RESOLUTION NO. 15780


WHEREAS, the San Francisco Bay Regional Water Quality Control Board’s Municipal Regional Permit (MRP) regulates stormwater discharges from municipal storm drain systems throughout San Mateo County, including the City of Redwood City; and

WHEREAS, Provision C.3.j of the MRP requires each permittee to develop a Green Infrastructure (GI) Plan that demonstrates how permittees will gradually shift from traditional “gray” storm drain infrastructure—which channels polluted runoff directly into receiving waters without treatment—to a more resilient and sustainable storm drain system comprised of “green” infrastructure, which captures, stores and treats stormwater; and

WHEREAS, the MRP also requires that GI Plans be collectively designed to achieve specific reductions in mercury and PCBs (polychlorinated biphenyls) within specific time horizons; and

WHEREAS, on May 22, 2017, the City Council approved the Workplan to Develop a Green Infrastructure Plan in accordance with provision C.3.j of the MRP as was required by the MRP to be done no later than June 30, 2017; and

WHEREAS, the City/County Association of Governments of San Mateo County (C/CAG) has been working with its member agencies, including Redwood City staff members, to develop model GI documents, which Redwood City staff members incorporated into the GI Plan; and

WHEREAS, the GI Plan, attached as Exhibit A, details the required tasks to be compliant with MRP requirements, including those aspects that will be implemented by C/CAG and those by local agencies; and

WHEREAS, while the cost to implement the GI Plan is yet to be determined, it is the intent of the City of Redwood City to allocate sufficient resources to ensure timely development of GI in accordance with MRP requirements.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF REDWOOD CITY DOES RESOLVE AS FOLLOWS:

1. The recitals set forth above are true and correct, and are hereby incorporated herein by this reference as if fully set forth in their entirety.
2. The City Council of City of Redwood City approves the GI Plan attached hereto as Exhibit A and incorporated by reference, and authorizes the City Manager or designee to make minor and conforming changes to the Green Infrastructure Plan to correct errors or to ensure compliance with the MRP.

3. This Resolution shall be effective upon its adoption.

*   *   *
Passed and adopted by the Council of the City of Redwood City at a
Joint City Council/Successor Agency Board/Public Financing Authority Meeting
thereof held on the 24th day of June 2019 by the following votes:

AYES: Aguirre, Borgens, Hale, Howard, Masur, Reddy and Mayor Bain

NOES: None

ABSENT: None

ABSTAINED: None

RECUSED: None

Attest:

Pamela Aguilar, CMC
City Clerk of Redwood City

I hereby approve the foregoing resolution this 25th day of June 2019.

Ian Bain
Mayor of the City of Redwood City

RESO. # 15780
MUFF # 802
Green Infrastructure Plan

June 2019
8 Adaptive Management

8.1 Process for Plan Updates

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D. Phase II Green Infrastructure Modeling Report – Provides documentation of the application of models to determine the most cost-effective GI
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1 Introduction and Overview

1.1 Regulatory Mandate

The City of Redwood City (City) is one of 76 local government entities subject to the requirements of the San Francisco Bay Region Municipal Regional Stormwater National Pollutant Discharge Elimination System Permit (MRP) issued by the San Francisco Bay Regional Water Quality Control Board (RWQCB). The MRP was last reissued in November 2015. 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.i.i requires the City to prepare a Green Infrastructure Plan, to be submitted with an 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 bio-retention 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, bio-retention 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.

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1 Order R2-2015-0049

"Provisions C.11 and C.12 in the MRP require San Mateo Permittees (San Mateo County and its 20 cities and towns) to reduce estimated PCBs loading by 15 grams/year and estimated mercury loading by 6 grams/year using Green Infrastructure by June 30, 2020."
Provisions C.11 and C.12 in the MRP require San Mateo Permittees (San Mateo County and its 20 cities and towns) to reduce estimated PCBs loading by 15 grams/year and estimated mercury loading by 6 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 of PCBs and 10 kg/year of mercury by 2040.

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 fish from the Bay, 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 of mercury per kg dry sediment.

A roughly 50% decrease in sediment, fish tissue, and bird egg mercury concentrations is necessary for Bay Area cities and counties 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 bio-retention 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 San Mateo Clean Water Program’s (SMCWP’s) Stormwater C.3 Guidebook, which the City of Redwood City has referenced in Ordinance No. 2269 amending Chapter 27A of the Redwood City Municipal Code.

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.

1.3 Plan Context and Elements

1.3.1 Planning Context

Redwood City, a community located between the waters of the San Francisco Bay and the verdant open spaces of the Santa Cruz Mountains, offers a wonderful balance of natural and urban places that attracts residents and businesses seeking good jobs, pleasant neighborhoods, a multitude of...
recreation and leisure-time activities, and convenient connections to San Francisco and San Jose. From the many local knowledge-based, biotechnology, and healthcare businesses to the industrial uses surrounding the Port of Redwood City, this City offers a location for businesses to thrive.

Our neighborhoods provide diverse housing choices that can accommodate people in all stages of their lives, and that allow them to be lifelong residents. Our Downtown, with its beautiful historic structures and complementary new development, has emerged as a local and regional center for enterprise, entertainment, and excitement. Residents of Downtown and the surrounding historic neighborhoods love being able to work close to home. On weekends, residents throughout the community find time to bike, walk along the Bay Trail, and participate in activities at city parks and recreation centers.

1.3.2 Related Regional and Countywide Plans and Planning Documents

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

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

- The San Mateo Countywide Reasonable Assurance Analysis (RAA). The RAA for green infrastructure is being prepared by San Mateo municipalities collectively through the SMCWP 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.

1.3.3 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, Redwood City will review and/or update planning documents to appropriately incorporate green infrastructure requirements at the time the documents are comprehensively revised.

1.3.4 Outreach and Education

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

Outreach started through an internal working group that included staff from various departments within the City. The group met on a quarterly basis to discuss ongoing efforts to develop the GI Plan, and discuss potential policy considerations for meeting the goals of the MRP.

In May 2017 the City Council adopted a Resolution (Appendix A) approving the GI Workplan, which is a framework outlining the schedule, budget, and tasks necessary to develop and implement a GI Plan, such as outreach and mapping and prioritizing areas for potential and planned projects. The resolution included the City Council’s commitment to the MRP goals. As outlined in the GI Workplan and required by the 2015 MRP, the City Council must approve the City’s GI Plan before June 30, 2019.
In May 2018, City staff gave a presentation to the City Council's Utilities Sub-committee outlining the results of a preliminary analysis by C/CAG regarding what would be needed to meet the goals of the MRP, which include the additional goals of the GI Plan. Staff investigated compliance with pollutant load reduction goals through a combination of treatment measures built into future development projects and by installing GI in "green streets" projects and found that the cost of public improvements was expected to be expensive. Recognizing that installing green streets was cost prohibitive, staff worked with C/CAG to develop a regional project concept that would serve Redwood City, Woodside, and surrounding unincorporated parts of San Mateo County. The conceptual project is a 2.6 acre infiltration gallery underneath McGarvey Field in Red Morton Park that would divert stormwater from the Redwood Creek culvert that runs through the center of the park (see Appendix B – Regional Stormwater Capture Project at Red Morton Community Park). This concept was presented to the Utilities Sub-committee.

The feedback given by the Utilities Sub-committee was that the project should be pursued, but that the cost of the project was still more than expected for compliance. Based on this feedback staff looked into other policy considerations and analyzed other potential ways to comply with the MRP goals.

In March 2019, City Staff presented to the Utilities Sub-committee and presented those policy considerations, which included the requirement for Low Impact Development (LID) treatment in additional developments beyond current thresholds set by the MRP, including the inclusion of GI right-of-way improvements on larger developments. In April 2019, a similar presentation was made to the City Council and Council members were supportive of the inclusion of Staff's recommended approach provided additional community outreach was done.

The following additional Community Outreach was completed after presenting to City Council:

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<td>Downtown Business Group</td>
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<td>Redwood City Improvement Association – Board of Directors</td>
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<td>Chamber of Commerce - Transportation and Housing Committee</td>
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In addition, City Staff took part in the county-wide efforts led by C/CAG through the GI Technical Advisory Committee (TAC). The TAC met on a quarterly basis, and additionally as needed, and included discussion of various components of the GI Plan.

1.3.5 Policies, Ordinances, and Legal Mechanisms

This GI Plan was adopted by City Council through a resolution on June 24, 2019.

In addition to the GI Plan, an ordinance was adopted to update Municipal Code Chapter 18 (Local Development Standards) and Municipal Code Chapter 27A (Stormwater Treatment Measures and Maintenance Program). For both Municipal Code sections, the changes include new definitions for GI and revisions to language to include GI. Chapter 18 is also being revised to identify that GI improvements are required for new buildings and substantial commercial remodels as identified in Chapter 27A. For Chapter 27A, the required improvements will reference a resolution that will be approved after the adoption of the GI Plan. Having specific policy guidelines and implementation details in a resolution will give staff the ability to closely monitor the progress of the implementation and return to City Council as needed with suggested policy changes and ensure compliance with the goals of the MRP. Since the GI Plan goals are projected through fiscal year 2040, it is expected that the implementation will need to be adjusted from time to time to make sure that the implementation is in line with City goals and initiatives in addition to the MRP goals. The resolution will provide that flexibility.
2 RAA Model and GI Targets

Provisions C.11 and C.12 in the MRP require San Mateo Permittees (San Mateo County and its 20 cities and towns) to reduce estimated PCBs loading by 15 grams/year and estimated mercury loading by 6 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 of PCBs and 10 kg/year of 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 Redwood 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 Redwood City’s jurisdiction by 2020, 2030, and 2040.

2.1 Reasonable Assurance Analysis and GI Implementation Goals

The Municipal Regional Stormwater Permit (MRP) (Order No. R2-2015-0049) requires the development of GI Plans (Provision C.3) and PCBs and Mercury Control Measure Implementation Plans (Provisions C.11 and C.12) that provide the necessary pollutant load reductions to meet TMDL WLAs over specified compliance periods. A key component of these plans is a Reasonable Assurance Analysis (RAA) that quantitatively demonstrates that proposed control measures will result in sufficient load reductions of PCBs and mercury to meet WLAs and municipal stormwater discharges to the Bay. The City/County Association of Governments (C/CAG) of San Mateo County, via its San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), led a county-wide effort to develop an RAA to estimate the baseline PCB and mercury loads to the Bay, determine load reductions to meet WLAs among San Mateo County Permittees, and set goals for the amount of GI needed to meet the portion of PCB and mercury load reduction the MRP assigns to GI (SFBRWQCB 2015). Appendices C and D include documentation of the county-wide RAA, including:

- Phase I Baseline Modeling Report – Provides documentation of the development, calibration, and validation of the baseline hydrology
and water quality model, and the determination of PCB and mercury load reductions to be addressed through GI implementation (SMCWPPP 2018).

- Phase II Green Infrastructure Modeling Report — Provides documentation of the application of models to determine the most cost-effective GI implementation for each municipality, setting stormwater improvement goals for the GI Plan (SMCWPPP 2019).

The following sections provide an overview of the purpose of the RAA, and a summary of RAA results for Redwood City to serve as stormwater improvement goals that set the stage for an adaptive management approach.

2.2 Purpose of the Reasonable Assurance Analysis

In 2017, the EPA Region 9 released Developing Reasonable Assurance: A Guide to Performing Model-Based Analysis to Support Municipal Stormwater Program Planning (EPA RAA Guide) (USEPA 2017), which provides guidance on the technical needs of the RAA and considerations for model selection. Building upon the EPA RAA Guide, the BASMAA prepared the Bay Area Reasonable Assurance Analysis Guidance Document (Bay Area RAA Guidance) (BASMAA 2017), which provides specific guidance on modeling to support RAAs performed in the Bay Area to meet MRP requirements, address TMDLs for PCBs and mercury, and support GI planning. The EPA RAA Guide and Bay Area RAA Guidance both outline essential steps for performing an RAA, as depicted in Figure 1.
Figure 1. RAA Process Flow Chart (USEPA 2017).

Depending on the audience, the purpose of the RAA can vary in terms of what constitutes reasonable assurance, and it is important to consider not just the targets for pollutant load reductions, but also the effectiveness of information.
management and engineering and economic feasibility. The EPA RAA Guide provides an example of three differing perspectives for defining reasonable assurance (USEPA 2017):

- **Regulator Perspective** - Reasonable assurance is a demonstration that the implementation of a GI Plan will result in sufficient pollutant reductions over time to address TMDL WLA or other targets specified in the MRP.

- **Stakeholder Perspective** - Reasonable assurance is a demonstration that specific management practices are identified with sufficient detail, and implemented on a schedule to ensure that necessary improvements in water quality will occur.

- **Permittee Perspective** - Reasonable assurance is based on a detailed analysis of the TMDL WLA and associated MRP targets themselves, and a determination of the feasibility of those requirements. The RAA may also assist in evaluating the financial resources needed to meet pollutant reductions based on schedules identified in the MRP.

Appendices C and D provide full documentation of the technical approaches and results of the SMCWPPP RAA, which are consistent with the recommendations of the EPA RAA Guide and Bay Area RAA Guidance.

### 2.3 Preliminary Identification of Opportunities for GI Projects

To support the RAA and GI Plans, C/CAG has initiated a number of planning efforts that identify opportunities for GI implementation. The following is a summary of those efforts:

- **Low Impact Development (LID) for New Development and Redevelopment** – The MRP includes a Provision (C.3) for the integration of LID within new development and redevelopment. As LID techniques are implemented as new development and redevelopment occurs throughout Redwood City, the benefits of such practices in terms of reducing urban runoff flows and associated pollutant loads can be considered as part of the pollutant load reductions attributed to implementation of GI. C/CAG worked with San Mateo County Permittees to compile information on LID practices that have been implemented within new development and redevelopment since water year 2003 (baseline year for the TMDL). C/CAG also performed an analysis to project the number of acres of future new development and redevelopment to be addressed through Provision C.3 by 2040. The RAA considers existing LID practices and projections of LID in future new development and rede...
redevelopment areas to estimate anticipated PCBs and mercury load reductions from 2003 to 2040.

- **Countywide Stormwater Resource Plan (SRP)** — The SRP is a comprehensive plan that identifies and prioritizes thousands of GI project opportunities throughout San Mateo County and within each municipal jurisdiction. Prioritized project opportunities include: (1) large regional projects within publicly owned parcels (e.g., public parks) that infiltrate or treat stormwater runoff generated from surrounding areas (e.g., diversion from neighborhood storm drain system; diversions from creeks draining large urban areas); (2) retrofit of publicly owned parcels with GI that provide demonstration of onsite LID designs; and (3) retrofit of public street rights-of-way with GI, or “green streets.” The SRP included a multi-benefit scoring and prioritization process that ranks GI project opportunities based on multiple factors beyond pollutant load reduction (e.g., proximity to flood prone channels, potential groundwater basin recharge). Figure 2 provides an example of green street opportunities identified, scored, and prioritized by the SRP throughout San Mateo County (SMCWPPP 2017).

### 2.4 Description of the RAA Model

C/CAG performed a comprehensive, countywide modeling effort to provide: (1) simulation of baseline loads of PCBs and mercury for each of the County’s watersheds and municipal jurisdictions discharging to San Francisco Bay; (2) estimation of necessary load reduction goals to meet requirements of the MRP and TMDL WLAs; and (3) determination of the amount of GI needed to address load reduction goals based on project opportunities identified Section 2.3. The RAA also provides analysis of alternative implementation scenarios through cost-benefit optimization that can inform cost-effective GI implementation within each municipal jurisdiction. These results set goals for GI Plans developed by each Permittee.

The analytical framework selected to support the San Mateo Countywide RAA is based on a linked system of models (Figure 3). Component models of the linked system include:

- **Loading Simulation Program C++ (LSPC)** — The hydrologic and water quality model selected for the baseline model of San Mateo County watersheds was the Loading Simulation Program in C++ (LSPC) (Shen et al., 2004), a watershed modeling system that includes Hydrologic Simulation Program – FORTRAN (HSPF) (Bicknell et al. 1997) algorithms for simulating watershed hydrology, erosion, water quality, and instream fate and transport processes. The model can
simulate upland loading of sediment, mercury, and PCBs and instream delivery and transport. LSPC is built upon a relational database platform, making it ideal for collating diverse datasets to produce robust representations of natural systems. LSPC integrates GIS outputs, comprehensive data storage and management capabilities, the original HSPF algorithms, and a data analysis/post-processing system into a convenient PC-based Windows environment. The algorithms of LSPC are identical to a subset of those in the HSPF model with selected additions, such as algorithms to address land use change over time. LSPC is an open-source public-domain watershed model available from EPA.

- **System for Urban Stormwater Treatment & Analysis Integration (SUSTAIN)** – Developed by EPA’s Office of Research and Development, SUSTAIN was primarily designed as a decision-support system for selection and placement of GI projects at strategic locations in urban watersheds. It includes a process-based continuous project simulation module for representing flow and pollutant transport routing through various types of GI projects. A distinguishing feature of SUSTAIN is a robust cost-benefit optimization model that incorporates dynamic, user-specified project unit-cost functions to quantify the costs associated with project construction, operation, and maintenance. The cost-benefit optimization model runs iteratively to generate a cost-effectiveness curve that is sometimes comprised of millions of GI project scenarios representing different combinations of projects throughout a watershed. Those results are used to make cost-effective management recommendations by evaluating the trade-offs between different scenarios. The “benefit” component can be represented in several ways: (1) reduction in flow volume; (2) reduction in load of a specific pollutant; or (3) other conditions including numeric water quality targets, frequency of exceedances of numeric water quality targets, or minimizing the difference between developed and pre-developed flow-duration curves (USEPA 2009, Riverson et al. 2014).
For this analysis, model cost functions were developed from literature, including an inventory of projects in the Los Angeles region. Because of uncertainty regarding the true costs to C/CAG member agencies, results were normalized for relative comparison—the relative costs between project types is well represented for the optimization of project types in the RAA. In other words, although it is not recommended to use the RAA costs to project county-wide or city-wide implementation costs, they are sufficiently resolved for comparing alternative implementation scenarios and selecting the most cost-effective strategies and combination of GI, LID, and regional stormwater capture projects to meet pollutant reduction targets.

The LSPC model provides a characterization of existing conditions and determination of necessary pollutant load reductions to meet requirements of TMDLs and the MRP. SUSTAIN provides analysis of the amount of GI needed to provide the portion of the load reduction assigned to GI by the MRP. Appendices C and D provide more detailed discussion of the models and their application to the San Mateo County watersheds.

2.5 Model Considerations to Inform GI Plans

An important consideration for the RAA was the ability to track costs and benefits of different categories of GI projects within the model. This tracking
was performed for GI project categories within each model subwatershed and municipal jurisdiction, and supports the selection of the most cost-effective implementation strategy to attain pollutant reduction goals. The RAA builds upon the previous planning efforts and represents the following generalized GI project categories in the model:

- **Existing Projects**: Stormwater treatment and GI projects that have been implemented since FY-2004/05. This primarily consists of all of the regulated projects that were mandated to treat runoff via Provision C.3 of the MRP, but also includes any public green street or other demonstration projects that were not subject to Provision C.3 requirements. For regulated projects in the early years of C.3 implementation, stormwater treatment may have been achieved through non-GI means, such as underground vault systems or media filters.

- **Future New Development and Redevelopment**: All the regulated projects that will be subject to Provision C.3 requirements to treat runoff via LID and is based on spatial projections of future new and redevelopment tied to regional models for population and employment growth.

- **Regional Projects (identified)**: C/CAG worked with agencies to identify five projects within public parks or Caltrans property to provide regional capture and infiltration/treatment of stormwater, and included conceptual designs to support further planning and designs. Note – the model can be updated to include future identified projects to support adaptive management.

- **Green Streets**: The SRP identified and prioritized opportunities throughout San Mateo County for retrofitting existing streets with GI in public rights-of-way. Green streets were ranked as high, medium, and low priority (within each subwatershed) based on a multiple-benefit prioritization process developed for the SRP.

- **Other GI Projects (to be determined)**: Other types of GI projects on publicly owned parcels, representing a combination of either additional parcel-based GI or other Regional Projects. The SRP screened and prioritized public parcels for opportunities for onsite LID and Regional Projects. These opportunities need further investigation to determine the best potential projects.

The RAA considers the numerous GI project opportunities that exist within each municipal jurisdiction, and selects a suite or “recipe” of projects that can most cost-effectively address pollutant load reductions. The amount and combination of those GI projects can be determined through analysis of estimated load reductions and implementation costs. Figure 4 presents an example GI recipe showing the distribution of selected GI project categories versus incremental reductions in pollutant loading and increasing cost. Cost-
benefit optimization of GI project opportunities was included to build upon the preliminary C/CAG SRP planning efforts above, and to properly inform and set meaningful goals for GI Plans. For each optimized combination of GI projects, SUSTAIN provides an estimate of the resulting pollutant load reduction and implementation costs, allowing for the comparison of GI implementation scenarios and the selection of the most cost-effective implementation plan to address pollutant reduction goals, whether at the scale of an individual jurisdiction or across municipal boundaries.

2.6 Goals for GI Implementation

As discussed in Section 2.2, depending on the perspective of the regulators, stakeholders, or Permittees, the purpose and expectations of the RAA can vary in terms of how reasonable assurance is demonstrated. As a result, the output from the RAA must consider multiple perspectives and strike the right balance between detail and specificity while still leaving ample opportunity to allow for future adaptive management. The following are key considerations for the RAA output:

- **Demonstrate PCBs and Mercury Load Reductions** — The primary goal of the RAA is to quantitatively demonstrate that GI Plans and Control Measure Implementation Plans will result in load reductions of PCBs and mercury sufficient to attain their respective TMDL WLAs and the component stormwater improvement goals to be achieved with GI. Based on the baseline hydrology and water quality model (Appendix C), the RAA determined that a 17.6% reduction in PCB loads is needed to meet the GI implementation goals established by the MRP. Zero reduction in mercury loads was determined to be needed from MRP areas because baseline loads were predicted to be below the TMDL WLA for San Mateo County. As a result, a 17.6% reduction in PCB loads is established as the primary pollutant reduction goal for the GI Plan. However, there is some uncertainty in terms of how PCB source areas are represented in the model, which will require more monitoring and analysis in the future to gain an improved understanding of PCB source areas and the ability to target these areas with GI. Since PCBs are generally understood to be transported with cohesive sediment (e.g., silt and clay), cohesive sediment load can serve as a surrogate on which to base a load reduction target. The RAA considers a 17.6% reduction of cohesive sediment load as a more conservative surrogate until a better understanding is reached in terms of specific PCB source areas within the County. If additional PCB source areas are confirmed, these areas could be targeted for source control measures or additional GI implementation, likely resulting in greater effectiveness for GI to reduce PCB loads in those areas, and thus redistributing or reducing...
the overall amount of GI needed to meet the load reduction target based on sediment loading estimates.

- **Develop Metrics to Support Implementation Tracking** – The MRP (Provision C.3.j) also requires tracking methods to provide reasonable assurance that TMDL WLAs are being met. Provision C.3.j states that the GI Plan “shall include means and methods to track the area within each Permittee’s jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area.” Through C/CAG’s current effort preparing a Sustainable Streets Master Plan for San Mateo County, a tracking tool will be developed that will enable calculation of metrics consistent with the results of the RAA and additional metrics relevant to sustainable street implementation. The tracking tool is planned for completion in 2020.

- **Support Adaptive Management** – Given the relatively small scale of most GI projects (e.g., LID on an individual parcel or a single street block converted to green street), numerous individual GI projects will be needed to address the pollutant reduction goals. All the GI projects will require site investigations to assess feasibility and costs. As a result, the RAA provides a preliminary investigation of the amount of GI needed spatially (e.g., by subwatershed and municipal jurisdiction) to achieve the countywide pollutant load reduction target. The RAA sets the GI Plan “goals” in terms of the amount of GI implementation over time to address pollutant load reductions. As GI Plans are implemented and more comprehensive municipal engineering analyses (e.g., masterplans, capital improvement plans) are performed, the adaptive management process will be key to ensuring that goals are met. In summary, the RAA informs GI implementation goals, but the pathway to meeting those goals is subject to adaptive management and can potentially change based on new information or engineering analyses performed over time.

The RAA output, or goals for GI implementation, attempt to identify the appropriate balance in terms of detail and specificity needed to address the above considerations. The RAA also considered multiple alternative scenarios that can inform implementation and the adaptive management process. These scenarios tested the underlying assumptions for GI implementation, and demonstrate the need for further research, collaboration among multiple Permittees, and incorporation of lessons learned in order to gain efficiencies and maximize the cost-effectiveness of GI to reduce pollutant loads over time. Four modeling scenarios were configured for this analysis (as summarized in Table 1):

**Table 1. Model scenarios objectives and cost-benefit evaluation.**
The following factors are considered for each model scenario:

- **Load Reduction Objective** - With a cohesive sediment load reduction objective, Scenarios 1 and 2 represent the most conservative approaches. Those scenarios assume that given the uncertainties about PCB source areas, targeting an overall 17.6% load reduction of cohesive sediment in general (silts and clays) achieves the PCB load reduction objective for GI. Scenarios 3 and 4 assume that PCB sources are spatially distributed based on analysis of land use types. The cost-benefit optimization process targets those areas as having the highest likelihood of PCB sources. Scenarios 3 and 4 highlight the potential cost savings (relative to Scenarios 1 and 2) that could be realized if PCB sources are identified and targeted for GI implementation.

- **Jurisdictional versus Countywide** - There are many possible ways to achieve a 17.6% load reduction for all of San Mateo County. The “Jurisdictional” approach stipulates that each jurisdiction must individually achieve at least a 17.6% load reduction based on the population-based wasteload reduction for each jurisdiction. Conversely, the “Countywide” approach achieves the 17.6% load reduction countywide by allowing the model to allocate the countywide wasteload reduction via GI across jurisdictional boundaries. The countywide approach can provide significant cost savings over the jurisdictional approach, especially where pollutant sources are spatially concentrated. Figure 1 conceptually illustrates the jurisdictional versus countywide optimization approaches. Where there is cooperation among jurisdictions, results from these two scenarios can provide a useful analytical framework for cost-sharing and implementation of the most cost-effective management scenarios.
REDWOOD CITY

Jurisdictional

Each location is responsible for individually achieving the target load reduction

Countywide

Optimization approach reduces total implementation cost by targeting specific source areas across locational boundaries

Figure 5. Modeling System Supporting the RAA.

Results of each of the four RAA scenarios are documented in Appendix D. These results can inform the adaptive management process for GI implementation, and help garner support for collaborative efforts for GI implementation or further research of PCB source areas that can seek more cost-effective implementation strategies over time. Figure 6, Table 2, and Figure 7 provide a summary of Scenario 1 RAA results for the City of Redwood City. Scenario 1 represents the most conservative scenario for GI implementation. The following steps outline how the process for formulating the scenario in the RAA model and using the results to set goals for GI implementation.

First: Based on GI project categories defined in Section 2.5, SUSTAIN was used to simulate effectiveness/load reductions and estimate planning-level costs for various combinations of GI projects within Redwood City's jurisdiction (along the x-axis of Figure 6, from low pollutant reduction/effectiveness to high reduction/effectiveness). “Existing Projects” were locked in the model and included those GI projects included in the FY 2016-17 MRP Annual Report to the Water Board. “Future New & Redevelopment” is an estimation of the LID that will likely be implemented in the future in redevelopment areas (based on Provision C.3). “Green Streets” were based on prioritized and ranked (High, Medium, and Low) street retrofit opportunities reported in the SRP. For Redwood City, the “Regional Stormwater Capture Project at Red Morton Community Park” refers to the regional project located within Red Morton Park. “Other GI Projects” refer to additional GI projects needed, but
specific locations for project opportunities within certain subwatersheds are yet to be determined.

**Second:** As depicted in Figure 6, a 17.6% reduction of modeled PCB for Redwood City was identified as the target reduction to be attained through the implementation of GI (for Scenario 1, cohesive sediment reduction is used as a surrogate to represent load reduction of PCBs).

**Third:** SUSTAIN is used to provide cost-optimization and selection of the most cost-effective combination of GI projects to attain the target reduction. In Figure 6, this solution can be viewed as the vertical slice that intersects the point on the x-axis at 17.6% reduction. The combination of GI structural capacities in that slice at the 17.6% load reduction represents the proposed GI implementation plan for Redwood City produced by the model.

Table 2 provides details on that implementation plan for the ten subwatersheds within Redwood City's jurisdiction (represented by each row in table). Optimization results recommend that varying amounts of GI capacity in different subwatersheds (different rows) are needed to achieve the most cost-effective solution, but the overall PCBs load reduction addresses 17.6% (bottom row of table). The relative amount of GI capacities (normalized by area) for each subwatershed are shown in the map in Figure 7.

![Figure 6. Scenario 1: Optimization summary for Redwood City (sediment target, with regional identified project).](image-url)
Table 1. Scenario 1: GI implementation strategy for Redwood City (sediment target, with regional identified project)

<table>
<thead>
<tr>
<th>Subwatershed ID</th>
<th>Management Metrics for GI</th>
<th>Green Infrastructure Capacity to Achieve 17.6% Reduction Target</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Load Reduction (PCBs Annual)</td>
<td>Annual Stormwater (acre-feet)</td>
</tr>
<tr>
<td>221415</td>
<td>52%</td>
<td>0.03</td>
</tr>
<tr>
<td>230215</td>
<td>15%</td>
<td>64.02</td>
</tr>
<tr>
<td>230315</td>
<td>20%</td>
<td>295.42</td>
</tr>
<tr>
<td>230415</td>
<td>49%</td>
<td>1.23</td>
</tr>
<tr>
<td>230515</td>
<td>15%</td>
<td>0.25</td>
</tr>
<tr>
<td>230615</td>
<td>13%</td>
<td>13.33</td>
</tr>
<tr>
<td>230715</td>
<td>9%</td>
<td>0.49</td>
</tr>
<tr>
<td>230815</td>
<td>3%</td>
<td>11.28</td>
</tr>
<tr>
<td>230915</td>
<td>21%</td>
<td>0.21</td>
</tr>
<tr>
<td>232015</td>
<td>52%</td>
<td>2.14</td>
</tr>
<tr>
<td>Total</td>
<td>17.9%</td>
<td>388.4</td>
</tr>
</tbody>
</table>
As can be seen in the above results, the cost-optimization favored implementation of different combinations of GI projects within each subwatershed. These combinations were based on: (1) number and type of GI project opportunities identified within each subwatershed, and (2) cost-effectiveness given various characteristics associated with GI control measure efficiency (typically governed by infiltration rates), higher sediment (or PCBs) generation in upstream areas, etc. During implementation, it is almost certain that the actual implementation of GI will not follow the RAA output exactly; however, the recipe provides “management metrics” by subwatershed (described below) to guide the adaptive management process. Dimensions and location of GI projects will vary based on on-the-ground feasibility and site-specific constraints. GI performance varies based on factors like the physical properties of the facility and upstream drainage area managed. For these reasons, it is not recommended that GI capacity serve as the focus for stormwater improvement goals for the GI Plan.

The RAA recommends management metrics for the GI Plan that are based on metrics that can be easily measured and tracked throughout implementation. At the left side of the table in Table 2 are columns under the header “Management Metrics for GI,” which include performance metrics for “% Load Reduction PCBs (Annual),” “Annual Volume Managed (acre-ft),” and “Impervious Area Treated (acres).” The “% Load Reduction PCBs (Annual)” and “Annual Volume Managed (acre-ft)” metrics are based on annualized results represented in the RAA modeling system that are directly comparable to TMDL WLAs. The “% Load Reduction PCBs (Annual)” provides a relative comparison of the load reduction to be achieved within each subwatershed. The “Annual Volume Managed (acre-ft)” shows the acre-feet of water captured and infiltrated and/or treated within each subwatershed, resulting in a total annual volume of 15.3 acre-feet of stormwater managed in Redwood City for an average year. This 15.3 acre-feet of stormwater managed could serve as the primary metric to be tracked for GI implementation. In other words, stormwater volume managed is being used as a unifying metric to evaluate GI effectiveness. “Impervious Area Treated (acres)” is an additional metric suggested by the MRP for implementation tracking. As a result of adaptive management, the implementation plan may change over time and alternative
GI projects can be substituted without having to re-run the RAA model, as long as the “Management Metrics for GI,” representing the goals for the GI Plan, remain on track.

2.7 Implementation Schedule

Throughout the adaptive management process, the City will continue to verify feasible opportunities for GI projects to meet the final load reduction goals for 2040. The process will include the tracking of management metrics and continued re-evaluation of GI project opportunities considered for the RAA. For instance, the RAA assumed projected amounts of LID associated with new and redevelopment, which are subject to change based on factors that are outside the control of the City. If less development occurs over time, more Green Streets or regional projects on public land may be needed to provide equivalent volume management. For the RAA and GI Plan, a preliminary schedule was developed in order to chart a potential course for GI implementation, which considered the various project opportunities.

The MRP requires reporting of goals for implementation of GI for interim milestones 2020 and 2030, in addition to the final milestone of 2040. In order to estimate the amount of GI to be implemented at these milestones, various assumptions were made in terms of the pace of implementation for various GI project types. Separate analyses determined the projected amount of LID associated with new development and redevelopment by 2020, 2030, and 2040. In addition, the Regional Project at Red Morton Park, is assumed to be built and operational by 2040. Finally, a small portion of Green Streets and other projects required by 2040 are assumed to be implemented by 2030, but the City’s planned policy initiatives are expected to take the place of those improvements. The resulting schedule presented in Figure 8 demonstrates anticipated interim and final milestones for GI implementation in terms of structural capacity (corresponding to the capacities presented at the right side of Table 2). These interim and final GI capacities are subject to adaptive management, however the 2040 Management Metrics for GI (left side of Table 2) set the ultimate goal for GI planning efforts and tracking.

Figure 8 also provides a comparison of the amount of GI capacity estimated to be needed in Redwood City to address 2040 goals for Scenario 1 (jurisdictional) and Scenario 2 (countywide). Results demonstrate that if the 17.8% sediment load reduction target is met countywide, the RAA favors the implementation of additional GI projects within Redwood City, above the amount needed if

RWC GREEN INFRASTRUCTURE PLAN
ATTY/RESO.0075/CC RESO APPROVING THE GREEN INFRASTRUCTURE PLAN – EXHIBIT A
REV: 06-20-19 PR
Redwood City only addressed the 17.8 sediment reduction within the City jurisdiction. The countywide scenario would require significant additional discussion among San Mateo County Permittees in order to provide cost-share agreements that would result in more GI implementation within Redwood City, likely resulting in less GI implemented in other city or unincorporated County jurisdictions. However, comparison of these scenarios further demonstrates the need for an adaptive management framework to further investigate the most cost-effective approach to countywide GI implementation.

Figure 8. Summary GI capacity for interim and final implementation milestones.

Implementation Milestones
3 Public Project Identification, Prioritization, and Mapping

3.1 Introduction

To meet the requirements of the MRP, the City of Redwood City's (City) GI Plan must describe the mechanism by which the City will identify, prioritize and map areas for potential and planned projects that incorporate GSI components in different drainage areas within the City. The mechanism must include the criteria for prioritization and outputs that can be incorporated into the City's long-term planning and capital improvement processes. For the purposes of this Plan, staff conducted an analysis and determined that based on current development trends the inclusion of GI into projects that are not currently C.3 regulated would help to meet the permit goals through without the addition of GI projects within the City. That is also with the expectation that the City will construct the Regional Project at Red Morton Park based on the projected GI implementation strategy for Redwood City (sediment target, with regional identified project in Table 2 in Section 2.6).

The development projects that are not currently regulated but are being considered for requiring C.3 included new commercial buildings, new residential buildings, and substantial commercial remodels (more than 50% remodel of the interior of a building). A future resolution would be adopted by City Council outlining what the requirements on these types of projects would be, and identify any exclusions that would be considered such as zero lot line buildings, low income housing projects, and a minimum square footage of commercial remodel. The resolution would also include the installation of GI frontage improvements on large development projects where there are opportunities based on staff's recommendations.

The City would still continue to evaluate Capital Improvement Projects that may have potential for the inclusion of GI, but would rely on development projects and the Regional Project at Red Morton to meet the goals of the MRP.

3.2 Tools for Public Project Identification and Prioritization

C/CAG obtained grant funding to develop The Countywide Sustainable Streets Master Plan (SSMP), which is an opportunity for C/CAG to proactively plan for the adaptation of transportation infrastructure across the county to mitigate...
the impacts of future climate change scenarios through the implementation of GI. An update to the countywide hydrology model will provide simulation of hydrologic scenarios representing existing and future conditions with climate change and is key to providing a comparison of multiple metrics and critical conditions crucial in the prioritization of sustainable street opportunities. The City intends to use this master plan to prioritize GI opportunities in the public right-of-way and integrate them into future Capital Improvement Projects.

3.3 Maps and Project Lists

The City has mapped all existing GI facilities, planned GI facilities, and current GI projects under construction and has the mapping available on its website. Both private and public projects are mapped and include information about the type of treatment, and the type of project such as parcel based or green streets. The website can be found here:

https://webgis.redwoodcity.org/storymap/greeninfrastructure/

The mapping will be updated as needed on a continuing basis.
4 Early Implementation Projects

4.1 Review of Capital Improvement Projects

MRP Provision C.3.j.ii. requires that the City of Redwood City (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 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 E.

As mentioned in Section 3.1 the City would continue to evaluate Capital Improvement Projects that may have potential for the inclusion of Gi, but would rely on development projects and the Regional Project at Red Morton to meet the goals of the MRP.

4.2 List of Projects Identified

CIP Projects with green infrastructure potential that were identified during 2015-2019 are listed in Table 3, along with their status.

Table 3. CIP Projects with Green Infrastructure Potential

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Project Status</th>
<th>Included in Green Infrastructure Plan (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kennedy Safe Routes to School Project – Portions of Alameda De Las Pulgas, Goodwin Ave, and Fernside Ave</td>
<td>This funding is to implement safety improvements around Kennedy Middle School to encourage more students to walk and bike to school. The project will have grant funding from Measure A ($500,000) for the construction phase. The City’s contribution to the project includes design and ROW costs, along with $1MM in construction funds (maximum of $150K can come from traffic impact fees).</td>
<td>Completing Construction</td>
<td>Yes</td>
</tr>
</tbody>
</table>

"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."
<table>
<thead>
<tr>
<th>Project Name</th>
<th>Description</th>
<th>Department</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jardin de Niño's - Phase II 1668 Middlefield Road</td>
<td>The newly city-owned parcel, located next to the recently renovated Jardin de Niño's Park, will become an expansion of the existing park.</td>
<td>Planning</td>
<td>Still Evaluating</td>
</tr>
<tr>
<td>Roselli Garden - Downtown Library Park 1668 Middlefield Road</td>
<td>The project proposes to renovate the existing park or swap location with the adjacent parking lot that serves the library and downtown.</td>
<td>Planning</td>
<td>Still Evaluating</td>
</tr>
<tr>
<td>Storm Pump Stations Rehabilitation Program - Throughout City</td>
<td>An evaluation of all stormwater pump stations within the City's jurisdiction. Some pump stations will only require equipment upgrades, but others will include site work with potential for green infrastructure improvements.</td>
<td>Planning</td>
<td>Still Evaluating</td>
</tr>
<tr>
<td>Garrett Park Rehabilitation 3654 Glenwood Ave</td>
<td>This neighborhood park is scheduled for a playground renovation.</td>
<td>Planning</td>
<td>Still Evaluating</td>
</tr>
<tr>
<td>Veterans Memorial Senior Center - YMCA Project - 1400 Roosevelt Ave</td>
<td>The VMSC-YMCA is a joint development project for an intergenerational recreational center in Red Morton Park. The project includes hiring a Master Architect, extensive community outreach, and developing both an MOU for future land use and an operational agreement.</td>
<td>Planning</td>
<td>Yes</td>
</tr>
<tr>
<td>Alameda de las Pulgas Bike and Pedestrian Improvements - Alameda De Las Pulgas near Woodside Rd</td>
<td>Joint Project with the Lead City being Woodside to install Bike and Pedestrian Improvements to provide better connectivity between the two jurisdictions.</td>
<td>Planning</td>
<td>No</td>
</tr>
<tr>
<td>Community Garden - Maple &amp; Lathrop</td>
<td>This project proposes to build raised beds and a fruit alle to form a community garden on a vacant city-owned parcel.</td>
<td>Planning</td>
<td>Still Evaluating</td>
</tr>
</tbody>
</table>
Redwood Shores Library Art Play Structure and Playground — 399 Marine Pkwy

This project will install a public art piece with a public accessible playground.

Planning  Still Evaluating

Middlefield Road Utility Underground Project —

Middlefield Road between Woodside Road and Main Street

The Middlefield Road project includes construction of a joint utility trench (JUT) to accommodate new and relocated underground electrical and telecommunication lines, as well as streetscape improvements between Main Street and Woodside Road.

Design Complete  Yes

Hopkins Traffic Calming Project

Hopkins Ave between Broadway and Alameda De Las Pulgas

This project will install traffic calming measures based on Public outreach in the neighborhood surrounding the project area.

Pilot Program  Still Evaluating

4.3 Workplan for Completion

As identified in Section 2.7 the City intends to construct the Regional Stormwater Capture Project at Red Morton Community Park between 2030-2040. Since that project and the development policies are intended to meet the goals of the MRP, any other CIP projects with the inclusion of GI will not be considered a priority. This will need to be revisited from time to time, and will be part of the City’s adaptation plan (Section 8).
5 Tracking and Mapping Public and Private Projects Over Time

5.1 Tools and Process

As identified in Section 3.3, the City has mapped all existing, planned, and current projects under construction and has the mapping available on its website. Both private and public projects are mapped and include information about the type of treatment, and the type of project such as parcel based or Green Streets.

Through C/CAG's current effort preparing a Sustainable Streets Master Plan for San Mateo County, a tracking tool will be developed that will enable calculation of metrics consistent with the results of the RAA and additional metrics relevant to sustainable street implementation. The tracking tool is planned for completion in 2020.
6 Design Guidelines and Specifications

6.1 Green Infrastructure Guidelines, Specifications, and Typical Design Details

The San Mateo Countywide Water Pollution Prevention Program (SMCWPPP), with input and feedback from its member agencies, including the City of Redwood City, has developed a countywide Green Infrastructure Design Guide (Design Guide) and its appendices to provide comprehensive guidance on the planning, design, construction, and operations and maintenance of green infrastructure for buildings, parking lots, sites, and streets. The Design Guide addresses the requirements of the MRP, fulfilling Section C.3.j.i. (2) (e) requiring design and construction guidelines for streets and projects and C.3.j.i. (2)(f) for developing typical design details and specifications for different street and project types. The Design Guide also addresses the part of C.3.j.i. (2)(g) related to a regional approach for alternative hydraulic sizing for non-regulated and constrained street projects.

The Design Guide includes a range of information related to green infrastructure, such as provision of policies and definitions; identification of different types of treatment and site design measures; summation of various benefits including a range of community benefits provided beyond stormwater management; presentation of before and after images of integrating green infrastructure into projects; introduction of complete streets concepts and design; discussion regarding BASMAA's regional approach for alternative sizing for non-regulated and constrained Green Street projects; design and implementation considerations; operations and maintenance; and provision of typical construction details and specifications. The Design Guide explains how these concepts, considerations, and guidance can be used to effectively integrate green infrastructure into communities in new and redevelopment projects whether they are C.3 regulated or not.

General guidelines for overall streetscape and project design, construction, and maintenance have been developed so that projects have a unified, complete design and implement the range of functions associated with the projects. The MRP emphasizes the need for guidance related to Green Streets functions. The Design Guide includes implementation guidance specifically for stormwater management and treatment within streets. The guidance supports safe and effective multimodal travel with a focus on the comfort of
people walking and cycling; shared use as public space and an attractive and functional public realm; use of appropriate measures for different street and land use contexts and types; and the achievement of urban forestry goals and benefits. The Design Guide defines practices to give considerations to no missed opportunities and the efficient and effective coordination, review, and implementation of green infrastructure in public and private projects.

The Appendices of the Design Guide include typical design details and specifications for the design and construction of green infrastructure applicable to a variety of applications whether street or site-based projects.

The City of Redwood City will use the Design Guide and future amended versions to provide support and guidance in implementing green infrastructure within the City. As more green infrastructure projects are implemented in Redwood City, portions of the Design Guide may be superseded by Redwood City-specific updates or modifications based upon lessons learned and other factors experienced in or determined by the City. The Design Guide can be found at SMCWPPP’s website, at https://www.flowstobay.org/gidesignguide.
7 Funding Options

7.1 Funding Strategies Developed Regionally

BASMAA created the “Roadmap for Funding of Sustainable Streets” in which it describes a roadmap that 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.

It includes specific actions in the roadmap that 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.

It also states some of the challenges of obtaining funding. 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. For example, some transportation grants may fund only some aspects of a Sustainable Street project, while resource grants may fund other aspects. Assembling multiple funding sources brings new challenges and costs to a project. The roadmap also identifies the financial needs to support the placement of Sustainable Streets, considering that 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).

Lastly, the roadmap includes the benefits, which include climate change mitigation, air quality improvement, water quality improvement, localized flood control, and community benefits.
7.2 Local Funding Strategies that Require Ballot Process

There are two basic types of balloted measures appropriate for stormwater funding, namely, special taxes and property-related fees. Successfully implemented balloted approaches have the greatest capacity to significantly and reliably fund stormwater management.

**Special Taxes:** Special Taxes are decided by registered voters and require a two-thirds majority for approval. Special taxes are well known to Californians and are utilized for all manner of services, projects, and programs. They are usually legally very stout and flexible and can support an issuance of debt such as loans or bonds in most cases.

There are several types of special taxes, but the most common for stormwater services are parcel taxes. Parcel taxes are levied against real property and can be calibrated for some parcel metric such as acreage, size of building, impermeable area, type of use, or simply a flat rate where each parcel pays the same amount. Examples of parcel taxes that have been successfully implemented for stormwater services are in the cities of Culver City, Los Angeles, Santa Cruz, and Santa Monica.

Other types of special taxes include sales, business license, vehicle license, utility users, and transit occupancy taxes.

**Property Related Fee:** A Proposition 218-compliant, property owner balloted, property-related fee is a viable revenue mechanism to fund stormwater programs.

Property-related fees must apply to defined services within a defined service area, and the costs of providing those services must be spread equitably over the properties that receive the services.

**General Obligation Bonds:** Bonds are issued to raise funding up front and are repaid through a tax levied against property on the annual property tax bill. These levies are based on property value, so higher value properties pay a higher portion of these taxes.

One primary restriction on GO bonds is that they can only be used for capital projects. While that includes land acquisition, planning, design and
construction, the costs for maintenance and operations cannot be paid from the bond proceeds.

Examples of stormwater-related GO bonds successfully implemented include Berkeley's Measure M ($30 million — partly for GI, 2012) and Los Angeles' Measure O ($500 million, 2004).

Funding strategies are discussed in greater detail in Appendix C, which also includes a list of balloted efforts throughout the State along with a discussion on why they succeeded or failed.

7.3 Grants and Loan

Federal, state, and regional grant programs have funding available to local governments to support GI efforts. These grant programs include:

- California Proposition 1 (Water Quantity, Supply, and Infrastructure Improvement Act of 2014) Stormwater Implementation Grant Program; US Environmental Protection Agency: San Francisco Bay Water Quality Improvement Fund;
- California Water Resources Control Board: 319(h) Non-Point Source Implementation Program;
- California Department of Water Resources: Integrated Regional Water Management Program Implementation Grants;
- California State Parks: Land & Water Conservation Fund and Rails-to-Trails Programs;
- California Department of Forestry and Fire Protection: Urban and Community Program;
- Caltrans Cooperative Implementation Agreements or Grants Program, and
- One Bay Area Grant Program (transportation projects).

Other potential grant resources that may be available in the future to support GI include Greenhouse Gas Reduction Funds derived from the California Cap and Trade Program. As a result of Senate Bill 985, now incorporated into the California Water Code, stormwater capture and use projects must be part of a prioritized list of projects in a Stormwater Resource Plan in order to compete for state grant funds from any voter-approved bond measures.
Loans: Long-term debt financing can be a valuable tool to use for funding important projects and programs. It is not a source of new funding in and of itself, but rather allows an agency to leverage an ongoing revenue stream by borrowing money for immediate needs such as capital construction, which is then repaid over time. While GO bonds (discussed above) are a type of debt instrument that requires voter approval, other forms of long-term debt do not require voter approval such as certificates of participation (COPs) or loans from a state revolving fund (SRF). COPs are a type of municipal bond that usually has relatively low interest rates but is only secured by the agency's ability to repay and can have substantial administrative costs.

7.4 Assessments & Special Financing Districts

Special financing districts are not the same as special districts, which are a form of governance with its own elected board and scope of services. Special financing districts are simply financial structures created by local governments for the purpose of levying taxes, fees, or assessments for specific improvements and/or services provided. These include benefit assessments, community facility districts, business improvement districts, and infrastructure financing districts.

Most special financing districts require a balloting of affected property owners, but these are typically either a very small area (like a business district) or are applied to single land owner such as a developer in the process of a new development.

Benefit Assessments: Benefit assessment districts can levy charges that correlate to special benefits conferred on property by virtue of improvements or services. These can range from landscaping, lighting, recreation facilities, parks, fire protection, mosquito abatement, and cemeteries. Most benefit assessment districts are governed by a statute, which can vary depending on the type of service or improvement. All benefit assessments must comply with Proposition 218, which limits assessments to the special benefits conferred, but cannot be levied based on any general benefit (such as to properties outside the district boundary or to the general public at large). The portion of the benefits that are general must be funded from sources other than the benefit assessments - such as a city's general fund. This general benefit factor can become prohibitive in some cases.
As they pertain to GI, property owners in a watershed could be assessed to fund stormwater runoff management programs that provide direct benefit to properties within that watershed or sub-basin. The watershed unit may be particularly effective and equitable as programs can be tailored to address specific priorities identified within that watershed and would include the diverse socio-economic demographics from the hills to the flatlands typical to a Bay Area urban watershed.

Benefit assessments are not taxes or fees and must be approved by a weighted majority of the affected property owners that cast votes. Benefit assessments typically are collected as part of the annual property tax bill.

**Community Facilities Districts:** Community facilities districts, more commonly known as “CFDs” or “Mello-Roos Districts,” are a form of special tax, and must be approved by property owners or registered voters. Similar to benefit assessments, CFDs are often formed during the development process for a finite set of parcels owned by a single entity. Often, formation of a CFD will be included in the conditions of approval for a development.

As a tax, the structure of the charges and the use of the funding is much more flexible than for a benefit assessment. For instance, publicly-owned property can be exempted as well as other classes of properties (such as commercial properties in a school-based CFD). In addition, general benefit does not need to be considered or funded from other sources. Finally, CFD taxes are easily structured to allow for future expansion to other properties that are developed in the future. They need not be contiguous to the original (or seed) development.

As they pertain to GI, the flexibility inherent in a CFD tax would allow flexibility in the types of improvements or services that are funded. However, as a tool primarily used for new development, the proceeds may be restricted to improvements and services for those new developments only.

**Business Improvement District (BID):** Business improvement districts are mechanisms in which businesses and property owners tax themselves and manage the funds to build or maintain certain assets. The BID can be set up and administered by the community members. For example, the Dogpatch and Northwest Potrero Hill Green Benefit District (http://dnwph-gbd.org) is a Green Business Improvement District in San Francisco developed to fund and
maintain the public-realm landscaping in the area. The landscape staff used to maintain this landscaping can be trained in GI maintenance practices and qualified in sustainable landscaping services.

**Infrastructure Financing Districts:** Infrastructure financing districts (IFD), a relatively new funding mechanism, may develop into a viable mechanism. IFDs have emerged as a potential replacement for Redevelopment Agencies, which were eliminated in 2012. Cities and counties may create IFDs to capture ad valorem tax increments, similar to the now-defunct Redevelopment Agencies, to invest within the specific IFD boundaries. IFDs are not limited to blighted areas and can directly, or through 30-year bonds, fund local infrastructure including highways, transit, water systems, sewer projects, flood control, childcare facilities, libraries, parks, and solid waste facilities. However, the formation of an IFD requires consent from all the impacted local agencies (school districts are exempt from IFDs) and two-thirds support from eligible voters within the IFD boundaries. Both of these are high hurdles, which may explain why so few IFDs have been formed. In addition, IFDs cannot pay for maintenance, repairs, operating costs, and services, and IFDs do not have access to the school's portion of the property tax increment.

In 2014, the California Legislature approved the Enhanced Infrastructure Financing District (EIFD) structure, in part to offer an alternative to the recently banned redevelopment structure. Unlike the IFD, it does not require voter approval unless bonds are to be issued. Like the IFD, the schools' portion of property tax increment is not available. This financing structure may be a good fit for localized areas where stormwater infrastructure and quality, and particularly environmental clean-up on private properties, are major concerns. An EIFD can be created with multiple municipalities, so it can span political boundaries making it a good fit for a watershed approach to GI funding.
8 Adaptive Management

8.1 Process for Plan Updates

The City of Redwood City (City) will revisit the Green Infrastructure Plan along a similar time frame as the adoption of future versions of the MRP. Since the adoption of future MRPs often comes with alterations to what is required to be a regulated project or implement low impact development design, it is expected that the current plan will need to be updated from time to time to incorporate additional design and implementation procedures to meet the current goals of the MRP.

8.2 Pursuing Future Funding Sources

The City is not currently pursuing future funding sources, but will consider them as needed to meet the goals of the MRP. The funding strategies will likely be in line with Section 7, however additional sources will be considered as they become available.

8.3 Alternative Compliance and Credit Trading Investigations

The City does not intend to do any alternative compliance or credit investigations at this time, although it may be a consideration for future GI Plans.
9 References

CCCWP (Contra Costa County Clean Water Program). 2018. Green Infrastructure Draft Plan Template


