004	0.011
San Pablo	2	planned_160	Planned Flood Control	0.94	0.44	47%	0.004	0.011
San Pablo	2	ROW_114	ROW Opportunity	2.62	1.66	63%	0.002	0.011
San Pablo	2	ROW_14301	ROW Opportunity	3.39	2.13	63%	0.002	0.011
San Pablo	2	ROW_15832	ROW Opportunity	0.35	0.24	69%	0.009	0.011
San Pablo	2	ROW_20998	ROW Opportunity	2.84	1.84	65%	0.002	0.011
San Pablo	2	ROW_11348	ROW Opportunity	1.55	1.05	68%	0.003	0.010
San Pablo	2	ROW_18545	ROW Opportunity	1.13	0.78	69%	0.003	0.010
San Pablo	2	ROW_604	ROW Opportunity	2.68	1.72	64%	0.002	0.010
San Ramon	2	ROW_16937	ROW Opportunity	14.91	8.01	54%	0.008	0.404
San Ramon	2	ROW_5150	ROW Opportunity	17.26	9.38	54%	0.006	0.361
San Ramon	2	Parcel_1429	Parcel-Based Opportunity	7.08	3.05	43%	0.012	0.288
San Ramon	2	ROW_16938	ROW Opportunity	44.75	26.81	60%	0.002	0.202
San Ramon	2	Parcel_1424	Parcel-Based Opportunity	3.25	2.00	62%	0.016	0.177
San Ramon	2	ROW_13922	ROW Opportunity	5.32	2.95	55%	0.010	0.166
San Ramon	2	ROW_5023	ROW Opportunity	5.42	2.58	48%	0.009	0.161
San Ramon	2	Parcel_74168	Parcel-Based Opportunity	4.28	3.30	77%	0.010	0.154
San Ramon	2	ROW_19140	ROW Opportunity	13.00	6.76	52%	0.003	0.112
San Ramon	2	ROW_560	ROW Opportunity	48.47	23.77	49%	0.001	0.102
San Ramon	2	ROW_14434	ROW Opportunity	2.77	1.52	55%	0.011	0.095
San Ramon	2	ROW_16426	ROW Opportunity	1.39	0.84	60%	0.016	0.077
San Ramon	2	ROW_13536	ROW Opportunity	15.98	8.39	53%	0.002	0.068
San Ramon	2	Parcel_59728	Parcel-Based Opportunity	40.01	15.74	39%	0.001	0.066
San Ramon	2	ROW_9268	ROW Opportunity	1.38	0.82	59%	0.013	0.060
San Ramon	2	ROW_19361	ROW Opportunity	0.95	0.61	64%	0.015	0.052
San Ramon	2	ROW_5451	ROW Opportunity	24.69	12.16	49%	0.001	0.049
San Ramon	2	Parcel_74549	Regional Opportunity	0.89	0.57	64%	0.015	0.048
San Ramon	2	ROW_7238	ROW Opportunity	5.09	2.65	52%	0.003	0.047
San Ramon	2	ROW_2693	ROW Opportunity	27.57	13.61	49%	0.001	0.046
San Ramon	2	ROW_14869	ROW Opportunity	14.80	6.94	47%	0.001	0.043
San Ramon	2	ROW_19759	ROW Opportunity	3.77	1.87	50%	0.004	0.043
San Ramon	2	Parcel_1440	Regional Opportunity	2.20	0.24	11%	0.005	0.039
San Ramon	2	ROW_14030	ROW Opportunity	3.62	2.17	60%	0.004	0.039
San Ramon	2	ROW_20234	ROW Opportunity	3.27	1.89	58%	0.004	0.037
San Ramon	2	ROW_2149	ROW Opportunity	14.02	7.03	50%	0.001	0.036
San Ramon	2	Parcel_54308	Regional Opportunity	1.18	0.65	55%	0.008	0.032
San Ramon	2	Parcel_73130	Regional Opportunity	1.30	0.32	25%	0.007	0.030
San Ramon	2	ROW_2328	ROW Opportunity	0.92	0.30	33%	0.009	0.030
San Ramon	2	ROW_5995	ROW Opportunity	8.73	3.50	40%	0.002	0.030
San Ramon	2	Parcel_1133	Parcel-Based Opportunity	9.50	2.66	28%	0.001	0.025
San Ramon	2	Parcel_56107	Parcel-Based Opportunity	16.67	5.24	31%	0.001	0.024
San Ramon	2	Parcel_56619	Parcel-Based Opportunity	11.96	4.45	37%	0.001	0.021
San Ramon	2	ROW_7425	ROW Opportunity	5.04	2.86	57%	0.002	0.020
San Ramon	2	Parcel_54147	Parcel-Based Opportunity	11.94	4.08	34%	0.001	0.019
San Ramon	2	ROW_11940	ROW Opportunity	5.68	2.26	40%	0.002	0.019
San Ramon	2	ROW_12822	ROW Opportunity	14.95	7.56	51%	0.000	0.019
San Ramon	2	ROW_3355	ROW Opportunity	4.30	1.88	44%	0.002	0.019
San Ramon	2	Parcel_56925	Parcel-Based Opportunity	10.03	3.99	40%	0.001	0.018
San Ramon	2	ROW_5148	ROW Opportunity	0.88	0.42	48%	0.007	0.018
San Ramon	2	ROW_17356	ROW Opportunity	7.97	3.72	47%	0.001	0.016
San Ramon	2	ROW_558	ROW Opportunity	2.14	1.25	58%	0.003	0.016
San Ramon	2	ROW_10130	ROW Opportunity	0.82	0.51	62%	0.005	0.014
San Ramon	2	ROW_10239	ROW Opportunity	6.36	3.22	51%	0.001	0.014
San Ramon	2	ROW_14016	ROW Opportunity	5.41	2.19	40%	0.001	0.014
San Ramon	2	ROW_17472	ROW Opportunity	3.74	1.78	48%	0.002	0.014
San Ramon	2	ROW_19366	ROW Opportunity	7.37	3.52	48%	0.001	0.014
San Ramon	2	ROW_6768	ROW Opportunity	2.05	1.31	64%	0.003	0.013
San Ramon	2	ROW_7432	ROW Opportunity	4.06	1.64	40%	0.001	0.013
San Ramon	2	ROW_18224	ROW Opportunity	5.30	2.56	48%	0.001	0.012
San Ramon	2	ROW_3115	ROW Opportunity	3.26	1.35	41%	0.002	0.012
San Ramon	2	ROW_14638	ROW Opportunity	5.32	2.59	49%	0.001	0.011
San Ramon	2	ROW_20860	ROW Opportunity	3.04	1.64	54%	0.002	0.011
San Ramon	2	ROW_6884	ROW Opportunity	4.99	2.61	52%	0.001	0.011
San Ramon	2	ROW_3070	ROW Opportunity	4.82	2.40	50%	0.001	0.010
San Ramon	2	ROW_3632	ROW Opportunity	4.57	2.38	52%	0.001	0.010
Unincorporated	2	planned_32	Planned Unlined Bioretention	460.01	217.16	47%	0.005	8.311
Unincorporated	2	Parcel_234358	Regional Opportunity	437.95	212.62	49%	0.005	8.269
Unincorporated	2	planned_426	Planned Creek/Marsh Restoration	11.44	3.32	29%	0.012	0.573

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Unincorporated	2	Parcel_253891	Parcel-Based Opportunity	31.99	2.26	7%	0.005	0.466
Unincorporated	2	ROW_18993	ROW Opportunity	4.03	1.35	33%	0.019	0.330
Unincorporated	2	Parcel_257160	Regional Opportunity	27.71	15.65	56%	0.004	0.312
Unincorporated	2	planned_928	Planned Unlined Bioretention	12.72	5.77	45%	0.006	0.285
Unincorporated	2	ROW_326	ROW Opportunity	5.29	3.11	59%	0.012	0.232
Unincorporated	2	planned_845	Planned Unlined Bioretention	9.56	4.74	50%	0.006	0.193
Unincorporated	2	planned_1251	Planned Unlined Bioretention	6.65	3.60	54%	0.008	0.180
Unincorporated	2	ROW_4127	ROW Opportunity	4.13	2.65	64%	0.012	0.180
Unincorporated	2	planned_134	Planned Unlined Bioretention	7.12	4.36	61%	0.007	0.172
Unincorporated	2	planned_1128	Planned Unlined Bioretention	18.84	6.19	33%	0.003	0.171
Unincorporated	2	planned_813	Planned Unlined Bioretention	6.43	3.65	57%	0.007	0.166
Unincorporated	2	ROW_336	ROW Opportunity	1.33	0.82	62%	0.031	0.166
Unincorporated	2	ROW_18095	ROW Opportunity	1.02	0.74	73%	0.040	0.164
Unincorporated	2	planned_834	Planned Unlined Bioretention	6.15	3.59	58%	0.007	0.160
Unincorporated	2	planned_1158	Planned Unlined Bioretention	4.47	2.62	59%	0.008	0.127
Unincorporated	2	Parcel_231873	Regional Opportunity	4.42	2.78	63%	0.008	0.126
Unincorporated	2	planned_922	Planned Unlined Bioretention	4.80	2.79	58%	0.007	0.124
Unincorporated	2	ROW_7003	ROW Opportunity	3.09	0.99	32%	0.009	0.116
Unincorporated	2	planned_910	Planned Unlined Bioretention	0.77	0.41	53%	0.030	0.098
Unincorporated	2	ROW_3884	ROW Opportunity	4.07	2.27	56%	0.007	0.098
Unincorporated	2	planned_921	Planned Unlined Bioretention	3.60	2.10	58%	0.007	0.093
Unincorporated	2	planned_944	Planned Unlined Bioretention	7.39	1.26	17%	0.003	0.091
Unincorporated	2	ROW_15893	ROW Opportunity	2.97	1.65	56%	0.008	0.078
Unincorporated	2	ROW_18461	ROW Opportunity	1.29	0.56	43%	0.015	0.077
Unincorporated	2	ROW_7816	ROW Opportunity	1.63	0.34	21%	0.011	0.074
Unincorporated	2	planned_948	Planned Unlined Bioretention	2.32	1.60	69%	0.009	0.072
Unincorporated	2	planned_951	Planned Unlined Bioretention	2.22	1.53	69%	0.008	0.068
Unincorporated	2	planned_715	Planned Unlined Bioretention	4.86	2.45	50%	0.004	0.067
Unincorporated	2	Parcel_373409	Regional Opportunity	46.53	17.47	38%	0.001	0.061
Unincorporated	2	ROW_9938	ROW Opportunity	0.86	0.53	62%	0.019	0.061
Unincorporated	2	Parcel_212559	Regional Opportunity	2.98	1.31	44%	0.005	0.057
Unincorporated	2	planned_1159	Planned Unlined Bioretention	2.41	1.29	54%	0.007	0.057
Unincorporated	2	planned_824	Planned Unlined Bioretention	2.98	1.31	44%	0.005	0.057
Unincorporated	2	Parcel_234658	Regional Opportunity	1.95	1.27	65%	0.008	0.056
Unincorporated	2	planned_1120	Planned Unlined Bioretention	2.72	1.22	45%	0.006	0.056
Unincorporated	2	planned_932	Planned Unlined Bioretention	1.95	1.27	65%	0.008	0.056
Unincorporated	2	ROW_14235	ROW Opportunity	1.05	0.63	60%	0.013	0.055
Unincorporated	2	planned_1145	Planned Unlined Bioretention	1.80	1.30	72%	0.008	0.053
Unincorporated	2	Parcel_238562	Regional Opportunity	12.03	6.43	53%	0.002	0.052
Unincorporated	2	planned_950	Planned Unlined Bioretention	1.69	1.17	69%	0.008	0.052
Unincorporated	2	Parcel_233114	Regional Opportunity	1.76	1.09	62%	0.008	0.050
Unincorporated	2	Parcel_227066	Regional Opportunity	1.84	0.99	54%	0.007	0.047
Unincorporated	2	Parcel_183600	Regional Opportunity	2.16	1.04	48%	0.006	0.046
Unincorporated	2	planned_1234	Planned Unlined Bioretention	2.16	1.04	48%	0.006	0.046
Unincorporated	2	planned_965	Planned Unlined Bioretention	6.89	2.96	43%	0.002	0.042
Unincorporated	2	ROW_8370	ROW Opportunity	3.43	2.12	62%	0.004	0.042
Unincorporated	2	Parcel_227359	Regional Opportunity	1.61	0.86	53%	0.007	0.041
Unincorporated	2	planned_949	Planned Unlined Bioretention	1.37	0.93	68%	0.008	0.041
Unincorporated	2	planned_1160	Planned Unlined Bioretention	1.68	0.89	53%	0.007	0.040
Unincorporated	2	ROW_17780	ROW Opportunity	2.96	1.24	42%	0.004	0.040
Unincorporated	2	planned_18	Planned Lined Bioretention	1.52	0.87	57%	0.007	0.038
Unincorporated	2	ROW_10003	ROW Opportunity	1.69	0.37	22%	0.006	0.036
Unincorporated	2	planned_1295	Planned Unlined Bioretention	1.25	0.75	60%	0.008	0.035
Unincorporated	2	planned_13	Planned Lined Bioretention	2.14	0.72	34%	0.005	0.035
Unincorporated	2	planned_1161	Planned Unlined Bioretention	1.41	0.66	47%	0.006	0.032
Unincorporated	2	Parcel_218901	Regional Opportunity	1.82	1.15	63%	0.005	0.030
Unincorporated	2	planned_829	Planned Unlined Bioretention	1.82	1.15	63%	0.005	0.030
Unincorporated	2	planned_927	Planned Unlined Bioretention	1.35	0.61	45%	0.006	0.030
Unincorporated	2	Parcel_251699	Regional Opportunity	1.25	0.63	50%	0.007	0.029
Unincorporated	2	Parcel_40021	Regional Opportunity	17.61	7.00	40%	0.001	0.029
Unincorporated	2	planned_1138	Planned Unlined Bioretention	0.92	0.66	72%	0.009	0.029
Unincorporated	2	planned_1144	Planned Unlined Bioretention	0.89	0.65	73%	0.009	0.029
Unincorporated	2	planned_890	Planned Unlined Bioretention	1.14	0.66	58%	0.007	0.029
Unincorporated	2	planned_714	Planned Unlined Bioretention	18.57	6.68	36%	0.001	0.028
Unincorporated	2	planned_818	Planned Unlined Bioretention	1.37	0.61	45%	0.006	0.028
Unincorporated	2	ROW_302	ROW Opportunity	4.48	2.58	58%	0.002	0.027
Unincorporated	2	planned_1132	Planned Unlined Bioretention	1.16	0.53	46%	0.006	0.024
Unincorporated	2	planned_955	Planned Unlined Bioretention	0.82	0.54	66%	0.008	0.024
Unincorporated	2	Parcel_11752	Regional Opportunity	10.67	2.59	24%	0.001	0.023
Unincorporated	2	Parcel_225283	Regional Opportunity	10.44	5.50	53%	0.001	0.023
Unincorporated	2	planned_1249	Planned Unlined Bioretention	8.27	3.84	46%	0.001	0.023
Unincorporated	2	planned_947	Planned Unlined Bioretention	0.86	0.49	57%	0.008	0.023
Unincorporated	2	planned_1297	Planned Unlined Bioretention	0.62	0.12	19%	0.010	0.021
Unincorporated	2	planned_1188	Planned Unlined Bioretention	2.05	0.21	10%	0.003	0.020
Unincorporated	2	planned_843	Planned Unlined Bioretention	0.97	0.44	45%	0.006	0.020
Unincorporated	2	planned_1056	Planned Unlined Bioretention	2.73	1.12	41%	0.003	0.019
Unincorporated	2	planned_19	Planned Lined Bioretention	0.94	0.40	43%	0.006	0.019
Unincorporated	2	planned_926	Planned Unlined Bioretention	0.85	0.39	46%	0.006	0.019
Unincorporated	2	Parcel_190589	Regional Opportunity	7.24	4.65	64%	0.001	0.018
Unincorporated	2	Parcel_190676	Regional Opportunity	2.81	1.39	49%	0.002	0.018
Unincorporated	2	planned_1148	Planned Unlined Bioretention	0.57	0.42	74%	0.009	0.018
Unincorporated	2	planned_1248	Planned Unlined Bioretention	2.81	1.39	49%	0.002	0.018
Unincorporated	2	Parcel_134621	Regional Opportunity	5.52	4.38	79%	0.001	0.017
Unincorporated	2	Parcel_18653	Regional Opportunity	10.01	4.18	42%	0.001	0.017
Unincorporated	2	Parcel_211551	Regional Opportunity	0.70	0.38	54%	0.007	0.017
Unincorporated	2	Parcel_248771	Regional Opportunity	8.72	4.17	48%	0.001	0.017
Unincorporated	2	Parcel_260347	Regional Opportunity	13.69	3.71	27%	0.001	0.017
Unincorporated	2	planned_825	Planned Unlined Bioretention	0.70	0.38	54%	0.007	0.017
Unincorporated	2	planned_854	Planned Unlined Bioretention	0.73	0.37	51%	0.006	0.017
Unincorporated	2	Parcel_185725	Regional Opportunity	0.67	0.37	55%	0.007	0.016
Unincorporated	2	Parcel_204352	Regional Opportunity	0.50	0.37	74%	0.010	0.016
Unincorporated	2	Parcel_214683	Regional Opportunity	0.82	0.32	39%	0.005	0.016
Unincorporated	2	Parcel_234760	Regional Opportunity	10.17	3.71	36%	0.001	0.016
Unincorporated	2	Parcel_261278	Regional Opportunity	7.47	4.01	54%	0.001	0.016

Jurisdiction	Permit	Project ID	Project Type	Area (Acres)	Impervious Area (Acres)	Percent Impervious	PCBs Yield (g/acre)	PCBs Mass reduced (g)
Unincorporated	2	Parcel_363962	Regional Opportunity	8.03	3.75	47%	0.001	0.016
Unincorporated	2	planned_1099	Planned Unlined Bioretention	7.47	4.01	54%	0.001	0.016
Unincorporated	2	planned_1232	Planned Unlined Bioretention	0.67	0.37	55%	0.007	0.016
Unincorporated	2	planned_817	Planned Unlined Bioretention	9.30	3.93	42%	0.001	0.016
Unincorporated	2	planned_827	Planned Unlined Bioretention	0.82	0.32	39%	0.005	0.016
Unincorporated	2	Parcel_221126	Regional Opportunity	7.83	3.50	45%	0.001	0.015
Unincorporated	2	Parcel_259820	Regional Opportunity	8.72	3.46	40%	0.001	0.015
Unincorporated	2	Parcel_373937	Regional Opportunity	9.10	4.03	44%	0.001	0.015
Unincorporated	2	planned_1047	Planned Unlined Bioretention	4.54	1.79	39%	0.002	0.015
Unincorporated	2	planned_820	Planned Unlined Bioretention	0.59	0.34	58%	0.007	0.015
Unincorporated	2	Parcel_236835	Regional Opportunity	11.70	2.62	22%	0.001	0.014
Unincorporated	2	Parcel_25124	Regional Opportunity	10.84	2.77	26%	0.001	0.014
Unincorporated	2	Parcel_260232	Regional Opportunity	0.64	0.31	48%	0.006	0.014
Unincorporated	2	Parcel_262723	Regional Opportunity	10.53	3.23	31%	0.001	0.014
Unincorporated	2	planned_838	Planned Unlined Bioretention	0.51	0.35	69%	0.008	0.014
Unincorporated	2	Parcel_180679	Regional Opportunity	0.58	0.29	50%	0.007	0.013
Unincorporated	2	Parcel_368650	Regional Opportunity	7.51	3.18	42%	0.001	0.013
Unincorporated	2	planned_1065	Planned Unlined Bioretention	7.95	2.46	31%	0.001	0.013
Unincorporated	2	planned_837	Planned Unlined Bioretention	0.44	0.28	64%	0.008	0.013
Unincorporated	2	planned_905	Planned Unlined Bioretention	0.92	0.52	57%	0.004	0.013
Unincorporated	2	ROW_19675	ROW Opportunity	4.36	2.48	57%	0.001	0.013
Unincorporated	2	Parcel_186716	Regional Opportunity	0.53	0.28	53%	0.007	0.012
Unincorporated	2	Parcel_373408	Regional Opportunity	12.02	4.26	35%	0.000	0.012
Unincorporated	2	planned_1231	Planned Unlined Bioretention	0.53	0.28	53%	0.007	0.012
Unincorporated	2	Parcel_20770	Regional Opportunity	7.74	2.72	35%	0.001	0.011
Unincorporated	2	Parcel_234439	Parcel-Based Opportunity	0.38	0.25	66%	0.009	0.011
Unincorporated	2	planned_1026	Planned Unlined Bioretention	7.74	2.72	35%	0.001	0.011
Unincorporated	2	planned_1134	Planned Unlined Bioretention	0.23	0.11	48%	0.013	0.011
Unincorporated	2	planned_1281	Planned Unlined Bioretention	0.34	0.25	74%	0.010	0.011
Unincorporated	2	planned_839	Planned Unlined Bioretention	0.41	0.29	71%	0.008	0.011
Unincorporated	2	planned_909	Planned Unlined Bioretention	1.48	0.76	51%	0.003	0.011
Unincorporated	2	planned_953	Planned Unlined Bioretention	0.38	0.06	16%	0.008	0.011
Unincorporated	2	ROW_10414	ROW Opportunity	5.41	0.94	17%	0.001	0.011
Unincorporated	2	Parcel_244216	Regional Opportunity	2.77	1.14	41%	0.002	0.010
Unincorporated	2	planned_1029	Planned Unlined Bioretention	0.89	0.19	21%	0.003	0.010
Unincorporated	2	planned_1055	Planned Unlined Bioretention	2.12	1.35	64%	0.002	0.010
Unincorporated	2	planned_1176	Planned Unlined Bioretention	0.40	0.23	58%	0.008	0.010
Walnut Creek	2	GIP_10032 / planned_213	Parcel-Based Opportunity (planned)	8.96	6.84	76%	0.010	0.302
Walnut Creek	2	GIP_10042 / ROW_12633	ROW Opportunity (planned)	5.92	2.96	50%	0.009	0.209
Walnut Creek	2	GIP_10049 / Parcel_120162	Parcel-Based Opportunity (planned)	4.71	3.32	70%	0.009	0.160
Walnut Creek	2	GIP_10044 / ROW_17453	ROW Opportunity (planned)	8.19	4.13	50%	0.006	0.156
Walnut Creek	2	GIP_10047 / ROW_1225	ROW Opportunity (planned)	4.45	3.00	67%	0.010	0.149
Walnut Creek	2	GIP_10024	Regional Opportunity (planned)	15.64	4.86	31%	0.003	0.123
Walnut Creek	2	ROW_13263	ROW Opportunity	1.31	0.40	31%	0.019	0.104
Walnut Creek	2	GIP_10052	Regional Opportunity (planned)	180.53	56.43	31%	0.000	0.073
Walnut Creek	2	GIP_10048 / Parcel_113464	Regional Opportunity (planned)	1.99	1.41	71%	0.010	0.072
Walnut Creek	2	GIP_10051	Regional Opportunity (planned)	68.22	18.26	27%	0.000	0.051
Walnut Creek	2	GIP_10040 / Parcel_49020	Regional Opportunity (planned)	1.77	1.13	64%	0.008	0.049
Walnut Creek	2	GIP_10038 / Parcel_128594	Regional Opportunity (planned)	2.40	0.93	39%	0.005	0.043
Walnut Creek	2	GIP_10041 / Parcel_129611	Regional Opportunity (planned)	2.32	0.89	38%	0.005	0.041
Walnut Creek	2	GIP_10037 / Parcel_136845	Regional Opportunity (planned)	1.46	0.72	49%	0.007	0.036
Walnut Creek	2	GIP_10053	Regional Opportunity (planned)	21.50	7.65	36%	0.001	0.034
Walnut Creek	2	GIP_10025	Regional Opportunity (planned)	10.70	3.02	28%	0.001	0.015
Walnut Creek	2	GIP_10045 / Parcel_45368	Parcel-Based Opportunity (planned)	0.42	0.33	79%	0.010	0.014
Walnut Creek	2	GIP_10050	Regional Opportunity (planned)	6.92	2.68	39%	0.001	0.011
Walnut Creek	2	GIP_10046 / Parcel_111176	Parcel-Based Opportunity (planned)	0.28	0.19	68%	0.010	0.010
Walnut Creek	2	GIP_10028	Regional Opportunity (planned)	6.82	1.76	26%	0.001	0.008
Walnut Creek	2	GIP_10022 / ROW_13709	ROW Opportunity (planned)	6.59	2.78	42%	0.000	0.007
Walnut Creek	2	GIP_10029	Regional Opportunity (planned)	6.59	1.71	26%	0.000	0.007
Walnut Creek	2	GIP_10021 / ROW_13708	ROW Opportunity (planned)	6.65	2.50	38%	0.000	0.006
Walnut Creek	2	GIP_10023	Regional Opportunity (planned)	25.68	4.00	16%	0.000	0.004
Walnut Creek	2	GIP_10026	Regional Opportunity (planned)	159.56	6.60	4%	0.000	0.003
Walnut Creek	2	GIP_10027	Regional Opportunity (planned)	3.45	0.46	13%	0.000	0.002
Walnut Creek	2	GIP_10039 / Parcel_125621	Regional Opportunity (planned)	1.73	0.48	28%	0.001	0.002
Walnut Creek	2	GIP_10043 / Parcel_135339	Regional Opportunity (planned)	1.32	0.02	2%	0.000	0.000

ROADMAP OF FUNDING SOLUTIONS
FOR SUSTAINABLE STREETS

Prepared by the
Bay Area Stormwater Management Agencies Association
for the Urban Greening Bay Area Initiative
Final April 26, 2018

URBAN GREENING BAY AREA

APPENDIX C

Credits

This Roadmap of Funding Solutions for Sustainable Streets was prepared as part of the Regional Roundtable on Sustainable Streets led by the Bay Area Stormwater Management Agencies Association (BASMAA) with grant funding from the US Environmental Protection Agency's San Francisco Bay Water Quality Improvement Fund, as part of the Urban Greening Bay Area initiative managed by the San Francisco Estuary Partnership.

BASMAA wishes to acknowledge the following individuals, agencies and firms that developed the Roadmap:

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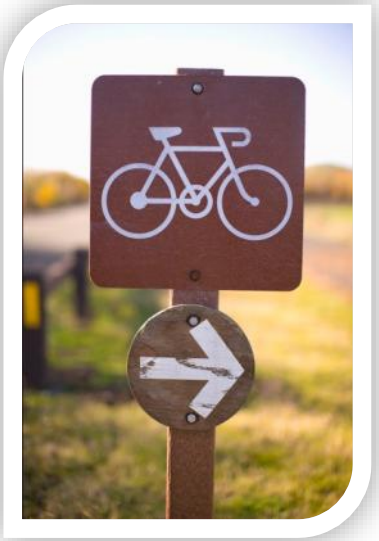
Additional Reviewers

This Roadmap incorporates input provided by attendees of the September 19, 2017, Regional Roundtable, as identified in Appendix G, List of Participating Agencies and Organizations.

Photo and Image Credits

Several images included in the Roadmap were provided the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) or by the following consultants to SMCWPPP, Nevue Ngan Associates and Bottomley Urban Design.

Contents



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Executive Summary

This report, the Roadmap, was developed to identify and remedy obstacles to funding for Sustainable Street projects, which are defined as **projects that include both Complete Street improvements and green stormwater infrastructure, and that are maintained in a state of good or fair condition.**

The specific actions included in this Roadmap are designed to improve the capacity – both statewide and in the San Francisco Bay Area -- to fund Sustainable Street projects that support compliance with regional permit requirements to reduce pollutant loading to San Francisco Bay, while also helping to achieve the region's greenhouse gas reduction targets.

Sustainable Street in the City of San Mateo; stormwater runoff flows into a "bioretention area" or rain garden that reduces the crossing length for pedestrians near a local school (Source: SMCWPPP).

Challenges for Sustainable Streets

To date, Sustainable Streets have faced funding obstacles due to the restrictions of various funding programs – which may not recognize the potential for overall cost savings that local agencies may achieve through multi-benefit Sustainable Streets projects. Some transportation grants may fund only some aspects of a Sustainable Street project, while resource grants may fund other aspects – and assembling multiple funding sources brings new challenges and costs to a project.

Financial Needs and Benefits

Over the next 20 to 30 years, cities throughout the Bay Area, and in other parts of California, are required to invest in widespread construction of infrastructure projects that remove pollutants from stormwater runoff, in order to achieve water quality goals for San Francisco Bay. The cost is anticipated to parallel the costs to meet similar requirements in other parts of the state. For example, City of Los Angeles alone, over the next 20 to 30 years, has estimated that $7 to $9 billion dollars will be needed to implement the city's Water Quality Compliance Master Plan for Urban Runoff (Farfsing and Watson 2014). Sustainable Streets are designed to cost effectively deliver multiple benefits, including: climate change mitigation, air quality improvement, water quality improvement, localized flood control, and community benefits.

Specific Actions to Address Challenges

This Roadmap presents specific actions intended to ease the financial burden local governments are facing by maximizing available resources and/or identifying new funding streams. The specific actions to fund Sustainable Streets are scheduled for the following timeframes:

- **Immediate actions**, such as addressing Sustainable Streets in grant solicitations
- **Short-term actions**, such as reviewing policies for better ways to fund Sustainable Streets
- **Long-term solutions**, including legislative engagement and/or advocacy regarding Sustainable Street

This Sustainable Street project in Union City incorporates a bioretention area and pervious paving with curb extensions (Source: Horizon).

How You Can Help

Public agencies that fund transportation, water, and climate change mitigation and adaptation investments are collaborating to implement specific actions related to their funding programs. Implementation agencies and non-governmental organizations (NGOs) are leading additional specific actions to fund Sustainable Streets, including legislative engagement and/or advocacy. A Roadmap Committee will continue to provide support throughout the implementation of the Roadmap, to spread the word about successes achieved when there is investment in these recommended actions.

A sample of specific actions to fund Sustainable Streets is provided below:

Specific Action No.	Description	Lead Entity	Support Entity(ies)
1-2	Update One Bay Area Grant Guidance - Develop guidance clarifying eligibility of green stormwater infrastructure (GSI) elements in federally funded (One Bay Area Grant - OBAG) transportation projects, for inclusion in guidance materials that MTC will provide county's for OBAG's third round of funding.	Metropolitan Transportation Commission (MTC)	Caltrans
1-4	Identify Opportunities to More Fully Fund Sustainable Streets - Each identified agency will review policy documents for its applicable grant program(s) to identify opportunities to more fully fund Sustainable Streets projects, using a checklist provided in Appendix D.	Funding agencies identified on page 7	None
1-7	Develop State Legislative Program - Develop and implement an initiative to inform and/or influence future state propositions, related legislation and incorporation into state law – that provides a clear path for full eligibility of Sustainable Streets, and coordinates application requirements among grant programs that fund Sustainable Streets.	San Francisco Estuary Partnership	BASMAA, State Water Board, Regional Water Board Trust for Public Land, Save the Bay

1. Purpose and Need

Funding Sustainable Streets

The purpose of this Roadmap is to identify specific actions to fund Sustainable Street projects, which are defined as **projects that include both Complete Streets improvements and green stormwater infrastructure, such as rain gardens and pervious paving, and that are maintained in a state of good or fair condition,** based on the Good-to-Poor rating system adopted by the California Transportation Commission (Caltrans 2016). The funding of Sustainable Streets projects has proven challenging, due to the tendency for various funding programs to focus only on one or a few of the multiple benefits provided by Sustainable Streets.

This Sustainable Street in City of San Mateo incorporates a bicycle land and a "bioretention area" or rain garden that removes pollutants from stormwater runoff (Source: SMCWPPP).

Investments in Sustainable Streets will help meet needs for stormwater permit compliance, greenhouse gas (GHG) reduction, and road maintenance. Sustainable Streets support stormwater compliance, by addressing the water quality impacts of cars and trucks, the fact that stormwater runoff from adjacent properties is often routed to roadways, and the integration of storm drain systems into streets and roads. Sustainable Streets sequester carbon and encourage alternative modes of travel, supporting the San Francisco Bay Area's GHG reduction targets. Sustainable Streets can help maintain roadways in good or fair condition, which is important for maintaining the safety of the traveling public, and has been challenging, as gas tax revenues have declined, due to improved vehicle efficiency and efforts to reduce single occupancy vehicle travel. It may be possible to achieve economies of scale by including active transportation, pavement rehabilitation, and water grant funding to fully fund a Sustainable Streets project.

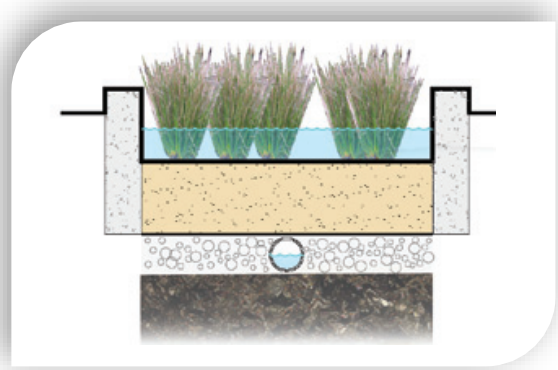
This Roadmap is an output of a Regional Roundtable process that convened meetings of representatives from federal, state, regional, and local agencies to identify and seek to resolve obstacles to funding Sustainable Streets projects. The specific actions for funding Sustainable Streets listed in Section 2 are based primarily on information presented at meetings of the Regional Roundtable. Agencies and organizations participating in the Regional Roundtable were provided an opportunity to review and comment on the Roadmap. There is a close correspondence between the agencies and organizations participating in the Roadmap and the Regional Roundtable. More information on the Regional Roundtable is available at http://www.sfestuary.org/urban-greening-bay-area/#planning.

Financial Needs and Benefits

Municipalities throughout the Bay Area are required to change the way they manage stormwater runoff, due to green infrastructure planning requirements in the Municipal Regional Stormwater Permit (San Francisco Bay Regional Water Quality Control Board 2015), as well as green infrastructure components of the San Francisco Public Utilities Commission's 20-year Sewer System Improvement Program (SFPUC 2017). These planning processes call for a transition from traditional "gray" infrastructure to an increase in green stormwater infrastructure, in order to improve water quality in San Francisco Bay over the coming decades.

Green stormwater infrastructure is designed to mimic natural processes. This photo shows how landscaped bioretention areas help to detain and slow the flow of stormwater runoff to the storm drain system (Source: Nevue Ngan).

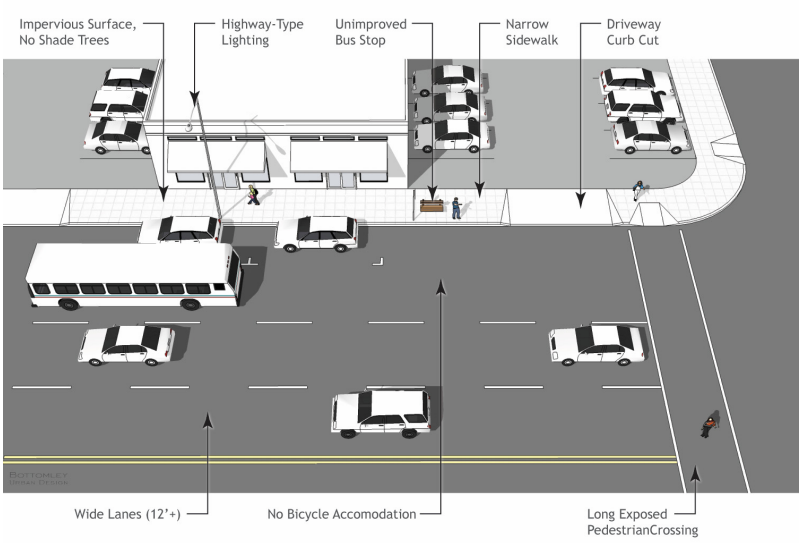
The cost is anticipated to parallel costs to meet similar requirements in Southern California. The City of Los Angeles alone, over the next 20 to 30 years, estimated $7 to $9 billion will be needed to implement the city's Water Quality Compliance Master Plan for Urban Runoff (Farfsing and Watson 2014).



Cut-away view of a bioretention area. Natural processes remove pollutants from stormwater runoff as it filters through biotreatment soil. Some of the treated water will infiltrate into native soils; some will enter the underdrain and go to the storm drain

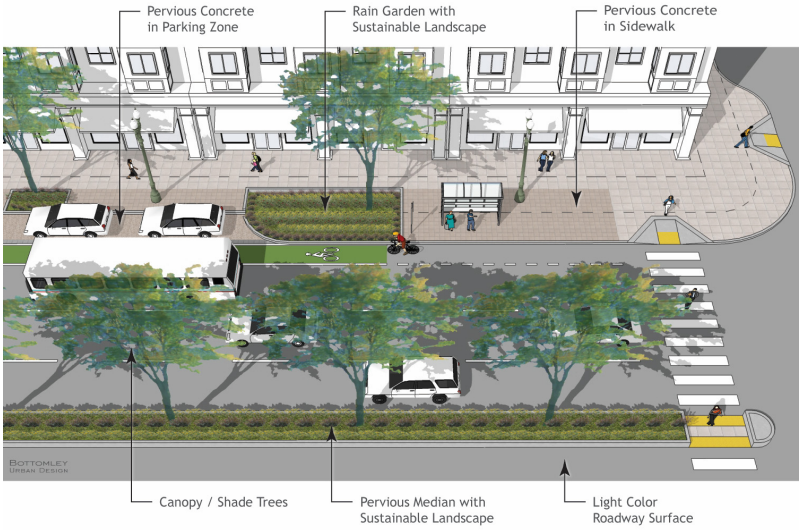
Union City prepared a preliminary capital cost estimate in the range of $72 million to $126 million, in 2017 dollars, to implement GSI in accordance with the estimated local share of mercury and PCB pollutant load reduction targets (Ruark 2017). With a population of 72,155 and geographical area of 19.3 square miles, representing just 1.5 percent of the Bay Area's urbanized land, Union City's GSI program represents a small percentage of the anticipated capital investments that will be needed from the 76 local agencies subject to the Municipal Regional Stormwater Permit to comply with the GSI planning requirements. Efforts to further quantify the need for investment in GI are currently underway as part of developing jurisdiction-specific GI Plans.

In the coming decades, state and regional transportation agencies are seeking to mitigate climate change and improve mobility in the Bay Area through large-scale funding of transportation projects that emphasize bicycle, pedestrian, and public transit facilities. The Transportation Investment Strategy of the Draft Plan Bay Area 2040 anticipates over $5 billion in funding for complete streets and active transportation projects over the next 24 years (MTC 2017d). The following sequence of three images shows how Complete Streets plus GSI equal Sustainable Streets.



Conventional Street

Complete Street



Complete Street
+
Green Infrastructure
=
Sustainable Street

Source: Bottomley Urban Design

Sustainable Streets are designed to cost effectively deliver multiple benefits, including:

- **Climate change mitigation** – Sustainable street designs encourage bicycling, walking, and the use of public transportation to help reduce carbon emissions from motor vehicles. Trees and landscaping are planted to sequester carbon.
- **Air quality improvement** – By encouraging bicycling, walking, and the use of public transportation, Sustainable Streets can help reduce particulate matter and other pollutants from motor vehicles that can adversely affect human health.
- **Water quality improvement** – Pollutants in stormwater runoff are removed by capturing and treating stormwater in specially designed landscape areas.
- **Localized flood control** – Directing stormwater runoff to landscaping can help address local flooding problems.
- **Water supply reliability** – In areas that rely on groundwater supplies, directing stormwater runoff to landscaping can help support water supply reliability by recharging groundwater.
- **Community benefits** – Planting trees and landscaping enhances public spaces, which can increase property values and improve community cohesiveness, improving quality of life and better accommodating an increasing number of Bay Area residents.
- **Public health** – Construction of bicycle and pedestrian facilities encourages active living.
- **Climate change adaptation** – Green infrastructure designs can help improve the resilience of transportation infrastructure to withstand high intensity storms and rising sea levels.

Challenges to Funding Sustainable Streets

Because each funding programs has historically focused on only one or a few of the multiple benefits provided by Sustainable Streets, local agencies have encountered challenges in funding Sustainable Streets projects including:

- **Ineligible components of Sustainable Streets projects:** Green infrastructure may be ineligible for funding by transportation grants; transportation facilities may be ineligible for funding by resource agency grants.
- **Ineligible activities:** Some grants may not cover all project phases, such as planning or short-term maintenance.
- **Inability to use other grants as matching funds:** Matching funds must cover eligible activities; therefore, grant funding for GSI components of a Sustainable Street project may not “count” as a match for a transportation grant, and vice versa.
- **Funding cycles of grants are not coordinated:** Projects that must assemble funding from multiple grants may have difficulty finding two applicable grants that will be available at the same time.

- **Costs of tracking and applying for grants:** Local agencies often lack the resources to track grant opportunities, prepare applications, and "repackage" the same project to apply for multiple grants.
- **Costs of administering and reporting on grants:** Obtaining multiple grants for a single project adds substantial administrative requirements due to separate record-keeping and reporting.
- **Scoring approaches may penalize multiple-benefit projects:** Sustainable Streets projects may not score competitively for grants that seek the most cost-effective transportation solution, due to the inclusion of ineligible costs.

Case Studies: Opportunities to Improve Funding of Sustainable Streets

At the Regional Roundtable meeting on May 23, 2017, two case studies were presented, identifying opportunities to improve funding of Sustainable Streets under the Metropolitan Transportation Committee's One Bay Area Grant (OBAG) program and the State Water Resources Control Board's Storm Water Grant Program (SWGP). These case studies led to the development of several Specific Actions included in the Roadmap. Appendix E presents the results of the review of policy documents for these grant programs, using a checklist format.

This Roadmap has been developed to address these challenges, in order to achieve funding of Sustainable Streets projects.

2. Specific Actions

This section of the Roadmap identifies Specific Actions for implementation by federal, state, regional, and local agencies – including agencies in the water resources and transportation sectors – to improve conditions for funding Sustainable Street projects. All agencies face certain limitations in their roles. For example, transportation agencies are subject to various requirements to specifically focus on addressing transportation needs, while water resource agencies must address their own legislative mandates. The Specific Actions described below seek to maximize collaboration across sectors, as possible given the limitations of the respective agencies' roles.

Categories and Timeframes for Specific Actions

The Roadmap includes three pathways, based on three categories of specific actions to fund Sustainable Streets, as follows:

- Pathway 1, Prioritize Sustainable Streets in Funding Sources
- Pathway 2, Improve Conditions for Projects that Are Funded by Multiple Grants
- Pathway 3, Additional Funding Options

Each specific action will be conducted by a lead entity, and, in some cases, supporting entities. The specific actions included in each pathway are organized by timeframe (immediate, short-term, and long-term). Some of the Specific Actions have statewide implications, and some have potential to involve Integrated Regional Water Management groups. Therefore, the Roadmap Committee may coordinate some Specific Actions with applicable provisions of the California Water Action Plan, and the Committee may recommend reaching out to local agencies from other regions and/or IRWM groups to collaborate on some Specific Actions. The Roadmap Committee may also identify needs for workgroups to implement various Specific Actions. Immediate tasks are anticipated to be initiated in 2018, and are likely to conclude in 2019. Short-term tasks are anticipated to be initiated in 2019, and are likely to conclude in 2020. Long-term tasks may begin as early as 2019 and are likely to continue for a period of years. Within each timeframe, actions are alphabetized by lead entity name.

Pathway 1: Prioritize Sustainable Streets in Funding Sources

Pathway 1 seeks to prioritize Sustainable Street project activities in funding sources managed by both transportation and resource agencies. The goal of this pathway is to maximize the ability of each funding source to fund both transportation and green stormwater infrastructure improvements -- reflecting the integration of transportation and resource benefits in Sustainable Streets.

Table 1 lists specific actions and participation by agencies and organizations to prioritize Sustainable Streets in funding sources. A number of the actions are specific to the State Water Resources Control Board's Storm Water Grant Program (SWGP) and the Metropolitan Transportation Commission's One Bay Area Grant Program (OBAG), based on case studies that were prepared for these programs as part of the Regional Roundtable on Sustainable Streets. Other funding agencies will conduct similar reviews of applicable grant programs, under Specific Action 1-4.

Specific Action 1-7, Develop State Legislative Program, does not specify particular legislative initiatives, which will be identified as part of this Specific Action. The State Legislative Program may recommend requirements for interagency collaboration and/or participation by key agencies in actions that promote widespread implementation of Sustainable Streets, recognizing that requirements have been needed for interagency collaboration such as the Integrated Regional Water Management program. The State Legislative Program may also review other Specific Actions, and recommendations that emerge from Specific Actions, to identify items that would be best implemented through legislation.

Table 1
Specific Actions to Prioritize Sustainable Streets in Funding Sources

Specific Action No.	Entities Lead Support		Description of Action
Immediate Actions			
1-1	Caltrans Local Assist.	FHWA MTC	**Clarify GSI Eligibility in Federal Transportation Grants -** Provide clarification of the eligibility of GSI elements in federally funded transportation projects.
1-2	MTC	Caltrans Div. of Local Assist.	**Update OBAG Guidance -** Develop guidance clarifying eligibility of GSI elements in federally funded (One Bay Area Grant - OBAG) transportation projects, for inclusion in guidance materials that MTC will provide to counties for OBAG's third round of funding.
1-3	California Transportation Commission	Caltrans, MTC	**Clarify GSI Eligibility in the Local Streets and Roads Program –** As guidelines are developed for this program, in accordance with SB 1 of 2017, clarify the eligibility of GSI elements in pavement rehabilitation and other applicable projects.
Short-Term Actions			
1-4	Applicable funding agencies[1]	--	**Identify Opportunities to More Fully Fund Sustainable Streets -** Each identified agency will review policy documents for its applicable grant program(s) to identify opportunities to more fully fund Sustainable Streets projects, using a checklist provided in Appendix D.
1-5	Regional Water Board staff	BASMAA, countywide stormwater programs	**Regional Water Board Staff to Review the Completed Checklists Prepared in Specific Action 1-4.** Water Board staff will identify opportunities to more fully fund Sustainable Streets. The purpose of this review would be to help funding agencies identify opportunities to further support GI implementation. This review of the completed checklists will provide an opportunity to suggest changes to eligibility requirements, potentially including modifications that would make it easier for small agencies to obtain funding for GI.

[1]

Agencies implementing Action 1-4	**Applicable grant programs**
ACTC, CCTA, SMCTA, VTA	Transportation half-cent sales tax measure programs
ACTC, C/CAG, CCTA, VTA	Congestion Management Agency programs
BAAQMD	Transportation Fund for Clean Air
Caltrans	Active Transportation Program, Cooperative Implementation Agreements
CNRA	Urban Greening grants
DWR, SCC	Proposition 1 grants
FEMA	Emergency Management Performance Grant
SFBRA, SCC	Measure AA Program
SGC	Affordable Housing and Sustainable Communities Program

Table 1 Specific Actions to Prioritize Sustainable Streets in Funding Sources			
Specific Action No.	**Entities Lead Support**		**Description of Action**
Actions to Achieve Long-Term Solutions			
1-6	BASMAA	SFEP, TPL, SFBRWQCB	**Identify Opportunities to Influence Federal Policy** - Identify opportunities to support efforts by others to influence eligibility of GSI in federal surface transportation programs, maintaining communication with MTC on legislative engagement and/or advocacy.
1-7	SFEP[2]	State Water Board, RWQCB BASMAA, TPL, STB	**Develop State Legislative Program** - Develop and implement a strategy to inform and/or influence future state propositions, related legislation, and incorporation into state law – that provides a clear path for full eligibility of Sustainable Streets, and coordinates application requirements among grant programs that fund Sustainable Streets. This is anticipated to include reports to legislators about the types of designs and co-benefits (including green jobs) that resonate with communities. Topics to consider incorporating into the State Legislative Program include: • Recommendations regarding bond measures, language about match and eligibility, and other issues that were discussed in case studies presented at Roundtable meeting -- which may include tracking the funding for a future iteration of the Storm Water Grant Program (after Prop 1 is complete) and participating in the stakeholder outreach workshops. • Requirements for interagency collaboration and/or for participation by key agencies in actions that promote widespread implementation of Sustainable Streets. • Review other Specific Actions and recommendations that emerge from Specific Actions, in order to identify items that would be best implemented through legislation. To help demonstrate the need for legislative fixes, potentially identify the ideal state to modernize roadways, and then compare that effort to the effort needed to maintain the facilities that we have now.
1-8	Caltrans stormwater staff	State Water Board staff, Regional Water Board staff	**Address Caltrans Stormwater Treatment Credit -** Prepare proposal for providing credit to Caltrans for GI that is funded as part of Caltrans' transportation grants to local agencies.

Pathway 2: Improve Conditions for Using Multiple Grants

Pathway 2 seeks to improve conditions for projects that are funded with multiple grants. The goal of Pathway 2 is to remove obstacles that local agencies have encountered when attempting to obtain and manage multiple grants for a single Sustainable Streets project. The specific actions for this pathway are listed in Table 2.

[2] The legislative work done by public agencies would consist of educating lawmakers on issues and opportunities.

Table 2 Specific Actions to Improve Conditions for Using Multiple Grants			
Specific Action No.	**Entities Lead Support**		**Description of Action**
Immediate Actions			
2-1	SWRCB	Other funding agencies	**Coordinate to Publicize Solicitations -** Coordinate with other agencies to join SWRCB in participating in funding fairs and the California Financing Coordinating Committee website.
2-2	Applicable funding agencies[3]	--	**Inform other agencies of solicitations -** Identify and add staff from applicable agencies to the list of parties to notify regarding schedules of future solicitations for applicable grant programs.
Short-Term Actions			
2-3	BASMAA	Funding agencies, SFBRWQCB	**Offer Training on Obtaining Grants** - Develop and offer training to assist local agencies in the San Francisco Bay Area in identifying funding sources and preparing grant applications for Sustainable Streets projects, seeking to help local agencies build capacity to be able to apply for grants and follow through with the requirements for project planning, public involvement, tracking of results, and funding of maintenance. This will include consideration how to address the needs of disadvantaged communities. Examples of grants to address include Caltrans' Cooperative Implementation Program and Financial Contribution Only Program. Potentially include in the training: • Nuts and bolts of obtaining funding, • How to gauge the competitiveness of a project and be strategic in efforts to seek funding, • How to find the flexibility in a funding program and tailor the applications accordingly, • Case studies of how cities have succeeded in winning grants and keeping the grant funds that they won – especially when there were multiple sources of funding. (Note: this action also applies to Pathway 1, Prioritize Sustainable Streets in Funding Sources.)

[3] **Agencies implementing Action 2-2** / **Applicable grant programs**

ACTC, CCTA, SMCTA, VTA	Transportation half-cent sales tax measure programs
ACTC, C/CAG, CCTA, VTA	Congestion Management Agency programs
BAAQMD	Transportation Fund for Clean Air
Caltrans	Active Transportation Program, Cooperative Implementation Agreements
CNRA	Urban Greening grants
DWR, SCC	Proposition 1 grants
FEMA	Emergency Management Performance Grant
MTC	One Bay Area Grants
SFBRA, SCC	Measure AA Program
SGC	Affordable Housing and Sustainable Communities Program
SWRCB	Storm Water Grant Program

Table 2 Specific Actions to Improve Conditions for Using Multiple Grants			
Specific Action No.	**Entities Lead**	**Support**	**Description of Action**
2-4	BASMAA	Funding agencies, CASQA	**Prepare Guidance for Packaging Projects -** Prepare statewide guidance on how to "package" Sustainable Streets projects for specific grants, which may be incorporated in future grant guidelines and will consider the needs of disadvantaged communities. Examples of grants to address include in the guidance encompass Caltrans' Cooperative Implementation Program and Financial Contribution Only Program. Potentially include in the training: • Information on coordination, match requirements of different grants, how to demonstrate multiple benefits of GSI components in transportation projects, • Successful strategies to seek funding, • Guidance on how GI can be considered functional landscaping per Caltrans definitions, and • Recommendations from funding agencies on how to find the flexibility in the programs they are applying for and tailor applications to meet the requirements identified in the grant solicitation. (Note: this action also applies to Pathway 1, Prioritize Sustainable Streets in Funding Sources.)
2-5	SFEP	BASMAA	**Track Upcoming Solicitations -** Develop and maintain a database to track upcoming solicitations for grants and applicable loans, such as the State Revolving Fund, that fund Sustainable Streets.
2-6	SFEP	Funding agencies, BASMAA	**Identify Opportunities to Coordinate Reporting -** Compare reporting requirements among grant programs and identify opportunities to coordinate reporting schedule, format, etc. – for example, SWRCB allows grant recipients to establish some milestone dates.
Actions to Achieve Long-Term Solutions			
2-7	Applicable funding agencies[4]	--	**Consider Linkages to Other Programs** - Funding agencies will consider aspects of other related grant programs (timing, criteria, etc.) in the development of future grant programs, and will coordinate with other grant programs where feasible.

[4] **Agencies implementing Action 2-7** / **Applicable grant programs**

ACTC, CCTA, SMCTA, VTA	Transportation half-cent sales tax measure programs
ACTC, C/CAG, CCTA, VTA	Congestion Management Agency programs
BAAQMD	Transportation Fund for Clean Air
Caltrans	Active Transportation Program, Cooperative Implementation Agreements
CNRA	Urban Greening grants
DWR, SCC	Proposition 1 grants
FEMA	Emergency Management Performance Grant
MTC	One Bay Area Grants
SFBRA, SCC	Measure AA Program
SGC	Affordable Housing and Sustainable Communities Program
SWRCB	Storm Water Grant Program

Pathway 3: Additional Funding Options

Pathway 3, Additional Funding Options, seeks to improve conditions for local agencies to fund Sustainable Streets projects with a range of funding options, including fees and loans, and the funding of pavement rehabilitation projects, through sources identified in Senate Bill 1 (SB 1), the Road Repair and Accountability Act of 2017, which was signed into law on April 28, 2017. SB 1 includes the continuous appropriation of $1.5 billion annually for maintenance and rehabilitation of local streets and roads through various sources of revenue, such as increases in the State gasoline and diesel fuel taxes, and a new a transportation improvement fee to be collected with vehicle registration fees (League of California Cities 2017). The goal of Pathway 3 is to secure local funding mechanisms such as parcel taxes or fees for planning, implementation, and operations & maintenance of Sustainable Streets. It may be more cost-effective in the long run to fund ongoing costs through parcel taxes or fees than to expend staff time pursuing grants and loans to cover these costs. Although it is difficult to achieve the super-majority required by Proposition 218 to enact a stormwater fee, there are examples of successful ballot measures, including the 2017 approval of a fee in Palo Alto to fund routine water system maintenance and operation that provides for storm water system improvements (City of Palo Alto 2017), and the 2009 approval of a fee in Burlingame to fund a $39 million Capital Improvement Program to improve the City's storm drain system (City of Burlingame 2015). Funds from parcel taxes or fees would help leverage grant opportunities as a reliable local match.

Table 3
Specific Actions for Additional Funding Options

Specific Action No.	Entities Lead Support		Description of Action
Immediate Actions			
3-1	ACCWP, CCCWP, SMCWPPP, SCVURPPP	BASMAA	**Provide Guidance on a Range of Funding Options –** Countywide stormwater programs will provide guidance for local agencies to evaluate a range of funding options for Sustainable Streets projects and other projects that incorporate green stormwater infrastructure. This is anticipated to include an evaluation of Business Improvement Districts, approaches to fund maintenance including fees, and working with BASMAA to explore potential opportunities to develop a regional alternative compliance program.
3-2	SFEP	BASMAA	**Improve the Existing Web Presence for the Roadmap.** Expand the existing Green Stormwater Infrastructure Resources of SFEP's website to help publicize the Roadmap, or potentially develop a new website for the Roadmap. This will include the management of an online spreadsheet of Specific Actions to monitor progress of Roadmap implementation.
3-3	SFEP	BASMAA	**Seek Funding for Roadmap Implementation.** Identify potential funding sources and submit applications for a grant to cover expenses for state legislative program development website development and maintenance, annual meetings of the Roadmap Committee, training on obtaining grants, development of guidance for obtaining multiple grants, and tracking implementation of Specific Actions.

Table 3 Specific Actions for Additional Funding Options			
Specific Action No.	**Entities Lead Support**		**Description of Action**
3-4	CASQA	BASMAA, Countywide stormwater programs, Local governments, SFEP, STB, TPL, SPUR	**Support SB 231 Implementation.** Participate in strategic efforts to use SB 231 (which clarified that the Prop 218 "sewer" exemption includes storm sewers) to raise local stormwater fees in ways that do not engender unwanted lawsuits while establishing that the full scope of the exemption includes planning, constructing, and maintaining sustainable streets the establishment of reliable revenue sources may allow local stormwater programs to seek loans under SWRCB's State Revolving Fund.
Short-Term Actions			
3-5	SFEP	BASMAA	**Convene the Roadmap Committee –** Monitor implementation of the Roadmap of Funding Solutions by convening the Roadmap Committee described in Section 3, Roles and Responsibilities. This will include at least two meetings per year. Potential agenda items include: • Progress updates, • Reminders to partner agencies of action items, • Periodic reviews and adjustments of Specific Actions, Updates regarding quantification of the need for GI, based on GI Plans prepared throughout the region.
3-6	MTC	BASMAA, SFEP, Countywide stormwater programs	**Coordinate with Local Agency Staff to Share Information -** Facilitate discussions among staff from public works, stormwater, active transportation, and transit to develop integrated approaches to Sustainable Streets – at MTC's working groups and/or a set of outreach/coordination meetings led by BASMAA and/or other partners. This dialogue is anticipated to improve communication between funding agencies and local agencies regarding the funding process. Topics for sharing and dialogue may include how local agencies can build capacity to address long-term maintenance needs for GI, the types of tools that can help local agencies communicate internally and work together across departments and identifying types of information sharing that can reduce effort for both funding agencies and local agencies.
3-7	BASMAA	SFEP	**Prepare and Distribute a Fact Sheet of the Roadmap -** The fact sheet would help agencies communicate internally regarding actions to fund Sustainable Streets, and could potentially be used for other outreach, in coordination with Specific Action 3-9, Develop and Conduct Outreach Strategy.
3-8	Funding agencies[5]	--	**Incorporate Applicable Specific Actions in Agency Policies, Procedures, Strategic Plans and/or Other Documentation.** Funding agencies will each incorporate into its strategic plan the Specific Actions for which agency has been identified as Lead agency. Examples of policy documents include Green Building Policy, Sustainable Landscaping Guidelines, and BMPs.

[5]

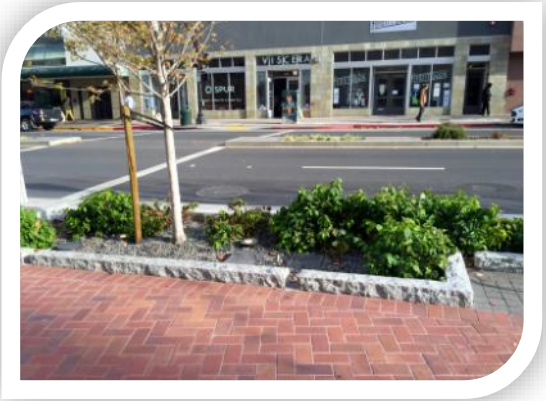
Agencies implementing Action 3-8	**Applicable grant programs**
ACTC, CCTA, SMCTA, VTA	Transportation half-cent sales tax measure programs
ACTC, C/CAG, CCTA, VTA	Congestion Management Agency programs
BAAQMD	Transportation Fund for Clean Air
Caltrans	Active Transportation Program, Cooperative Implementation Agreements
CNRA	Urban Greening grants

Table 3 Specific Actions for Additional Funding Options			
Specific Action No.	**Entities Lead Support**		**Description of Action**
Actions to Achieve Long-Term Solutions			
3-9	SFEP	BASMAA, BCDC, NRDC, Save the Bay, SPUR, TPL, Countywide stormwater programs	**Develop Outreach Strategy** - The strategy will identify the steps necessary to develop and implement an outreach program, seeking to build broader public engagement around Sustainable Streets. The strategy is anticipated to focus on the resiliency benefits of Sustainable and Streets and frame the issues as making streets better, laying the groundwork for a call to action around the Roadmap. The strategy will identify actions and assign roles for implementation. Depending on interests and capacities of support organizations, actions may encompass community outreach, elected official outreach, and business engagement, A Sustainable Streets fact sheet may be developed, focused on communicating to local elected officials the need for action to better fund Sustainable Streets. Part of the messaging is anticipated to present GI as an integral part of road projects. The Los Angeles River campaign is anticipated to serve as a model for the outreach strategy.

DWR, SCC	Proposition 1 grants
FEMA	Emergency Management Performance Grant
MTC	One Bay Area Grants
SFBRA, SCC	Measure AA Program
SGC	Affordable Housing and Sustainable Communities Program
SWRCB	Storm Water Grant Program

3. Roles and Responsibilities

The Roadmap will be implemented by Participating Agencies, Organizations, and Champions, with implementation monitored by a Roadmap Committee. These roles are described below, followed by a description of procedures to track and monitor implementation of the Roadmap.



This bioretention facility in Oakland receives stormwater runoff from both the roadway and an adjacent plaza (Source: Horizon)

Participating Agencies and Organizations

The Participating Agencies and Organizations are listed in Table 4, at the end of this section of the Roadmap. The agencies and organizations are categorized by type (federal agency, state agency, etc.) and listed alphabetically within these categories. Table 4 is cross-referenced to the lists of specific actions in Section 2, to identify the actions that each agency or organization is leading. Some actions are led by multiple parties, because individual agencies will conduct that action internally. For example, numerous funding agencies have committed to leading Action 1-4, Identify Opportunities to More Fully Fund Sustainable Streets, in which they will each review their own funding programs to identify opportunities to remove obstacles to the integrated funding of Sustainable Streets projects.

Champions

Champions are organizations that have the interest and capability to influence legislation and policy decisions, and generally advocate for the funding of Sustainable Streets. The current list of Champions is provided below.

- **Bay Area Stormwater Management Agencies Association (BASMAA)** – BASMAA is a consortium of nine San Francisco Bay Area municipal stormwater programs. BASMAA was started by local governments in response to municipal stormwater permits in an effort to promote regional consistency and facilitate efficient use of public resources. BASMAA is designed to encourage information sharing and cooperation, and to develop products and programs that are more cost-effective when done regionally than could be accomplished locally. In addition, BASMAA provides a forum for representing and advocating the common interests of member programs at the regional and state level.
- **San Francisco Bay Regional Water Quality Control Board (Regional Water Board) –** The Regional Water Board issued the current Municipal Regional Stormwater Permit on November 19, 2015, including in Provision C.3.j of the permit a requirement for the Permittees to prepare and implement Green Infrastructure Plans. Green Infrastructure Plans are required to include

targets for the amount of impervious surface to be retrofitted with green infrastructure by 2020, 2030, and 2040.

- **San Francisco Estuary Partnership (SFEP)** – SFEP is a collaboration of local, state, and federal agencies, NGOs, academia and business leaders working to protect and restore protect and restore the San Francisco Bay-Delta Estuary. SFEP builds partnerships and leverages federal funding with millions of dollars in state and local funds for regional-scale restoration, water quality improvement, and resilience-building projects (SFEP 2017).
- **Save The Bay –** Save The Bay is the largest regional organization working to protect, restore and celebrate San Francisco Bay since 1961. Save The Bay mobilizes thousands of Bay Area residents to protect and restore the Bay for future generations, both as advocates in their community and volunteers on the shoreline, working with scientists and policymakers to protect the Bay as the region's most important natural resource--essential to our environment, economy, and quality of life (Save The Bay 2017).

Roadmap Committee

A Roadmap Committee will be formed to monitor and track progress of actions taken by agencies to make available funding for sustainable streets projects, to track the projects that succeed in obtaining funding, and periodically review and adjust Specific Actions as needed. This Committee may also identify needs for workgroups to implement various Specific Actions. The Roadmap Committee will consist of representatives of the Participating Agencies, potentially including local agency representatives, and is anticipated to elect officers for limited terms. The Committee is anticipated to meet at least twice a year, unless Committee members determine that more frequent meetings are needed. One annual meeting is anticipated to include progress reports and keynote speeches highlighting achievements by Participating Agencies and/or new advancements in Sustainable Streets.

Tracking and Follow-up

The Roadmap Committee's primary tool for tracking and monitoring progress in implementing the actions listed in Section 2 is anticipated to be an online spreadsheet of specific actions, which would be editable by the representatives of Participating Agencies. Participating Agencies would periodically be reminded to populate the online spreadsheet with information on progress since the last update, which could be formatted as a progress report for annual meetings of the Roadmap Committee.

The Roadmap Committee will continue to follow up with partner agencies and organizations to identify additional Champions. For example, the Roadmap Committee is following up with the agencies listed below, as well as other agencies and organizations, regarding the potential to serve as Champions.

- **Department of Transportation (Caltrans) –** Through its Division of Local Assistance, Caltrans oversees more than one billion dollars annually available to over 600 cities, counties and regional agencies for the purpose of improving their transportation infrastructure or providing transportation services (Caltrans 2018). Some of the Division of Local Assistance grant programs, such as the Active Transportation Program, prioritize the funding of projects that include Sustainable Streets elements, such as bicycle and pedestrian improvements. Caltrans is subject to the California Department of Transportation Municipal Stormwater Permit, issued by the

State Water Board on September 19, 2012, as amended. As part of complying with this permit, the Caltrans Stormwater Program provides funding to local agencies for green infrastructure improvements through Cooperative Implementation Agreements.

- **Metropolitan Transportation Commission (MTC) -** MTC is the transportation planning, financing and coordinating agency for the nine-county San Francisco Bay Area. Congress distributes federal transportation dollars to MTC (and other metropolitan planning organizations) to invest in regional priority transportation projects and programs. MTC also helps local agencies in the Bay Area obtain state funding for transportation projects. In 2012, MTC established the One Bay Area Grant (OBAG) program, which taps federal funds to maintain MTC's commitments to regional transportation priorities while also advancing the Bay Area's land-use and housing goals. OBAG includes both a regional program administered by MTC and a county program that allows counties to use OBAG funds to invest in a range of street and road project types, including elements of Sustainable Streets projects.
- **State Water Resources Control Board (State Water Board)** – Through its Division of Financial Assistance, the State Water Board implements financial assistance programs, including the Storm Water Grant Program, loan and grant funding for construction of municipal sewage and water recycling facilities, remediation for underground storage tank releases, watershed protection projects, and nonpoint source pollution control projects (SWRCB 2018) . The State Water Board has experience collaborating with other funding agencies, including the Department of Water Resources.

Sustainable Streets and Collaborative Action

This Roadmap sets forth a vision of collaborative action to implement specific actions to realize multi-benefit projects. This may challenge some existing organizational structures that were developed to support single-benefit projects. Agencies are making this commitment in order to realize a vision of multi-benefit projects that help make communities healthier and more vibrant than single-benefit projects of the past.

Meeting of the Regional Roundtable on Sustainable Streets, March 2017

Table 4 Agency or Organization Assignments			
Categories of Participants	**Participating Agencies and Organizations**	**Specific Actions**	
		Led by Agency or Organization	**Supported by Agency or Organization**
Federal Agencies	• Federal Emergency Management Agency	1-4, Identify Opportunities to More Fully Fund Sustainable Streets 2-2, Inform Other Agencies of Solicitations 2-7, Consider Linkages to Other Programs 3-8, Incorporate Applicable Specific Actions in Agency Policies, Procedures, Strategic Plans, and/or Other Documentation	2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 2-6, Identify Opportunities to Coordinate Reporting
	• Federal Highway Administration • Federal Transit Administration	--	1-1, Clarify GSI Eligibility in Federal Transportation Grants
State Agencies	• Caltrans Division of Local Assistance	1-1, Clarify GSI Eligibility in Federal Transportation Grants	1-2, Update OBAG Guidance 1-3, Clarify GSI Eligibility in the Local Streets and Roads Program
	• Caltrans Stormwater Program	1-4, Identify Opportunities to More Fully Fund Sustainable Streets 1-8, Address Caltrans Stormwater Treatment Credit 2-2, Inform Other Agencies of Solicitations 2-7, Consider Linkages to Other Programs	2-1, Coordinate to Publicize Solicitations 2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 2-6, Identify Opportunities to Coordinate Reporting
	• Caltrans Active Transportation Program • California Natural Resources Agency • Department of Water Resources • State Coastal Conservancy • Strategic Growth Council	1-4, Identify Opportunities to More Fully Fund Sustainable Streets 2-2, Inform Other Agencies of Solicitations 2-7, Consider Linkages to Other Programs 3-8, Incorporate Applicable Specific Actions in Agency Policies, Procedures, Strategic Plans, and/or Other Documentation	2-1, Coordinate to Publicize Solicitations 2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 2-6, Identify Opportunities to Coordinate Reporting
	• State Water Resources Control Board	2-1, Coordinate to Publicize Solicitations 2-2, Inform Other Agencies of Solicitations 2-7, Consider Linkages to Other Programs 3-8, Incorporate Applicable Specific Actions in Agency Policies, Procedures, Strategic Plans, and/or Other Documentation	1-7, Develop State Legislative Program 1-8, Address Caltrans Stormwater Treatment Credit 2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects

Table 4 Agency or Organization Assignments			
Categories of Participants	**Participating Agencies and Organizations**	**Specific Actions**	
		Led by Agency or Organization	**Supported by Agency or Organization**
State Agencies (cont.)			2-6, Identify Opportunities to Coordinate Reporting
Regional Agencies	• Bay Area Air Quality Management District • San Francisco Bay Restoration Authority	1-4, Identify Opportunities to More Fully Fund Sustainable Streets 2-2, Inform Other Agencies of Solicitations 2-7, Consider linkages to other programs 3-8, Incorporate Applicable Specific Actions in Agency Policies, Procedures, Strategic Plans, and/or Other Documentation	2-1, Coordinate to Publicize Solicitations 2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 2-6, Identify Opportunities to Coordinate Reporting
	• Bay Conservation and Development Commission	--	3-9, Develop Outreach Strategy
	• Metropolitan Transportation Commission	1-2, Update OBAG Guidance 2-2, Inform Other Agencies of Solicitations 2-7, Consider Linkages to Other Programs 3-6, Coordinate with Local Agency Staff to Share Information 3-8, Incorporate Applicable Specific Actions in Agency Policies, Procedures, Strategic Plans, and/or Other Documentation	1-1, Clarify GSI Eligibility in Federal Transportation Grants 1-3, Clarify GSI Eligibility in the Local Streets and Roads Program 2-1, Coordinate to Publicize Solicitations 2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 2-6, Identify Opportunities to Coordinate Reporting
	• San Francisco Bay Regional Water Quality Control Board	1-5, Regional Water Board Staff to Review the Completed Checklists Prepared in Specific Action 1-4	1-6, Identify Opportunities to Influence Federal Policy 1-7, Develop State Legislative Program 1-8, Address Caltrans Stormwater Treatment Credit 2-3, Offer Training on Obtaining Grants
	• San Francisco Estuary Partnership	1-7, Develop State Legislative Program 2-5, Track Upcoming Solicitations 2-6, Identify Opportunities to Coordinate Reporting 3-2, Improve the Existing Web Presence for the Roadmap	1-6, Identify Opportunities to Influence Federal Policy 3-4, Support SB 231 Implementation 3-6, Coordinate with Local Agency Staff to Share Information

Table 4 Agency or Organization Assignments			
Categories of Participants	**Participating Agencies and Organizations**	**Specific Actions**	
		Led by Agency or Organization	**Supported by Agency or Organization**
Regional Agencies (cont.)		3-3, Seek Funding for Roadmap Implementation 3-5, Convene the Roadmap Committee 3-7, Prepare and Distribute a Fact Sheet of the Roadmap 3-9, Develop Outreach Strategy	
County Transportation Agencies	• Alameda County Transportation Commission • Contra Costa Transportation Authority • San Mateo County/City Association of Governments • San Mateo County Transportation Authority • Santa Clara Valley Transportation Authority	1-4, Identify Opportunities to More Fully Fund Sustainable Streets 2-2, Inform Other Agencies of Solicitations 2-7, Consider Linkages to Other Programs 3-8, Incorporate Applicable Specific Actions in Agency Policies, Procedures, Strategic Plans, and/or Other Documentation	2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 2-6, Identify Opportunities to Coordinate Reporting
	• Napa County Transportation and Planning Agency • San Francisco County Transportation Authority • Solano Transportation Authority • Sonoma County Transportation Authority • Transportation Authority of Marin	--	2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 2-6, Identify Opportunities to Coordinate Reporting
Local Storm-water Programs	• Alameda Countywide Clean Water Program • Contra Costa Clean Water Program • San Mateo Countywide Water Pollution Prevention Program • Santa Clara Valley Urban Runoff Pollution Prevention Program	3-1, Provide Guidance on a Range of Funding Options	3-4, Support SB 231 Implementation 3-6, Coordinate with Local Agency Staff to Share Information 3-9, Develop and Conduct Outreach Strategy

Table 4 Agency or Organization Assignments			
Categories of Participants	**Participating Agencies and Organizations**	**Specific Actions**	
		Led by Agency or Organization	**Supported by Agency or Organization**
Local Storm-water Programs (cont.)	• Cities of American Canyon, Benicia, Calistoga, Napa, Petaluma, Sonoma, St. Helena, Yountville • Counties of Napa, Solano, Sonoma, and Vallejo • Fairfield-Suisun Urban Runoff Management Program • Marin County Stormwater Pollution Prevention Program • San Francisco Public Utilities Commission • Sonoma County Water Agency • Town of Ross • Vallejo Sanitation and Flood Control District	--	3-6, Coordinate with local Agency Staff to Share Information 3-4, Support SB 231 Implementation
Non-Governmental Organizations	• Bay Area Stormwater Management Agencies Association	1-4, Identify Opportunities to More Fully Fund Sustainable Streets 2-3, Offer Training on Obtaining Grants 2-4, Prepare Guidance for Packaging Projects 3-9, Develop Outreach Strategy	1-7, Develop State Legislative Program 2-5, Track Upcoming Solicitations 2-6, Identify Opportunities to Coordinate Reporting 3-2, Improve the Existing Web Presence for the Roadmap 3-3, Seek Funding for Roadmap Implementation 3-4, Support SB 231 Implementation 3-5, Convene the Roadmap Committee 3-6, Coordinate with Local Agency Staff to share Information 3-7, Prepare and Distribute a Fact Sheet of the Roadmap 3-9, Develop Outreach Strategy
	• Save The Bay • Trust for Public Land	--	1-6, Identify Opportunities to Influence Federal Policy 1-7, Develop State Legislative Program

Table 4 Agency or Organization Assignments			
Categories of Participants	**Participating Agencies and Organizations**	**Specific Actions**	
		Led by Agency or Organization	**Supported by Agency or Organization**
Non-Governmental Organizations (cont.)			3-4, Support SB 231 Implementation 3-9, Develop Outreach Strategy
	• California Stormwater Quality Association	3-4, Support SB 231 Implementation	2-4, Prepare Guidance for Packaging Strategy
	• NRDC	--	3-9, Develop Outreach Strategy
	• SPUR	--	3-4, Support SB 231 Implementation 3-9, Develop Outreach Strategy

Appendix A

Acronyms and Definitions

This appendix provides a list of acronyms and glossary of technical terms used in the Roadmap.

List of Acronyms

ACCWP	Alameda Countywide Clean Water Program
ACTC	Alameda County Transportation Commission
BAAQMD	Bay Area Air Quality Management District
BASMAA	Bay Area Stormwater Management Agencies Association
Caltrans	California Department of Transportation
CASQA	California Stormwater Quality Association
C/CAG	San Mateo County/City Association of Governments
CCCWP	Contra Costa Clean Water Program
CCTA	Contra Costa Transportation Authority
CMA	Congestion Management Agency
CNRA	California Natural Resources Agency
DWR	Department of Water Resources
FEMA	Federal Emergency Management Agency
GI	Green infrastructure
GSI	Green stormwater infrastructure
MRP	Municipal Regional Stormwater Permit
MTC	Metropolitan Transportation Commission
OBAG	One Bay Area Grant Program
RWQCB	Regional Water Quality Control Board
SCC	State Coastal Conservancy
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFBRA	San Francisco Bay Restoration Authority
SFEP	San Francisco Estuary Partnership
SGC	Strategic Growth Council
SMCTA	San Mateo County Transportation Authority
SMCWPPP	San Mateo Countywide Water Pollution Prevention Program
STB	Save the Bay
VTA	Santa Clara Valley Transportation Authority
TMDL	Total Maximum Daily Load
TPL	Trust for Public Land
USEPA	United States Environmental Protection Agency

Glossary of Terms

Active Transportation: Any self-propelled, human-powered mode of transportation, such as walking or bicycling (CDC 2011).

Carbon sequestration: Terrestrial, or biologic, carbon sequestration is the process by which trees and plants absorb carbon dioxide, release the oxygen, and store the carbon. Geologic sequestration is one step in the process of carbon capture and sequestration, and involves injecting carbon dioxide deep underground where it stays permanently (USEPA 2016).

Complete Street: A transportation facility that is planned, designed, operated, and maintained to provide safe mobility for all users, including bicyclists, pedestrians, transit vehicles, truckers, and motorists, appropriate to the function and context of the facility (Caltrans 2017a).

Congestion Management Agency: A congestion management agencies (CMA) is a countywide body funded by the state gas tax that works to keep traffic levels manageable. CMAs help coordinate land use, air quality and transportation planning among the local jurisdictions; prepare a congestion management program to spend gas tax funds; monitor levels of congestion on major roads; and analyze the impacts that a proposed development will have on future traffic congestion (Institute for Local Government 2015).

Green infrastructure: Green infrastructure is an approach to water management that protects, restores, or mimics the natural water cycle, providing habitat, flood protection, cleaner air, and cleaner water (American Rivers 2017).

Green stormwater infrastructure: Green stormwater infrastructure is type of green infrastructure that specifically addresses stormwater management. It includes a range of soil-water-plant systems that intercept stormwater, infiltrate a portion of it into the ground, evaporate a portion of it into the air, and in some cases release a portion of it slowly back into the storm drain system (Philadelphia Water Department 2017)

Stormwater treatment system: Any engineered system designed to remove pollutants from stormwater runoff by settling, filtration, biological degradation, plant uptake, media absorption/adsorption or other physical, biological, or chemical process (San Francisco Bay Regional Water Quality Control Board 2015)

Sustainable Street: Roadway segment that includes both complete streets features and green stormwater infrastructure, and that is maintained in a state of good or fair condition.

Total Maximum Daily Load: After the identification of a water quality-limited waterbody is completed, a Total Maximum Daily Load is established at a level necessary to achieve the applicable state water quality standards (USEPA 2017c). A TMDL establishes the maximum amount of a pollutant allowed in a waterbody and serves as the starting point or planning tool for restoring water quality (USEPA 2017d).

Urban greening: An integrated, citywide approach to the planting, care and management of all vegetation in a city to secure multiple environmental and social benefits for urban dwellers; projects may involve planting of trees, shrubs, grass, or agricultural plots (Sorensen et al. 1997).

Appendix B

Potential Sources of Funding for Sustainable Streets

This appendix provides two tables that, taken together, identify a range of funding sources that may potentially be used to fund Sustainable Streets projects. Table B-1 includes transportation funding sources and presents available information regarding the eligibility of green stormwater infrastructure. Table B-2 includes resource-related funding sources and presents available information regarding the eligibility of transportation features.

Table B-1
Transportation Funding Sources that May Potentially Fund Sustainable Streets

Row No.	Name of Funding Source	Administering Agency	Funded by	Conditions under which Green Stormwater Infrastructure is Eligible	Link to information
1	One Bay Area Grant Program	Metropolitan Transportation Commission (MTC)	• Surface Transportation Block Grant Program (STP – federal funding) • Congestion Mitigation and Air Quality Improvement (CMAQ – federal funding) • (Source: MTC 2017)	• Permeable pavement is eligible. • Landscaping as part of streetscape improvement or safety improvement is eligible. • GSI is eligible if required for mitigation. • Dependent on various goals and guidelines of OBAG sub-programs • Must comply with all Federal & State & Regional & County level (for county programs) regulations. • Follows Caltrans Federal Aid Delivery process. • (Sources: MTC 2015a, Atkinson 2017)	http://mtc.ca.gov/our-work/invest-protect/focused-growth/one-bay-area-grants (Source: MTC 2017a)
2	Active Transportation Program	California Transportation Commission (CTC)	Myriad of fund sources that will have to be obtained from CTC	• Scoring criteria is a balance dictated by the various fund sources. • Landscaping as part of the ATP project that meets the program goals are eligible expenses. • Projects must comply with all Federal and State regulations and must follow the Caltrans Federal Aid and CTC delivery process.	www.dot.ca.gov/hq/LocalPrograms/atp/ (Source: Caltrans 2017b)
3	TDA Article 3	MTC establishes guidelines; counties administer funding per MTC guidelines (Source: MTC 2017b)	State funded through Transportation Development Act (TDA), Public Utilities Code (PUC) Section 99200	• Intersection safety improvements including bulbouts/curb extensions (Source: MTC 2016). • Curb and gutter improvements were not specifically mentioned in the guidelines, but would be integral to curb extension construction.	http://mtc.ca.gov/our-work/fund-invest/investment-strategies-commitments/transit-21st-century/funding-sales-tax-and-0 (Source: MTC 2017b)
4	Transportation for Livable Communities	Counties administer Transportation for Livable Communities funding (Sources: ACTC 2012, CCTA 2017, C/CAG 2016, VTA 2017)	Funding sources may vary by county. (Sources: ACTC 2012, CCTA 2017, C/CAG 2016, VTA 2017)	• Eligibility may vary by county.	Alameda: www.alamedactc.org/app_pages/view/8057 (ACTC 2012a) Contra Costa: www.ccta.net/_resources/detail/18/1 (CCTA 2017a) San Mateo: http://ccag.ca.gov/wp-content/uploads/2016/06/OBAG-TLC-Scoring-Criteria.pdf (C/CAG 2016) Santa Clara: www.vta.org/projects-and-programs/call-for-projects (VTA 2017a)
5	Safe Routes to School	MTC establishes guidelines; counties administer funding per MTC guidelines.	CMAQ funding (Source: MTC 2015b)	• MTC guidelines identify new curbs and gutters as eligible improvements for pedestrian improvement projects (Source: MTC 2012).	http://mtc.ca.gov/tags-public/safe-routes-school (MTC 2017c)
6	TIGER grants	FHWA	FHWA	• National competition aimed at highway/ Bridge bike/ped/passenger and freight rail/port / intermodal projects. • Very intensive benefit-cost analysis required. • Infrastructure as required mitigation is probably eligible.	https://www.transportation.gov/tiger (USDOT 2017)

Table B-1
Transportation Funding Sources that May Potentially Fund Sustainable Streets

Row No.	Name of Funding Source	Administering Agency	Funded by	Conditions under which Green Stormwater Infrastructure is Eligible	Link to information
7	Transportation Fund for Clean Air	BAAQMD	State Funding	• The Application Guidance for the Bicycle Facilities Grant Program does not specifically mention storm drainage, landscaping, or other project activities directly related to green stormwater infrastructure (BAAQMD 2017b); however, an informational interview with BAAQMD staff (BASMAA 2016) indicated that green stormwater infrastructure improvements, or other landscaping improvements, may be eligible due to carbon sequestration benefits.	http://www.baaqmd.gov/grant-funding/public-agencies (BAAQMD 2017a)
8	Affordable Housing and Sustainable Communities	Strategic Growth Council guidelines.	State Cap and Trade Funding	• Urban greening costs are eligible, and projects must include at least one urban greening element. The definition of urban greening includes natural infrastructure and stormwater features. Natural infrastructure is defined as the preservation and/or restoration of ecological systems, or utilization of engineered systems that use ecological processes, to increase resiliency to climate change and/or manage other environmental problems. • Projects may receive up to 3 points for incorporating natural infrastructure, if the surrounding community is experiencing any specific climate vulnerabilities and the project aims to address specific concerns. (Source SGC 2017)	http://www.sgc.ca.gov/Grant-Programs/AHSC-Program.html (SGC 2015)
9	Half-cent sales tax measure funding (different measures for different counties)	ACTC – Alameda County CCTA – Contra Costa County VTA – Santa Clara County SMCTA – San Mateo County	Countywide sales taxes	Eligibility policies vary by county.	Alameda County: Measure B: www.alamedactc.org/app_pages/view/4617 (ACTC 2012b) Measure BB: www.alamedactc.org/news_items/view/14837 (ACTC 2015) Contra Costa County Measure J: www.ccta.net/sources/detail/2/1 (CCTA 2017b) San Mateo County Measure A: www.smcta.com/about/About_Measure_A.html (SMCTA 2012) Santa Clara County: Measure A Transit Improvements: www.vta.org/projects-and-programs/programs/2000-measure-a-transit-improvement-program (VTA 2015) Measure B: www.vta.org/measure-b-2016 (VTA 2017b)

Table B-2
Resource-Based Grant and Loan Programs that May Potentially Fund Sustainable Streets

Row No.	Name of Funding Source	Administering Agency	Funded by	Conditions under which Transportation is Eligible	Link to information
1	Prop 1 Stormwater Grant Program	State Water Resources Control Board	State Proposition 1	• Costs for permeable pavement are eligible • Costs for bike lanes/pedestrian pathways/alternate transit lane could be eligible if GHG reduction is shown as a quantifiable benefit (Source: BASMAA 2017b)	www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/prop1/ (Source: SWRCB 2017)
2	Prop 1 Integrated Regional Water Management Grants	Department of Water Resources	State Proposition 1	• The guidelines for the 2016 round of funding do not specifically address the eligibility of the transportation features of Sustainable Streets projects; however, projects receive points for demonstrating a reduction of GHG (DWR 2016)	http://www.water.ca.gov/irwm/grants/prop1index.cfm (DWR 2017)
3	State Coastal Conservancy	Prop 1 Grants	State Proposition 1	• The program funds multi-benefit projects in four focus areas: Fisheries, Wetlands restoration, Agricultural water use/ ecosystem, and Urban Greening. Urban greening looks as multi-benefits, including public access to ecological resources, carbon sequestration, enhancement of urban park, with a focus on ecological function (BASMAA 2017a). • The grant guidelines do not specifically address the eligibility of the transportation features of Sustainable Streets projects; however, one of the project selection criteria is for project design and construction methods to include measures to avoid or minimize GHG emissions to the extent feasible and consistent with the project objectives (SCC 2016).	http://scc.ca.gov/grants/proposition-1-grants/ (SCC 2017)
4	Measure AA	San Francisco Bay Restoration Authority	Regional Measure AA	• The program generally looks at larger scale GSI, but could fund water quality treatment systems along urbanized shorelines of the Bay. Projects in association with restoration and/or along shore or Bay edge may be eligible (BASMAA 2017a). • The Measure AA grant guidelines do not mention roads or streets. Eligible project types include trails and levees (SFBRA 2017b).	http://sfbayrestore.org/sf-bay-restoration-authority-grants.php (SFBRA 2017a)
5	Urban Greening Grants	California Natural Resources Agency	State Cap and Trade funding	• Eligible activities include green street and alleyway projects that integrate green stormwater infrastructure elements into the street or alley design, including permeable surfaces, bioswales, and trees (CNRA 2017b).	http://resources.ca.gov/grants/urban-greening/ (CNRA 2017a)
6	Emergency Management Performance Grant	Federal Emergency Management Agency	Appropriation Authority for Program: Department of Homeland Security Appropriations Act, 2017 (Pub. L. No. 115-31)	• This is a planning grant that provides Federal funds to states to assist state, local, territorial, and tribal governments in preparing for all	https://www.fema.gov/preparedness-non-disaster-grants (FEMA 2017)

Table B-2
Resource-Based Grant and Loan Programs that May Potentially Fund Sustainable Streets

Row No.	Name of Funding Source	Administering Agency	Funded by	Conditions under which Transportation is Eligible	Link to information
				hazards. Examples of funded activities include conducting risk assessments and updating emergency plans (USDHS and FEMA 2017).	
7	Cooperative Implementation Agreements for Total Maximum Daily Load (TMDL) Compliance	Caltrans Stormwater Program	Caltrans Stormwater Program funding	• As of March 2018, the program had funded three local agency projects through cooperative implementation agreements in the San Francisco Bay Area; none were Sustainable Street projects. Sustainable Streets projects in the SF Bay Area could potentially be eligible; however, this program can only fund water quality improvements. Key criteria include: the number of TMDL pollutants that will be addressed (including trash) and the amount of Caltrans right of way that is treated. Projects that infiltrate or capture and use stormwater are preferred.	For information, contact Tom Rutsch, tom.rutsch@dot.ca.gov
8	San Francisco Bay Water Quality Improvement Grants	USEPA	The funds for the awards under the 2017 RFP were appropriated to USEPA under the "Further Continuing and Security Assistance Appropriations Act, 2017" (Public Law 114-254) and will be issued under Section 320 of the Clean Water Act (National Estuary Program), 33 U.S.C. §1330 (USEPA 2017b).	• Eligible projects include projects that manage stormwater with low impact development and green stormwater infrastructure; projects should be based on a restoration plan, TMDL, stormwater/green stormwater infrastructure plan, or watershed plan (USEPA 2017b).	www.epa.gov/sfbay-delta/sf-bay-water-quality-improvement-fund (USEPA 2017)
9	Clean Water State Revolving Fund (CWSRF)	SWCRB	The CWSRF provides below-market rate financing, funded by the California Infrastructure and Economic Development Bank State Revolving Funds revenue bonds (Fitch Ratings 2014).	• Eligible projects include planning, design, and/or construction of publicly-owned storm water treatment and control facilities.	www.waterboards.ca.gov/water_issues/programs/grants_loans/ (SWCRB 2018)

Appendix C

Solutions Considered and Withdrawn

A number of potential solutions were developed as part of the Regional Roundtable of Funding Solutions for Sustainable Streets but were withdrawn from further consideration based on input provided by agencies participating in the roundtable process. These potential solutions are listed in Table C-1, together with an explanation of the basis for withdrawing the solutions from further consideration.

Table C-1
Potential Solutions Considered and Withdrawn from Further Consideration

Potential Solution	Basis for Withdrawing the Potential Solution
Single Distribution – Create a single distribution of funding for projects that include both green stormwater infrastructure and transportation improvements that reduce greenhouse gases.	This potential solution would have introduced difficulties inherent in mixing funds from different sources, since each funding source has been developed to address layers of objectives, as well as the agency mission and the funding source needs. Funding agencies participating in the Regional Roundtable for Funding Sustainable Streets did not support this potential solution.
Coordinate the Timing of Funding Cycles – Coordinate the timing of funding cycles among agencies, in order to publish solicitations for different grants that fund Sustainable Streets within a given timeframe. This would make it more possible for one project to receive funding from multiple grants.	The timing of the funding cycle for each funding source is subject to many diverse factors, such as funding appropriations, which are unlikely to be changed in order to accommodate a subset of eligible types of projects.

Appendix D

Checklist for Identifying Opportunities to Improve Funding of Sustainable Streets

This checklist is provided for use by individual funding agencies to review policy documents regarding their programs. For questions that receive a "YES" answer, enter in the "Potential Revisions for Consideration" columns potential changes to policies and procedures that would improve the funding of Sustainable Street projects. Potential revisions that could be done the program level go in the "Program Revisions" column, and potential revisions that require legislation go in the "Legislative Revisions" column. If you cannot currently determine whether legislation would be required, please indicate in the "Legislative Revisions" column that legislation may be required, pending more information.

YES	NO	N/A	Question	Potential Revisions for Consideration Program Revisions	Legislative Revisions
Questions Regarding Pathway 1: Prioritize Sustainable Streets in Funding Sources					
☐	☐	☐	1. If the funding source is a transportation grant, does it restrict the use of funds for green stormwater infrastructure? If yes, please describe the restrictions in the "Items to Consider Revising" columns. If applicable, include a discussion of how Transportation Asset Management (TAM) is used at the funding program level, and how TAM addresses or does not address green stormwater infrastructure.		
☐	☐	☐	2. If the funding source is a resource grant, does it restrict the use of funds for transportation improvements that reduce greenhouse gases? If yes, please describe the restrictions in the "Items to Consider Revising" columns.		
☐	☐	☐	3. Is the maximum grant amount too low to fully fund the construction of both the transportation and green stormwater infrastructure features of a Sustainable Streets project? If yes, please indicate in the "Items to Consider Revising" columns whether an increase in the maximum grant amount could be considered.		
Questions Regarding Pathway 2: Improve Conditions for Using Multiple Grants					
☐	☐	☐	4. To simplify the application process for projects that must obtain multiple grants,		

YES	NO	N/A	Question	Potential Revisions for Consideration Program Revisions	 Legislative Revisions
			would the agency consider coordinating with other funding agencies to develop a basic application form, which each agency could modify as needed for each funding program?		
☐	☐	☐	5. Would the agency consider incorporating into the guidelines for its funding program(s) statewide guidance on how to "package" Sustainable Streets projects for specific grants?		
☐	☐	☐	6. Would the agency consider jointly establishing a match with other agencies – for example, would resource agencies consider establishing a standard local match similar to transportation grants?		
☐	☐	☐	7. If grant recipients may combine this grant with other grants, is your agency willing to coordinate with the other funding agencies to allow joint reporting?		
☐	☐	☐	8. If the funding source does not fund all aspects of Sustainable Streets, does the scoring system put projects at a disadvantage if they include ineligible costs?		
☐	☐	☐	9. If grant recipients may combine this grant with other grants, is your agency willing to coordinate among agencies to time solicitations?		
☐	☐	☐	10. If your agency does not currently include in solicitations the extensions that may be available, would you be willing to include this information in order to assist applicants in evaluating the potential alignment of grant periods of different grants that may be combined for a project?		
☐	☐	☐	11. Are any of the following activities ineligible under the grant program: planning, design, construction, and/or short-term maintenance, and monitoring?		

YES	NO	N/A	Question	Potential Revisions for Consideration Program Revisions	 Legislative Revisions
☐	☐	☐	12. How does the funding program ensure that the various regions of the state get their fair share of funding?		
☐	☐	☐	13. How does the funding program address the need for green stormwater infrastructure to be provided in old industrial areas, which will help meet load reduction targets for PCBs? Please describe any ways in which locating Sustainable Streets in the old industrial areas are encouraged or discouraged.		
☐	☐	☐	14. For urban greening grant programs, would the agency be willing to coordinate with other urban greening programs in order to standardize urban greening solicitations to the extent possible?		

Appendix E

Case Studies

Two case studies were conducted to identify opportunities to improve funding of Sustainable Streets. The case studies are intended to serve as examples for how funding agencies may use the checklist provided in Appendix D to review their funding programs and develop specific actions to improve funding of Sustainable Streets projects. The two case studies focused, respectively on the One Bay Area Grant (OBAG) county program managed by the Metropolitan Transportation Commission (MTC) and the Storm Water Grant Program (SWGP) managed by the State Water Resources Control Board (SWRCB). The results of each case study is presented in the format of the checklist provided in Appendix D, followed by an explanation of how specific actions were identified based on the results.

One Bay Area Grant (OBAG) Case Study

The following checklist presents the results of a review of MTC Resolution 4202, Adoption of the project selection policies and project programming for the second round of the One Bay Area Grant program (OBAG 2), using the checklist in Appendix D. This review focused on the OBAG County Program, which provides funding for grants administered by the nine Bay Area counties. Resolution 4202 establishes regional policies that must be followed by each county's OBAG program. Following the checklist is a discussion of how the results were used to develop specific actions included in the Roadmap.

OBAG County Program Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
				Potential Revisions for Consideration	
YES	**NO**	**N/A**	**Question**	**Program Revisions**	**Legislative Revisions**
Questions Regarding Pathway 1: Prioritize Sustainable Streets in Funding Sources					
☒	☐	☐	1. If the funding source is a transportation grant, does it restrict the use of funds for green stormwater infrastructure? If yes, please describe the restrictions in the "Potential Revisions for Consideration" columns.	• Eligibility is governed by federal law. Some GSI components of Sustainable Streets projects, such as pervious paving, are clearly eligible. It would be helpful to have guidance to assist grant applicants in demonstrating the benefits of GSI in transportation projects.	• The Water Environment Foundation has been involved in the public review of federal surface transportation legislation and may seek to influence eligibility of GSI in future federal surface transportation acts. If other regional partners seek to influence GSI eligibility in federal legislation,

OBAG County Program Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
				Potential Revisions for Consideration	
YES	NO	N/A	Question	Program Revisions	Legislative Revisions
				• Coordination with Caltrans is recommended to clarify eligibility of GSI components in federally funded transportation projects.	they should inform MTC. MTC conducts legislative advocacy on the federal level.
☐	☐	☒	2. If the funding source is a resource grant, does it restrict the use of funds for transportation improvements that reduce greenhouse gases? If yes, please describe the restrictions in the "Potential Revisions for Consideration" columns.	• The funding source is not a resource grant.	
☐	☒	☐	3. Is the maximum grant amount too low to fully fund the construction of both the transportation and green stormwater infrastructure features of a Sustainable Streets project? If yes, please indicate in the "Potential Revisions for Consideration" columns whether an increase in the maximum grant amount could be considered.	• MTC does not specify a maximum amount for OBAG County Program grants.	
Questions Regarding Pathway 2: Improve Conditions for Using Multiple Grants					
☐	☒	☐	4. To simplify the application process for projects that must obtain multiple grants, would the agency consider coordinating with other funding agencies to develop a basic application form, which each agency could modify as needed for each funding program?	• OBAG2, proposition, and other funding program requirements are too unique to fit into a "single application" solution. However, MTC is looking at ways to coordinate regional programs to develop an MTC application that may be used for multiple programs.	N/A

OBAG County Program Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
				Potential Revisions for Consideration	
YES	NO	N/A	Question	Program Revisions	Legislative Revisions
☒	☐	☐	5. Would the agency consider incorporating into the guidelines for its funding program(s) statewide guidance on how to "package" Sustainable Streets projects for specific grants?	• This type of guidance could be helpful for grant applicants to demonstrate multiple benefits of GSI in transportation projects.	N/A
☐	☐	☒	6. Would the agency consider jointly establishing a match with other agencies – for example, would resource agencies consider establishing a standard local match similar to transportation grants?	• The OBAG match requirement is determined by federal law.	• No changes to the federally-legislated 11.47% non-federal local match requirement are anticipated.
☐	☐	☒	7. If grant recipients may combine this grant with other grants, is your agency willing to coordinate with the other funding agencies to allow joint reporting?	• MTC does not have reporting requirements for OBAG.	
☐	☐	☒	8. If the funding source does not fund all aspects of Sustainable Streets, does the scoring system put projects at a disadvantage if they include ineligible costs?	• The OBAG program already includes an emphasis on multi-modal, multi-benefit projects. Additionally, OBAG criteria do not include a requirement to look at cost/benefit.	
☐	☒	☐	9. If grant recipients may combine this grant with other grants, is your agency willing to coordinate among agencies to time solicitations?	• MTC is looking at ways to coordinate regional programs, and could inform other funding agencies of its RFPs.	• Federal legislation dictates when funds are spent; there are no opportunities to time the requirements with other programs.
☐	☐	☒	10. If your agency does not currently include in solicitations the extensions that may be available, would you be willing to include this information in order to assist applicants in evaluating the potential alignment of grant periods of different grants that may be combined for a project?	• The obligation and delivery deadlines are already described in the OBAG policy resolution; extensions are not available.	

OBAG County Program Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
				Potential Revisions for Consideration	
YES	NO	N/A	Question	Program Revisions	Legislative Revisions
☐	☐	☒	11. Are any of the following activities ineligible under the grant program: planning, design, construction, and/or short-term maintenance, and monitoring?	• OBAG grants can be used for planning, design, construction, and short-term establishment. Eligibility for maintenance is determined by federal law.	
☐	☐	☒	12. For urban greening grant programs, would the agency be willing to coordinate with other urban greening programs in order to standardize urban greening solicitations to the extent possible?	• The funding source is not an urban greening grant program.	

As a result of completing the above checklist for the OBAG program, four Specific Actions were identified. The relationship between these specific actions and the information in the checklist is shown in Table E-1.

Table E-1 Relationship between Specific Actions and the OBAG Program Review			
	Agencies/Organizations		
Specific Action	Lead	Support	Applicable Items from the OBAG Review Checklist
1-1, Clarify GSI Eligibility in Federal Transportation Grants - Provide clarification of the eligibility of GSI elements in federally-funded transportation projects	Caltrans	FHWA, MTC	The clarification of eligibility proposed in Specific Action 1-1 would address issues discussed in the following checklist item: • Item 1 (Eligibility of GSI components of Sustainable Streets)
1-2, Update OBAG Guidance - Develop guidance clarifying eligibility of GSI elements in federally funded (One Bay Area Grant - OBAG) transportation projects, for inclusion in guidance materials that MTC will provide to counties for OBAG's third round of funding (OBAG 3)	MTC	Caltrans	Guidance proposed in Specific Action 1-2 would address issues discussed in the following checklist item: • Item 1 (Eligibility of GSI components of Sustainable Streets)
1-6, Identify Opportunities to Influence Federal Policy - Identify opportunities to support efforts by Champions to influence eligibility of GSI in federal surface transportation programs, maintaining communication with MTC on legislative engagement and/or advocacy	BASMAA	SFEP, Trust for Public Land, Save the Bay	The federal legislative engagement and/or advocacy proposed in Specific Action 1-6 would address issues discussed in the following checklist item: • Item 1 (Eligibility of GSI components of Sustainable Streets)
2-2, Inform other agencies of solicitations - Identify and add staff from applicable agencies to the list of parties to notify regarding schedules of future solicitations for applicable grant programs	Funding agencies, including MTC	None	The coordination proposed in Specific Action 2-2 would address issues discussed in the following checklist item: • Item 9 (Coordinate timing of solicitations)

Storm Water Grant Program (SWGP) Case Study

The following checklist presents the results of a review of the State Water Resources Control Board's (SWRCB) Proposition 1 Storm Water Grant Program Guidelines (SWRCB 2015), which was conducted using the checklist in Appendix D. Following the checklist is a discussion of how the results were used to develop specific actions included in the Roadmap.

SWGP Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
				Potential Revisions for Consideration	
YES	NO	N/A	Question	Program Revisions	Legislative Revisions
Questions Regarding Pathway 1: Prioritize Sustainable Streets in Funding Sources					
☐	☐	☒	1. If the funding source is a transportation grant, does it restrict the use of funds for green stormwater infrastructure? If yes, please describe the restrictions in the "Potential Revisions for Consideration" columns.	• The funding source is not a transportation grant.	
☒	☐	☐	2. If the funding source is a resource grant, does it restrict the use of funds for transportation improvements that reduce greenhouse gases? If yes, please describe the restrictions in the "Potential Revisions for Consideration" columns.	• Costs for impervious surfaces are generally ineligible; however, costs for bike lanes, pedestrianpathways, and/or alternate transit lanes could be eligible if greenhouse gas (GHG) reduction is shown as a quantifiable benefit. Guidance may be provided to assist applicants in documenting multiple benefits of GSI.	• Fure grant programs could consider how the program may support the funding of Sustainable Streets as eligibility criteria are developed.
☐	☒	☐	3. Is the maximum grant amount too low to fully fund the construction of both the transportation and green stormwater infrastructure features of a Sustainable Streets project? If yes, please indicate in the "Potential Revisions for Consideration" columns whether an increase in the maximum grant amount could be considered.	• Although the maximum implementation grant amount is $10 million, projects that seek funding under the Storm Water Grant Program often combine funding from multiple sources.	N/A

SWGP Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
YES	NO	N/A	Question	Potential Revisions for Consideration Program Revisions	Legislative Revisions
Questions Regarding Pathway 2: Improve Conditions for Using Multiple Grants					
☐	☐	☒	4. To simplify the application process for projects that must obtain multiple grants, would the agency consider coordinating with other funding agencies to develop a basic application form, which each agency could modify as needed for each funding program?	• The SWGP and other funding program requirements are too unique to fit into a "single application" solution.	• It may be possible to influence the development of future propositions/enacting legislation to coordinate some elements of application requirements with other grant programs that fund Sustainable Streets
☒	☐	☐	5. Would the agency consider incorporating into the guidelines for its funding program(s) statewide guidance on how to "package" Sustainable Streets projects for specific grants?	• This type of guidance could be helpful for grant applicants to demonstrate multiple benefits of Sustainable Streets projects, including GHG reduction.	N/A
☐	☐	☒	6. Would the agency consider jointly establishing a match with other agencies – for example, would resource agencies consider establishing a standard local match similar to transportation grants?	• The SWGP match requirement was dictated by the chapter of State law into which the program was incorporated. • Guidance could be developed to help applicants demonstrate the eligibility of transportation elements, such as the use of permeable paving, so that funding of those elements could be	• As future funding programs based on future propositions are developed, there may be opportunities to influence related legislation and the incorporation into a chapter of state law.

SWGP Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
YES	NO	N/A	Question	Potential Revisions for Consideration Program Revisions	Legislative Revisions
				identified as matching funds.	
☐	☐	☒	7. If grant recipients may combine this grant with other grants, is your agency willing to coordinate with the other funding agencies to allow joint reporting?	• SWRCB currently allows grant recipients to establish some milestone dates. If reporting requirements of applicable funding programs are compared, there may be opportunities to coordinate the reporting schedule, format, etc.	N/A
☐	☐	☒	8. If the funding source does not fund all aspects of Sustainable Streets, does the scoring system put projects at a disadvantage if they include ineligible costs?	• The SWGP's scoring criteria do not penalize projects that include ineligible costs.	
☐	☐	☒	9. If grant recipients may combine this grant with other grants, is your agency willing to coordinate among agencies to time solicitations?	• Timing of solicitations is subject to state budget allocation. Bond law dictates when funds must be spent. • While the SWGP has no flexibility in the timing of solicitations, there are opportunities to coordinate information. SWRCB participates in funding fairs and the California Financing Coordinating Committee website. A database of grants/ upcoming solicitations could be	N/A

SWGP Case Study Identifying Opportunities to Improve Funding of Sustainable Streets					
YES	NO	N/A	Question	Potential Revisions for Consideration Program Revisions	Legislative Revisions
				developed. Funding agencies could inform one another on RFP timing.	
☐	☐	☒	10. If your agency does not currently include in solicitations the extensions that may be available, would you be willing to include this information in order to assist applicants in evaluating the potential alignment of grant periods of different grants that may be combined for a project?	• Time extension requests are never guaranteed and may be denied by the Governor.	
☐	☐	☒	11. Are any of the following activities ineligible under the grant program: planning, design, construction, and/or short-term maintenance, and monitoring?	• Grants can only cover costs incurred within the grant period.	
☐	☐	☒	12. For urban greening grant programs, would the agency be willing to coordinate with other urban greening programs in order to standardize urban greening solicitations to the extent possible?	• The funding source is not an urban greening grant program.	

As a result of completing the above checklist for the SWGP, four Specific Actions were identified. The relationship between these specific actions and the information in the checklist is explained in Table E-2.

Table E-2 Relationship between Specific Actions and the SWGP Review			
	Agencies/Organizations		
Specific Action	Lead	Support	Applicable Items from the SWGP Review Checklist
1-7, Develop State Legislative Program - Develop and implement an initiative to influence future state propositions, related legislation, and incorporation into a chapter of state law – to provide a clear path for full eligibility of Sustainable Streets, and coordinate application requirements among grant programs that fund Sustainable Streets	SFEP	SWRCB, RWQCB, BASMAA, Champions	The State Legislative Program proposed in Specific Action 1-7 would address issues discussed in the following checklist items: • Item 2 (Eligibility of transportation components of Sustainable Streets) • Item 4 (Potential coordination of some application requirements with other grant programs) • Item 6 (Match requirements)
2-1, Coordinate to publicize solicitations - Coordinate with other agencies to join SWRCB in participating in funding fairs and the California Financing Coordinating Committee website	SWRCB	Other funding agencies	The coordination proposed in Specific Action 2-1 would address issues discussed in the following checklist item: • Item 9 (Coordinate timing of solicitations)
2-2, Inform other agencies of solicitations - Identify and add staff from applicable agencies to the list of parties to notify regarding schedules of future solicitations for applicable grant programs	Funding agencies, including SWRCB	None	The coordination proposed in Specific Action 2-2 would address issues discussed in the following checklist item: • Item 9 (Coordinate timing of solicitations)
2-7, Consider linkages to other programs - Funding agencies will consider aspects of other related grant programs (timing, criteria, etc.) in the development of future grant programs, and will coordinate with other grant programs where feasible	Funding agencies, including SWRCB	None	The considerations proposed in Specific Action 2-7 would address issues discussed in the following checklist item: • Item 4 (Potential coordination of some application requirements with other grant programs)

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VTA – See Santa Clara Valley Transportation Authority.

Appendix G

List of Participating Agencies and Organizations

Participating agencies and organizations are listed below, and includes the names of the representatives that attended Regional Roundtable meetings. Attendees[6] of this meeting provided comments on the Draft Roadmap that have been incorporated in the Final Roadmap.

Table G-1
Participating Agencies and Organizations

Agency/Organization	Roundtable Attendance 9/19/2017
Alameda Countywide Clean Water Program	Jim Scanlin
BAAQMD	--
BASMAA	Geoff Brosseau
	Matt Fabry
Bay Area Metro | ABAG and MTC	Anne Richman
	Matt Maloney
	Mallory Atkinson
	Christy Leffal
Bay Area Regional Collaborative	--
Bay Conservation and Development Commission	Miriam Torres
California Natural Resources Agency	--
California Transportation Commission	Garth Hopkins
Caltrans	Jagjiwan Grewal
	Ephrem Meharena
	Tom Rutsch
California Stormwater Quality Association	Geoff Brosseau
City of Campbell	Fred Ho
City of Oakland	Ryan Russo
	Alison Schwartz

[6] Curt Kruger, of Contech, and Eric Zickler, of Lotus Water, also attended the September 19, 2017, Regional Roundtable meeting and commented on the Draft Roadmap.

Table G-1 Participating Agencies and Organizations	
Agency/Organization	**Roundtable Attendance 9/19/2017**
	Terri Fashing
	Bruce Wells
City of San Jose	--
City of San Pablo	Amanda Booth
City of Union City	Thomas Ruark
Contra Costa Clean Water Program	Rachel Kraai
Contra Costa County	Mary Halle
Contra Costa Transportation Authority	--
Department of Water Resources	Paul Wells
Federal Emergency Management Agency	--
Federal Highway Administration	--
Natural Resources Defense Council	Alisa Valderrama
Regional Water Quality Control Board	Thomas Mumley
	Keith Lichten
San Francisco Estuary Partnership	Josh Bradt
San Mateo City/County Association of Governments	Jean Higaki
San Mateo Countywide Water Pollution Prevention Program	Matt Fabry
San Mateo Transportation Authority	--
Santa Clara Urban Runoff Pollution Prevention Program	Jill Bicknell
Santa Clara Valley Transportation Authority	Eugene Maeda
Save the Bay	Allison Chan
SPUR	Laura Tam
State Coastal Conservancy/ San Francisco Bay Restoration Agency	Sam Schuchat
	Matt Gerhart
State Water Resources Control Board	Jeffrey Albrecht
	Meghan Tosney
Strategic Growth Council	--

Table G-1 Participating Agencies and Organizations	
Agency/Organization	**Roundtable Attendance 9/19/2017**
Trust for Public Land	Katherine Jones
U.S. Environmental Protection Agency	David Smith
	Luisa Valiela
	Erica Yelensky

Guidance for Sizing Green Infrastructure Facilities in Street Projects

with companion analysis:

Green Infrastructure Facility Sizing for Non-Regulated Street Projects

B A S M A A

Bay Area
Stormwater Management
Agencies Association

Prepared by
Dan Cloak Environmental Consulting
EOA, Inc.

June 2019

APPENDIX D

Introduction and Regulatory Background

Provision C.3.j. in the reissued Municipal Regional Stormwater Permit[1] (MRP) requires each Permittee to "complete and implement a Green Infrastructure (GI) Plan for the inclusion of low impact development drainage design into storm drain infrastructure on public and private lands, including streets, roads, storm drains, parking lots, building roofs, and other storm drain infrastructure elements."

Provision C.3.j.i.(g) further mandates that these plans include:

> *Requirements that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. For street projects not subject to Provision C.3.b.ii. (i.e., non-Regulated Projects) Permittees may collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude fully meeting the C.3.d. sizing requirements. The single approach can include different options to address specific issues or scenarios. That is, the approach shall identify the specific constraints that would preclude meeting the sizing requirements and the design approach(es) to take in that situation. The approach should also consider whether a broad effort to incorporate hydromodification controls into green infrastructure, even where not otherwise required, could significantly improve creek health and whether such implementation may be appropriate, plus all other information as appropriate (e.g., how to account for load reduction for the PCBs or mercury TMDLs).*

This document represents the "single approach" collectively proposed by the Permittees for how to proceed when constraints on GI projects affect facility sizing in street projects. For other types of projects, information on hydraulic sizing is provided in the technical guidance manuals for Provision C.3 developed by each countywide stormwater program.

Hydraulic Sizing Requirements

MRP Provision C.3.d contains criteria for sizing stormwater treatment facilities. Facilities may be sized on the basis of flow, volume, or a combination of flow and volume. With adoption of the 2009 MRP, a third option for sizing stormwater treatment facilities was added to Provision C.3.d. This option states that "treatment systems that use a combination of flow and volume capacity shall be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data."

This option can also be used to develop sizing factors for facilities with a standard cross-section (i.e., where the volume available to detain runoff is proportional to facility surface area). To calculate sizing factors, inflows, storage, infiltration to groundwater, underdrain discharge, and overflows are tracked for each time-step during a long-term simulation. The continuous simulation is repeated, with variations in the treatment surface area, to determine the minimum area required for the facility to capture and treat 80% of the inflow during the simulation.

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[1] Order R2-2015-0049

Such an analysis was conducted for BASMAA by Dubin Environmental Consulting and is described in the attached Technical Report. The analysis shows that bioretention facilities with the current-standard cross-section can capture and treat the Provision C.3.d amount of runoff when sized to 1.5% - 3% of tributary equivalent impervious area, depending on location.

Hydromodification Management

A principal objective of LID is to mimic natural hydrology in the post-development condition. This is accomplished by retaining and infiltrating runoff flows during small to medium events. Flows from larger events are detained and slowed.

MRP Provision C.3.g. includes requirements and criteria for implementing hydromodification management (HM). These HM requirements apply to Regulated Projects that create or replace an acre or more of impervious area, increase the amount of impervious area over the pre-project condition, and flow to creeks that are at risk of erosion. As such, the HM requirements do not apply to street projects that retrofit drainage systems that receive runoff from existing roofs and paving.

However, Provision C.3.j.i.(g) states that the Permittees' approach to sizing GI facilities "...should also consider whether a broad effort to incorporate hydromodification controls into green infrastructure, even where not otherwise required, could significantly improve creek health and whether such implementation may be appropriate..."

Various criteria for HM design have been used in California and throughout the U.S. These criteria have been based on one or more of the following principles:

- Maintaining watershed processes
- Maintaining a site-specific water balance
- Maintaining the value of the curve number used in the NRCS method of computing peak runoff
- Controlling increases in peak flows from a specified storm size
- Controlling increases in the duration of flows at each intensity within a specified range (flow duration control)
- Controlling the likelihood of downstream erosion in streams (erosion potential, or Ep)

Generally, for any HM criterion used, facilities with more storage and a larger infiltrative area will be more effective in meeting the criterion than facilities with less storage and a smaller infiltrative area.

In the statewide municipal stormwater NPDES permit for small MS4s, Provision E.12.f. includes the following HM standard applicable to Bay Area small MS4s: "Post-project runoff shall not exceed estimated pre-project flow rate for the 2-year, 24-hour storm..."

Dubin (2014) conducted modeling to evaluate whether this standard would be met in the San Francisco Phase II counties (Marin, Sonoma, Napa, and Solano) by a bioretention facility meeting the minimum requirements in that permit's Provision

E.12.f. Dubin's analysis found that a facility sized to 4% of tributary equivalent impervious area, and having a 6-inch deep reservoir with 2 inches of freeboard, 18 inches of treatment soil, and a 12-inch-deep "dead storage" gravel layer below the underdrain, would meet this standard, even in the wettest portions of the Bay Area.

Additional Considerations for Bioretention Sizing

In summary, bioretention facilities for street projects sized to 1.5% - 3% of tributary equivalent impervious area (depending on their location in the Bay Area) can meet the criteria in Provision C.3.d., according to the modeling study documented in the attached Technical Memo.

There are many reasons to design and build facilities larger than the Provision C.3.d. minimum. Building larger facilities helps ensure the facilities perform to the minimum hydraulic capacity intended, despite minor flaws in design, construction, and maintenance, providing an engineering safety factor for the project. Further, larger-sized facilities may more effectively address objectives to maximize the removal of pollutants (particularly pollutants in dissolved form), to operate as full trash capture devices, and to manage hydromodification effects.

However, municipalities often face considerable challenges in retrofitting existing streetscapes with GI facilities. Constraints and design challenges typically encountered in the public right-of-way include:

- The presence of existing underground utilities (known and unknown during the design phase);
- The presence of existing above-ground fixtures such as street lights, fire hydrants, utility boxes, etc.;
- The presence of existing mature trees and root systems;
- The elevation of or lack of existing storm drains in the area to which to connect underdrains or overflow structures;
- Challenges of defining and controlling any catchment areas on adjacent private parcels that drain to the roadway surface;
- Low soil permeability and strength, and the need to protect the adjacent roadway structure;
- Competition with other assets & uses for limited right-of-way area; and
- Presence of archeologic/cultural deposits.

Use of the sizing factors in the attached Technical Memo will provide municipalities flexibility in design of bioretention facilities for street projects where constraints are present.

Recommendations for Sizing Approaches for Green Infrastructure Retrofit Facilities in Street Projects

1. Bioretention facilities in street projects should be sized as large as feasible and meet the C.3.d criteria where possible. Constraints in the public right-of-way may affect the size of these facilities and warrant the use of smaller sizing factors.

Bioretention facilities in street projects may use the sizing curves in the attached memorandum to meet the C.3.d criteria. Local municipal staff involved with other assets in the public right of way should be consulted to provide further guidance to design teams as early in the process as possible.

2. Bioretention facilities in street projects smaller than what would be required to meet the Provision C.3.d criteria may be appropriate in some circumstances. As an example, it might be appropriate to construct a bioretention facility where a small proportion of runoff is diverted from a larger runoff stream. Where feasible, such facilities can be designed as "off-line" facilities, where the bypassed runoff is not treated or is treated in a different facility further downstream. In these cases, the proportion of total runoff captured and treated should be estimated using the results of the attached memorandum. In cases where "in-line" bioretention systems cannot meet the C.3.d criteria, the facilities should incorporate erosion control as needed to protect the facility from high flows. See Figures 1 and 2 below for illustration of the in-line and off-line concepts.
3. Pollutant reduction achieved by GI facilities in street projects will be estimated in accordance with the Interim Accounting Methodology[i] or the applicable Reasonable Assurance Analysis[ii].

Figure 1: Off-line system in El Cerrito where low flow is diverted to the sidewalk planter and high flows continue down the gutter.

Figure 2: In-line system in Berkeley/Albany where low and high flows enter the system and overflows exit through a drain within the system.

[i] The Interim Accounting Methodology for TMDL Loads Reduced Report (BASMAA 2017) describes the methodology that is being used to demonstrate progress towards achieving the PCB and mercury load reductions required during the term of MRP 2.0. The methodology is based on the conversion of land use from a higher to a lower PCB or mercury loading rate during the redevelopment of a parcel. See: www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/POC/Final%20Interim%20Accounting%20Methodology%20Report%20v.1.1%20(Revised%20March%202017).pdf

[ii] A Reasonable Assurance Analysis (RAA) is a methodology used to demonstrate that implementation of pollutant control measures (such as GI facilities) over a specified time period will meet required pollutant load reductions associated with a TMDL. The Bay Area Reasonable Assurance Analysis Guidance Document (BASMAA 2017) establishes a regional framework and provides guidance for conducting PCBs and mercury RAAs in the San Francisco Bay Area. See: http://basmaa.org/Announcements/bay-area-reasonable-assurance-analysis-guidance-document

BAY AREA STORMWATER MANAGEMENT AGENCIES ASSOCIATION

GREEN INFRASTRUCTURE FACILITY SIZING FOR NON-REGULATED STREET PROJECTS

Prepared by:
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December 13, 2017

B A S M A A
Bay Area Stormwater Management Agencies Association

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1. Introduction

The San Francisco Bay Regional Water Quality Control Board's reissued Phase I Municipal Regional Stormwater Permit (Order No. R2-2015-0049, issued 11/19/2015 and referred to as "MRP 2.0") includes a requirement that Permittees complete and implement green infrastructure plans to promote the increased use of green infrastructure in urban areas. These plans will guide the integration of green stormwater facilities into streets, parking lots, parks, building rooftops and similar places where there is an opportunity to retrofit traditional gray infrastructure systems and increase the removal of pollutants and improve water quality.

Provision C.3.j states:

> *Over the long term, the (Green Infrastructure) Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.*

Provision C.3.j.i.(2)(g) requires that projects be designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d. However, the provision further states that for street projects that are not Regulated Projects:

> *...Permittees may collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude fully meeting the C.3.d sizing requirements. The single approach can include different options to address specific issues or scenarios. That is, the approach shall identify the specific constraints that would preclude meeting the sizing requirements and the design approach(es) to take in that situation.*

To address this provision and further define the C.3.d sizing requirements for green infrastructure projects, the Bay Area Stormwater Management Agencies Association (BASMAA) contracted with Dubin Environmental to conduct continuous simulation hydrologic modeling to evaluate relationships of facility size (e.g., area, depth, flow rate) to facility performance. The BASMAA Development Committee, and BASMAA member agencies, intend to use these relationships to develop and justify an approach, to be created by the Development Committee, for implementing green street projects when there are constraints on facility size.

This report describes the modeling analysis that was performed to better understand the relationship between bioretention configuration and annual runoff treatment across the different BASMAA stormwater agencies and their climate zones. Long-term continuous modeling was used to compute stormwater runoff, simulate bioretention hydraulics, and estimate the annual percentage of stormwater that is treated. The analysis was performed for 10 different rain gauges that together represent the full range of climate conditions across the BASMAA member agency area. The analysis also considered different bioretention configurations and treatment goals. BASMAA member agencies can use these results to help establish policies and design guidelines to include in their green infrastructure plans.

2. Project Approach

The performance of bioretention facilities was modeled using HSPF (Hydrologic Simulation Program Fortran), which is a physically based, hydrologic model that is maintained and distributed by the US EPA.

HSPF has been used since the 1970s to conduct hydrologic analyses and size stormwater and flood control facilities. For this project, an HSPF model was developed to simulate runoff from a fully paved, 1-acre reference site and route this flow through a bioretention facility. This section describes the rain gauge selection and the HSPF modeling approach. Section 3 describes the modeling results.

2.1 Rainfall and Evapotranspiration Data

There are more than two dozen rain gauges with long-term, hourly data located within the BASMAA area. A list of candidate gauges was prepared from the National Center for Environmental Information (NCEI; formerly the National Climate Data Center or NCDC) network and then evaluated for inclusion. The evaluation focused on gauge data that could downloaded directly from EPA's National Stormwater Calculator, because these datasets have been reviewed and missing records filled with data from available nearby stations (similar to the data included with the EPA BASINS software). The list of candidate gauges was narrowed to 19 locations with 35+ years of data that are geographically distributed through the BASMAA area. The rain gauges were organized into tables that show a) mean annual precipitation (MAP) and b) 6-month, 1-year, and 2-year accumulations for 1-year and 24-hour durations. The different storm depth statistics were used to identify any outliers among the rain gauge data that could indicate problems that would hinder the effort to create regressions among the model results. The rain gauge locations were also plotted in ArcGIS.

The recommended sites were presented to the BASMAA project work group who provided helpful input about their preferences and experiences with different rain gauges. Based on this input, six stations were selected for inclusion in the modeling analysis. After developing the HSPF input and output routines, the number of gauges was increased to 10 by including higher rainfall locations to allow development of regression relationships that span the rainfall characteristics at any likely project location. Table 1 lists the candidate rain gauges included in the modeling analysis. For all gauges, a common 37 year period was used to eliminate the influence of drought and wet periods that occurred when some gauges were operational but not others. Figure 1 shows the mean annual rainfall and Figure 2 shows their locations. The 1-year and 24-hour storm durations are included in Appendix A.

TABLE 1. SELECTED RAIN GAUGES FOR GREEN INFRASTRUCTURE MODELING

2	Name	County/Agency	Years of Record	Mean Annual Rain (in)
049001	Tracy Pumping Plant	Contra Costa	37	12.7
047821	San Jose	Santa Clara	37	15.2
045378	Martinez Water Plant	Contra Costa	37	19.6
047769	SF Airport	San Francisco	37	20.4
047772	SF Downtown	San Francisco	37	21.9
046336	Oakland Museum	Alameda	37	22.8
042934	Fairfield	Fairfield-Suisun	37	24.1
043714	Half Moon Bay	San Mateo	37	28.6
047807	San Gregorio	San Mateo	37	30.0
044500	Kentfield	Marin	37	48.1

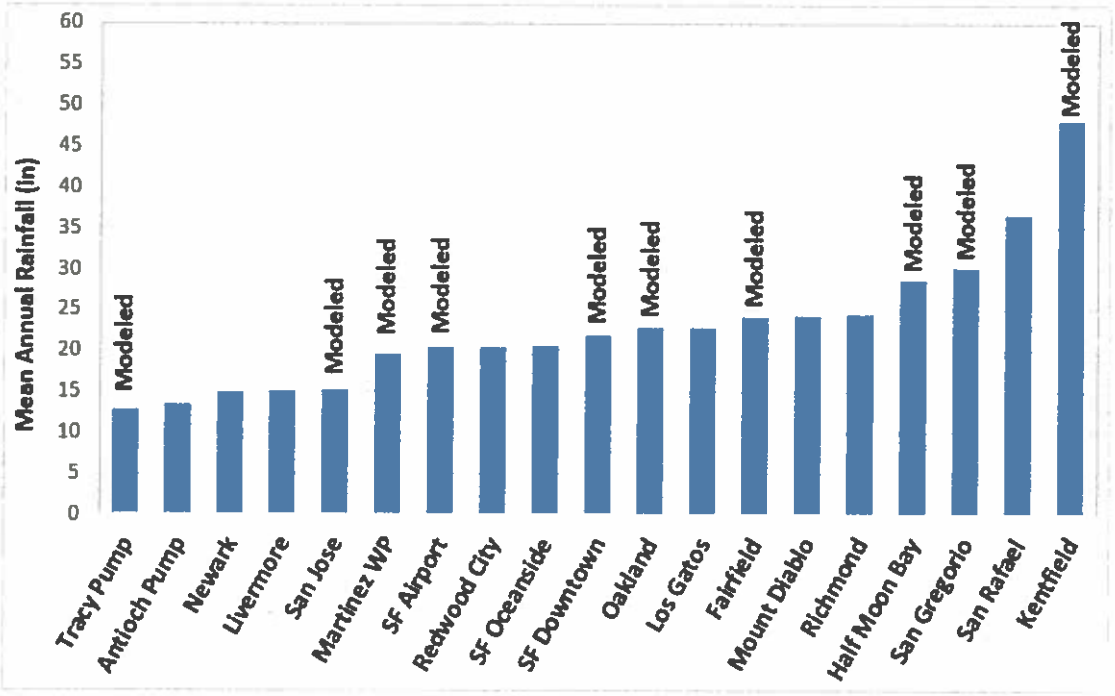

Figure 1. Candidate and selected rainfall sites with mean annual rainfall

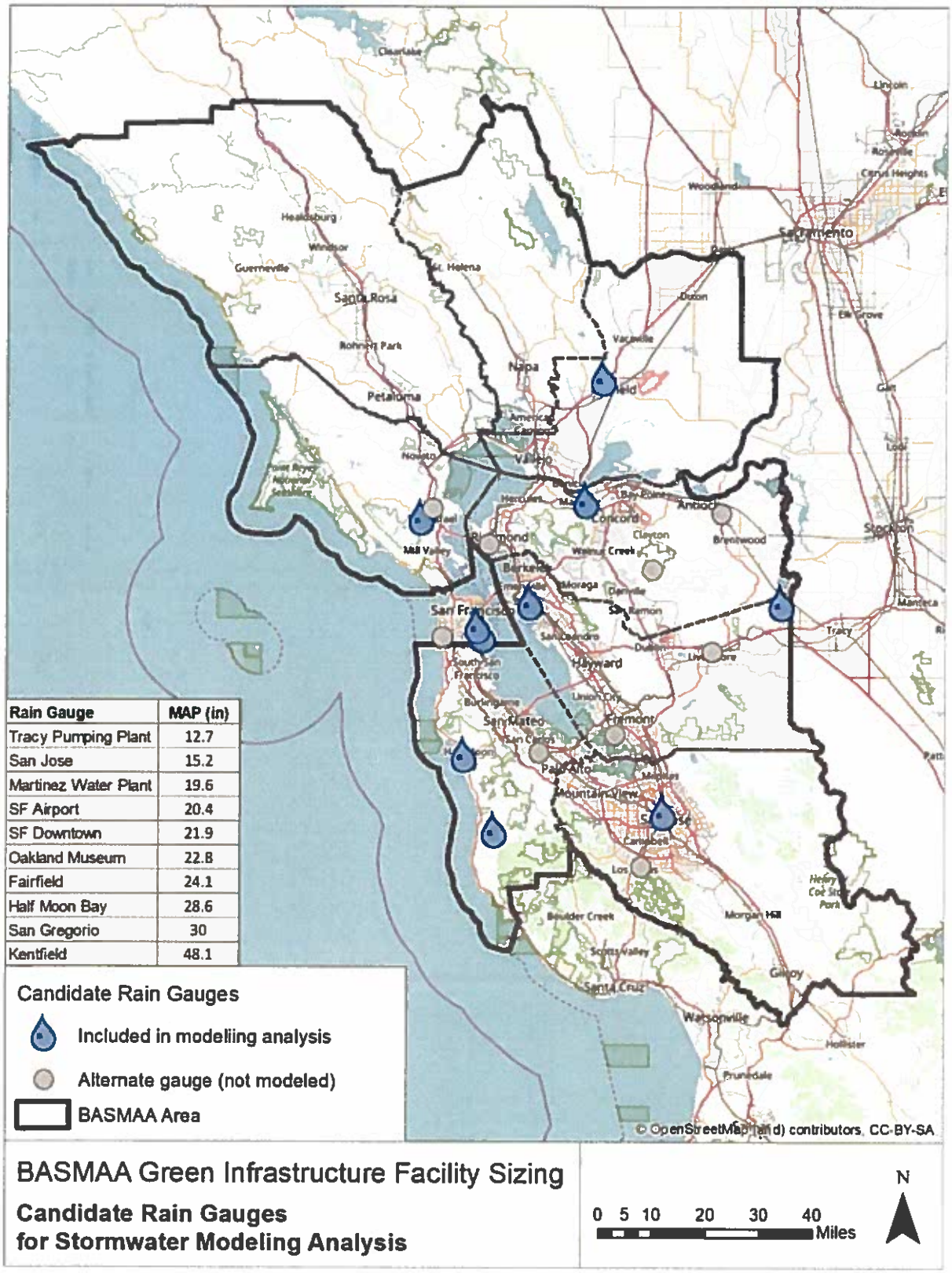

Figure 2. Location of rain gauges used in the modeling analysis

2.2 HSPF Model Setup

An HSPF model was developed to simulate runoff from a fully paved, 1-acre reference area and route this flow through a bioretention facility. The model outputs were then evaluated to determine the fraction of incoming stormwater receiving water quality treatment (defined as the fraction filtered through the bioretention media, evaporated or transpired). The HSPF model was developed with Excel/VBA-based code that enabled us to easily modify the rain gauge, bioretention area, and surface reservoir depth to determine how these watershed and configuration parameters affect the fraction of stormwater being treated.

The model parameters and approach to simulating bioretention hydraulics are discussed in detail below:

- Stormwater runoff flows across the reference 1-acre paved area and enters the bioretention facility. This water is initially detained in a shallow surface reservoir and then infiltrates to the bioretention media.
- Stormwater infiltrates through the bioretention media into an underlying gravel layer. The saturated soil permeability was set to 5 inches per hour (based on the media specification). For unsaturated soils, the relationship between soil moisture and permeability was based on monitoring data collected at three installations in Pittsburg (Contra Costa, 2013). The data showed very little infiltration occurs until the soil reaches about two-thirds saturation, and then infiltration increases roughly linearly until reaching 5 inches per hour at 90 percent saturation. Evapotranspiration also occurs in this layer.
- Stormwater within the gravel layer can move freely and infiltrate to surrounding soils, based on their capacity. If runoff enters the gravel layer more rapidly than it infiltrates, the saturation level in the gravel layer will rise until it reaches the elevation of a perforated pipe underdrain. When this occurs, water will flow through the underdrain to a downstream discharge point (typically the municipal storm drainage system).
- The surface reservoir is also equipped with an overflow structure that will become active if runoff enters the surface reservoir more rapidly than it infiltrates through the bioretention media and the surface reservoir fills to its maximum depth. Water discharged via the overflow relief structure does not receive treatment.

The bioretention configuration was based on the water quality treatment design criteria listed in the MRP 2.0 and accepted design practice in the Bay Area. Table 2 lists the dimensions of the bioretention layers as modeled in HPSF.

TABLE 2. BIORETENTION CHARACTERISTICS IN HSPF MODEL

Component	Characteristics
Surface reservoir	• Area = bioretention area (varies from 0.5% to 5% of upstream impervious area) • Depth = 6 or 12 inches with overflow relief set 2 inches from top of reservoir
Bioretention soil media	• Area = bioretention area • Depth = 18 inches • Saturated permeability = 5 inches per hour • Unsaturated permeability = variable, based on Contra Costa's 2013 monitoring data
Storage (gravel) layer	• Area = bioretention area • Depth = 12 inches • Permeability of surrounding soils = 0.024 inches per hour
Underdrain	• Located at top of gravel layer • Assumed 4-in diameter pipe

2.3 Model QA/QC Process

The HSPF input files and initial model results were carefully examined during the QA/QC process. Model errors and warnings were systematically eliminated and then the results were compared with the results generated from three independent calculation methods:

1. An Excel-based bioretention hydraulics calculator
2. A Matlab-based bioretention algorithm that was used for bioretention modeling in the Central Coast region
3. An EPA SWMM model using the LID module to represent bioretention hydraulics

The comparison was performed for the San Jose and Fairfield gauges with a bioretention sizing factor of 0.02 (i.e., bioretention surface area equal to 2 percent of the upstream impervious area). The estimated annual runoff treatment percentages agreed to within 3 percent, which confirmed the HSPF model was performing as intended.

3. Modeling Scenarios and Results

The HSPF modeling analysis was used to develop bioretention sizing criteria and support policy decisions. Working collaboratively with the BASMAA Development Committee, the modeling analysis addressed the following issues, which are presented in this section:

1. Bioretention area necessary to treat 80 percent of annual stormwater runoff
2. Relationships for estimating annual stormwater treatment percentage across a range of bioretention sizes and mean annual precipitation depths
3. Relationships for estimating annual stormwater treatment percentage for bioretention facilities without an underdrain
4. Bioretention treatment percentage for facilities with no infiltration to surrounding soils
5. Bioretention treatment percentage for facilities with lower bioretention media permeability

The results are summarized graphically here. The full set of results and underlying data were provided separately to the BAASMA Development Committee on 7/28/2017 and are available from BASMAA upon request.

3.1 Bioretention Sizing for Treatment of 80 Percent of Annual Runoff

The performance of bioretention facilities was modeled for 10 different rain gauges and bioretention footprint areas, ranging from 0.5 to 5.0 percent of the upstream tributary area, using the approach described in Section 2. Bioretention configurations with 6-inch and 12-inch deep surface reservoirs were modeled. For each of the model runs, the runoff treatment percentage was computed, and the results were plotted. Figure 3 shows an example for the San Jose gauge. Appendix B shows results for the other rain gauges.

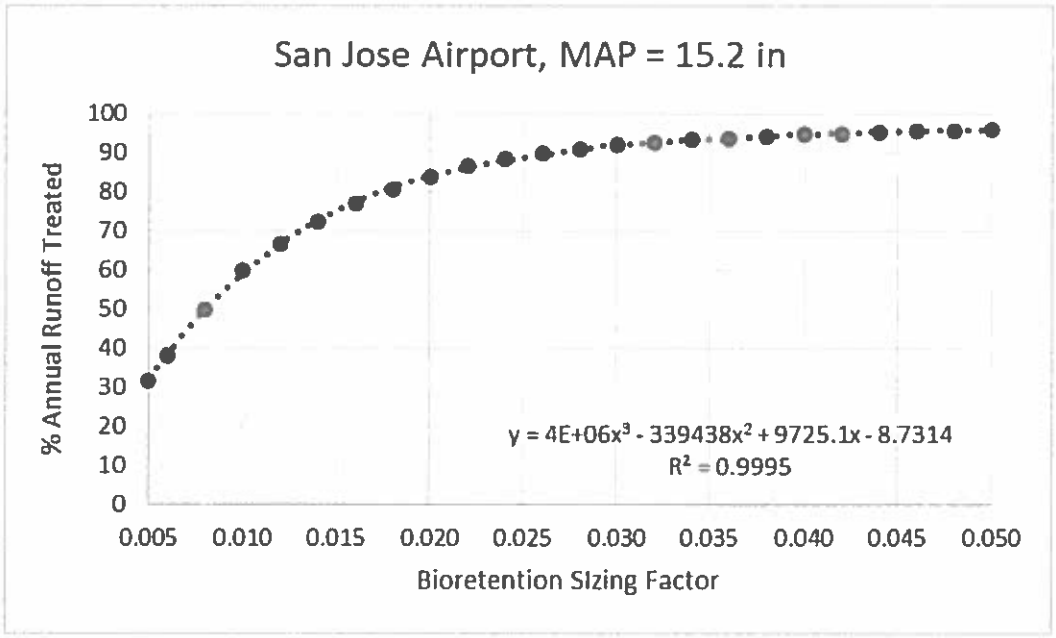

Figure 3. Percent of annual runoff treated for range of bioretention facility sizes using San Jose rain gauge

Using a polynomial regression equation, the model results for each rain gauge/surface reservoir depth scenario were interpolated to estimate the bioretention sizing factor needed to provide 80 percent annual runoff treatment, which is the treatment criterion for regulated water quality projects in the MRP 2.0. The results across the 10 rain gauges showed a clear linear relationship between mean annual rainfall and the bioretention footprint needed for 80 percent annual runoff treatment. Figure 4 and Figure 5 show the results for the 6-inch and 12-inch surface reservoir configurations, respectively.

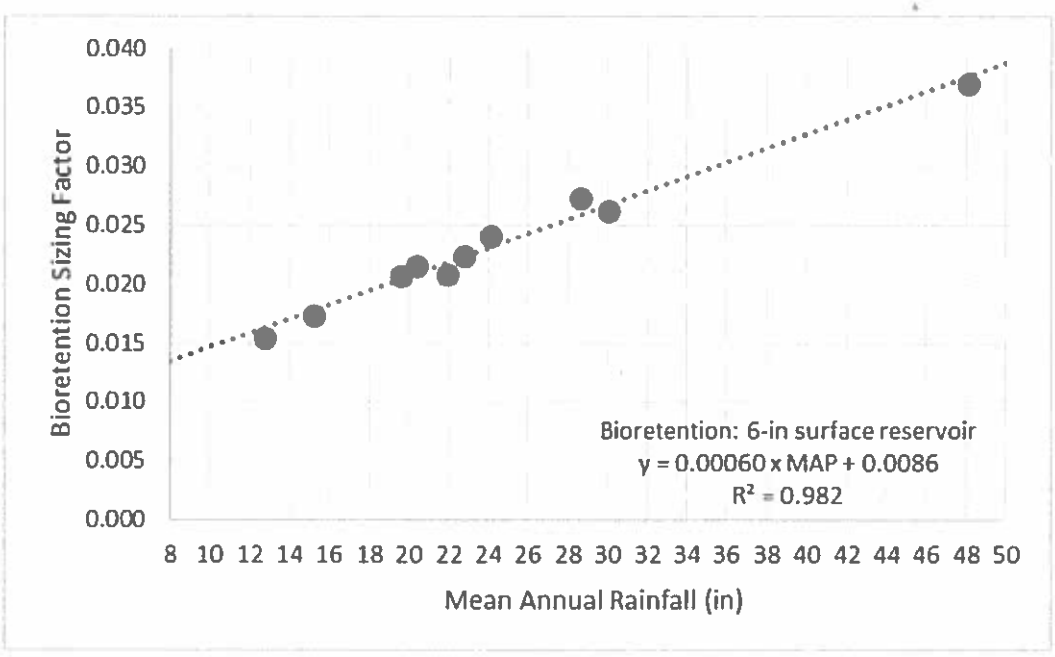

Figure 4. Bioretention size needed to provide treatment of 80 percent of annual runoff; 6-in surface reservoir

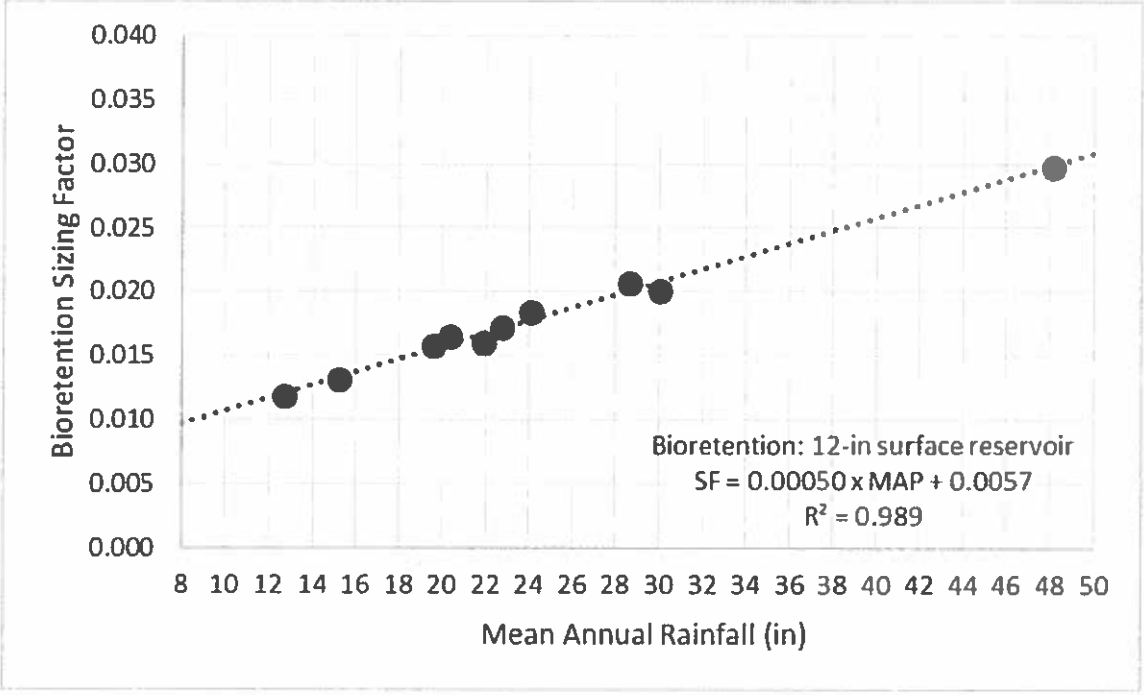

Figure 5. Bioretention size needed to provide treatment of 80 percent of annual runoff; 12-in surface reservoir

The results shown above could be used by BASMAA agencies to set minimum bioretention sizing criteria for projects that must provide treatment of 80 percent of annual runoff. The following equations could be included in BASMAA guidance for green infrastructure manuals.

For bioretention with 6-in surface reservoir configuration:

$$SizingFactor = 0.00060 \times MAP(in) + 0.0086$$

For bioretention with 12-in surface reservoir configuration:

$$SizingFactor = 0.00050 \times MAP(in) + 0.0057$$

3.2 Relationship Among Bioretention Sizing, Annual Precipitation, and Percent of Annual Runoff Treated

The modeling results generated in the previous section were then further evaluated to develop more general relationships among a) bioretention sizing factor, b) mean annual rainfall, and c) annual runoff treatment percentages. The following steps were used for the 6-inch and 12-inch reservoir depth configurations:

1. A polynomial regression was fit to the annual runoff treatment results for each of the 10 rain gauges (see example in Figure 3 above) and surface reservoir depths of 6 and 12 inches.
2. For each rain gauge/surface reservoir depth combination, the regression equation was used to estimate the sizing factors needed to provide 50, 60, 70, 80, 90, and 95 percent annual runoff treatment. This step generated 10 pairs of mean annual rainfall/bioretention sizing factor data for each rain gauge/surface reservoir depth combination (120 pairs in total). Excel's solver function was used for these calculations.

3. For each runoff treatment percentage level (50 percent, 60 percent, etc.), the mean annual rainfall (x-axis) and computed sizing factor (y-axis) were plotted and a linear regression was fit to the data in a manner similar to Figure 4 and Figure 5 above.
4. The linear regressions created for each runoff treatment level (50 percent, 60 percent, etc.) and surface reservoir depth were then plotted together to create a nomograph. Figure 6 and Figure 7 show nomographs for the 6-inch and 12-inch reservoir depths, respectively.

These nomographs are simple but powerful tools that municipal planners can use to estimate the annual treatment percentage for any bioretention facility within the BASMAA member agency area that uses the standard bioretention configuration (i.e., 6-in or 12-in reservoir, 18-in soil media, 12-in gravel layer, underdrain at top of gravel layer). The nomographs should be read as follows:

Step 1: Find the mean annual rainfall for the project location along the horizontal axis

Step 2: Move vertically up the chart to the bioretention sizing factor for the project/installation (note: this step assumes the tributary impervious area and bioretention area have already been planned)

Step 3: Visually interpolate between the closest two "treatment lines" to estimate the percent of annual runoff treated for this location/project.

These nomographs and instructions could be included in BASMAA guidance for green infrastructure manuals and used to a) evaluate the water quality benefits of proposed projects or b) evaluate the treatment provided by existing facilities with the layer depths described above.

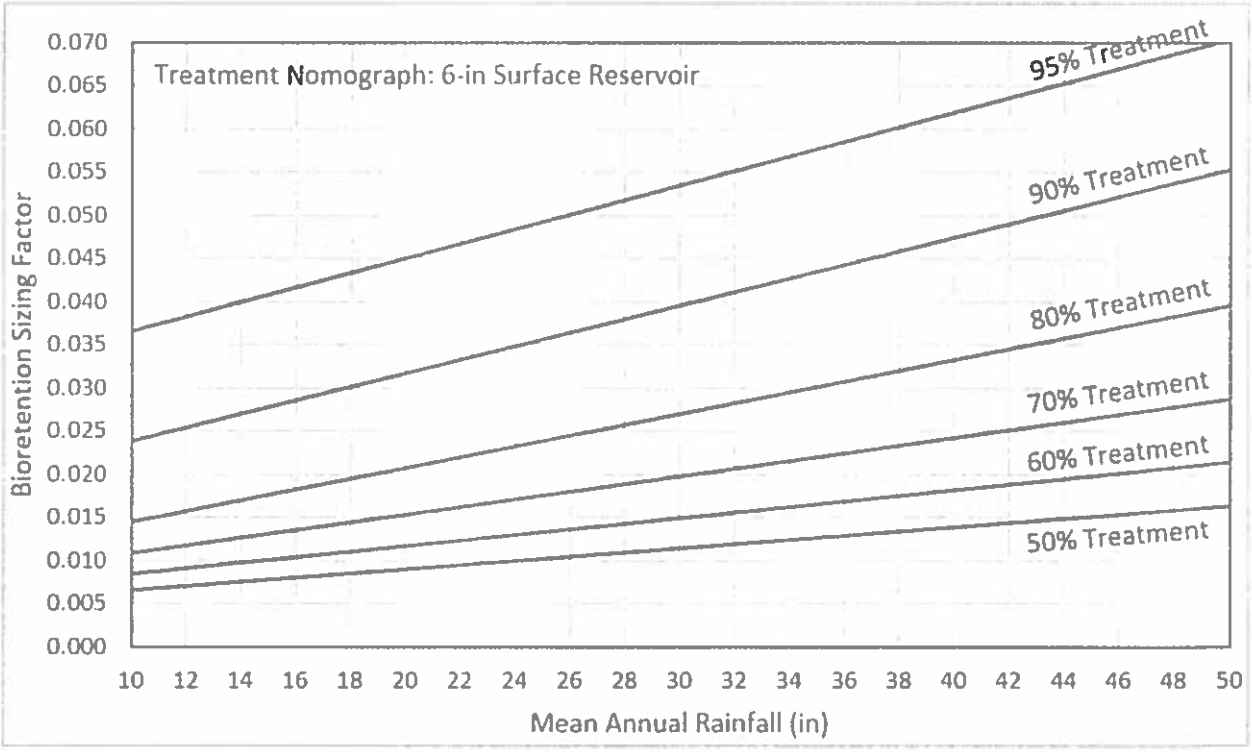

Figure 6. Percent of annual runoff treatment nomograph for bioretention facility with 6-in surface reservoir

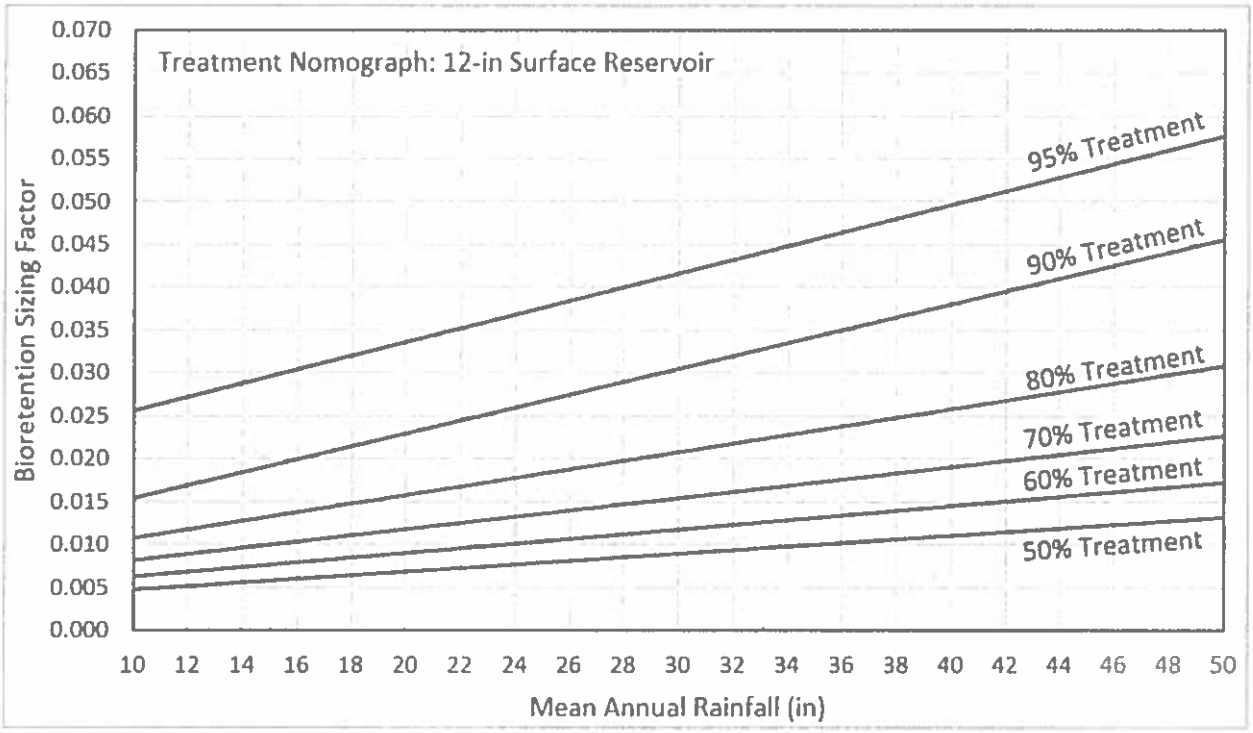

Figure 7. Percent of annual runoff treatment nomograph for bioretention facility with 12-in surface reservoir

3.3 Percent of Annual Runoff Treated by Bioretention Facilities with No Underdrain

Bioretention facilities are occasionally designed with no underdrain, including bioretention facilities in the following conditions:

- High permeability of surrounding (native) soils
- Isolated projects with no downstream drainage system for the underdrain connection
- Small projects that would not justify the additional design and construction costs associated with underdrains and cleanouts
- Projects that were designed and built prior to the development of the current standards

The HSPF model setup was modified to eliminate the underdrain outflows and allow the permeability of the surrounding soils to vary. The annual runoff treatment percentage was computed for a) three rain gauges representing drier, average and wetter than average conditions, b) six rates of permeability of surrounding soils, and c) two bioretention surface reservoir depths (Table 3).

TABLE 3. BIORETENTION WITH NO UNDERDRAIN SCENARIOS

Component	Characteristics
Rain gauges	• San Jose (MAP = 15.2 in) • San Francisco Airport (MAP = 20.4 in) • Fairfield (MAP = 24.1 in)
Permeability of surrounding (native) soils	• 0.2, 0.5, 1.0, 2.0, 3.0, 4.0 inches per hour • Underdrain results also plotted

TABLE 3. BIORETENTION WITH NO UNDERDRAIN SCENARIOS

Component	Characteristics
Surface reservoir depths	• Depth = 6 inches • Depth = 12 inches
Bioretention sizing factors	• Area = 0.5% to 5.0% of upstream impervious acre

Figure 8, Figure 9 and Figure 10 show the modeled annual runoff treatment results for the three rain gauges and a surface reservoir depth of 6 inches. Results for the 12-inch surface reservoir are shown in Appendix C. For rates of permeability of 4 inches per hour, there is little drop off in performance. The annual runoff treatment percentage declines gradually between rates of permeability of 2 to 4 inches per hour and then declines more rapidly for rates of permeability of 1 inch per hour or less. The reduction in performance is more pronounced in wetter areas (as seen in the Fairfield results). These results could be incorporated into the BASMAA guidance for green infrastructure manuals to assess the general performance of existing facilities that were installed with no underdrain.

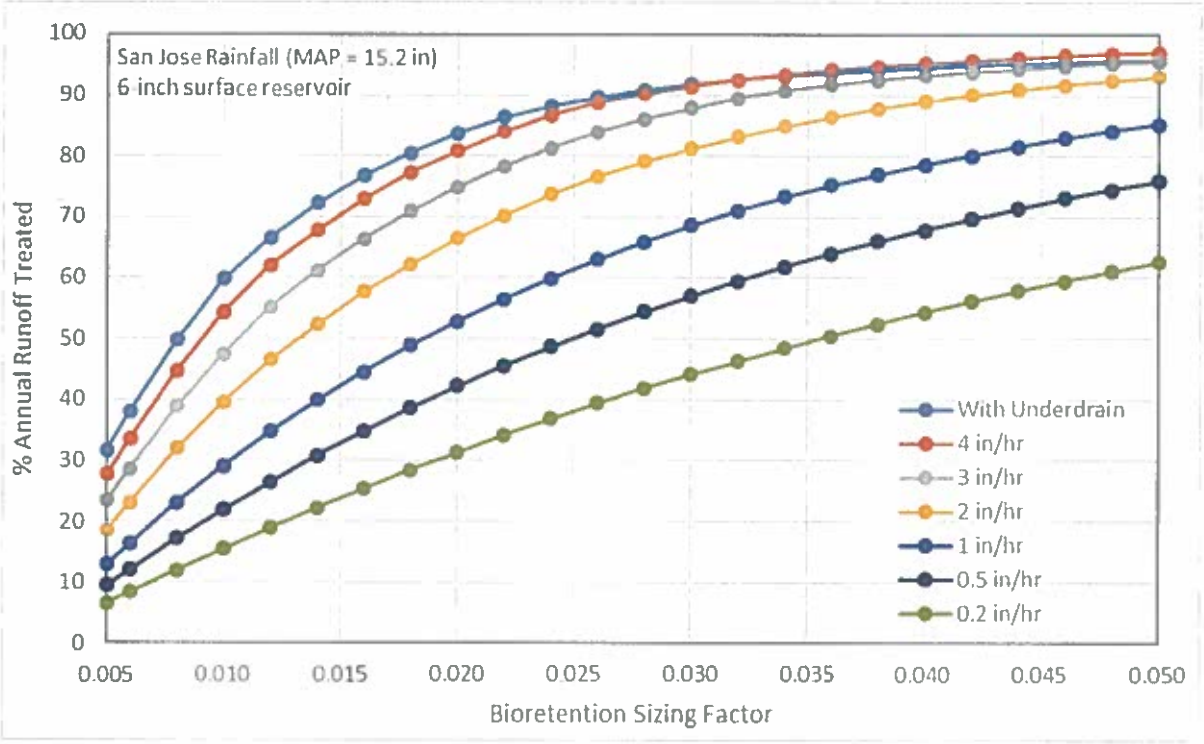

Figure 8. Treatment results for bioretention with no underdrain, San Jose gauge (MAP = 15.2 in), for varying rates of permeability of surrounding soils

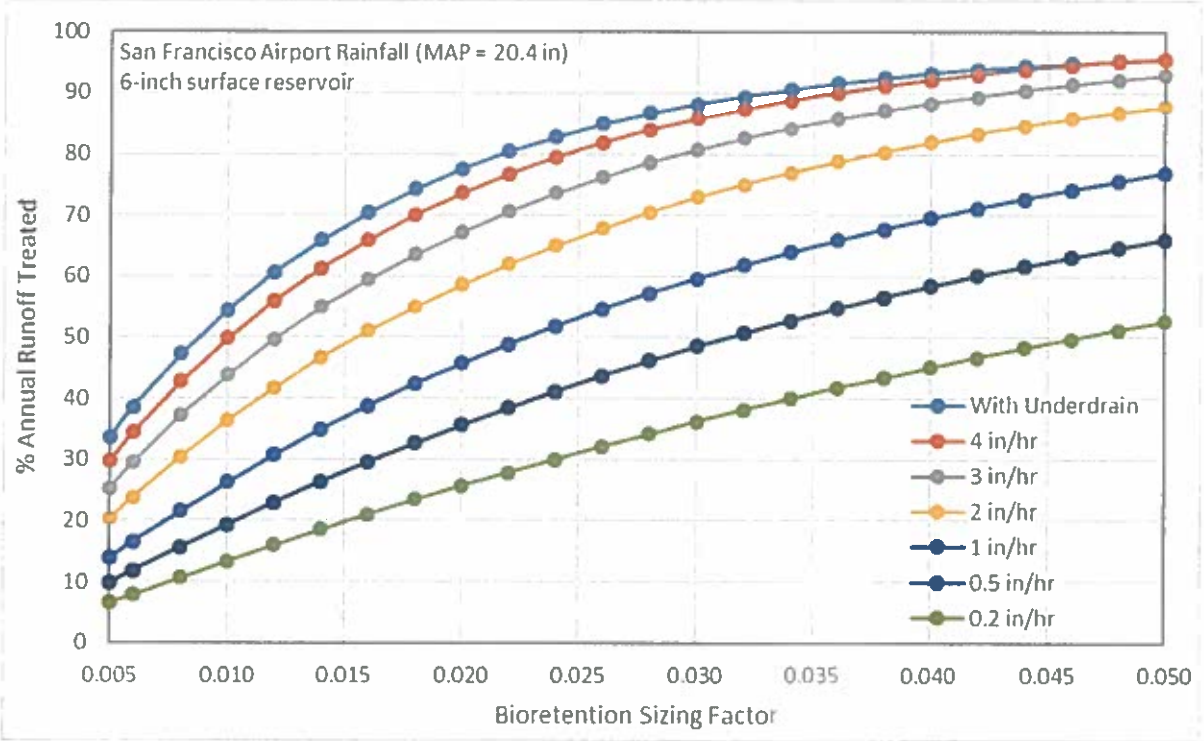

Figure 9. Treatment results for bioretention with no underdrain, San Francisco Airport gauge (MAP = 20.4 in), for varying rates of permeability of surrounding soils

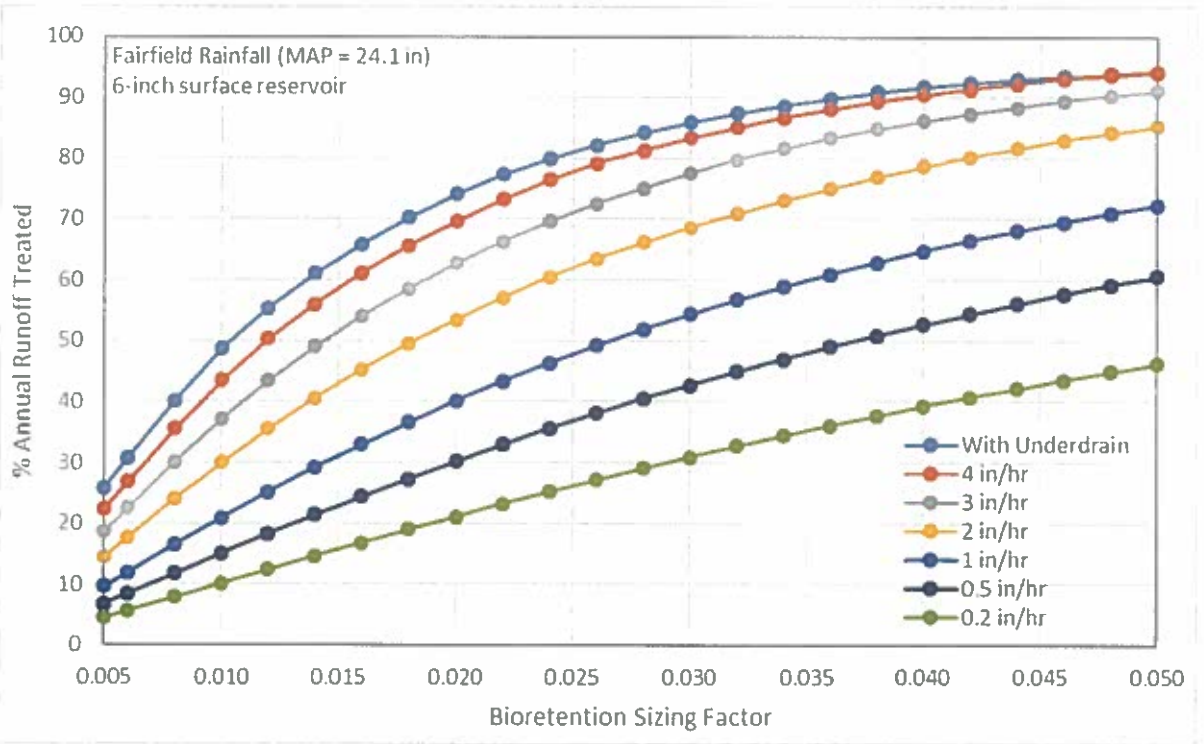

Figure 10. Treatment results for bioretention with no underdrain, Fairfield gauge (MAP = 24.1 in), for varying rates of permeability of surrounding soils

3.4 Percent of Annual Runoff Treated for Bioretention Facilities with No Infiltration to Surrounding Soils

The previous simulations described in Sections 3.1 and 3.2 were conducted for bioretention facilities located in NRCS hydrologic soil group D soils, which are low permeability soils, such as clays. These model simulations used a conservative permeability of 0.024 inches per hour from the bioretention gravel layer to surrounding soils. It was assumed the permeability of surrounding soils would have a negligible effect on the results because the hydraulic capacity of the underdrain is much higher than the permeability of D soils and that when the bioretention media becomes saturated, stormwater would exit mostly via the underdrain. If this assumption is correct, a lined bioretention facility or flow-through planter with no infiltration into surrounding soils should have similar performance.

This assumption was tested directly by running a limited number of simulations with the permeability of the surrounding soils set to a value of zero (i.e., an impervious layer directly below the bioretention facility). The annual treatment percentages were then compared to the previous modeling results (with D soil permeability set to 0.024 inches per hour). These simulations were performed for the Fairfield rain gauge and a bioretention facility with a 6-inch surface reservoir for sizing factors ranging from 0.005 to 0.050.

Figure 11 shows the two sets of model results. For the impermeable bottom scenario, the annual treatment percentage was on average 0.8 percent less the scenarios with a D soil permeability of 0.024 inches per hour (minimum difference = 0.4 percent; maximum difference = 1.5 percent). Therefore, the sizing curves and nomographs in Figure 4 through Figure 7 can be used for lined facilities with no infiltration.

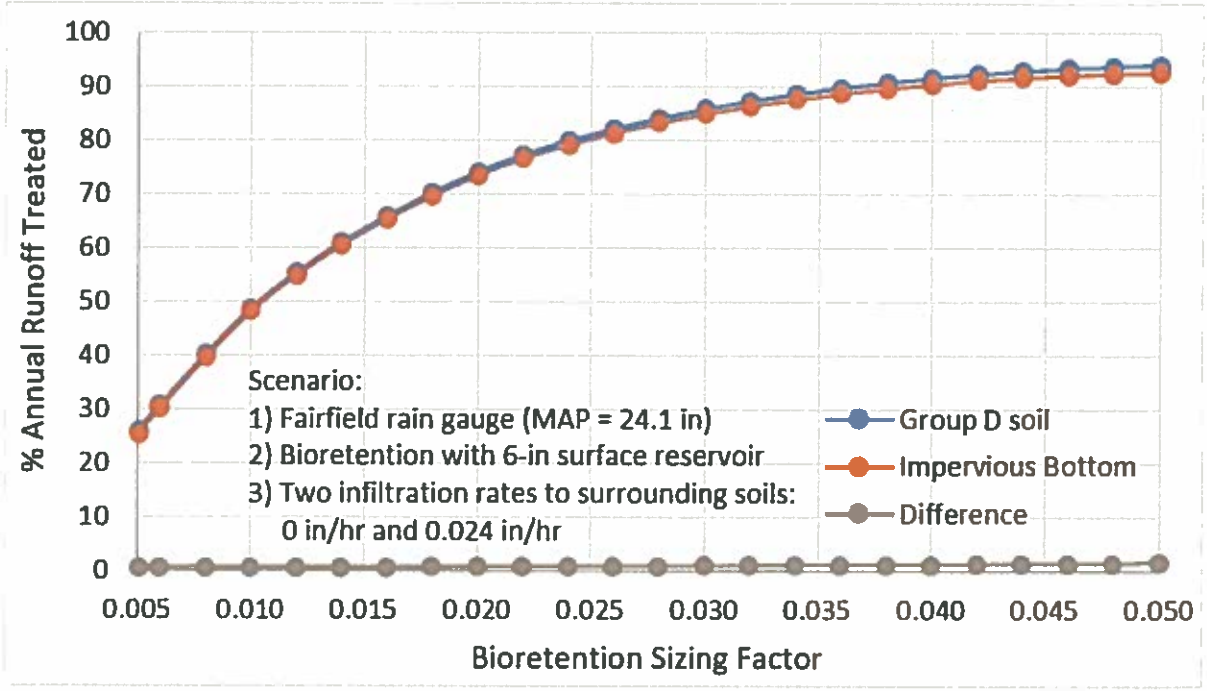

Figure 11. Comparison of model results for Group D soils and impermeable bottom scenarios

3.5 Percent of Annual Runoff Treated for Bioretention Facilities with Lower Media Permeability

The final modeling analysis examined the effect of modifying the bioretention media properties to reduce its saturated permeability from 5 inches per hour to 2 or 3 inches per hour. A lower permeability media would expand the list of available plantings and provide additional flexibility for landscape designers. However, the lower permeability would also reduce the bioretention's capacity for treating runoff during intense storms.

Due to budgetary constraints, this modeling analysis was limited to two scenarios: San Jose rain gauge, 6-inch surface reservoir depth, sizing factors ranging from 0.005 to 0.05, and saturated bioretention media permeability of 2 and 3 inches per hour. Figure 12 shows the percentage of annual runoff treated across the range of bioretention sizing factors and permeability rates. All of the scenarios include an underdrain, so the media permeability is the facility characteristic that controls the treatment percentage (i.e., the rate limiting step). The reduction in treatment percentage could be significant, particularly for smaller facilities. For example, the percent of annual runoff treated for a bioretention facility with a sizing factor of 0.02 would be reduced from 84 percent to 74 or 65 percent (for media permeability rates of 3 and 2 inches per hour, respectively).

Another way to consider the effect of lower media permeability is to estimate *how much larger a facility would need to be* to treat 80 percent of annual runoff. For the San Jose gauge, a sizing factor of 0.017 is needed with the standard bioretention media specification. If the media permeability were reduced to 3 or 2 inches per hour, the sizing factor needed to treat 80 percent of annual runoff would be 0.024 or 0.030, respectively, which represents a 37 to 75 percent increase in the facility footprint.

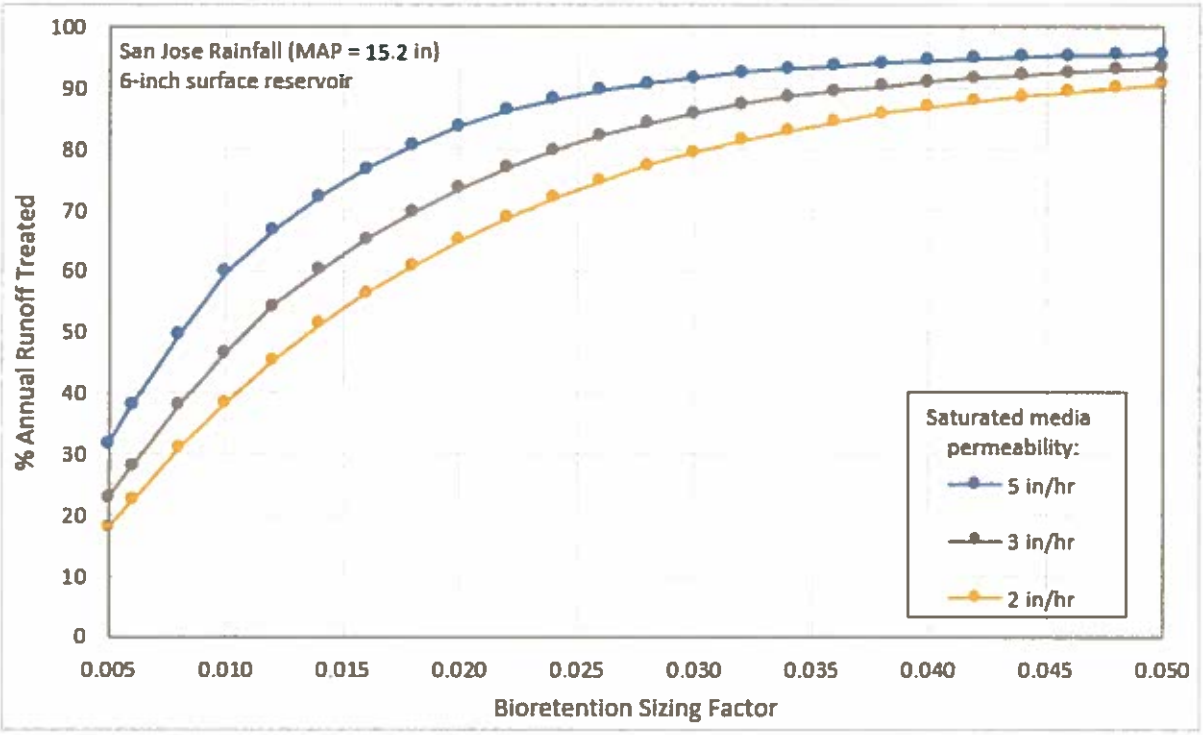

Figure 12. Treatment results for bioretention with variable media permeability, San Jose gauge (MAP = 15.2 in)

As a final note, the media permeability modeling was limited to two scenarios (one rain gauge, one facility configuration, two permeability rates). However, these results could be extended by noting that they are

generally similar to the "no underdrain" results shown in Section 3.3 (e.g., comparing the results for a media permeability of 2 inches per hour to a 2-inch per hour permeability of surrounding soil). When comparing the two sets of results, the percent of annual runoff treated for the lower media permeability is a little lower (0.5 to 2.5 percent) than the corresponding "no underdrain" scenario and the shape of the curve in Figure 12 is similar to the Figure 8 in Section 3.3.

4. Summary and Conclusions

Bioretention facilities are a useful and flexible approach for improving stormwater quality in urban areas. This project developed a set of useful tools that will help municipal staff plan green infrastructure projects in constrained public rights-of-way and assess the effectiveness of existing facilities.

1. Bioretention Sizing Criteria for 80 Percent Annual Runoff Treatment

   The modeling analysis in Section 3.1 showed that bioretention facility performance is closely related to mean annual rainfall. For most locations, the bioretention area necessary to treat 80 percent of annual stormwater ranges from 1.5 to 2.5 percent of the connected upstream impervious area. The precise bioretention area necessary for any project within the BASMAA area (under the guidelines to be developed by BASMAA) can be calculated using the regression equations in Section 3.1.

2. General Sizing Relationships that Apply Throughout the BASMAA Area

   The modeling analysis in Section 3.2 developed nomographs that estimate the annual stormwater treatment percentage across a range of bioretention facility sizes and mean annual rainfall depths. These nomographs can be used to estimate the annual treatment percentages for retrofit projects with space constraints and will enable municipal staff to compare bioretention with other treatment technologies. These nomographs can also be used to assess the effectiveness of existing facilities.

3. Performance of Bioretention Facilities with No Underdrain and Varying Rates of Permeability of Surrounding Soils

   The modeling analysis in Section 3.3 demonstrated the relationship between stormwater treatment percentage and level of permeability of surrounding soils for bioretention facilities without an underdrain. Graphics were developed for rain gauges in wetter and drier areas. The results of this analysis can help assess existing installations and also inform designers about the benefits and tradeoffs of constructing bioretention with no underdrain.

4. Performance of Bioretention Facilities with No Infiltration

   The modeling analysis in Sections 3.1 and 3.2 included the conservative assumption that bioretention facilities were installed in NRCS Group D soils with a very low permeability. The modeling analysis in Section 3.4 compared these results to bioretention facilities with no infiltration to surrounding soils (e.g., facilities with a liner or concrete bottom). The results were very similar, which confirms that the sizing guidance developed in Sections 3.1 and 3.2 can apply to flow-through planters or similar facilities that do not infiltrate to surrounding soils.

5. Sizing Criteria for Facilities with Lower Permeability Soil Media

   The modeling analysis in Section 3.5 demonstrated the relationship between percent of annual runoff treated and bioretention soil media permeability. Reducing media permeability would allow for a wider range of bioretention plantings but would also result in a reduction in the percent of annual runoff treated for the same size drainage area. The reduction would be particularly notable for bioretention facilities with smaller sizing factors. The results of the bioretention media permeability analysis were similar to the no underdrain scenarios in Section 3.3 The Section 3.3 results could be used to estimate how reducing media permeability would influence treatment percentages across a wider range of scenarios.

In general, the bioretention surface area sizing criteria for treating 80% of the annual runoff derived from the modeling analyses described herein are significantly lower than the sizing factors that municipalities in the Bay Area have been requiring regulated projects to meet for compliance with permit requirements for some time. As stated in the Introduction (Section 1), the BASMAA Development Committee and BASMAA member agencies intend to use these sizing relationships to develop and justify a "single approach" for implementing non-regulated green street projects when there are constraints on facility size. A work group of the Development Committee was formed to develop policies and guidelines for implementing the new sizing criteria and addressing other related issues. These include defining the conditions, constraints, and types of projects for which the reduced sizing factors can be used; the method for applying the sizing factors; guidelines for when dimensions of other components such as media depths can be adjusted; how the design of other types of green infrastructure measures may be modified; the effectiveness of smaller or modified green infrastructure facilities in terms of pollutant load reduction; and other considerations.

5. References

Contra Costa Clean Water Program (CCCWP). 2006. Hydrograph Modification Management Plan. April 16, 2006.

Contra Costa Clean Water Program (CCCWP). 2013. IMP Monitoring Report, IMP Model Calibration and Validation Report. September 20, 2013.

Appendix A: Storm Depths for 1-Hour and 24-Hour Durations

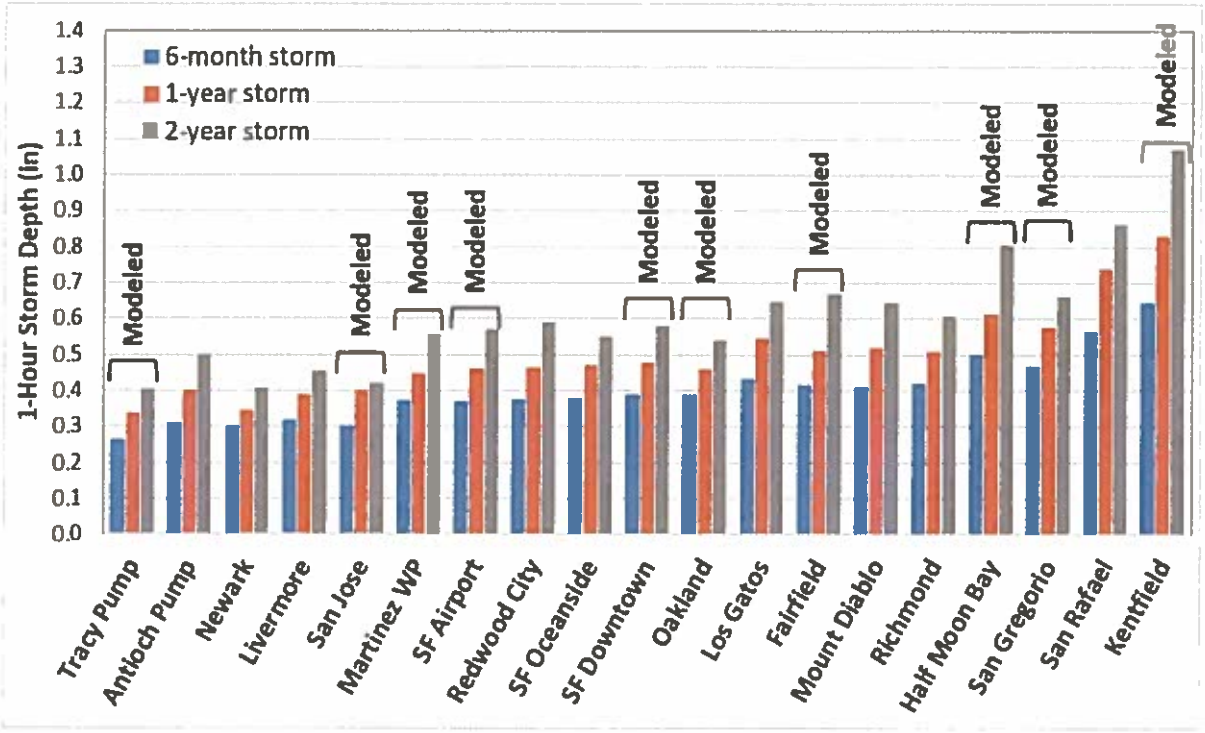

Figure 13. Storm depths for 1-hour duration

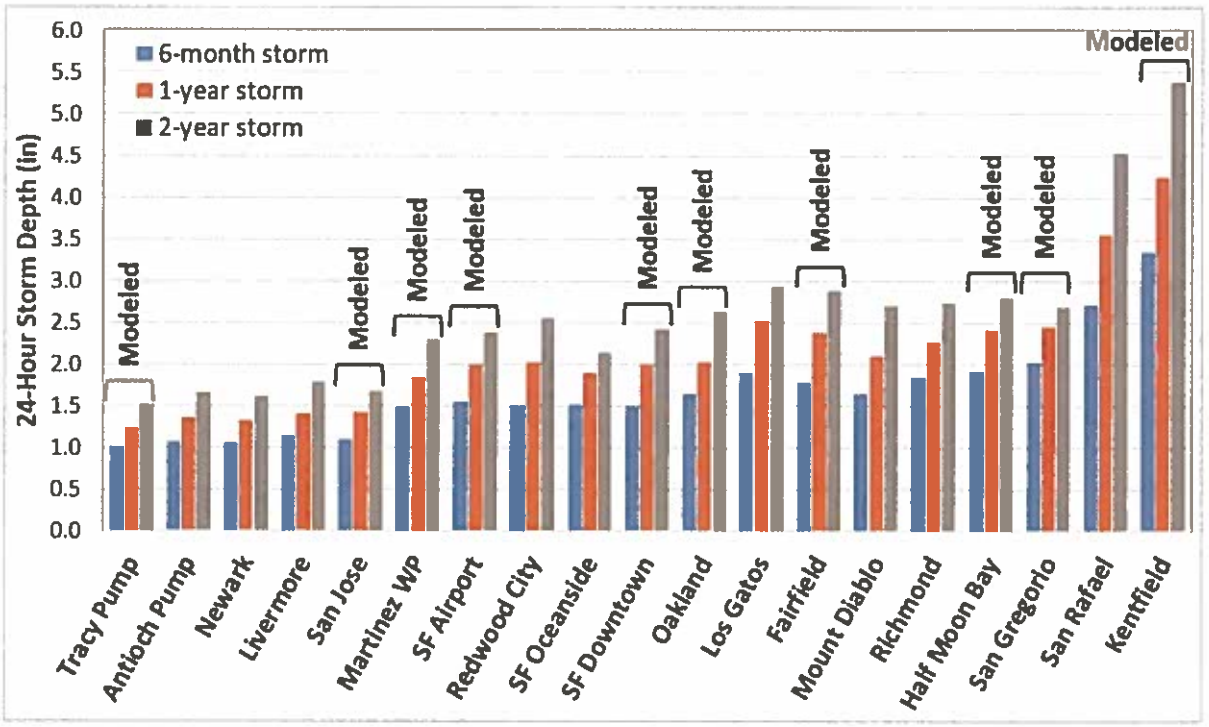

Figure 14. Storm depths for 24-hour duration

Appendix B: Treatment Percentage Results Graphics for All Rain Gauges

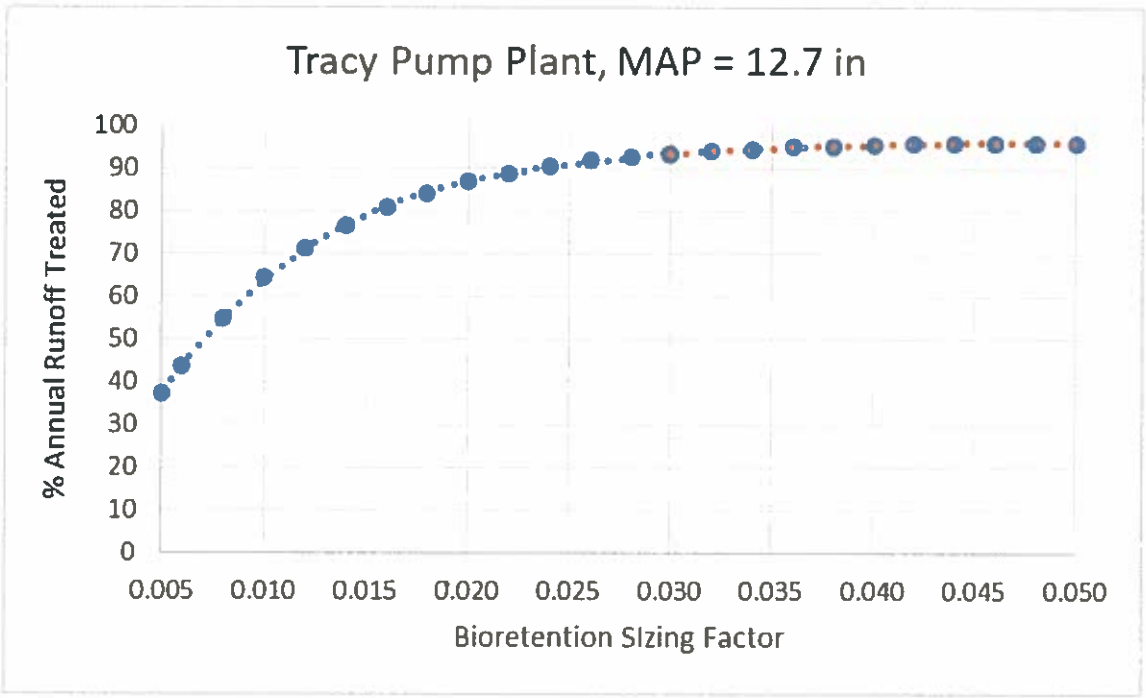

Figure 15. Annual treatment percentage for the Tracy Pump Plant rain gauge

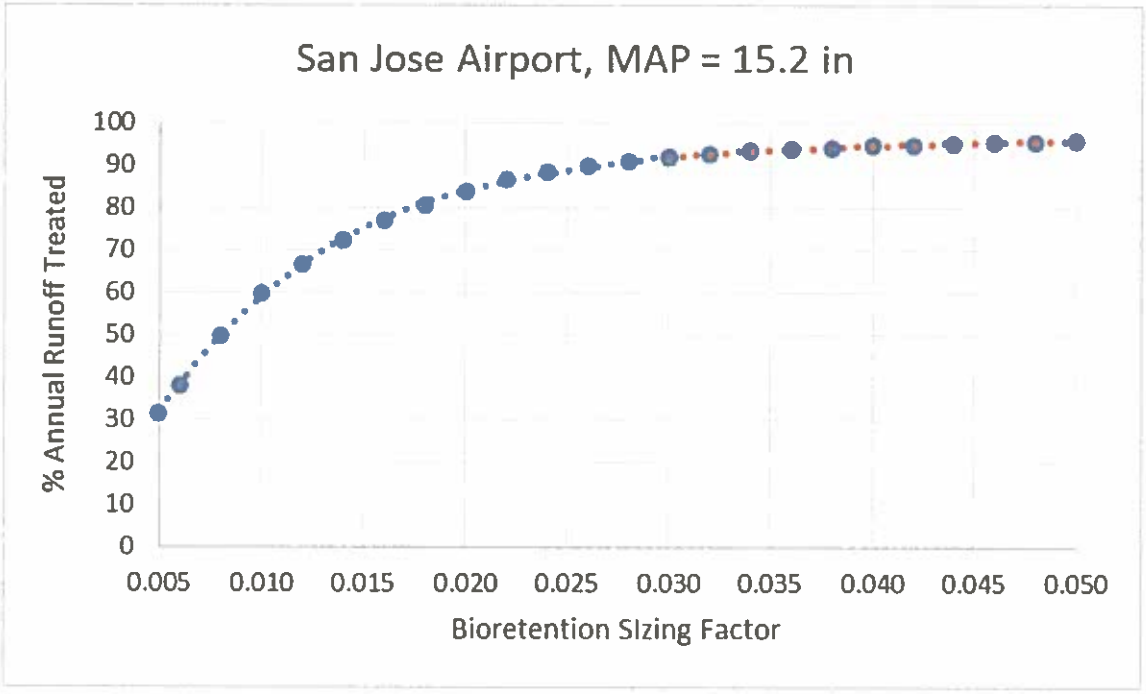

Figure 16. Annual treatment percentage for the San Jose rain gauge

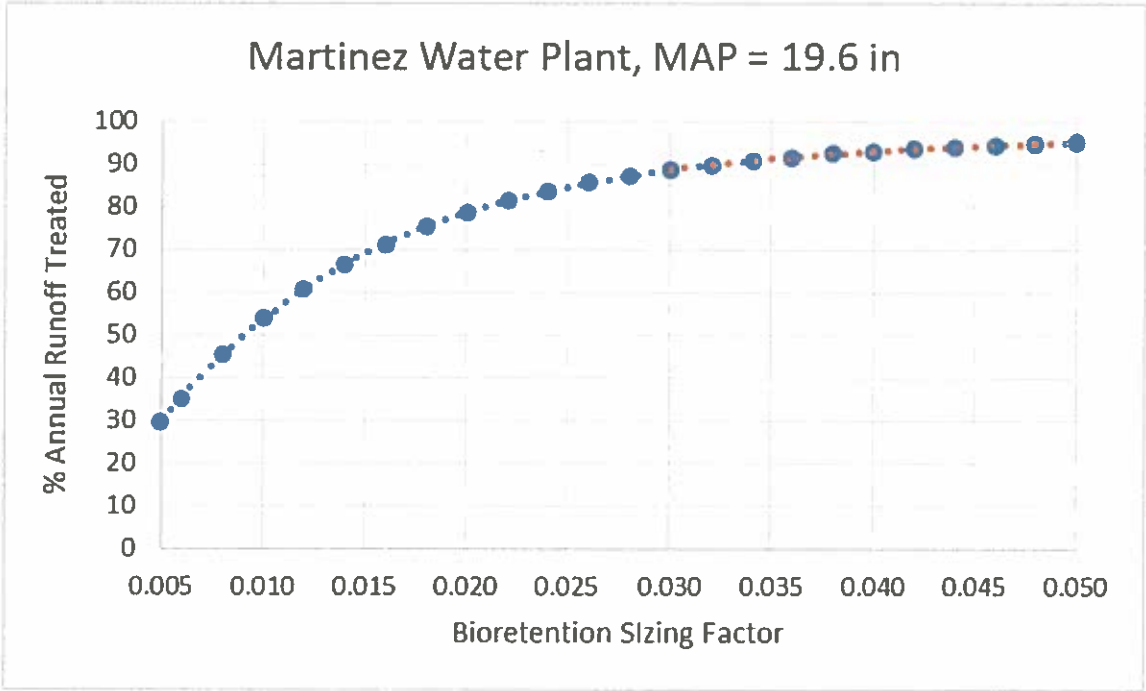

Figure 17. Annual treatment percentage for the Martinez Water Plant rain gauge

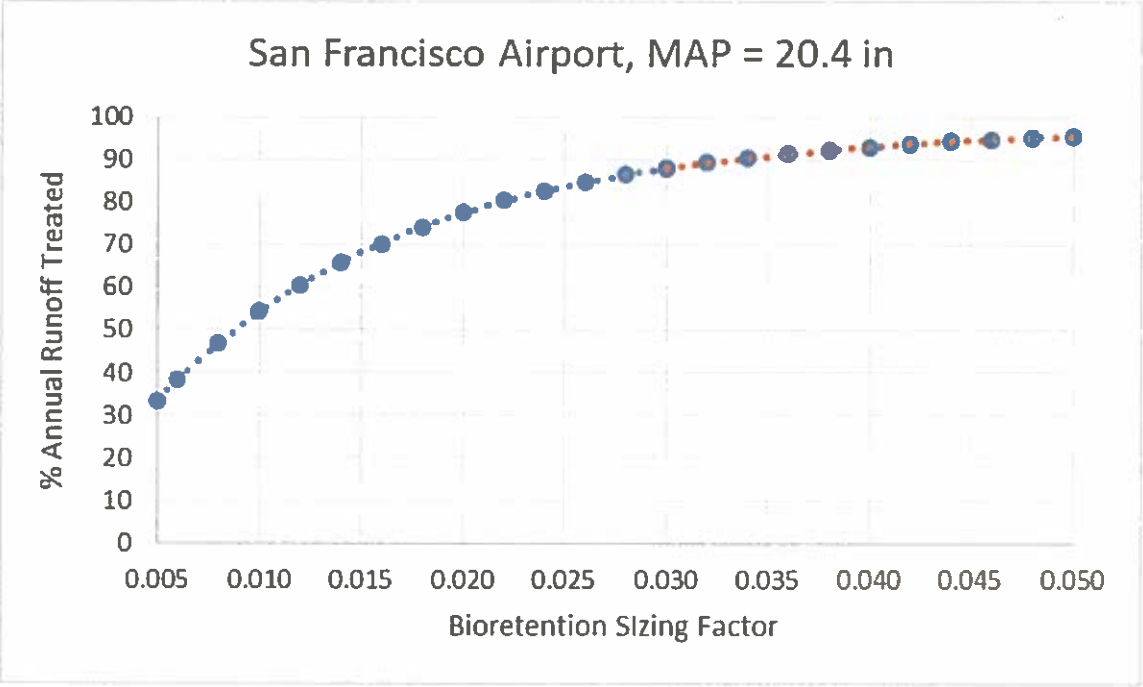

Figure 18. Annual treatment percentage for the San Francisco Airport rain gauge

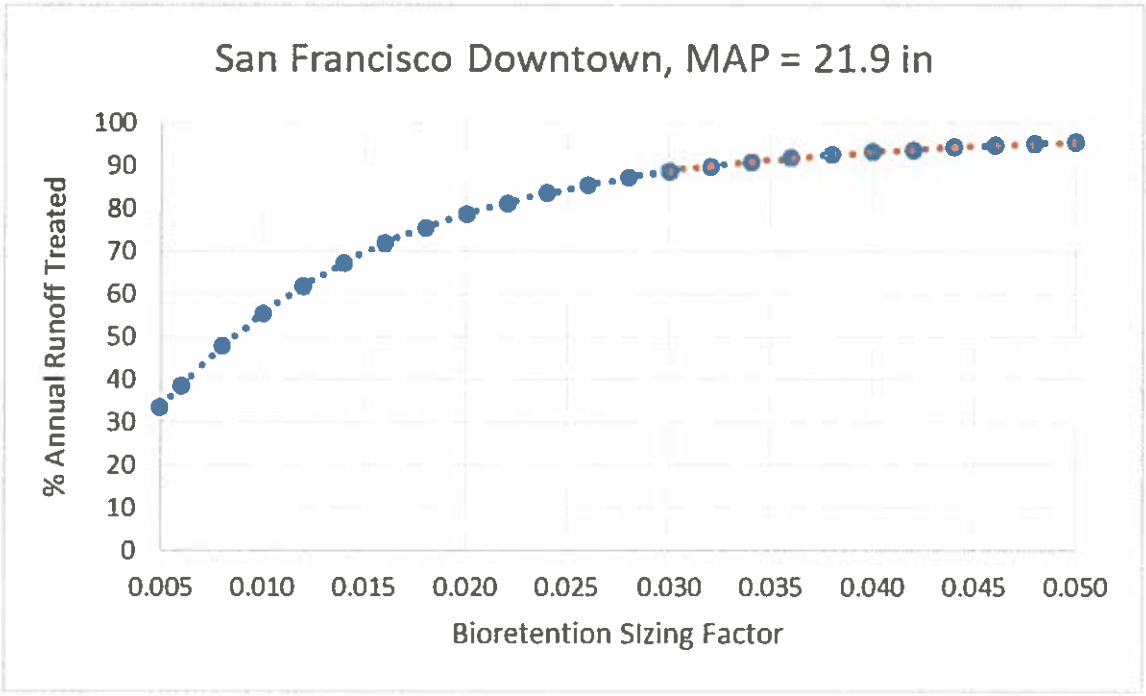

Figure 19. Annual treatment percentage for the San Francisco Downtown rain gauge

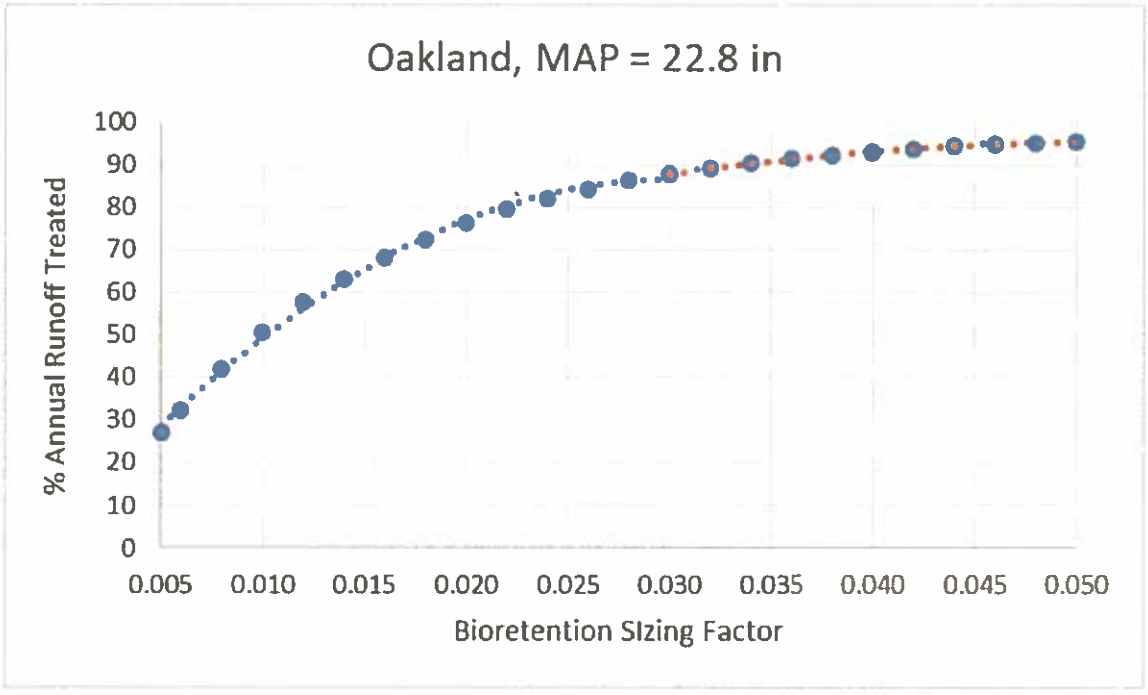

Figure 20. Annual treatment percentage for the Oakland rain gauge

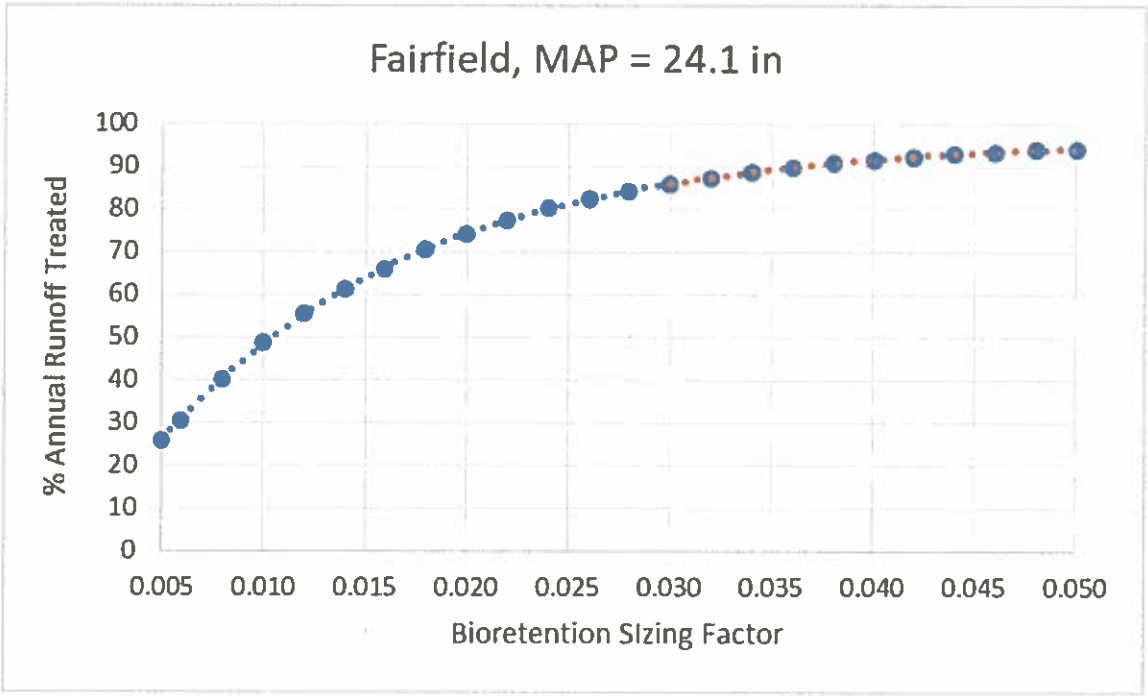

Figure 21. Annual treatment percentage for the Fairfield rain gauge

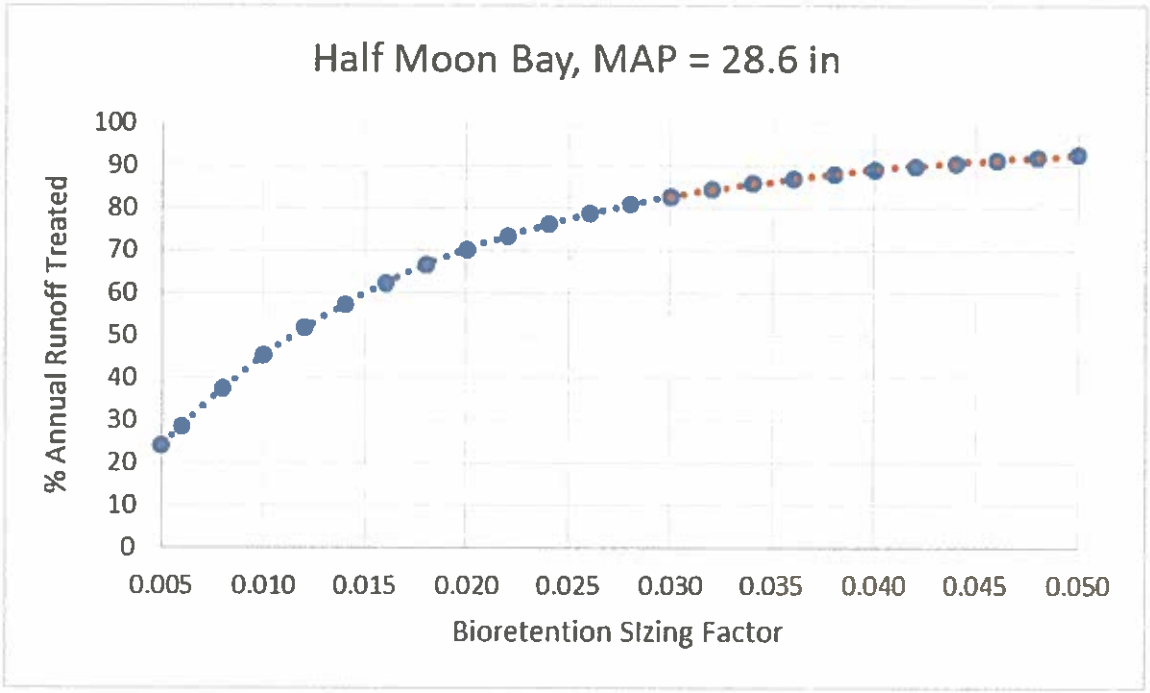

Figure 22. Annual treatment percentage for the Half Moon Bay rain gauge

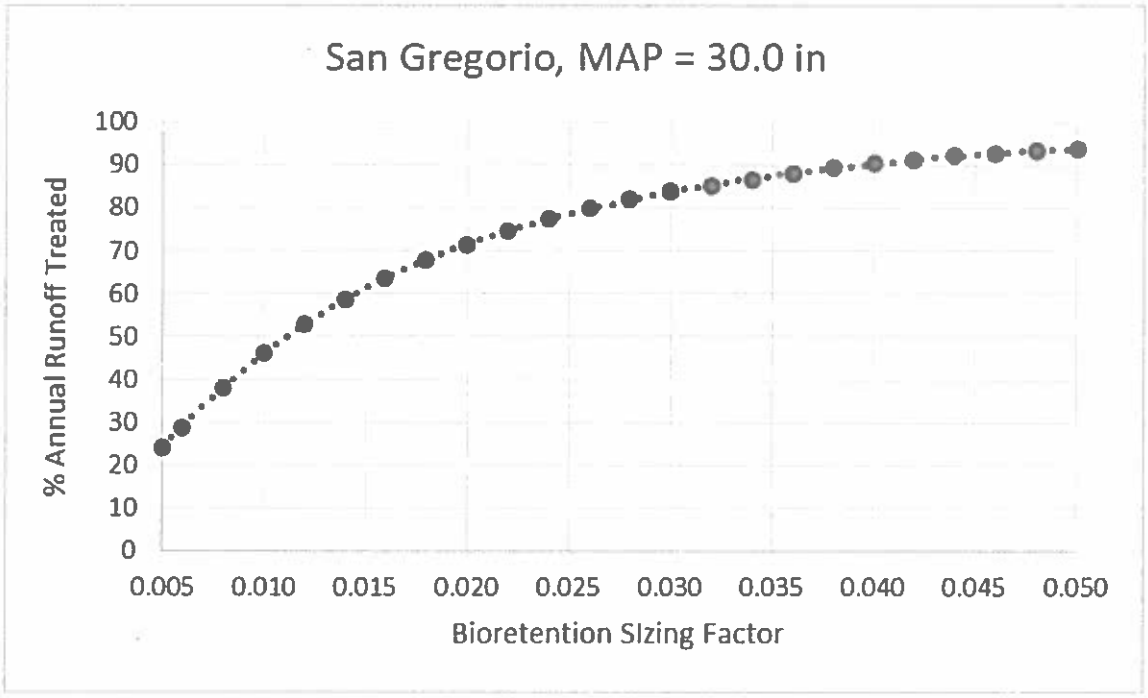

Figure 23. Annual treatment percentage for the San Gregorio rain gauge

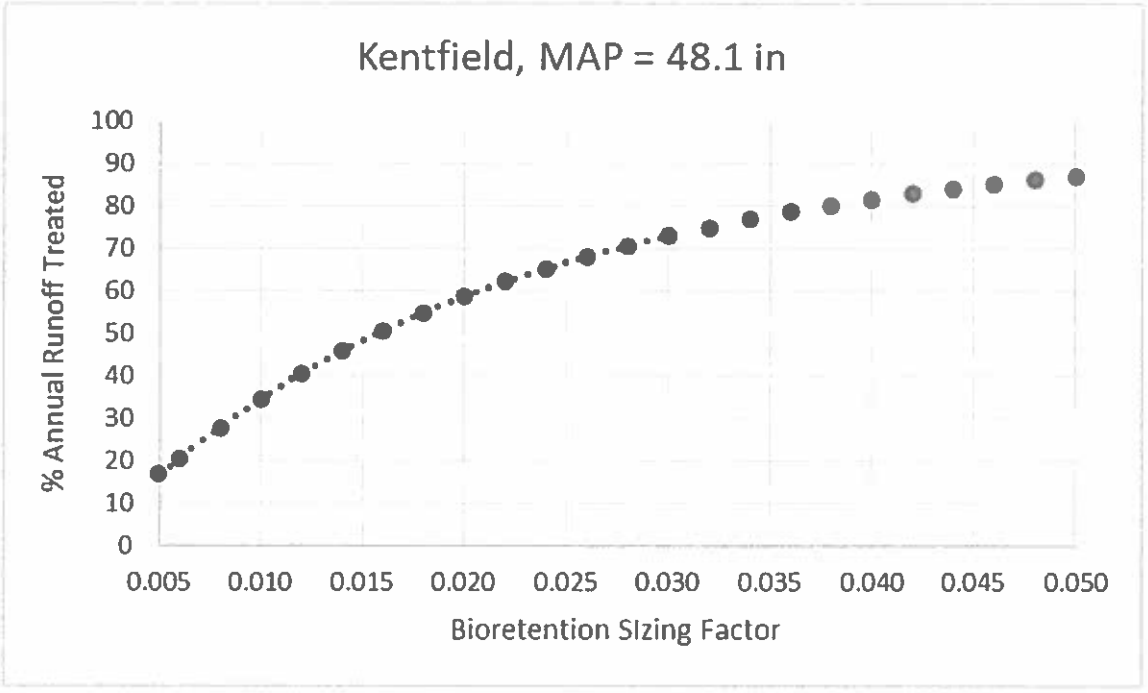

Figure 24. Annual treatment percentage for the Kentfield rain gauge

Appendix C: Bioretention with No Underdrain, 12-inch Surface Reservoir Results

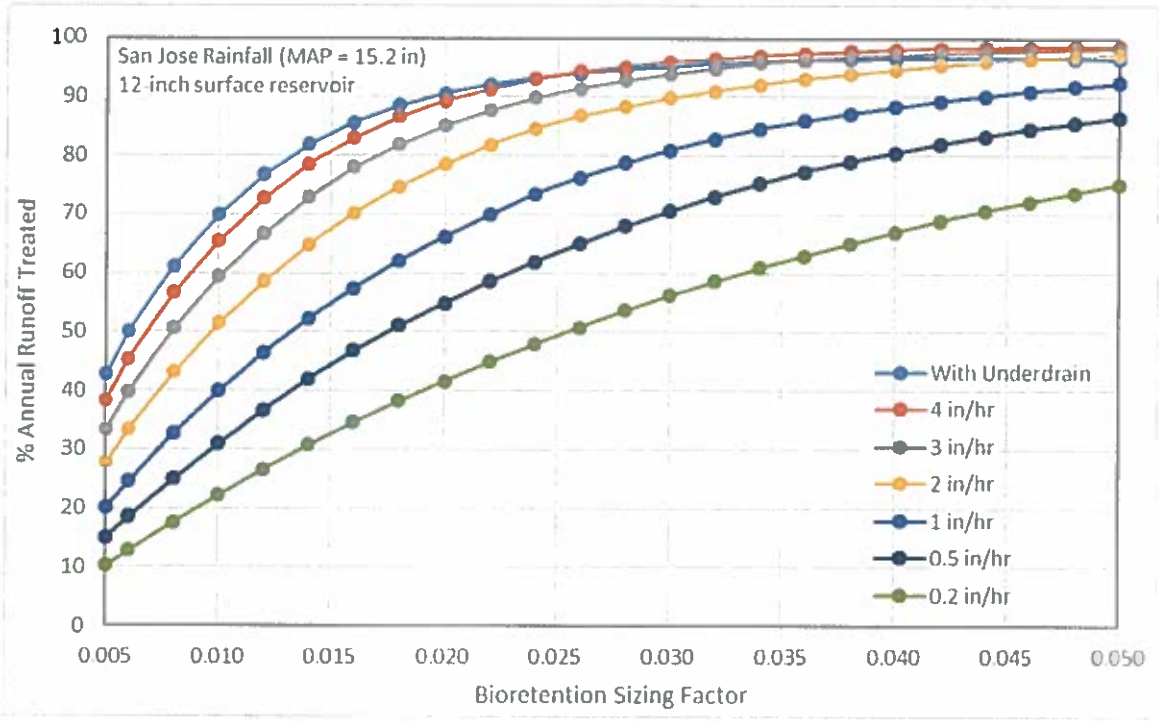

Figure 25. Treatment results for bioretention with no underdrain, San Jose gauge (MAP = 15.2 in)

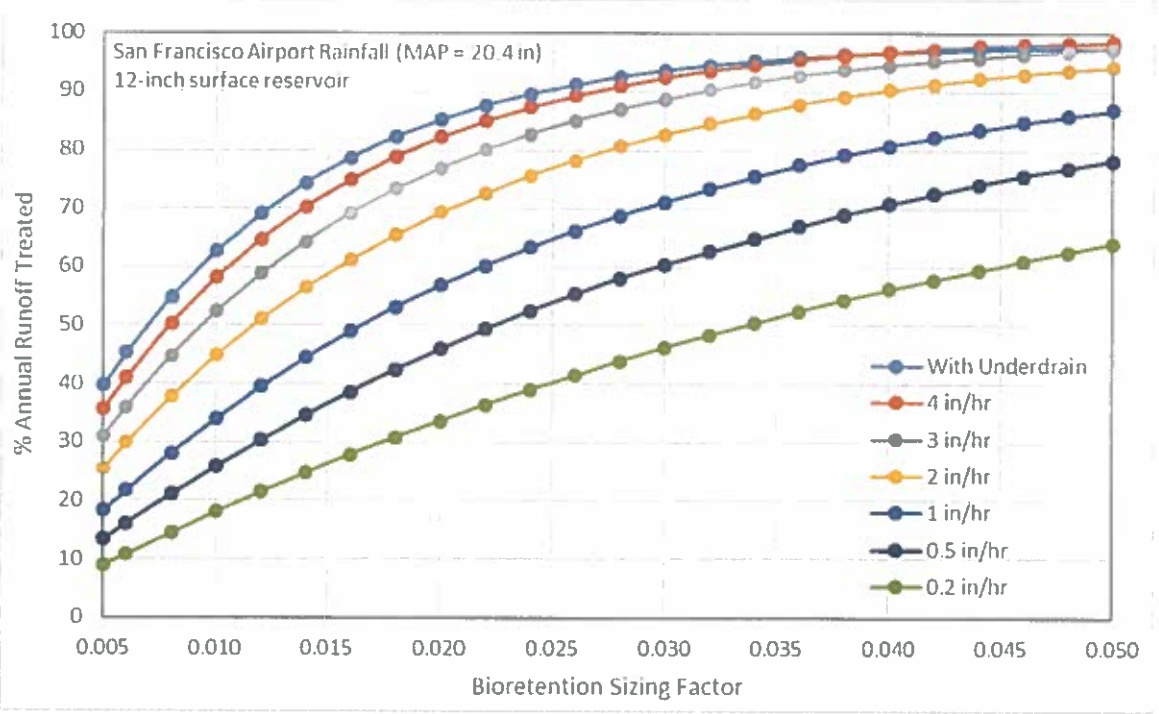

Figure 26. Treatment results for bioretention with no underdrain, San Jose gauge (MAP = 15.2 in)

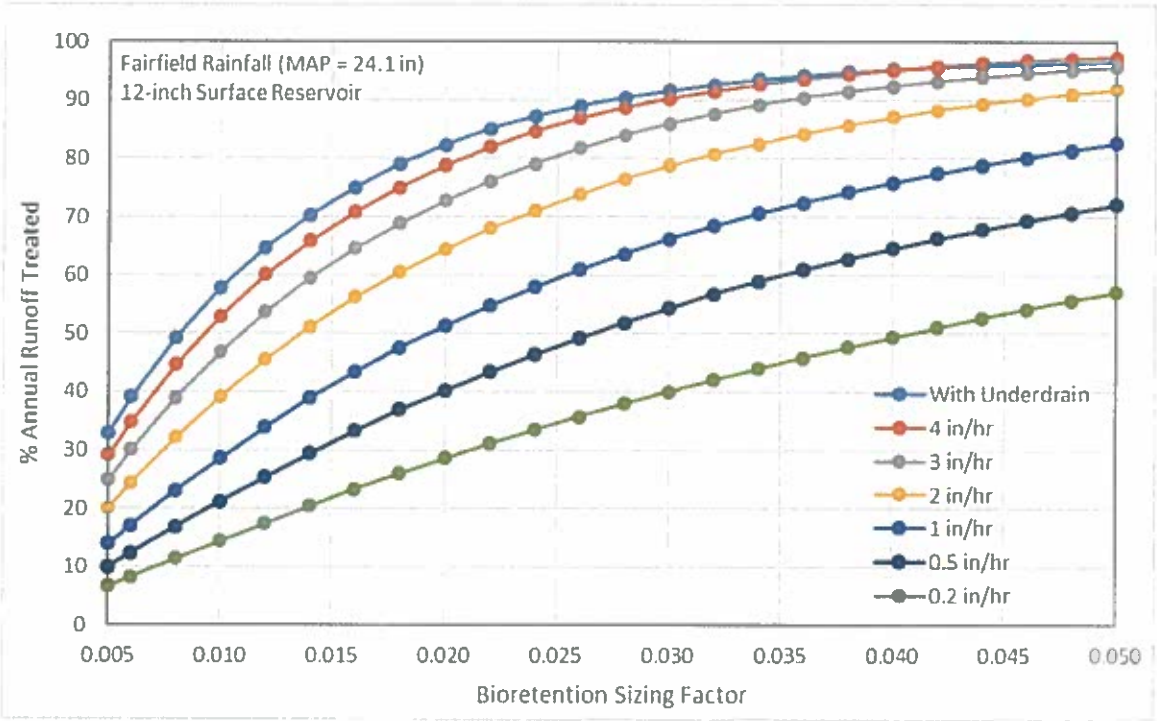

Figure 27. Treatment results for bioretention with no underdrain, San Jose gauge (MAP = 15.2 in)

BASMAA Development Committee

Guidance for Identifying Green Infrastructure Potential
in Municipal Capital Improvement Program Projects
May 6, 2016

Background

In the recently reissued Municipal Regional Stormwater Permit ("MRP 2.0"), Provision C.3.j. requires Permittees to develop and implement Green Infrastructure Plans to reduce the adverse water quality impacts of urbanization on receiving waters over the long term. Provisions C.11 and C.12 require the Permittees to reduce discharges of Mercury and PCBs, and portion of these load reductions must be achieved by implementing Green Infrastructure. Specifically, Permittees collectively must implement Green Infrastructure to reduce mercury loading by 48 grams/year and PCB loading by 120 grams/year by 2020, and plan for substantially larger reductions in the following decades. Green Infrastructure on both public and private land will help to meet these load reduction requirements, improve water quality, and provide multiple other benefits as well. Implementation on private land is achieved by implementing stormwater requirements for new development and redevelopment (Provision C.3.a. through Provision C.3.i.). These requirements were carried forward, largely unchanged, from MRP 1.0.

MRP 2.0 defines Green Infrastructure as:

> Infrastructure that uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.

In practical terms, most green infrastructure will take the form of diverting runoff from existing streets, roofs, and parking lots to one of two stormwater management strategies:

1. Dispersal to vegetated areas, where sufficient landscaped area is available and slopes are not too steep.
2. LID (bioretention and infiltration) facilities, built according to criteria similar to those currently required for regulated private development and redevelopment projects under Provision C.3.

In some cases, the use of tree-box-type biofilters may be appropriate[1]. In other cases, where conditions are appropriate, existing impervious pavements may be removed and replaced with pervious pavements.

In MRP 2.0, Provision C.3.j. includes requirements for Green Infrastructure planning and implementation. Provision C.3.j. has two main elements to be implemented by municipalities:

1. Preparation of a Green Infrastructure Plan for the inclusion of LID drainage design into storm drain infrastructure on public and private land, including streets, roads, storm drains, etc.
2. Early implementation of green infrastructure projects ("no missed opportunities"),

This guidance addresses the second of these requirements. The intent of the "no missed opportunities" requirement is to ensure that no major infrastructure project is built without assessing the opportunity for incorporation of green infrastructure features.

Provision C.3.j.ii. requires that each Permittee prepare and maintain a list of green infrastructure projects, public and private, that are already planned for implementation during the permit term (not including C.3-regulated projects), and infrastructure projects planned for

[1] Standard proprietary tree-box-type biofilters are considered to be non-LID treatment and will only be allowed under certain circumstances. Guidance on use and sizing of these facilities will be provided in a separate document.

implementation during the permit term that have potential for green infrastructure measures. The list must be submitted with each Annual Report, including:

> "… a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practical during the permit term. For any public infrastructure project where implementation of green infrastructure measures is not practicable, submit a brief description for the project and the reasons green infrastructure measures were impracticable to implement".

This requirement has no specified start date; "during the permit term" means beginning January 1, 2016 and before December 31, 2020. The first Annual Report submittal date will be September 30, 2016.

Note that this guidance primarily addresses the review of proposed or planned public projects for green infrastructure opportunities. The Permittee may also be aware of proposed or planned private projects, not subject to LID treatment requirements, that may have the opportunity to incorporate green infrastructure. These should be addressed in the same way as planned public projects, as described below.

Procedure for Review of Planned Public Projects and Annual Reporting

The municipality's Capital Improvement Program (CIP) project list provides a good starting point for review of proposed public infrastructure projects. Review of other lists of public infrastructure projects, such as those proposed within separately funded special districts (e.g., lighting and landscape districts, maintenance districts, and community facilities districts), may also be appropriate. This section describes a two-part procedure for conducting the review.

Part 1 – Initial Screening

The first step in reviewing a CIP or other public project list is to screen out certain types of projects from further consideration. For example, some projects (e.g., interior remodels, traffic signal replacement) can be readily identified as having no green infrastructure potential. Other projects may appear on the list with only a title, and it may be too early to identify whether green infrastructure could be included. Still others have already progressed past the point where the design can reasonably be changed (this will vary from project to project, depending on available budget and schedule).

Some "projects" listed in a CIP may provide budget for multiple maintenance or minor construction projects throughout the jurisdiction or a portion of the jurisdiction, such as a tree planting program, curb and sidewalk repair/upgrade, or ADA curb/ramp compliance. It is recommended that these types of projects not be included in the review process described herein. The priority for incorporating green infrastructure into these types of projects needs to be assessed as part of the Permittees' development of Green Infrastructure Plans, and standard details and specifications need to be developed and adopted. During this permit term, Permittees will evaluate select projects, project types, and/or groups of projects as case studies and develop an approach as part of Green Infrastructure planning.

The projects removed through the initial screening process do not need to be reported to the Water Board in the Permittee's Annual Report. However, the process should be documented and records kept as to the reason the project was removed from further consideration. Note that projects that were determined to be too early to assess will need to be reassessed during the next fiscal year's review.

The following categories of projects may be screened out of the review process in a given fiscal year:

1. **Projects with No Potential -** The project is identified in initial screening as having no green infrastructure potential based on the type of project. For example, the project does not include any exterior work. Attachment 1 provides a suggested list of such projects that Permittees may use as a model for their own internal process.

2. **Projects Too Early to Assess –** There is not yet enough information to assess the project for green infrastructure potential, or the project is not scheduled to begin design within the permit term (January 2016 – December 2020). If the project is scheduled to begin within the permit term, an assessment will be conducted if and when the project moves forward to conceptual design.
3. **Projects Too Late to Change –** The project is under construction or has moved to a stage of design in which changes cannot be made. The stage of design at which it is too late to incorporate green infrastructure measures varies with each project, so a "percent-complete" threshold has not been defined. Some projects may have funding tied to a particular conceptual design and changes cannot be made even early in the design process, while others may have adequate budget and time within the construction schedule to make changes late in the design process. Agencies will need to make judgments on a case-by-case basis.
4. **Projects Consisting of Maintenance or Minor Construction Work Orders –** The "project" includes budgets for multiple maintenance or minor construction work orders throughout the jurisdiction or a portion of the jurisdiction. These types of projects will not be individually reviewed for green infrastructure opportunity but will be considered as part of a municipality's Green Infrastructure Plan.

Part 2 – Assessment of Green Infrastructure Potential

After the initial screening, the remaining projects either already include green infrastructure or will need to go through an assessment process to determine whether or not there is potential to incorporate green infrastructure. A recommended process for conducting the assessment is provided later in this guidance. As a result of the assessment, the project will fall into one of the following categories with associated annual reporting requirements. Attachment 2 provides the relevant pages of the FY 15-16 Annual Report template for reference.

- **Project is a C.3-regulated project and will include LID treatment.**

  Reporting: Follow current C.3 guidance and report the project in Table C.3.b.iv.(2) of the Annual Report for the fiscal year in which the project is approved.

- **Project already includes green infrastructure and is funded**.

  Reporting: List the project in "Table B-Planned Green Infrastructure Projects" in the Annual Report, indicate the planning or implementation status, and describe the green infrastructure measures to be included.

- **Project may have green infrastructure potential** pending further assessment of feasibility, incremental cost, and availability of funding.

  Reporting: If the feasibility assessment is not complete and/or funding has not been identified, list the project in "Table A-Public Projects Reviewed for Green Infrastructure" in the Annual Report. In the "GI Included?" column, state either "TBD" (to be determined) if the assessment is not complete, or "Yes" if it has been determined that green infrastructure is feasible. In the rightmost column, describe the green infrastructure measures considered and/or proposed, and note the funding and other contingencies for inclusion of green infrastructure in the project. Once funding for the project has been identified, the project should be moved to "Table B-Planned Green Infrastructure Projects" in future Annual Reports.

- **Project does not have green infrastructure potential.** A project-specific assessment has been completed, and Green Infrastructure is impracticable.

  Reporting: In the Annual Report, list the project in "Table A-Public Projects Reviewed for Green Infrastructure". In the "GI Included?" column, state "No." Briefly state the reasons for the determination in the rightmost column. Prepare more detailed documentation of the reasons for the determination and keep it in the project files.

Process for Assessing Green Infrastructure Potential of a Public Infrastructure Project

Initial Assessment of Green Infrastructure Potential

Consider opportunities that may be associated with:

- Alterations to roof drainage from existing buildings
- New or replaced pavement or drainage structures (including gutters, inlets, or pipes)
- Concrete work
- Landscaping, including tree planting
- Streetscape improvements and intersection improvements (other than signals)

Step 1: Information Collection/Reconnaissance

For projects that include alterations to building drainage, identify the locations of roof leaders and downspouts, and where they discharge or where they are connected to storm drains.

For street and landscape projects:

- Evaluate potential opportunities to substitute pervious pavements for impervious pavements.
- Identify and locate drainage structures, including storm drain inlets or catch basins.
- Identify and locate drainage pathways, including curb and gutter.

Identify landscaped areas and paved areas that are adjacent to, or down gradient from, roofs or pavement. These are potential facility locations. *If there are any such locations, continue to the next step.* Note that the project area boundaries may be, but are not required to be, expanded to include potential green infrastructure facilities.

Step 2: Preliminary Sizing and Drainage Analysis

Beginning with the potential LID facility locations that seem most feasible, identify possible pathways to direct drainage from roofs and/or pavement to potential LID facility locations—by sheet flow, valley gutters, trench drains, or (where gradients are steeper) via pipes, based on existing grades and drainage patterns. Where existing grades constrain natural drainage to potential facilities, the use of pumps may be considered (as a less preferable option).

Delineate (roughly) the drainage area tributary to each potential LID facility location. Typically, this requires site reconnaissance, which may or may not include the use of a level to measure relative elevations.

Use the following preliminary sizing factor (facility area/tributary area) for the potential facility location and determine which of the following could be constructed within the existing right-of-way or adjacent vacant land. Note that these sizing factors are guidelines (not strict rules, but targets):

- Sizing factor ≥ 0.5 for dispersal to landscape or pervious pavement[2] (i.e., a maximum 2:1 ratio of impervious area to pervious area)
- Sizing factor ≥ 0.04 for bioretention
- Sizing factor ≥ 0.004 (or less) for tree-box-type biofilters

For bioretention facilities requiring underdrains and tree-box-type biofilters, note if there are potential connections from the underdrain to the storm drain system (typically 2.0 feet below soil surface for bioretention facilities, and 3.5 feet below surface for tree-box-type biofilters).

[2] Note that pervious pavement systems are typically designed to infiltrate only the rain falling on the pervious pavement itself, with the allowance for small quantities of runoff from adjacent impervious areas. If significant runoff from adjacent areas is anticipated, preliminary sizing considerations should include evaluation of the depth of drain rock layer needed based on permeability of site soils.

If, in this step, you have confirmed there may be feasible potential facility locations, *continue to the next step*.

Step 3: Barriers and Conflicts

Note that barriers and conflicts do not necessarily mean implementation is infeasible; however, they need to be identified and taken into account in future decision-making, as they may affect cost or public acceptance of the project.

Note issues such as:

- Confirmed or potential conflicts with subsurface utilities
- Known or unknown issues with property ownership, or need for acquisition or easements
- Availability of water supply for irrigation, or lack thereof
- Extent to which green infrastructure is an "add on" vs. integrated with the rest of the project

Step 4: Project Budget and Schedule

Consider sources of funding that may be available for green infrastructure. It is recognized that lack of budget may be a serious constraint for the addition of green infrastructure in public projects. For example, acquisition of additional right-of-way or easements for roadway projects is not always possible. Short and long term maintenance costs also need to be considered, and jurisdictions may not have a funding source for landscape maintenance, especially along roadways. The objective of this process is to identify opportunities for green infrastructure, so that if and when funding becomes available, implementation may be possible.

Note any constraints on the project schedule, such as a regulatory mandate to complete the project by a specific date, grant requirements, etc., that could complicate aligning a separate funding stream for the green infrastructure element. Consider whether cost savings could be achieved by integrating the project with other planned projects, such as pedestrian or bicycle safety improvement projects, street beautification, etc., if the schedule allows.

Step 5: Assessment—Does the Project Have Green Infrastructure Potential?

Consider the ancillary benefits of green infrastructure, including opportunities for improving the quality of public spaces, providing parks and play areas, providing habitat, urban forestry, mitigating heat island effects, aesthetics, and other valuable enhancements to quality of life.

Based on the information above, would it make sense to include green infrastructure into this project—*if funding were available for the potential incremental costs of including green infrastructure in the project?* Identify any additional conditions that would have to be met for green infrastructure elements to be constructed consequent with the project.

Attachment 1

Examples of Projects with No Potential for Green Infrastructure

- ☐ Projects with no exterior work (e.g., interior remodels)
- ☐ Projects involving exterior building upgrades or equipment (e.g., HVAC, solar panels, window replacement, roof repairs and maintenance)
- ☐ Projects related to development and/or continued funding of municipal programs or related organizations
- ☐ Projects related to technical studies, mapping, aerial photography, surveying, database development/upgrades, monitoring, training, or update of standard specs and details
- ☐ Construction of new streetlights, traffic signals or communication facilities
- ☐ Minor bridge and culvert repairs/replacement
- ☐ Non-stormwater utility projects (e.g., sewer or water main repairs/replacement, utility undergrounding, treatment plant upgrades)
- ☐ Equipment purchase or maintenance (including vehicles, street or park furniture, equipment for sports fields and golf courses, etc.)
- ☐ Irrigation system installation, upgrades or repairs

Attachment 2

Excerpts from the C.3 Section of the FY 15-16 Annual Report Template:
Tables for Reporting C.3-Regulated Projects and Green Infrastructure Projects

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 1) – Projects Approved During the Fiscal Year Reporting Period

Project Name Project No.	Project Location[9], Street Address	Name of Developer	Project Phase No.[10]	Project Type & Description[11]	Project Watershed[12]	Total Site Area (Acres)	Total Area of Land Disturbed (Acres)	Total New Impervious Surface Area (ft^2)[13]	Total Replaced Impervious Surface Area (ft^2)[14]	Total Pre-Project Impervious Surface Area[15](ft^2)	Total Post-Project Impervious Surface Area[16](ft^2)
Private Projects											
Public Projects											

Comments:

Guidance: If necessary, provide any additional details or clarifications needed about listed projects in this box. Do not leave any cells blank.

[9]Include cross streets
[10]If a project is being constructed in phases, indicate the phase number and use a separate row entry for each phase. If not, enter "NA".
[11]Project Type is the type of development (i.e., new and/or redevelopment). Example descriptions of development are: 5-story office building, residential with 160 single-family homes with five 4-story buildings to contain 200 condominiums, 100 unit 2-story shopping mall, mixed use retail and residential development (apartments), industrial warehouse.
[12]State the watershed(s) in which the Regulated Project is located. Downstream watershed(s) may be included, but this is optional.
[13]All impervious surfaces added to any area of the site that was previously existing pervious surface.
[14]All impervious surfaces added to any area of the site that was previously existing impervious surface.
[15]For redevelopment projects, state the pre-project impervious surface area.
[16]For redevelopment projects, state the post-project impervious surface area.

C.3.b.iv.(2) ►Regulated Projects Reporting Table (part 2) – Projects Approved During the Fiscal Year Reporting Period (public projects)

Project Name Project No.	Approval Date[29]	Date Construction Scheduled to Begin	Source Control Measures[30]	Site Design Measures[31]	Treatment Systems Approved[32]	Operation & Maintenance Responsibility Mechanism[33]	Hydraulic Sizing Criteria[34]	Alternative Compliance Measures[35/36]	Alternative Certification[37]	HM Controls[38/39]
Public Projects										

Comments:

Guidance: If necessary, provide any additional details or clarifications needed about listed projects in this box. Note that MRP Provision C.3.c. contains specific requirements for LID site design and source control measures, as well as treatment measures, for all Regulated Projects. Entries in these columns should not be "None" or "NA". Do not leave any cells blank.

[29]For public projects, enter the plans and specifications approval date.
[30]List source control measures approved for the project. Examples include: properly designed trash storage areas; storm drain stenciling or signage; efficient landscape irrigation systems; etc.
[31]List site design measures approved for the project. Examples include: minimize impervious surfaces; conserve natural areas, including existing trees or other vegetation, and soils; construct sidewalks, walkways, and/or patios with permeable surfaces, etc.
[32]List all approved stormwater treatment system(s) to be installed onsite or at a joint stormwater treatment facility (e.g., flow through planter, bioretention facility, infiltration basin, etc.).
[33]List the legal mechanism(s) (e.g., maintenance plan for O&M by public entity, etc…) that have been or will be used to assign responsibility for the maintenance of the post-construction stormwater treatment systems.
[34]See Provision C.3.d.i. "Numeric Sizing Criteria for Stormwater Treatment Systems" for list of hydraulic sizing design criteria. Enter the corresponding provision number of the appropriate criterion (i.e., 1.a., 1.b., 2.a., 2.b., 2.c., or 3).
[35]For Alternative Compliance at an offsite location in accordance with Provision C.3.e.i.(1), on a separate page, give a discussion of the alternative compliance site including the information specified in Provision C.3.b.v.(1)(m)(i) for the offsite project.
[36]For Alternative Compliance by paying in-lieu fees in accordance with Provision C.3.e.i.(2), on a separate page, provide the information specified in Provision C.3.b.v.(1)(m)(ii) for the Regional Project.
[37]Note whether a third party was used to certify the project design complies with Provision C.3.d.
[38]If HM control is not required, state why not.
[39]If HM control is required, state control method used (e.g., method to design and size device(s) or method(s) used to meet the HM Standard, and description of device(s) or method(s) used, such as detention basin(s), biodetention unit(s), regional detention basin, or in-stream control).

C.3.j.ii.(2) ► Table A - Public Projects Reviewed for Green Infrastructure

Project Name and Location[43]	Project Description	Status[44]	GI Included?[45]	Description of GI Measures Considered and/or Proposed or Why GI is Impracticable to Implement[46]
EXAMPLE: Storm drain retrofit, Stockton and Taylor	Installation of new storm drain to accommodate the 10-yr storm event	Beginning planning and design phase	TBD	Bioretention cells (i.e., linear bulb-outs) will be considered when street modification designs are incorporated

C.3.j.ii.(2) ► Table B - Planned Green Infrastructure Projects

Project Name and Location[47]	Project Description	Planning or Implementation Status	Green Infrastructure Measures Included
EXAMPLE: Martha Gardens Green Alleys Project	Retrofit of degraded pavement in urban alleyways lacking good drainage	Construction completed October 17, 2015	The project drains replaced concrete pavement and existing adjacent structures to a center strip of pervious pavement and underlying infiltration trench.

[43] List each public project that is going through your agency's process for identifying projects with green infrastructure potential.
[44] Indicate status of project, such as: beginning design, under design (or X% design), projected completion date, completed final design date, etc.
[45] Enter "Yes" if project will include GI measures, "No" if GI measures are impracticable to implement, or "TBD" if this has not yet been determined.
[46] Provide a summary of how each public infrastructure project with green infrastructure potential will include green infrastructure measures to the maximum extent practicable during the permit term. If review of the project indicates that implementation of green infrastructure measures is not practicable, provide the reasons why green infrastructure measures are impracticable to implement.
[47] List each planned (and expected to be funded) public and private green infrastructure project that is not also a Regulated Project as defined in Provision C.3.b.ii. Note that funding for green infrastructure components may be anticipated but is not guaranteed to be available or sufficient.