GREEN INFRASTRUCTURE PLAN

CITY OF HALF MOON BAY 501 Main Street, Half Moon Bay, CA 94019 • 650.726.8270

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ACKNOWLEDGEMENTS

The City of Half Moon Bay gratefully acknowledges those who contributed to the preparation of this document, which was developed to comply with the requirements in Provision C.3.j.i of the Municipal Regional Stormwater NPDES Permit (MRP), Order R2-2015-0049, in collaboration with the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) and with use, in part, of the Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP) Green Infrastructure Plan template. The comments, guidance, suggestions, and content provided by those referenced below were instrumental to the development of the Green Infrastructure Plan.

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PREFACE

Green Infrastructure (GI) is a cost-effective, resilient approach to managing water quality. It uses plants, soils, and other elements to mimic the natural water cycle and capture rainwater. Examples of GI include a variety of stormwater measures, such as stormwater planters or bioretention areas, infiltration systems, permeable pavement, green roofs, green walls, green gutters, and stormwater trees which mimic natural hydrologic processes such as filtration, infiltration, detention, and evapotranspiration.

GI provides multiple community benefits such as improving water quality before discharging it to the bay or ocean by removing pollutants like sediment and trash from stormwater, reducing the effect of urbanization on local creeks and waterways, mitigating the heat island effect, providing climate change resilience, reducing localized flooding, promoting natural ground infiltration and groundwater recharge, increasing biodiversity and habitat for native plants and animals, and enhancing property and neighborhood economic vitality and aesthetics.

The San Francisco Bay Regional Water Quality Control Board (SFRWQCB)'s Municipal Regional Stormwater NPDES Permit (MRP), Order No. R2-2015-0049, regulates pollutants in stormwater runoff from municipal storm drain systems throughout San Mateo, Santa Clara, Alameda, and Contra Costa Counties, as well as the Cities of Fairfield, Suisun, and Vallejo, and the Vallejo Sanitation and Flood Control District. The City of Half Moon Bay is obligated to follow the mandates of the MRP to control stormwater discharge within City limits. The City of Half Moon Bay, as one of the 76 municipalities that are Permittees of the MRP, has developed this document, the Green Infrastructure Plan (GI Plan), in order to comply with the MRP's Green Infrastructure Planning and Implementation requirements.

This Green Infrastructure Plan describes how the City will, over time, transition its existing "gray" (i.e., traditional) infrastructure to "green" infrastructure. This local planning document determines, defines, and supports local GI goals and policies. This document also provides guidance to meet stormwater pollutant load reduction goals and creates a process for prioritizing the integration of GI into capital improvement projects. This plan is intended to be a "living document" and may change and adjust over time as regulatory requirements change, new information is gathered and analyzed, and GI technologies advance.

CEQA EXEMPTION

Development and approval of this Green Infrastructure (GI) Plan will likely result in the construction or installation of GI improvements such as landscaping, irrigation, bioretention areas, stormwater capture devices, and pervious paving which will improve the quality of stormwater on private property and/or in City rights-of-way and facilities, via operation, repair and maintenance, replacement or reconstruction, and/or construction or conversion of small structures.

Preparation and implementation of this GI Plan qualifies as a California Environmental Quality Act (CEQA) Class 1 categorical exemption (CEQA Guidelines Section 15301) for minor alteration of existing public or private facilities and structures such as highways, streets, sidewalks, gutters, and bicycle and pedestrian trails through addition of GI that would involve no or negligible expansion of existing use.

The policies contained herein also qualify as a Class 2 categorical exemption (CEQA Guidelines Section 15302), as they would involve replacement of existing storm drainage or facilities with GI that would have substantially the same purpose and capacity as the structures replaced.

The policies in this GI Plan further qualify as a Class 3 categorical exemption (CEQA Guidelines Section 1530) to the extent that new GI is incorporated into new construction or in the conversion of, and/or minor modifications to, existing small structures and facilities.

Lastly, the GI Plan qualifies as a Class 8 categorical exemption (CEQA Guidelines Section 15308), as the plan promotes the construction or installation of GI which will “assure the maintenance, restoration, enhancement, or protection of the environment” through improvement to water quality, provision of flood protection, and enhancement of community aesthetics. The City Council will provide final approval for adoption of this GI Plan, and a Notice of Exemption will be filed.

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GREEN INFRASTRUCTURE PLAN APPENDICES

ABBREVIATIONS

BASMAA	Bay Area Stormwater Management Agencies Association
C/CAG	City/County Association of Governments
CEQA	California Environmental Quality Act
CIP	Capital Improvement Program
City	City of Half Moon Bay
CWA	Clean Water Act
FY	Fiscal Year
GI	Green Infrastructure
GI Plan	Green Infrastructure Plan
GI TAC	Green Infrastructure Technical Advisory Committee
GIS	Geographic Information System
LID	Low Impact Development
MRP	Municipal Regional Stormwater NPDES Permit
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
PCBs	Polychlorinated Biphenyls
RAA	Reasonable Assurance Analysis
SCVURPPP	Santa Clara Valley Urban Runoff Pollution Prevention Program
SFRWQCB	San Francisco Bay Regional Water Quality Control Board
SMCWPPP	San Mateo County Water Pollution Prevention Program
SRP	San Mateo County Stormwater Resource Plan
SWRCB	State Water Resource Control Board
TMDL	Total Maximum Daily Load
WDR	Waste Discharge Requirements
WLA	Waste Load Allocation

1.0 INTRODUCTION

1.1 What is Green Infrastructure?

1.1.1 Basics of Green Infrastructure

A traditional stormwater management approach collects excess rainwater (called "runoff") through a series of "gray" infrastructure (curbs, gutters, storm drain structures, and piping) and directs it to the receiving waters quickly and without treatment. This is often called a "collect and convey" approach to stormwater management, in which stormwater is treated as a waste, instead of a resource. As land becomes more developed over time, natural landscapes are converted to impervious areas and soils are compacted, reducing the amount of water which infiltrates into the ground and increasing both the amount of runoff and the speed with which it reaches local creeks and other waterbodies.

As the runoff travels over impervious surfaces, it collects pollutants such as heavy metals, oils, grease, trash, sediment, bacteria, nutrients, pesticides, and toxic chemicals from vehicles, construction sites, animals, landscaping activities, and industrial or commercial businesses. Over time, this has led to the pollution of local waterbodies. In the case of the San Francisco Bay, the water quality is degraded to the point of being "impaired", meaning that it cannot meet at least one of its beneficial uses due to insufficient water quality. [1]

In contrast to traditional "gray" infrastructure, Green Infrastructure (GI) is a means of restoring water quality through implementing a range of natural and built approaches to stormwater management that mimic natural systems. GI can reduce the amount of runoff that enters the traditional piped stormwater system below ground, prevent overflows that pollute nearby water bodies, clean stormwater, and allow water to reabsorb back into the ground. GI uses vegetation, soils, filter media, and/or natural processes to create healthier urban environments. At the scale of a city or town, GI refers to the patchwork of natural areas that provide habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or project site, GI refers to stormwater management systems and features that mimic nature by absorbing and storing stormwater as well as reducing pollutants through filtration, infiltration, detention, and evapotranspiration.

Figures 1 and 2 represent the differences between the hydrologic cycle before and after development, while Figure 3 represents a balanced approach to stormwater management using GI.

[1] The SWRCB has defined the beneficial uses of the San Francisco Bay to be as follows: industrial service supply, industrial process supply, commercial and sport fishing, shellfish harvesting, estuarine habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, noncontact water recreation, and navigation. San Francisco Bay is impaired because mercury contamination is adversely affecting existing beneficial uses, including sport fishing, preservation of rare and endangered species, and wildlife habitat.

Figure 1. *Pre-Urban Development Water Cycle.*[2]

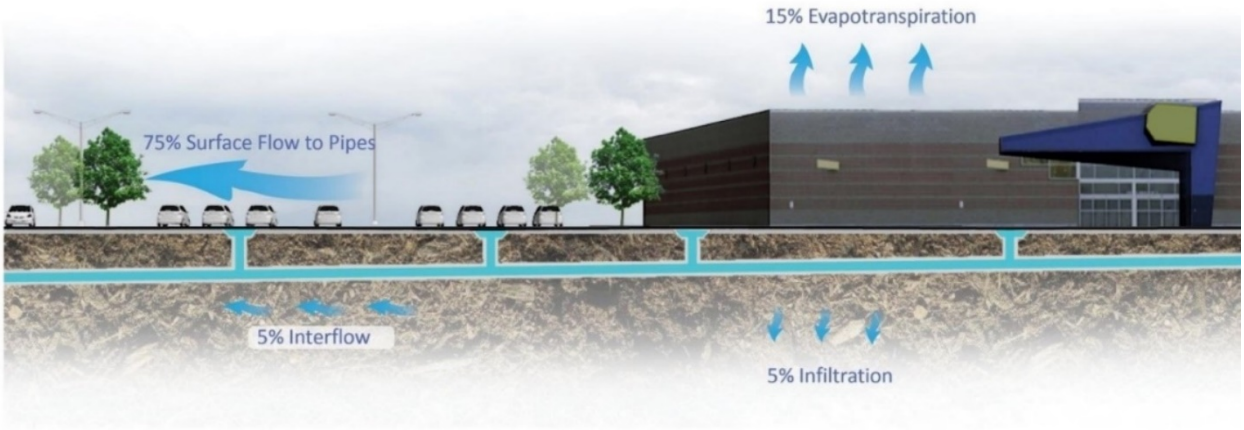


Figure 2. *Post-Urban Development Water Cycle.*[2]

GI measures are used on both public and private lands, such as roads and parking lots, and act as resilient, sustainable systems that retain, detain, filter, harvest, infiltrate, and/or evapotranspire runoff. This limits the discharge of pollutants to the storm drain system and promotes the infiltration of stormwater into the groundwater basin. GI also includes best management practices, like discharging impervious areas to

[2] San Mateo County Sustainable Green Streets and Parking Lots Guidebook. (2009). SMCWPPP.

landscape and minimizing of impervious surfaces on new developments, which act to remove pollutants and protect natural systems.

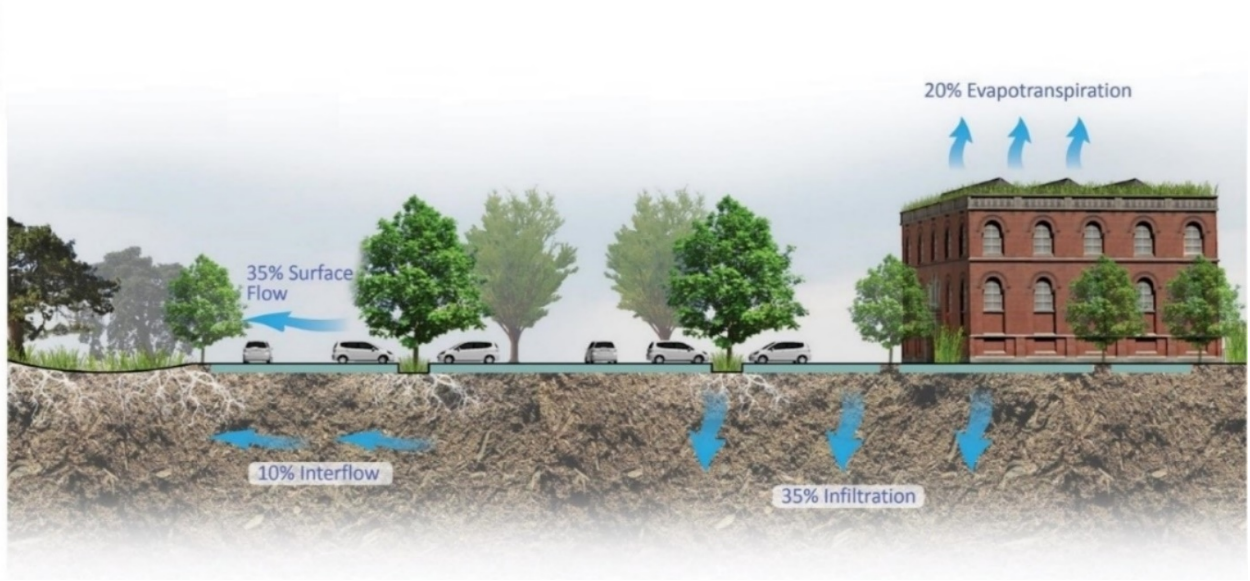


Figure 3. *Balanced Development Water Cycle.*[3]

GI also provides amenities with many benefits beyond water quality improvement and groundwater replenishment, including the reduction of flooding, creation of attractive streetscapes and habitats, and mitigation of the heat island effect.

Examples of GI include landscape-based stormwater "biotreatment" using soil and plants ranging from grasses to trees, pervious paving systems (e.g., interlocking concrete pavers, porous asphalt, and pervious concrete), rainwater harvesting systems (e.g., cisterns and rain barrels), and other methods to capture and treat stormwater. These practices are also known as Low Impact Development (LID) site design and treatment measures.

In addition to LID measures, non-LID measures such as mechanical treatment measures (e.g., media filters or high flow-rate tree well filters) can be used in areas where LID measures are not feasible. Some mechanical devices, such as hydrodynamic separators, offer pollutant removal capability and may offer partial treatment of the stormwater system. These can be used in isolation or can provide additional pollutant removal capability when installed in a "treatment train" with landscape-based systems.

Table 1 features the various terminology used to describe water quality improvement measures, ranging from engineered GI measures, such as bioretention areas, to watershed-based practices which reduce pollutants to receiving waters, such as preservation of open space areas.

[3] San Mateo County Sustainable Green Streets and Parking Lots Guidebook. (2009). SMCWPPP.

Table 1. *Water Quality Improvement Measures.*

Green Infrastructure Measures *These measures provide treatment of stormwater or intercept stormwater before it can collect pollutants.*	**Mechanical Treatment Measures** *These measures can improve water quality through the mechanical removal of pollutants.*
GI Planters Stormwater Planter (also known as a Bioretention or Biofiltration Area) Rain Garden Stormwater Curb Extension	Media Filter *(Non-LID)* High-Flow Rate Tree Well Filter *(Non-LID)* Hydrodynamic Separator *(Partial Treatment Credit)*
GI Trees Tree Well Stormwater Tree Interceptor Tree	**Natural Systems** *Preservation of natural systems can help to support anti-degradation policies on a watershed-based scale.*
GI Pavements Pervious Pavement Pervious Pavers Porous Asphalt Porous Concrete	Open Space Areas Landscaping
Underground GI Systems Infiltration System	**Other Best Management Practices** *These practices do not provide stormwater treatment, but they can help to improve water quality.*
GI for Buildings Rainwater Harvesting Green Roof Green Wall	Street sweeping Water conservation Draining impervious surfaces to landscaping Detention systems
Other GI Vegetative Systems Green Gutter Vegetated Swale (also known as a Bioswale) Self-Treating Areas Self-Retaining Areas	

Information about various types of GI measures is provided in the San Mateo Countywide Water Pollution Prevention Program (SMCWPPP) Green Infrastructure Design Guide *(Design Guide)*[4] and *C.3 Regulated Projects Guide*[5].

The *Design Guide* provides photos and renderings of example GI projects as well as detailed descriptions of various types of stormwater treatment measures. Figure 4 shows the key stormwater treatment measures featured in the *Design Guide*.

[4] The *Design Guide* can be found at SMCWPPP's website at https://www.flowstobay.org/gidesignguide

[5] C.3 Regulated Projects Guide (formerly known as the C.3 Technical Guidance) can be found on the SMCWPPP "Flows to Bay" website at https://www.flowstobay.org/newdevelopment.

CHAPTER 2

2.0 Green Infrastructure Measures and Opportunities

Introduction

A Visual Guide of Green Infrastructure Measures

Stormwater Planters

Stormwater Curb Extensions

Rain Gardens

Tree Wells

Infiltration Systems

Pervious Pavement

Green Roofs

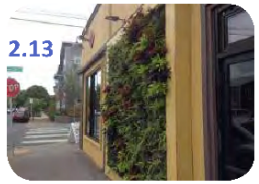
Rainwater Harvesting

Vegetated Swales

Green Gutters

Stormwater Trees

Interceptor Trees



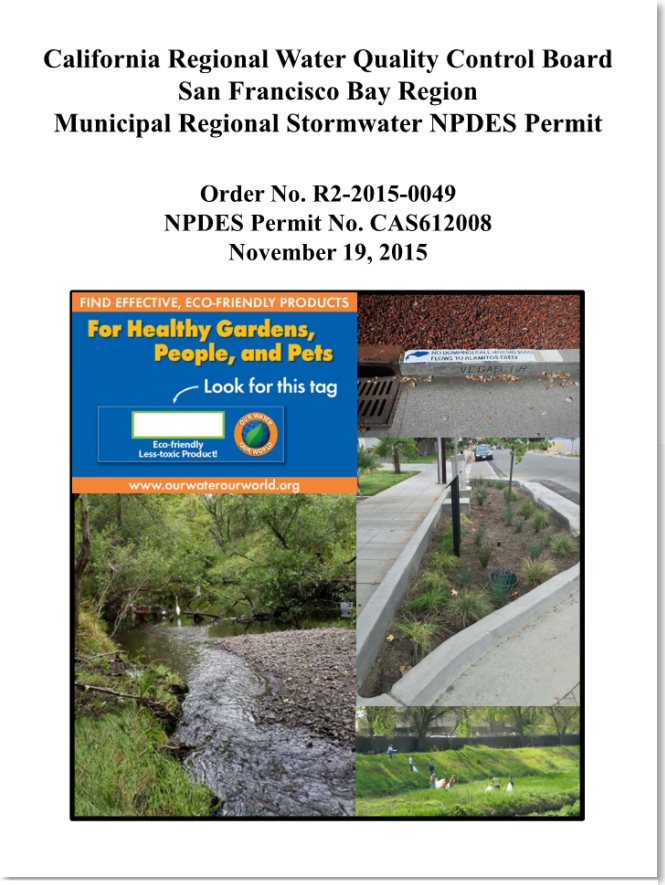
Green Walls

Figure 4. *Visual Guide of Green Infrastructure Measures. (SMCWPPP 2019b).*

"Green Streets" are roadway projects which incorporate GI strategies to manage runoff. "Complete Streets" are streets designed with equal consideration to all modes of travel for enhancement of safety and access for cyclists and pedestrians. When combined, Complete Streets and Green Streets are referred to as "Living Streets," "Better Streets," and "Sustainable Streets." This "Living Streets" movement recognizes that environmentally- and holistically-designed streets achieve many benefits, including increased multi-modal travel and safety, cleaner water and air, improved flood and climate change resilience and mitigation, enhanced placemaking and community cohesion, greater energy savings, and habitat retention, in addition to higher property values.

1.1.2 Regulatory Water Quality Requirements

Section 402(p) of the federal Clean Water Act (CWA) requires National Pollutant Discharge Elimination System (NPDES) permits for stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s), which are considered a significant contributor of pollutants to waters of the United States. The US Environmental Protection Agency (USEPA) delegates its authority to regulate MS4s to the State Water Resources Control Board, which, in turn, assigns many regulatory tasks to the Regional Water Quality Control Boards. The San Francisco Bay Regional Water Quality Control Board (SFRWQCB) oversees protection of water quality in the San Francisco Bay Area.



California Regional Water Quality Control Board San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (MRP).

NPDES Permittees, including the City of Half Moon Bay, are subject to the requirements of the recently reissued Municipal Regional Stormwater NPDES Permit for Phase I municipalities and agencies in the San Francisco Bay Area (Order R2-2015-0049), also known as the Municipal Regional Permit (MRP), which became effective on January 1, 2016. The MRP applies to 76 large, medium, and small municipalities (cities, towns, and counties) and flood control agencies (collectively referred to as Permittees).

Over the last thirteen (13) years, under successive NPDES stormwater permits, new and redevelopment projects on private and public property which result in the creation or replacement of impervious area exceeding specified size thresholds (referred to as "Regulated Projects") have been required to mitigate

impacts on water quality by incorporating site design, pollutant source control, stormwater treatment, and flow control measures as appropriate. LID treatment measures, such as rainwater harvesting and use, infiltration, and biotreatment, have been required on most Regulated Projects since December 2011. Construction of new roads is covered by these requirements, but projects related to existing roads and adjoining sidewalks and bike lanes are not Regulated Projects one or more travel lane(s) is added.

As of 2015, a new section of the MRP requires Permittees to develop and implement long-term GI Plans to address pollutants in stormwater discharges. GI measures can help remove these pollutants from stormwater runoff. The GI Plan sets goals for reducing, over the long term, adverse water quality impacts of urbanization and urban runoff to receiving waters.

Other pollutants, including trash and pesticides, should also be coordinated with the GI program since, when properly designed, constructed and maintained, biotreatment systems may also be credited toward trash and pesticide reduction goals.

1.1.3 Contributors to Pollution

Numerous human activities generate or otherwise contribute to pollution in stormwater and can cause impairments to the beneficial uses of receiving waterbodies. The following pollutants of concern have resulted in impairments of waters from San Mateo County watersheds[6]:

- **PCBs.** Sources of PCBs are transformers or capacitors with leaking hydraulic fluids, lubricants, plasticizers, building materials, and pesticide extenders. PCBs are released to the environment through spills, leaks, and improper disposal and storage. PCBs have not been produced since 1977, but they can be transported long distances and bind strongly to sediment and are therefore persistent once in the environment. In addition to treatment by GI, PCBs are managed through the City's PCB Demolition Program, which controls PCB-laden wastes resulting from building demolition, and through referrals of source properties to the SFRWQCB. After referral, the property owner is required to address the pollution.
- **Diazinon and Other Pesticides.** Pesticides have been used throughout the San Francisco Bay Area to manage pests, and are released into the environment during manufacture, formulation, distribution and retail, landscape maintenance, and through agricultural usage (SFRWQCB 2016). Urban runoff transports these pesticides to local water bodies. In addition to treatment by GI, pesticides are reduced through implementation of a Pesticides Toxicity Control Program, which includes an Integrated Pest Management program aimed at reducing the use of pesticides.

[6] *Stormwater Resource Plan for San Mateo County. (2017, February).* San Mateo Countywide Water Pollution Prevention Program. City/County Association of Governments of San Mateo County. Prepared by Paradigm Environmental and Larry Walker Associates, Inc.

- **Mercury.** Mercury sources include historic mines, urban runoff, wastewater discharges, resuspension of mercury-laden sediment in the Bay, and atmospheric deposition (SFRWQCB 2016). In addition to treatment by GI, mercury is reduced through implementation of a Mercury Control Program, which includes source control efforts at local mines.
- **Trash.** Trash accumulates in waterbodies due to littering and dumping of debris which is then transported to water through wind and urban runoff. Plastic represented 60% of the trash accumulated from a 2007 study of six (6) watersheds in the County (SMCWPPP 2007). In addition to treatment by GI, levels of trash are reduced by various trash prevention and control actions, such as installation and operation of trash capture devices, street sweeping, storm drain inlet cleaning, and hot spot cleanups.
- **Sediment.** Sources of sediment include erosion of creek banks and incision of creek streambeds (often caused by increased stormwater flows resulting from development) as well as excavation and deposition of sediment (such as through construction activities, historic logging, and agriculture). Sediment is controlled via GI and mechanical treatment devices, such as hydrodynamic separators.
- **Indicator Bacteria.** Sources of indicator bacteria along the shoreline of San Francisco Bay and beaches of the Pacific Ocean, and other waterbodies of San Mateo County stem from urbanization as well as natural background sources. Urban stormwater runoff carries pet waste and litter which contributes to coliform bacteria. Other sources include sanitary sewer leaks and overflows, boat waste, litter from recreation, and direct deposit by wildfowl (SFRWQCB 2013).

1.1.4 Benefits of Green Infrastructure

GI is a long-term solution to reduce the amount of water pollution entering nearby creeks, rivers, and the ocean by utilizing natural systems, such as water retention and the absorption capabilities of vegetation and soil, to treat urban runoff. Adopting and promoting the use of GI will ultimately lead to improved quality of urban water discharge.

GI is associated with a range of environmental and human health benefits, especially in urban areas. For example, a stormwater curb extension provides both improved water quality and traffic calming. “Green Streets” are roadway projects which incorporate GI strategies to manage runoff. “Complete Streets” are streets designed with equal consideration to all modes of travel for enhancement of safety and access for cyclists and pedestrians. When combined, Complete Streets and Green Streets are referred to as “Living Streets,” “Better Streets,” and “Sustainable Streets.” This “Living Streets” movement recognizes that environmentally- and holistically-designed streets achieve many benefits, including increased multi-modal travel and safety, cleaner water and air, improved flood and climate change resilience and mitigation, enhanced placemaking and community cohesion, greater energy savings, and habitat retention, in addition to higher property values (see Table 2). The City will prioritize types and locations of GI measures which provide multiple benefits

Table 2. *Green Infrastructure Benefits.*

1.2 Purpose, Goals, and Benefits of the Green Infrastructure Plan

1.2.1 Statement of Purpose and GI Plan Goals

The GI Plan describes how the City will shift its impervious surfaces and storm drain infrastructure from gray (traditional) to green. In other words, the plan describes how the City will change processes and practices over time to convert infrastructure that directs runoff directly into storm drains and receiving waters with GI, which slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and utilizes bioretention and other GI practices to treat stormwater runoff.

The GI Plan also demonstrates the City's long-term commitment to GI implementation to help reduce loads of pollutants conveyed in stormwater and discharged into local waterways. The GI Plan sets milestones for impervious surface area to be treated by GI by 2040, with a goal of reducing the adverse water quality impacts of urbanization and urban runoff on receiving waters over the long term.

The GI Plan identifies means and methods to prioritize areas and projects within the City's jurisdiction, at appropriate geographic and time scales, for the implementation of GI projects. Furthermore, it will include means and methods to track the area within the City's jurisdiction that is treated by GI controls and the amount of directly connected impervious area (i.e. impervious area which drains directly to the storm drain system without first flowing across permeable land area). The City will aim to meet the milestones established in the GI Plan by incorporating GI, where feasible, into the Capital Improvement Program (CIP).

The GI Plan goals and objectives are summarized in Table 3.

Table 3. *Green Infrastructure Plan Goals and Objectives.*

GI Plan Goals	Objectives
Protect the Environment	• Improve water quality by using GI to treat stormwater runoff • Protect local creeks, waterways, and the Pacific Ocean through reduction of sediment and peak runoff • Raise public awareness about pollution prevention • Participate in regional effort to improve water quality
Reduce Urban Flooding	• Reduce peak runoff volumes and velocities using GI
Use Rainwater as a Resource	• Harvest and use runoff for non-potable purposes • Promote neighborhood greening and create habitat using landscape-based GI measures
"No Missed Opportunities"	• Establish procedures and practices to require and implement GI practices in public and private projects as part of the City's regular course of business • Set milestones and goals for water quality improvement • Identify and prioritize areas and projects within the City's jurisdiction for the implementation of GI projects • Incorporate GI, where feasible, in CIP projects • Coordinate the GI Plan with other local planning documents and promote the multiple benefits of GI • Establish a means of tracking potential and completed GI projects

1.2.2 Integration of GI Plan with Provision C.3

The MRP requires Permittees to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new and redevelopment projects with the aim of addressing stormwater runoff pollutant discharges and preventing increases in runoff flows from new and redevelopments. Projects which meet the MRP-established thresholds must include stormwater treatment systems and are called "Regulated Projects".

In the MRP, the SFRWQCB states that the GI Plan's implementation is required, in part, as an alternative to expanding the definition and lowering the threshold of Regulated Projects prescribed in Provision C.3.b.[7] Regulated Projects are required to treat their site stormwater with LID site design and treatment control measures, thus contributing to the City's overall GI and sustainability goals. Lower thresholds for Regulated Projects would result in more projects being required to incorporate GI as a condition of new

[7] Since 2006, private or public projects that create or replace 10,000 square feet or more of impervious surface have been deemed Regulated Projects under Provision C.3 of the MRP. Effective December 1, 2011, the threshold was reduced from 10,000 to 5,000 square feet for uncovered parking areas, restaurants, auto service facilities, and retail gasoline outlets. Effective 1/1/16, Under MRP 2.0, all projects including single-family dwellings with ≥2,500ft^2 and <10,000ft^2 of impervious surface must install one or more of six (6) specified LID site design measures.

or redevelopment. The SFRWQCB may opt to lower this threshold in a future permit, however, if progress towards GI milestones is deemed insufficient.

The City is committed to protection of its natural resources, and to that effect will continue to provide oversight of implementation of LID on private projects in accordance with Provision C.3 requirements and will also continue to incorporate LID and GI into Capital Projects.

The City will plan, analyze, implement, and credit GI systems for pollutant load reductions on a watershed scale, as well as recognize all GI accomplishments within the City. One focus of the GI Plan is the integration of GI systems into Non-Regulated public rights-of-way projects. Another objective of the GI Plan is to provide incentives or opportunities for private property owners to add or contribute GI elements to Non-Regulated Projects. Additionally, the GI Plan also provides a mechanism to establish and implement alternative or in-lieu compliance options for Regulated Projects as well as to account for and justify Special Projects in accordance with Provision C.3.e.[8]

1.2.3 Benefits of Developing a GI Plan

Currently, most of the infrastructure constructed within the City is classified as "gray" infrastructure. The City is working toward fostering a more sustainable urban community by incorporating GI components in Capital Improvement Projects. This GI Plan can be used to educate City staff, developers, and the general community on both the nature of GI as well as the environmental, economic, and human health benefits of cultivating a climate in which opportunities for incorporation of GI are identified and pursued. Additionally, the GI plan provides guidelines for GI implementation in future developments. Benefits of this GI Plan include the following:

- Aids the City's and County's mission to create sustainable communities
- Facilitates systematic integration of GI into existing practices
- Identifies priority implementation locations
- Supports the City in meeting current and future permit requirements
- Assists in understanding of compliance costs as well as planning and budgeting for future implementation

1.3 Overview of Green Infrastructure Plan Development Process

1.3.1 Regional and SMCWPPP Guidance and Inter-Agency Collaboration

Since the issuance of MRP 2.0, the City of Moon Bay has undertaken a substantial effort to develop the GI Plan. In collaboration with the SMCWPPP Green Infrastructure Technical Advisory Committee (GI TAC),

[8] On November 28, 2011, the SFRWQCB amended the MRP to allow LID treatment reduction credits for smart growth, high density, and transit-oriented development projects which meet certain requirements. Special Projects can use non-LID treatment, such as high flow-rate media filters and high flow-rate tree well filters.

which was formed in April 2016 to address the new permit requirements, the City worked diligently to develop the elements of the GI Plan. Through SMCWPPP, the City participated in and supported regional (BASMAA) efforts, including the preparation of technical projects, memos, and reports.

A timeline showing the development of the key work products developed through the GI TAC is provided in Figure 5. These and other deliverables include the following:

- **GI TAC.** Formation of a committee to aid coordination among the San Mateo County Permittees to develop the GI Plans.
- **SRP.** Development of the San Mateo Countywide Stormwater Resource Plan (SRP), which established a prioritization protocol for GI projects and a list of prioritized GI projects.
- **CIP Screening.** Training on the BASMAA GI screening process to aid municipalities in undertaking an annual evaluation of their Capital Improvement Program for GI potential.
- **GI Workplan.** GI Workplan materials development, including the template, sample staff report, and sample resolution.
- **Green Suite.** Development of Countywide GI Guidelines and Specifications, consisting of the GI Design Guide and Regulated Projects Guide, referred to as the "Green Suite".
- **GI Funding Analysis.** Evaluation of GI Funding Options, which was summarized in a Nexus Evaluation report developed by SCI Consulting Group on behalf of SMCWPPP, and with input from the GI TAC.
- **Planning Updates.** Model Planning Document Language, which was a review of various planning documents completed by CD+A on behalf of SMCWPPP and with input from the GI TAC.
- **Alternative Sizing Criteria.** BASMAA Guidance for Sizing GI Facilities in Street Projects & GI Facility Sizing for Non-Regulated Street Projects. This serves to address Provision C.3.j.i.(2)(g) of the MRP, which states, "Permittees may collectively propose a single approach with their Green Infrastructure Plans for how to proceed should project constraints preclude full meeting the C.3.d. sizing requirements."

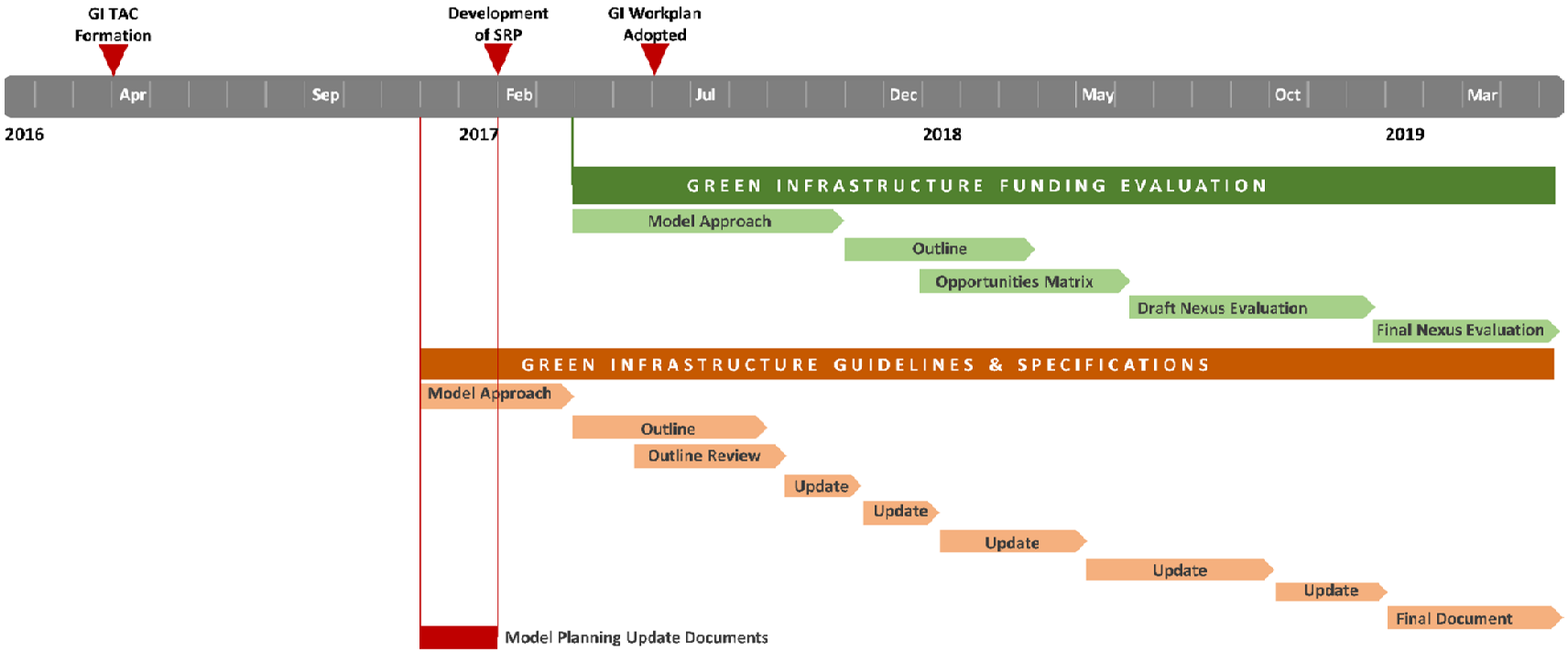


Figure 5. *SMCWPPP Green Infrastructure Technical Advisory Committee Deliverables Timeline.*

These deliverables make up the key elements and backbone of the GI Plan. Developing these elements at a Countywide level was a significant effort, and required collaboration among the various agencies in San Mateo, all of which have a different local context and perspective. Each GI TAC meeting required a commitment on the part of member agency staff to (1) review discussion items several weeks prior to the meeting, (2) attend meetings a minimum of 2.5 hours in length either remotely or in person, and (3) provide feedback on in-progress or updated versions of deliverables within a few weeks of each meeting.

In order to provide feedback on GI TAC deliverables in a timely manner, an unofficial interdepartmental task force headed by the Public Works Department which consisted of representatives of various other departments was formed. At various stages in the planning process, Public Works coordinated with the Community Development Department, the City Attorney, the City Manager's Office, and City Council to discuss the planning requirements and work products.

1.3.2 Workplan Development and Adoption

As part of the GI planning process, the MRP required all Permittees to adopt a GI Workplan by June 30, 2017 and submit it to the SFRWQCB by September 30, 2017. The workplan consisted of a framework for completing the GI Plan and included a statement of purpose, tasks, and timeframes to complete the required elements of the GI Plan.

The City of Half Moon Bay's GI Workplan was approved by City Council as a consent item on June 20, 2017 under Resolution C-2017-36. At this City Council meeting, City staff and their consultants provided a presentation to explain GI and the MRP GI Planning requirements.

1.3.3 Alignment with City Plans, Policies, and Programs

The City of Half Moon Bay enforces a Local Coastal Program to protect the special natural and scenic qualities of the Coastal Zone, which encompasses the entirety of Half Moon Bay. Half Moon Bay is unique among San Mateo County municipalities in that it is the only City that drains completely to the Pacific Ocean, with no stormwater runoff being directed to the San Francisco Bay. Most projects which require grading, design review, or a conditional use permit will also require a Coastal Development Permit (CDP). Conditions of the CDP include mitigation measures targeted at protection of the Coast.

The City was forward-thinking in its commitment to GI implementation and planning. For several years, the City has required the use of green infrastructure measures as a condition of the CDP on projects, even if they were not MRP Provision C.3 Regulated[9].

[9] For example, the City has required the construction of green infrastructure as a condition of CDPs for public school district redevelopment projects. School district properties are not Regulated under MRP Provision C.3 regulated, because the City does not have planning and building authority over these properties (the California Division of the State Architect has this authority). Refer to Section 4.4 for more information about public school districts.

The majority of the City is made up of either planned development areas, where or will be preserved and protected as open space (refer to Section 2.1 for a description of the City's land use composition). GI implementation goals help to propel the City's Coastal Protection efforts as areas within the City are developed, supporting an antidegradation approach to water quality.

GI implementation aligns with many other City plans, policies, and programs, such as the General Plan. Chapter 7, "Integration with Other Planning Documents", describes how existing planning documents coordinate with the GI Plan, and which planning documents will be updated to further support GI implementation.

Chapter 10, "Implementation Approach", describes how the City's standard operating procedures, Municipal Code, maintenance program, and internal policies help to support GI implementation.

1.3.4 Outreach and Education

Chapter 9, "Outreach and Education", describes which outreach and education efforts were conducted at a City- or County-wide level throughout the GI Plan development process. Chapter 9 also describes the education and outreach strategy to be implemented to raise awareness about water quality and pollution as well as to help promote GI implementation.

1.3.5 Project Oversight

The City convened interdepartmental meetings with affected department staff, including the Public Works and Community Development Departments, to discuss and develop the GI Plan.

Additional oversight was provided by the GI TAC, which provided City staff with information and feedback about various GI Plan elements. In order to develop a GI Plan which is consistent with others being developed in San Mateo and Santa Clara Counties, this GI Plan was developed using a combination of a GI Plan template provided by SCVURPPP and the model table of contents provided by SMCWPPP.

2.0 AGENCY DESCRIPTION AND BACKGROUND

2.1 Background and Land Use

Incorporated in 1959, the City of Half Moon Bay is in San Mateo County and has a jurisdictional area of 3,796.0 acres or 5.93 square miles. The City is located at the junction of State Highway 1 and State Highway 92 and fronts the Pacific Ocean (see Figure 6).

Figure 6. *Half Moon Bay Regional Location.*[10]

[10] *City of Half Moon Bay Draft of General Plan and Local Coastal Land Use.* City of Half Moon Bay. Department of Community Development. Planning Division.

The City's Downtown Retail/Commercial District is located immediately southeast of the intersection of the two highways, with additional retail areas located along Highway 92 and west of the highway intersection. There are some multi-family residential developments immediately south of the Downtown area. The remainder of the City north and south of the downtown area is primarily single-family residential, agricultural (farming and nurseries), and open space. A private golf course and single-family residential community are located at the south end of the City. The City contains four public schools, and owns and maintains nine City parks, a community center, and other recreational facilities. Figure 7 represents the City's breakdown of land uses by category.

Much of the westerly edge of the City along the oceanfront was subdivided in the 19th century but never developed. Much of this land is now owned by the State Department of Parks and Recreation. The Peninsula Open Space Trust owns several large properties southwest of downtown, and the Coastside Land Trust has also been purchasing undeveloped lots in this area for open space preservation, which limits the development potential in these areas. Figures 8 and 9 spatially depict the City's existing and future land uses, respectively.

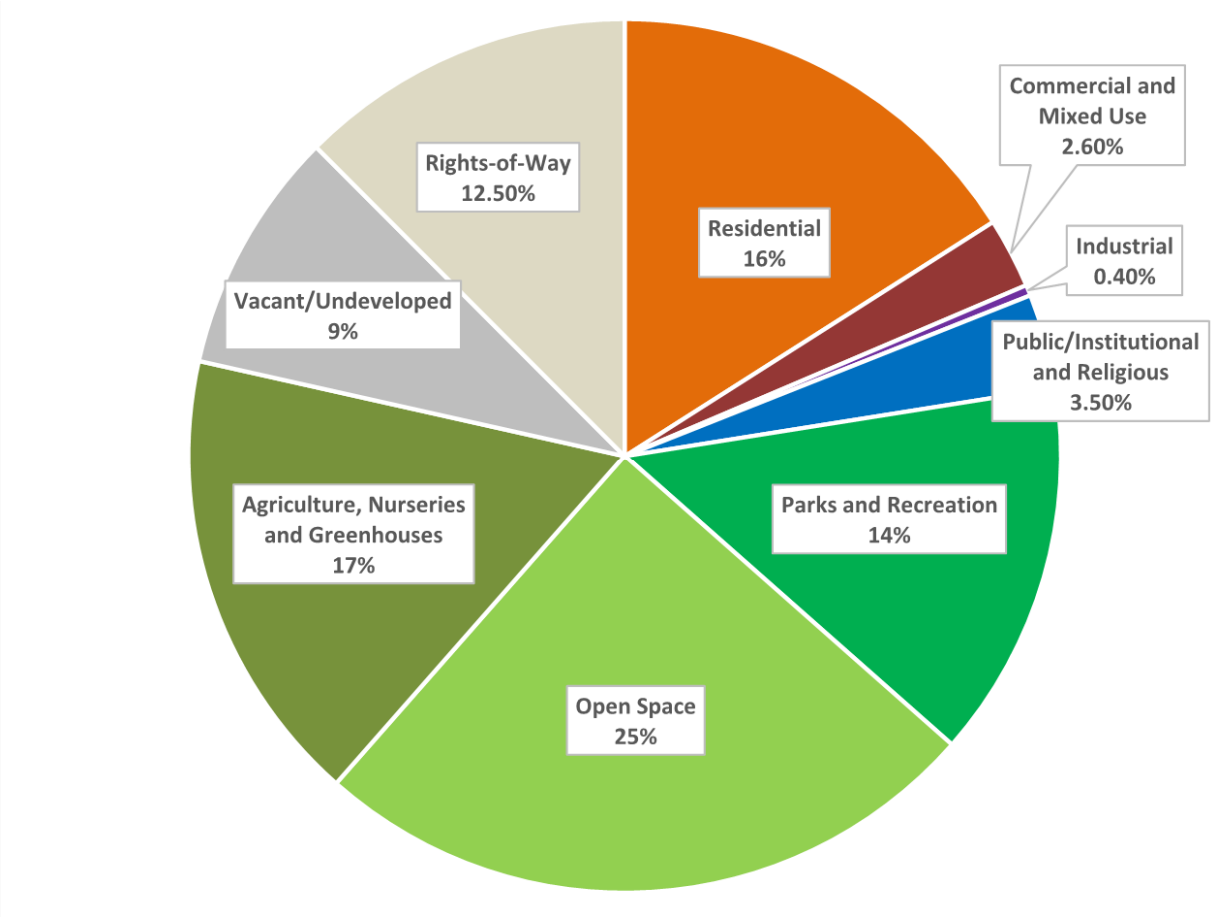


Figure 7. *Half Moon Bay Existing Land Uses.* [11]

[11] *San Mateo County Assessor's Office* (2014).

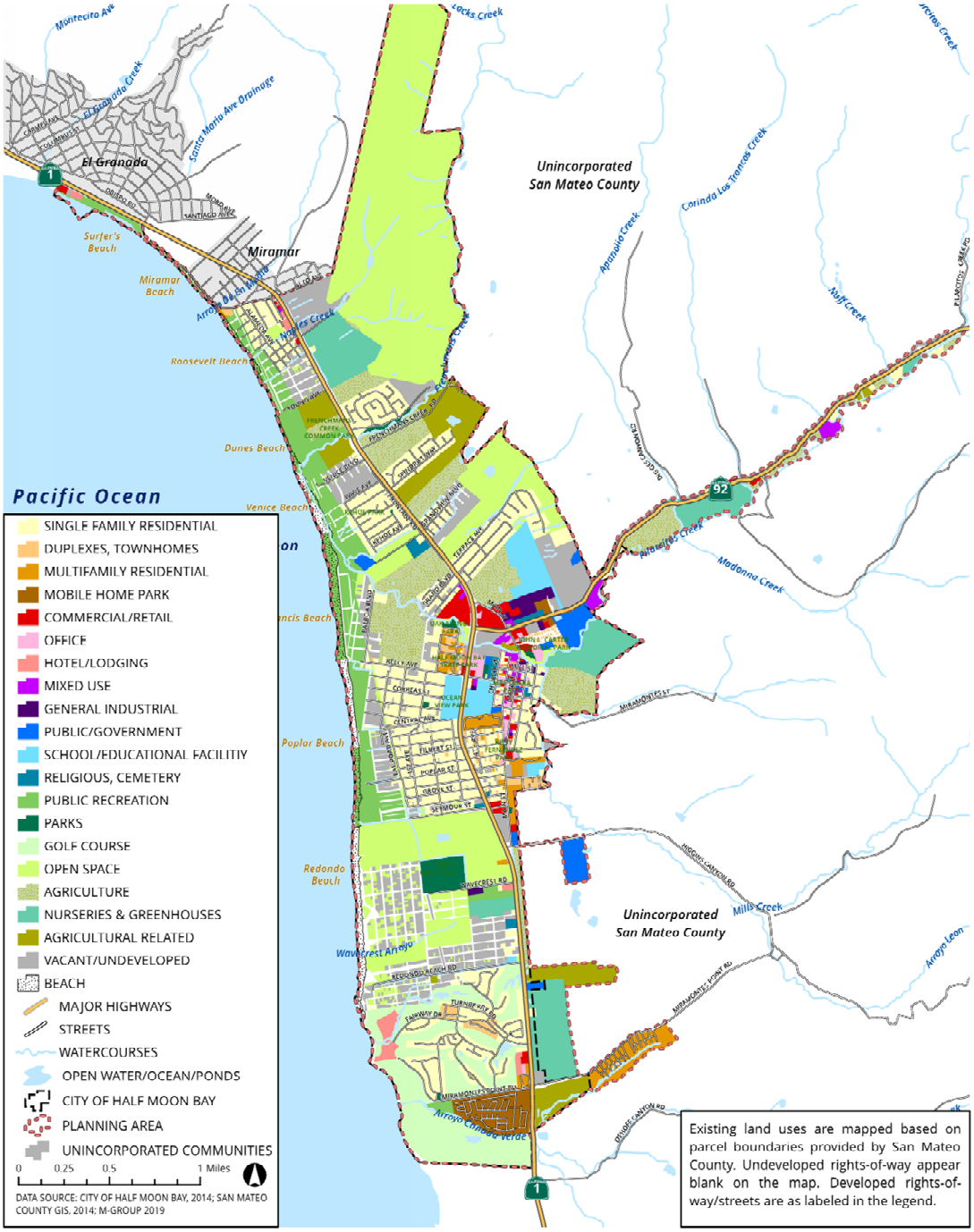


Figure 8. *Half Moon Bay Existing Land Uses.*[12]

[12] City of Half Moon Bay 2019 Draft Land Use Plan/General Plan Update. This map has not been finalized or adopted for the Land Use Plan/General Plan Update as of August 2019 and will be revised here as needed. City of Half Moon Bay, Community Development Department.

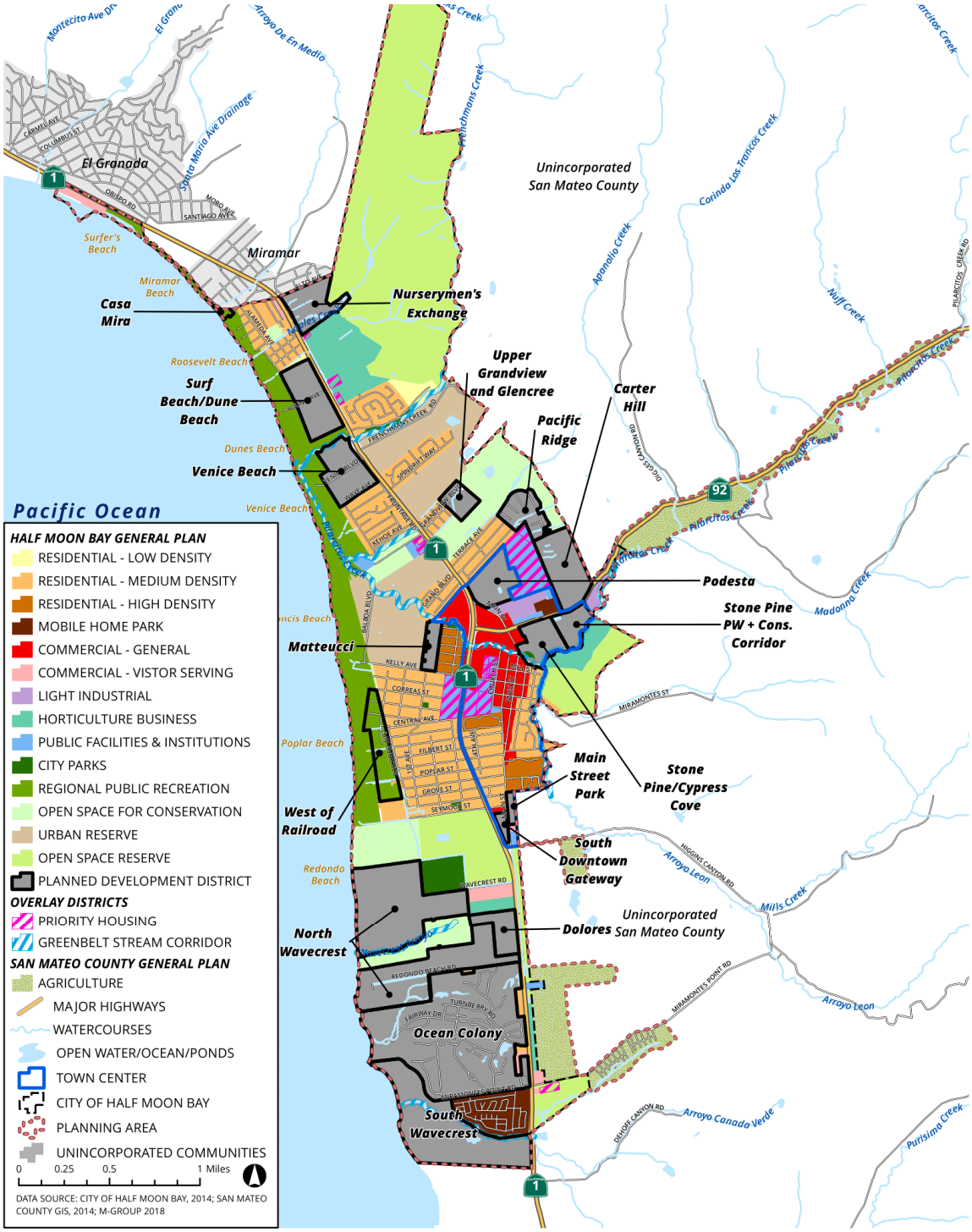


Figure 9. *Half Moon Bay Future Land Uses.* [13]

[13] City of Half Moon Bay 2019 Draft Land Use Plan/General Plan Update. This map has not been finalized or adopted for the Land Use Plan/General Plan Update as of August 2019 and will be revised here as needed. City of Half Moon Bay, Community Development Department.

Hydrologic soil is classified according to its infiltration rate ranging from group A (very high infiltration; very low runoff potential) to group D (very low infiltration; very high runoff potential). Groups B and C represent moderately high and moderately low infiltration soils, respectively. The area that drains to the City's existing storm system consists of 37.4% Group B soils, 17.2% Group C soils, and 45.4% Group D soils.[14]

Figure 10 depicts the City's hydrologic soil groups. These data were created via a study conducted by Schaaf & Wheeler for the City using storm drain system maps created by Psomas. Field research was conducted to collect and verify pipe sizes and material, system layouts, and to measure invert depths. In instances where this was impractical, record drawings provided by the City or Caltrans were referenced if available. See section 2.3 of the City's Storm Drain Master Plan for more detail.

[14] *City of Half Moon Bay Storm Drain Master Plan.* City of Half Moon Bay. Department of Public Works Development.

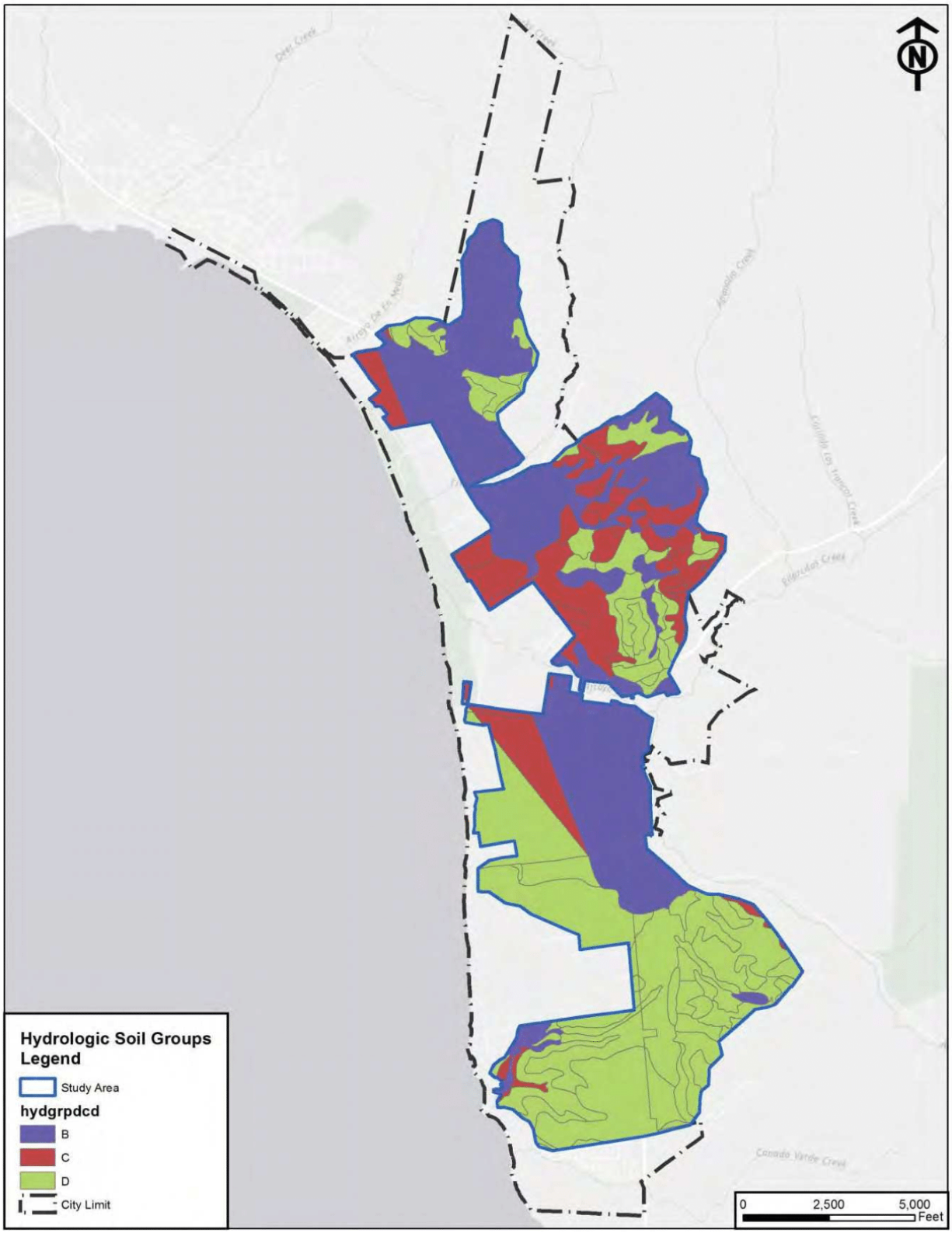


Figure 10. *Half Moon Hydrologic Soil Groups.* [15]

[15] *City of Half Moon Bay Storm Drain Master Plan.* City of Half Moon Bay. Department of Public Works Development.

2.2 Water Resources

2.2.1 Groundwater

Groundwater is an important element of the hydrology of the region. Half Moon Bay is almost entirely underlain by the Half Moon Bay Terrace groundwater basin. The basin supplies limited water for domestic and municipal uses; the most significant withdrawal comes from the Ocean Colony Partners Balboa well field which is used to irrigate two golf courses in the area.

The aquifer is generally bound on the east by bedrock and on the west by the Pacific Ocean. Groundwater flows move from east to west, toward the Pacific Ocean, and can be significant. Ocean discharge accounted for 77 percent of outflow.[16] This outflow to the ocean results in large seasonal changes in groundwater levels as well as a dynamic fresh-salt water interface. Although saltwater intrusion in existing wells has not been documented, greater withdrawal, less recharge, and/or drought will move this interface inland.

2.2.2 Surface Waters and Watersheds

There are nine watersheds within the City of Half Moon Bay (see Figure 11 on the next page). These watersheds are Roosevelt Creek, Pullman Creek, Frenchmans Creek, Pilarcitos Creek, Kehoe Creek, Beachwood Creek, Kelly Metzgar Creek, Seymour Ditch, and Ocean Colony. City of Half Moon Bay watersheds have generally been found to contain a low percentage of imperviousness and a high percentage of unmodified creek channels (e.g., not channelized, culverted, concrete-lined, or otherwise modified) compared to the Bay Area region, especially the more developed portions of the eastern San Francisco Peninsula.

The City is bisected by Pilarcitos Creek, which discharges into the ocean just north of the Highway 1 / Highway 92 intersection. Frenchmans Creek traverses east to west at the northerly half of the City and discharges into the ocean north of the Pilarcitos Creek outfall. Several minor creeks and manmade ditches are located west of Highway 1 and discharge directly to the ocean.

The City's drainage system consists of closed pipes, open roadside ditches, and manmade channels. The Downtown area along Main Street (along with some residential areas nearby) as well as developed commercial areas along Highway 1, Highway 92, and North Main Street discharge stormwater via closed pipes to Pilarcitos Creek. The remainder of the residential areas drain via a combination of pipes, ditches, and channels directly into the ocean. The City has several natural creeks which are maintained by both City staff and community groups, such as the Coastside Land Trust.

[16] *City of Half Moon Existing Conditions Report.* City of Half Moon Bay. Department of Public Works Development.

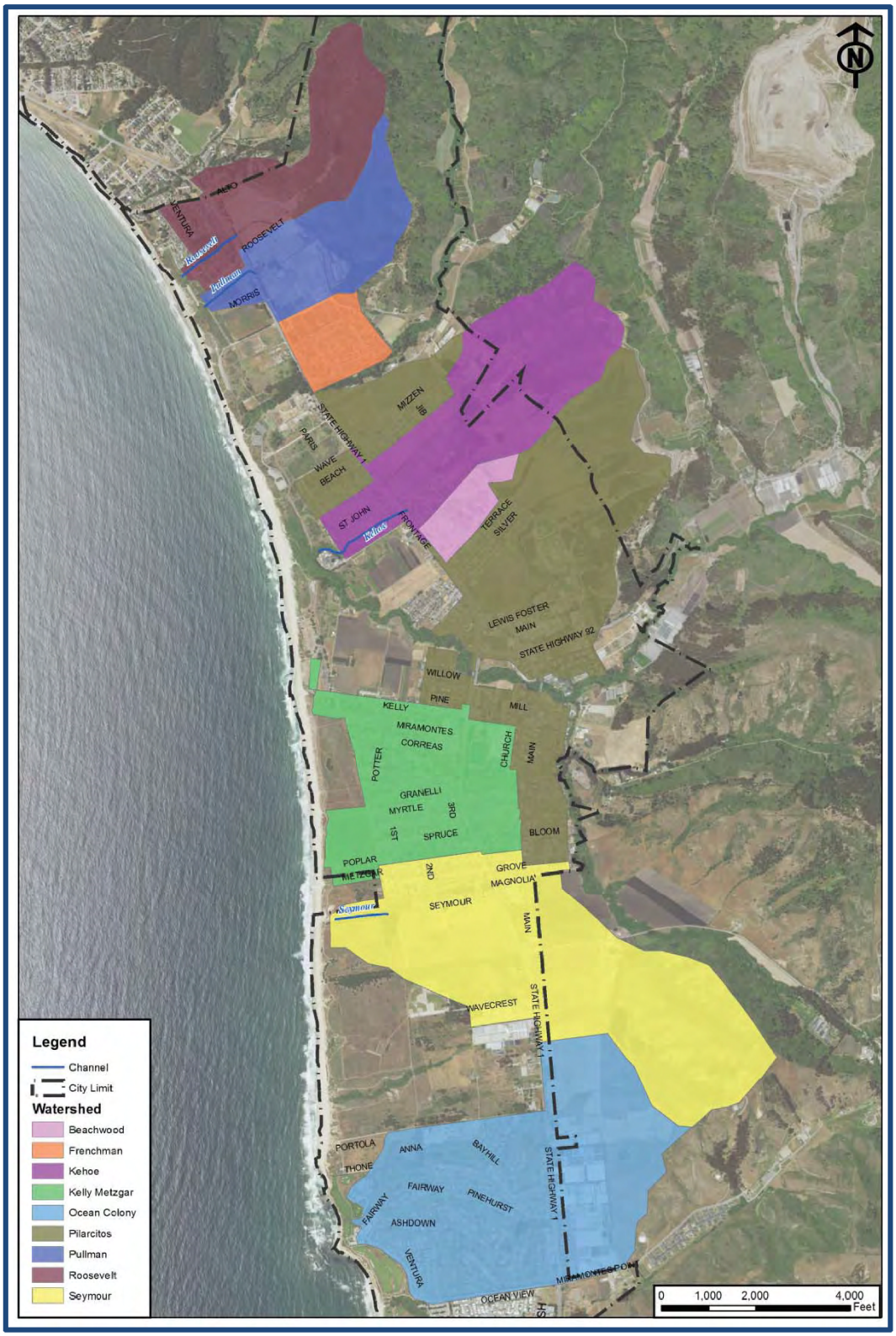


Figure 11. *City of Half Moon Bay Watersheds.* [17]

[17] *City of Half Moon Storm Drain Master Plan.* (August 2016). Schaaf & Wheeler.

2.3 Transportation

Regional vehicular access to the City is provided by Highway 1 passing directly through the center of the City and State Route 92 connecting from the west. Existing transit service to Half Moon Bay is provided by the San Mateo County Transit District. There are three fixed regional bus routes though Half Moon Bay. These routes are SamTrans Routes 17, 18, and 294.[18] Route 17 services along the coastline while route 294 connects Half Moon Bay to San Mateo and the eastern portions of the San Francisco Peninsula. Route 18 shuttles students traveling between Half Moon Bay and Granada, serving students at Manuel F. Cunha Intermediate School and Half Moon Bay High School. See Figure 12 for a visual depiction of the City's transit routes.

The City has approximately 11.7 miles of existing bikeways. The City is in the process of adopting a Bicycle and Pedestrian Transportation Plan. The City's Draft Bicycle and Pedestrian Plan identifies four types of bikeways: Class I Shared Use Path, Class II Bicycle Lanes, Class III Bicycle Routes, and Class IV Separated Bikeways. The plans recommend an additional 6 miles of bicycles facilities.[19]

[18] *City of Half Moon Existing Conditions Report.* City of Half Moon Bay. Department of Community Development.

[19] *City of Half Moon Draft of Bicycle and Pedestrian Master Plan.* City of Half Moon Bay. Department of Community Development.

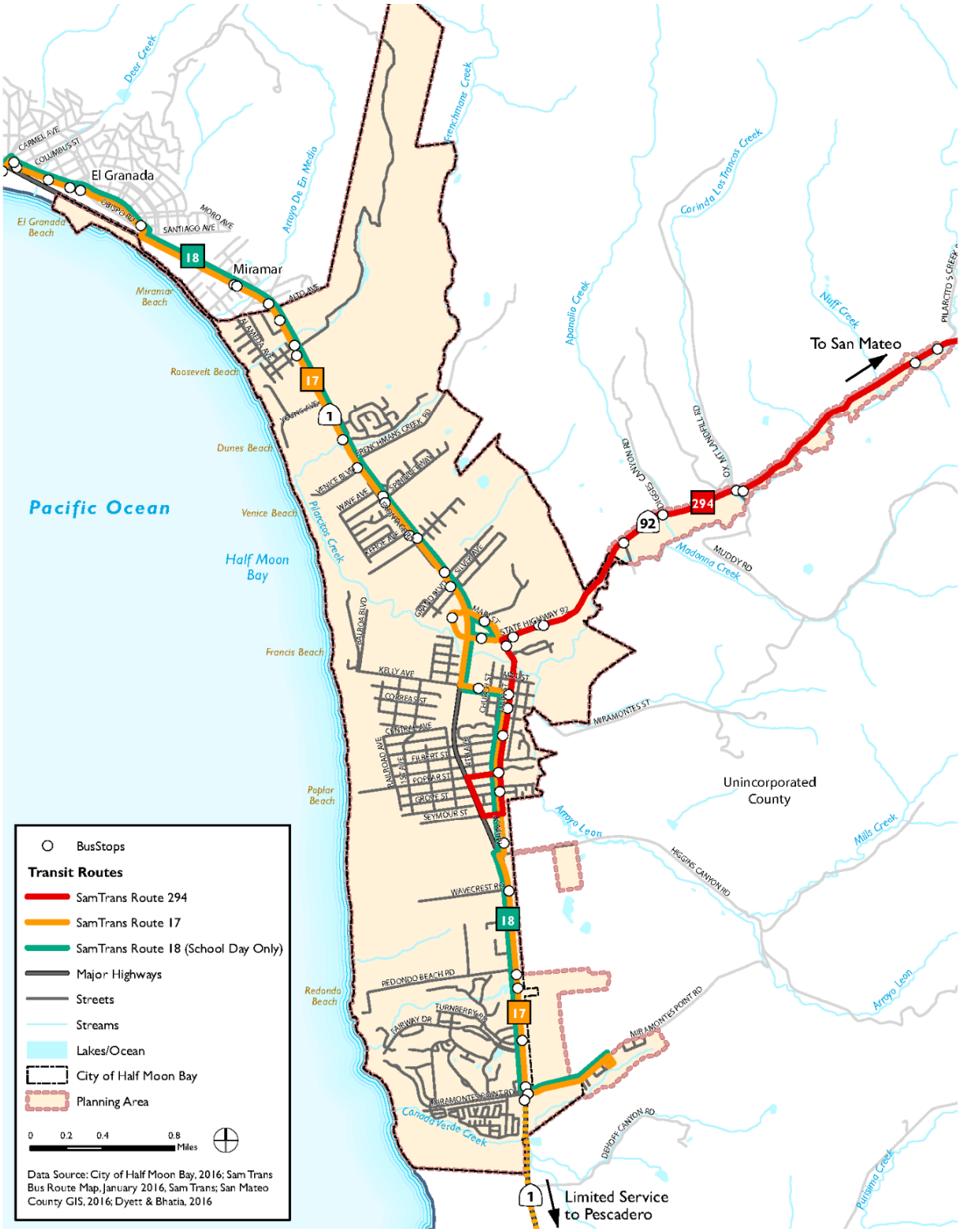


Figure 12. *Existing Transit Routes.* [20]

[20] *City of Half Moon Existing Conditions Report.* City of Half Moon Bay. Department of Community Development.

2.4 Population and Growth Forecasts

According to the 2017 American Community Survey[21], the City of Half Moon Bay had a population of 12,565, with a population density of 1951 people per square mile and an average household size of 2.33. The median household income was $110,900 in 2017. Major employers are the Ritz-Carlton Hotel, the Rocket Farms, Bay City Flower, the Cabrillo Unified School District, Half Moon Bay Golf Links, and Sam's Chowder House. The City's age distribution as of 2017 is displayed in Figure 13.

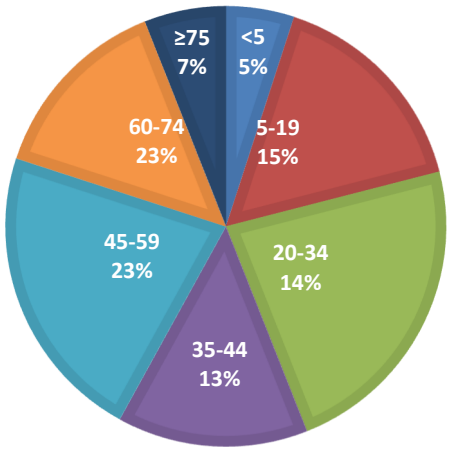


Figure 13. *Half Moon Bay Age Distribution. (2017 American Community Survey).*

2.5 Characteristics that Impact Green Infrastructure Implementation

Specific City challenges to green infrastructure implementation include the following:

- **Limited Funding.** The City of Half Moon Bay's capital infrastructure is aging and in need of significant repair and upgrade, and capital needs already exceed available funding. In addition to limited funding, the City has limited staff available to manage capital projects.
- **Ground Contamination in Certain Areas.** There are known sources of contamination in the City, including a concrete batch plant between Highway 92 and Lewis Foster Drive, a closed landfill owned and operated by the County of San Mateo, and a partially remediated landfill near the Sewer Authority Mid-Coastside wastewater treatment plan. Use of green infrastructure in these areas would require special handling, such as the prohibition of infiltration, to prevent contaminated groundwater plumes from intermixing with treated runoff.
- **Seawater Intrusion.** Due to the City's proximity to the coast, groundwater resources may be sensitive to seawater intrusion from the ocean. As sea level rise increases, infiltration-based measures may become more infeasible, due to lowering clearances to the seasonal high groundwater. As a result, standard types of green infrastructure measures may need to be located farther from the ocean shore to remain effective. On the other hand, sea level rise could present an opportunity for green infrastructure. For example, a "living shoreline" could be created using plants, reef, sand, and natural barriers to reduce erosion and flooding (https://www.epa.gov/green-infrastructure/coastal-resiliency). Currently, "living shorelines" are not described in the San

[21] *American FactFinder.* United States Census Bureau.

Mateo County Design Guide, though further guidance on this type of green infrastructure measure may be established in the future.

Specific City characteristics that support green infrastructure implementation include the following:

- **Capital Improvement Program.** The City will continue to screen its Capital Improvements Program for projects that may have GI potential.
- **Existing Infrastructure.** The City's highways generally already drain to earthen ditches or channels, providing an opportunity for green infrastructure retrofits.
- **Storm Drain Master Plan.** The City completed a Storm Drain Master Plan in August 2016, which identified storm system deficiencies. It may be possible to coordinate storm system improvements with green infrastructure.
- **Local Coastal Program.** The City has a Local Coastal Program, which manages the conservation and development of coastal resources. There may be opportunities to coordinate coastal protection activities with green infrastructure. Historically, the City has required green infrastructure as a condition of the Coastal Development Permit (CDP).
- **Pedestrian/Bicycle Master Plan.** The City's Draft Pedestrian and Bicycle Master Plan identifies multiple pedestrian and bicycle improvements, many of which could implement Green Infrastructure.

3.0 GREEN INFRASTRUCTURE MILESTONES

3.1 Regulatory Background

Provision C.3.j of the MRP specifies that the Green Infrastructure (GI) Plan should include the following:

> *"Targets for the amount of impervious surface, from public and private projects, within the Permittee's jurisdiction to be retrofitted over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11 and C.12: (i) By 2020; (ii) By 2030; and (iii) By 2040."*

Provision C.11.c of the MRP establishes mercury load reduction performance criteria, and Provision C.12.c of the MRP establishes PCBs load reduction performance criteria over specified compliance periods to be achieved via Green Infrastructure at the Countywide level. These provisions are tied to Total Maximum Daily Load (TMDL) limits on mercury and PCBs in the San Francisco Bay. Because the City of Half Moon Bay does not discharge to the San Francisco Bay, the numerical limits of Provisions C.11 and C.12 do not apply. Instead, the City of Half Moon Bay has voluntarily created targets for the amount of impervious surface to be retrofitted by 2020, 2030, and 2040, despite there being no regulatory numerical target, as a way of contributing in good faith to the regional effort to improve water quality and as a means of protecting the Coast, local creeks, and other waterbodies.

3.2 Determining GI Milestones

3.2.1 Background

Collectively, San Mateo County Permittees prepared a Reasonable Assurance Analysis (RAA) to demonstrate quantitatively that the proposed control measures will result in sufficient load reductions to meet Total Maximum Daily Load (TMDL) Waste Load Allocations (WLA) and set goals for the amount of Green Infrastructure needed to meet the portion of PCB and mercury load reduction the MRP assigns to Green Infrastructure (SFBRWQCB 2015).

Unlike other San Mateo County municipalities, the City of Half Moon Bay does not contribute storm water runoff to the San Francisco Bay. Therefore, the City of Half Moon Bay does not have a wasteload allocation goal from the RAA nor is required to construct GI to meet the pollutant load reduction goals of Provisions C.11 and C.12 of the MRP. Originally, as stated in the City's Green Infrastructure Workplan, approved in June 2017, the City did not intend to establish quantitative targets, though the City did plan to identify, prioritize, and implement green infrastructure.

SFRWQCB staff provided a clarifying memo on February 5, 2019, which stated that the MRP has a broad goal of requiring targets "to address the adverse water quality impacts of urbanization and urban runoff on receiving waters". Based on follow up discussions between SFRWQCB staff and C/CAG staff, the City understands that this can be inferred to mean that Cities which do not drain to the San Francisco Bay

should set goals to address their own water quality goals for other receiving waters. In the case of Half Moon Bay, the receiving waters are its local creeks and the Pacific Ocean.

Setting a green infrastructure goal can help the City accomplish the following:

1. Encourage green infrastructure implementation on public and private projects.
2. Participate in Countywide efforts to address the adverse water quality impacts of urbanization and urban runoff on receiving waters.
3. Establish sample "recipes" for achieving this load reduction, through a combination of existing projects, future new and redevelopment, regional projects, and green streets.
4. Evaluate the financial resources needed to meet the 2040 goal and determine the feasibility of meeting this goal based on City context, knowledge, and opportunities.
5. Serve as a discussion tool to facilitate conversations about countywide collaboration. Opportunities for regional projects or credit trading projects in Half Moon Bay are likely limited because the City does not contribute to water quality in the SF Bay.
6. Project the amount of green infrastructure to be constructed via future new development and redevelopment.
7. Facilitate the creation of a tracking tool for green infrastructure implementation by establishing goals that are easily tracked and measured.

The water quality goals must consider multiple perspectives, including not just pollutant reduction goals but engineering and economic feasibility. As a result, the water quality goal must 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 water quality goal:

- **Develop Metrics to Support Implementation Tracking –** The MRP (Provision C.3.j) requires tracking methods to allow the City to track progress towards its water quality goals. 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 target of "impervious surface to be retrofit" and additional metrics relevant to sustainable street implementation. The tracking tool is planned for completion in 2020. This is further described in Section 5.5.
- **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 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. The

pathway to meeting implementation goals is subject to adaptive management and can potentially change based on new information or engineering analyses performed over time. Adaptive management is further discussed in Section 5.6.

The goals for GI implementation, attempt to identify the appropriate balance in terms of detail and specificity needed to address the above considerations.

3.2.2 Green Infrastructure Opportunities

GI represents a group of structural control measures that provide similar process for the capture, infiltration, and/or treatment of urban runoff prior to the discharge to receiving waters, such as bioretention areas and permeable pavers. GI opportunities can be sorted into the following categories:

1. **Existing Projects:** Stormwater treatment measures and GI projects that have been implemented since FY -2004/05. This is primarily all 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.

2. **Future New and Redevelopment (Low Impact Development):** Low impact development uses a suite of technologies intended to imitate pre-urbanization (natural) hydrologic conditions. LID captures and treats runoff before it can reach downstream waterbodies. As opposed to "Green Streets" (discussed below), LID projects are located on parcels and sites, not streets. Examples include green roofs, bioswales, bioretention areas, permeable pavement, and infiltration trenches. These are regulated projects that will be subject to Provision C.3 requirements to treat runoff via GI per the MRP.

3. **Regional Projects:** Regional stormwater capture projects consist of facilities that capture and treat stormwater from offsite. The primary objective of regional projects is often flood attenuation, but many also contain a water quality treatment or infiltration component. Common examples include detention basins, retention basins, and subsurface infiltration galleries. Ideal locations are large public spaces, such as public parks, sports fields, parking lots, and school grounds (SMCWPPP 2017). The San Mateo County Stormwater Resource Plan (SRP) identified projects which provide regional capture and infiltration/treatment of stormwater and included conceptual design to support further planning and designs.

   Note: Because Half Moon Bay does not drain to the SF Bay, participating in the construction of regional projects in areas that drain to the SF Bay would not help to achieve City water quality goals, and vice versa - construction of regional projects in Half Moon Bay would not help to achieve the water quality goals in the SF Bay. Instead, the City will look for opportunities to partner with stakeholders who drain to the same receiving waters, like local creeks and the Ocean. Examples of agency partners may include Daly City, Pacifica, San Mateo County, and Caltrans.

4. **Green Streets:** Green streets consist of stormwater capture infrastructure that is implemented in public rights-of-way. These projects include permeable pavement, bioretention areas, and stormwater curb extensions. The SRP identified and prioritized opportunities throughout San Mateo County for retrofitting existing streets with green infrastructure in public rights-of-way. This prioritization was refined using feedback from the GI TAC. The green streets were further broken up into high, medium, and low priority, to represent the projects which have the greatest (high priority) or least (low priority) potential for a cost-effective installation of a green infrastructure measure.

5. **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.

Together, these GI opportunities present the "recipe" for attaining the water quality milestones. The contribution from each project category is simulated in the water quality goals, but the actual contribution will depend upon the opportunities which arise through development, capital projects, and regional collaboration between now and 2040. Figure 14 represents how the GI opportunities will be sequenced, to take advantage of the projects with the lowest implementation cost first, before incorporating the use of more costly GI opportunities.

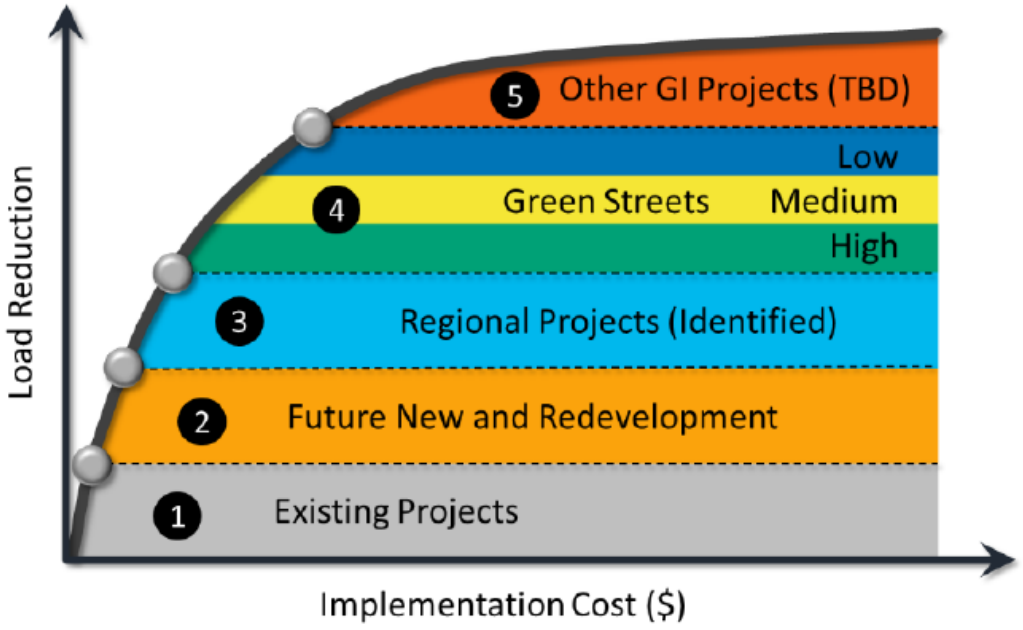


Figure 14. *Example Implementation Recipe Showing General Sequencing of GI Projects (SMCWPPP 2018a).*

3.2.1 Determination of Water Quality Goals

The City developed water quality goals that are specific to the context, character, and engineering and economic feasibility in Half Moon Bay. Each green infrastructure opportunity type (Existing Projects, Future New and Redevelopment Projects, and Potential Public GI Projects) was assessed individually, as follows:

- **Existing Projects:** Data for existing projects were calculated per C.3 and C.6 checklists and project plans currently on file, when available. Otherwise, project areas were determined based on City storm drain maps and estimation of areas from aerial mapping.
- **Future New and Redevelopment (Low Impact Development):** These are regulated projects that will be subject to Provision C.3 requirements to treat runoff via GI per the MRP. Projects were modeled based on spatial projections of future new and redevelopment tied to regional models for population and employment growth. Data for future new development and redevelopment were requested and received from CD+A and Paradigm.
- **Potential Public Green Infrastructure:** Potential public green infrastructure measures may include Regional Projects, Green Streets, or Other GI Projects as introduced in Section 3.2.2. To develop the water quality goals for potential public green infrastructure, the City reviewed it's current CIP to forecast potential project opportunities. The City will aim to meet these goals by integrating GI in the CIP. Though the specific projects used to set the GI milestones may not come to fruition (this would occur if the projects remain unfunded), the City will aim to backfill the lost opportunities with new opportunities which may be identified between now and 2040. For example, potential green streets opportunities were modeled with the San Mateo Countywide Stormwater Resources Plan (SRP), which may represent project opportunities not captured by the CIP.

All these data were compiled to create reasonable and achievable green infrastructure implementation goals for the City for the years 2020, 2030, and 2040.

3.3 City-Specific Water Quality Milestones

3.3.1 Existing Projects

Existing projects which were MRP Provision C.3 Regulated or Non-Provision C.3 Regulated currently account for 12.7 acres of impervious surface area managed by GI.

Projects with hydrodynamic separators, also known as "Continuous Deflective Separation" (CDS) units, would not meet the current stormwater treatment requirements of the MRP for Provision C.3 Regulated Projects, but they do provide measurable stormwater treatment. In Half Moon Bay, CDS units were installed as part of a handful of C.3 Regulated Projects which were entitled prior to 2009 and therefore subject to different treatment requirements. Recent studies indicate that pollutant removal efficiencies

of CDS units meet or exceed 20%[22], so for the purposes of assessing impervious area treated by CDS units, the City assumed that 20% of the impervious area is treated by the CDS unit as a rough analog for "treatment credit", though in reality 100% of the area is treated by the CDS unit. The City arrived at a total of 16.7 acres of impervious surface area which is currently managed by CDS units.

The projects which contributed to this total, as well as which treatment systems they utilized, are summarized in Tables 5, 6, and 7.

Table 4. *City of Half Moon Bay Existing Provision C.3 Regulated GI Projects.*

Regulatory Classification	Project Name	Project Location	Year Constructed	Public/Private	Total Site Area (acres)	Total Managed Impervious Surface Area (acres)	Treatment Systems Approved
Provision C.3 Regulated	Half Moon Bay Village Senior Housing	801 Arnold Way	FY 13-14	Private	1.1	0.8	Bioretention Areas
	Half Moon Bay Village Senior Housing	9 Bloom Lane	FY 14-15	Private	4.8	2.9	Bioretention Area
	Mercy Housing (Coastside Senior Housing; see also Lesley Gardens, which shares the CDS unit)	925 Main Street	FY 13-14	Private	1	1.3	Vegetative Swale, Drain Inserts, Hydrodynamic Separator
	Cameron's Inn (Hotel)	1410 S. Cabrillo Highway	FY 18-19	Private	1.49	1.1	Bioretention Area
	Fire Department Training Lot	1191 Main Street, at Higgins Canyon Road	FY 16-17	Public (Fire Department)	0.73	0.7	Bioretention area, flow-through planter
	Half Moon Bay Library Replacement Project	620 Correas Street	FY 18-19	Public	0.96	0.6	Bioretention area, flow-through planter, green roof, permeable pavers
TOTAL IMPERVIOUS AREA MANAGED BY PROVISION C.3 REGULATED PROJECTS						**7.4**	

[22] BASMAA, 2017a. Interim Accounting Methodology for TMDL Loads Reduced. Bay Area Stormwater Management *Agencies Association.*

Table 5. *City of Half Moon Bay Existing Non-Provision C.3 Regulated GI Projects.*

Regulatory Classification	Project Name	Project Location	Year Constructed	Public/Private	Total Site Area (acres)	Total Managed Impervious Surface Area (acres)	Treatment Systems Approved
Non-Regulated Project	Hatch School Addition and Modernization (Treatment Measures at Pilarcitos High School)	490 Miramontes Avenue	FY 17-18	Private	14.89	2.2	Bioretention area
	Cunha Middle School - Historic Bioretention area and New Gym	600 Church Street	FY 16-17	Public (School District)	0.74	0.7	Bioretention area
	Half Moon Bay High School Track & Field Improvements	100 Lewis Foster Drive	FY 17-18	Public (School District)	0.77	0.7	Bioretention area
	Correas Street/Purissima Street SRTS GI Project	Correas Street/Purissima Street	FY 18-19	Public	0.95	0.93	Bioretention area
	Ted Adcock Skateboard Plaza	535 Kelly Avenue	FY 16-17	Public		0.1	Bioretention area
	Mac Dutra Plaza	504 Main Street	2015	Public	N/A	0.06	Permeable pavers, pervious concrete
	Pacific Ridge Subdivision (63 units)	Terrace Avenue	FY 17-18	Private	26.4	0.63	Bioretention Swale
TOTAL IMPERVIOUS AREA MANAGED BY NON-PROVISION C.3 REGULATED PROJECTS						**5.3**	

Table 6. *City of Half Moon Bay Existing Projects Treated/Managed by CDS Units.*

Regulatory Classification	Project Name	Project Location	Year Constructed	Public/Private	Total Site Area (acres)	Total Managed Impervious Surface Area (acres)*	Treatment Systems Approved
Pollutant Removal Capability, Pre-MRP GI Credit	North Main Street and Highway 1 CDS Unit	North Main Street and Highway 1	2005	Public	64.2	12.8	CDS Unit
	Lesley Gardens	701 Arnold Way	2003	Private	N/A	1.5	CDS Unit (same as that on 925 Main Street)
	Pacific Ridge Subdivision (63 units)	Terrace Avenue	FY 17-18	Public	26.4	2.95	Two CDS Units
TOTAL IMPERVIOUS AREA MANAGED BY CDS UNITS						**16.7**	

**Assume 20% of the impervious area receives credit for being managed/treated by the CDS unit. This is derived from a CDS unit's pollutant removal efficiency of 20%.*

3.3.2 Future New Development and Redevelopment

Based on the data supplied by CD+A and Paradigm, future new development and redevelopment projects are projected to account for a growing amount of treated impervious area over time. After accounting for the fraction of each subwatershed which is impervious, the total estimated impervious treatment area (across all subwatersheds) is 10.5 acres by 2020, 19.4 acres by 2030, and 32.8 acres by 2040. Table 8 displays these data in greater detail, accounting for each subwatershed's individual contribution.

Table 7. *Half Moon Bay Future New Development and Redevelopment Estimates.*

Subwatershed ID	TOTAL IMPERVIOUS AREA					
	Incremental Area (acres)			Cumulative Area (acres)		
	C3-2020	C3-2030	C3-2040	C3-2020	C3-2030	C3-2040
1606	3.73	4.87	6.00	3.73	8.60	14.60
1701	3.39	1.94	3.79	3.39	5.33	9.12
1702	0.08	0.11	0.14	0.08	0.21	0.35
1703	0.06	0.09	0.10	0.06	0.15	0.26
1710	0.00	0.00	0.00	0.00	0.01	0.01
1711	0.32	0.39	0.50	0.32	0.72	1.21
1801	1.43	0.62	1.46	1.43	2.04	3.50
1802	1.38	0.54	1.27	1.38	1.91	3.18
1803	0.10	0.29	0.19	0.10	0.40	0.58
Total Area Managed by Future New and Redevelopment	**10.5**	**8.8**	**13.5**	**10.5**	**19.4**	**32.8**

3.3.3 Potential Public GI Projects

The City's current CIP outlines several opportunities for GI implementation. Table 9 describes the size of these projects, the approximate impervious area, and the allocated budget per the CIP. An approximate total impervious treated area and GI footprint is estimated for each project, based on a rough assumption that the City can allocate up to 20% of the project budget towards GI. The City considers this to result in aggressive water quality goals which synchronize with the City's Coastal and environmental protection policies set forth in its Local Coastal Plan.

Table 8. *Half Moon Bay Potential Public GI Project Estimates.*

Project	Approximate Impervious Area within Upstream Watershed (acres)	Budget from CIP	Approximate GI Footprint Required to Meet Goal	Approximate Impervious Area Treated Goal
Highway 1 North Safety Project	9.4	$7,910,000	11,000 SF	6.3
Highway 1 South Safety Project	4.8	$4,125,000	5,800 SF	3.3

Kehoe Ditch Developments	30.0	$7,854,250	11,000 SF	6.3
Kelly Avenue Complete Streets	63.3	$1,375,000	2,000 SF	1.1
Kelly/SR 1 Intersection Improvements	23.9	$1,700,000	2,400 SF	1.4
Poplar Street Complete Street Project	14.7	$1,754,000	2,500 SF	1.4
Naomi Patridge Trail Extension	0.9	$2,100,000	620	1.7
New Magnolia/ Seymour Park	5.3	$280,000	3,000 SF	0.2
Smith Field T-Ball Field/Smith Field Tot Lot	9.3	$445,000	1,700 SF	0.4
Walkway Extension from Cameron's to Smiths Field	6.0	$268,000	400 SF	0.2
			TOTAL POTENTIAL IMPERVIOUS AREA MANAGED BY GI	**22.2**
			% OF TOTAL IMPERVIOUS AREA MANAGED BY GI	**15%**
**Assume it costs $500,000 to treat 2 acres (actual cost will depend on the project, design details, and selected treatment measure).*				

3.3.4 Green Infrastructure Interim Milestones

The City set goals for impervious area managed by 2020, 2030, and 2040.

In order to establish the interim goals (2020 and 2030), the City has assumed to have constructed one-third of the potential public GI projects that are estimated to be constructed by 2040. The calculations made by CD+A (and based on data from C/CAG and MTC) to determine the City's projected future new development and redevelopment growth by 2020, 2030, and 2040 were complex and considered a variety of factors, including past growth rates for residential and business land uses.

Figure 15 shows that the City's goals for impervious acres managed through GI or CDS units is 32.5 acres by 2020, 48.8 acres by 2030, and 77.0 acres by 2040. All these totals include a contribution of 12.7 acres from existing GI projects and 16.7 acres from existing CDS units.

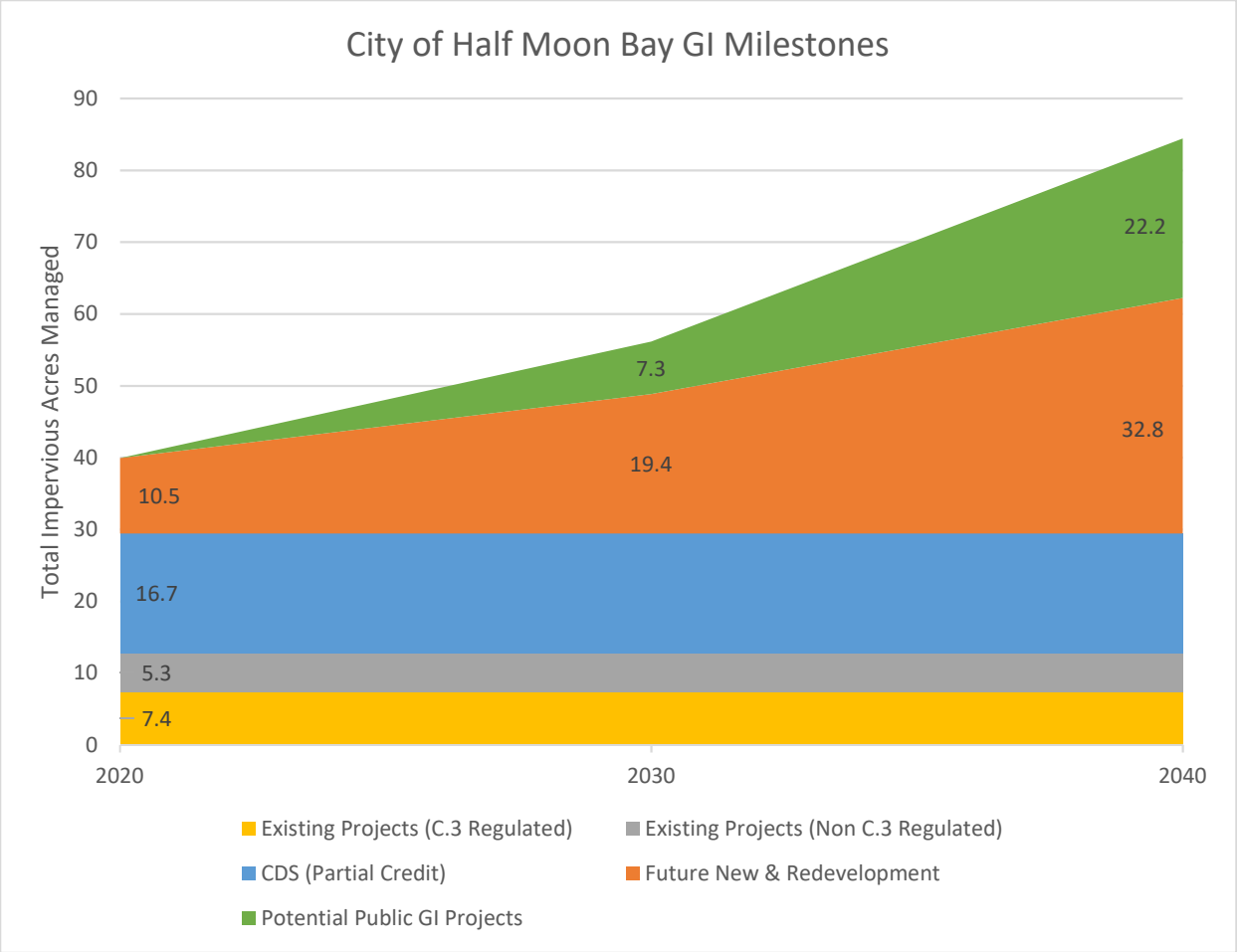


Figure 15. *Half Moon Bay Green Infrastructure Milestones.*

4.0 PROJECT IDENTIFICATION AND PRIORITIZATION

4.1 Introduction

Provision C.3.j of the MRP states that each Permittee shall develop the following:

> *"A mechanism…to prioritize and map areas for potential and planned projects, both public and private, on a drainage-area-specific basis, for implementation over the following time schedules, which are consistent with the timeframes for assessing load reductions specified in Provisions C.11. and C.12 (i) By 2020; (ii) By 2030; and (iii) By 2040.*
>
> *The mechanism shall include criteria for prioritization…and outputs (e.g., maps, project lists) that can be incorporated into the Permittee's long-term planning and capital improvement processes."*

This chapter summarizes the City's project identification and prioritization process, which consists of the following elements:

1. **Identification and Prioritization of Project Opportunities through the San Mateo County Stormwater Resources Plan (SRP).** In addition to identification of projects in the Capital Improvement Program (CIP), the City has integrated the prioritization results of the San Mateo County Stormwater Resource Plan (SRP), which was developed by SMCWPPP with participation from the GI TAC and member agencies. The SRP establishes a region-level, watershed-based planning and implementation guide for stormwater and dry weather runoff capture and reuse projects on publicly owned land and rights-of-way. The SRP produced a list of prioritized project locations eligible for future State implementation grant funds.
2. **Identification and Prioritization of Project Opportunities through the Capital Improvement Program (CIP).** Starting in 2016 with the adoption of the new MRP, the City prepared a list of projects that have the potential to incorporate Green Infrastructure (GI). This list is updated each year to reflect the project status, additional findings, and new additions to the CIP. The focus of this list is on public projects listed in the CIP rather than private projects, because private projects are typically tracked separately as regulated project opportunities. This chapter formalizes the process developed to promote early implementation of GI projects for the identification and prioritization of project opportunities.
3. **Identification and Prioritization of Project Opportunities on Private Property.** Identification and prioritization of opportunities on private property is not the focus of this chapter, but the City does intend to collaborate where possible with other agencies and private landowners. At the end of this chapter the City identifies possible partners with whom the City can collaborate to achieve the water quality goals outside the City rights-of-way.

4. **Future Identification and Prioritization of Project Opportunities through the San Mateo County Sustainable Streets Master Plan.** Further prioritization of the City's streets, sidewalks, City-owned properties, and other land resources will be conducted in the future through the San Mateo County Sustainable Streets Master Plan in 2021.

The City is intentionally spring-boarding off existing processes in order to (1) maintain consistency with the SRP and BASMAA GI screening process, (2) take advantage of training conducted to familiarize staff with the SRP and screening process, and (3) make the identification and prioritization process simple, so as to spend more time focusing on how to implement GI on projects that have GI potential.

Bioretention area located at Half Moon Bay High School.

4.2 Identifying Existing Projects and Future Opportunities

4.2.1 Participation in Developing San Mateo Countywide Stormwater Resource Plan

SMCWPPP developed an SRP, which, in addition to characterizing San Mateo County water resources, established both a quantitative prioritization protocol for GI opportunities and an initial list of prioritized local and regional GI projects. It also served the purpose of allowing municipalities access to funding for stormwater and dry weather runoff capture projects. Senate Bill 985, which went into effect on January 1, 2015, requires the development of an SRP as a condition of receiving voter-approved bond funds for

stormwater and dry weather runoff capture projects. The final draft of the San Mateo County SRP was approved under Resolution 17-04 by the C/CAG Board of Directors on February 9, 2017.

The SRP is intended to be a living document and will be periodically revised, once every five (5) years, to update the project implementation plan and reflect lessons learned through wide-scale integration of LID, green streets, and regional stormwater capture projects.

The City contributed proposed projects to the SRP during the development of the SRP and may consider opportunities to pursue grant funding for those projects identified as part of the GI Plan Implementation Process.

4.2.2 Identification and Screening of Project Opportunities through the Capital Improvement Program

The City's primary means of identifying and screening project opportunities is the Capital Improvement Program (CIP). Projects that are listed in the CIP are likely to be constructed and operated, as they address specific City needs and provide benefits consistent with City goals, policies, and priorities. Projects are typically added to the CIP based, in part, on needs assessments performed in association with the development of master plans, such as the City's Bike and Pedestrian Master Plan under development. With the development of this GI Plan, the City is both formalizing and documenting its procedure for screening CIP for GI potential as well as reinforcing the link between GI and the City's various local planning documents and master plans.

As required by the MRP, the City will continue to prepare and maintain a list of projects with potential for inclusion of GI measures that are planned for implementation during the permit term. The City also plans to annually update the map of the City's existing and potential GI projects in Appendix C to reflect current progress towards the GI plan implementation as well as future project opportunities.

Figure 16 summarizes the key factors that are taken into consideration when integrating GI into the CIP.

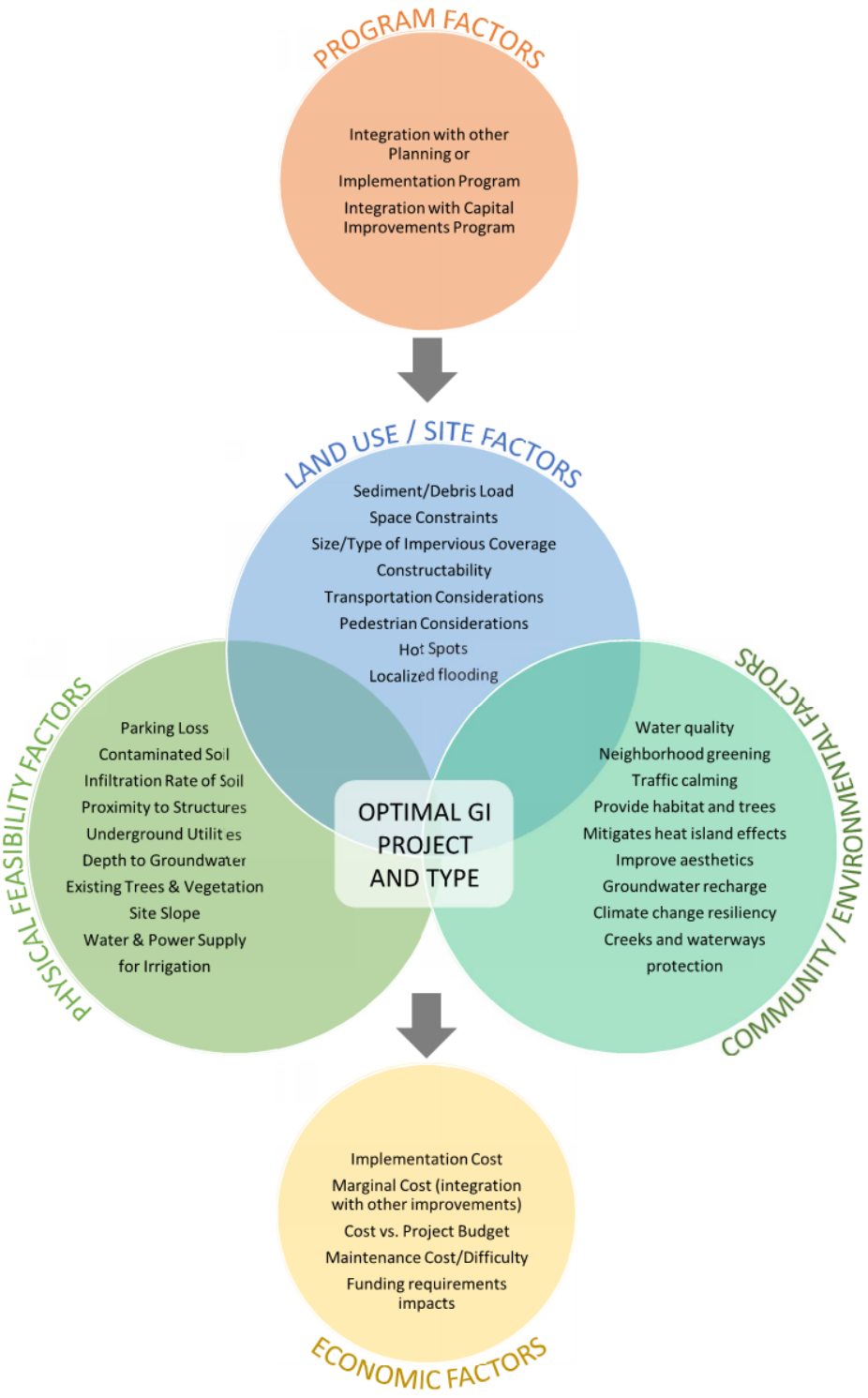


Figure 16. *Factors Impacting Selection of Optimal GI Projects.*[23]

The City screens its CIP using an adjusted version of the BASMAA Screening Process (BASMAA, 2016). This process consists of three parts:

- **Part 1 – Initial Screening.** Projects move on to the Part 2 Screening process unless they are one of the following categories: No Potential, Too Late to Change, Too Early to Assess, or Maintenance / Minor Construction. Projects without GI potential are removed from the City's tracking list.
- **Part 2 – Assessment of GI Potential.** Projects are assessed for their ease of integration of GI according to project types. C.3 Regulated project status is assessed. Projects without GI potential are removed from the City's tracking list, and the reasons for infeasibility of incorporating GI are documented.
- **Part 3 – Preliminary Design.** Information is collected, preliminary GI sizing takes place, barriers and conflicts are assessed, budget and schedule considerations are noted, and the results of the GI assessment are documented. Projects without GI potential are removed from the City's tracking list, and the reasons for infeasibility of incorporating GI are documented.

This screening process is provided in Appendix B.

4.2.3 Identification of Opportunities on Private Property

The GI Plan focuses on public rights-of-way as well as identification and screening of projects that are within the jurisdiction and control of the City. However, GI can be implemented on private property which is under development through the project entitlement process. **For more detail about how the City enforces GI on private property, refer to Section 10.2, "Private Development Program and Policies".**

As the GI Plan is implemented, there may be opportunities for outreach to or partnerships with private landowners which could result in GI on private property. Where possible, the City will work collaboratively with developers to explore public-private partnership opportunities for GI.

4.3 Determining GI Priorities

4.3.1 Countywide GI Project Screening

The SRP includes an evaluation of project benefits addressing several key metrics: Water Quality, Water Supply, Flood Management, Environmental, and Community Benefits. Based on these metrics, watershed characteristics and processes (including land use, impervious cover, hydrologic soil group, percent slope,

[23] Green Infrastructure Implementation. (2014). Adapted from Figure 10.1, Decision process for selection of GI Types. Water Environment Federation.

rainfall, and pollutant wasteload), the SRP identifies and prioritizes projects to address water quality impairment, reduce flooding, and provide more natural groundwater recharge[24].

Three basic categories of project opportunities have been screened (for more information about these project opportunities, refer to Section 3.3.2, Modeled GI Opportunities):

- Future New and Redevelopment
- Regional Projects
- Green Streets

Table 10 summarizes the screening methodology for parcels and rights-of-way.

Table 9. *SRP Parcel and Right-of-Way Project Screening Methodology.*

Screening Factor	Characteristic	Criteria	Reason
PARCEL			
Public Parcels	Ownership	City, County, or Town	Identify all public parcels for regional storm and dry weather runoff capture projects or onsite LID retrofits
	Land Use	Park, School, Other (e.g., Golf Course)	
Suitability	Parcel Size	>0.25 acres	Adequate space for regional stormwater and dry weather runoff capture project
		<0.25 acres	Opportunity for onsite green infrastructure retrofit
	Average Parcel Slope	<10%	Steeper grades present additional design challenges
RIGHT-OF-WAY			
Selection	Functional Class	S1200 S1400 S1730 S1780	City street, arterial Local neighborhood road, rural road Alley Parking lot roads
Suitability	Ownership	Public	Potential projects are focused on public and right-of-way opportunities
	Road Slope	<5%	Steep grades present additional design challenges; reduce capture opportunity due to increased runoff velocity

4.3.2 Countywide GI Project Prioritization

After the identification of feasible project locations, screened parcels and rights-of-way were prioritized to aid in the selection of potential project locations that would be most effective and provide the greatest number of benefits.

This was a two-step ranking process:

1. First, all potential project locations were ranked based on which sites offer the greatest opportunity for stormwater capture and other multiple benefits. Opportunities to combine stormwater capture projects with the CIP can be considered now, and in the future.

[24] *Stormwater Resource Plan for San Mateo County*. (2017, February). San Mateo Countywide Water Pollution Prevention Program. City/County Association of Governments of San Mateo County. Prepared by Paradigm Environmental and Larry Walker Associates, Inc.

2. The highest-ranked opportunities were further analyzed to provide a detailed quantification of project benefits and develop preliminary conceptual designs and project costs. Though this analysis was focused on a select number of opportunities, the concepts developed can be used on a wide variety of similar projects.

Specifically, projects were prioritized using the following categories within a quantitative scoring system:

- **Physical Characteristics.** For parcels, physical conditions include land use or, for green streets, street type. Physical characteristics also include impervious area, parcel size, hydrologic soil group, and/or slope. Prioritization based on these factors varies slightly depending on whether the project was a regional project, green street, or LID retrofit. In general, the highest prioritization is given to sites that consisted of high imperviousness, have the potential to infiltrate, and have mild slopes.
- **Flood-Prone Streams.** Projects placed within the subwatersheds of flood-prone streams and areas subject to flooding can help to mitigate flood risks and reduce flood and hydromodification impacts by limiting the volume of runoff that reaches the impacted streams. Therefore, high priority was given to sites closest to the flood-prone streams.
- **PCB Interest Areas.** PCBs are one of the primary pollutants of concern within the Bay Area; therefore, siting stormwater capture projects in PCB interest areas can potentially address water quality issues.
- **Co-Located Planned Projects.** Consideration of other potential or planned City projects opens opportunities for cost-sharing and maximizes multiple benefits achieved by a single project. Higher priority scores were given to project opportunities that may be implemented in parallel with new and redevelopment projects or other municipal CIP projects.
- **Drains to TMDL Waters.** Projects that are in watersheds that drain to Bay TMDL waters were given higher scores. Stormwater capture in these areas will aid in the removal of pollutants from runoff downstream.
- **Multiple Benefits.** While the reduction of pollutant loads is one of the primary objectives of GI, several other benefits can be achieved to improve cost effectiveness and increase buy-in. Potential benefits of GI are listed in Section 1.1.4.

Through the City staff's and SMCWPPP's input, the prioritization criteria were weighted to arrive at the final project prioritization methodology. The process resulted in assigned prioritization scores for each identified GI opportunity within each of the three project categories (green streets, LID retrofits, and regional projects). These scores could later be further filtered or sorted to support ongoing prioritization of projects within the City of Half Moon Bay. The criteria and weighting are summarized for each project type in Table 11.

Table 10. *SRP Parcel and Right-of-Way Project Prioritization Methodology.*

Metric	Points						Weight Factor
	0	1	2	3	4	5	
REGIONAL PROJECTS							
Parcel Land Use			Schools/Golf Courses	Public Buildings	Parking Lot	Park / Open Space	
Parcel Size (acres)	0.25 ≤ X < 0.5	0.5 ≤ X < 1	1 ≤ X < 2	2 ≤ X < 3	3 ≤ X < 4	4 ≤ X	
Slope (%)	5 < X ≤ 10	4 < X ≤ 5	3 < X ≤ 4	2 < X ≤ 3	1 < X ≤ 2	0 < X ≤ 1	
LID RETROFIT PROJECTS							
Parcel Land Use			Schools/Golf Courses	Park / Open Space	Parking Lot	Public Buildings	
Slope (%)	5 < X ≤ 10	4 < X ≤ 5	3 < X ≤ 4	2 < X ≤ 3	1 < X ≤ 2	0 < X ≤ 1	
GREEN STREET PROJECTS							
Parcel Land Use	Highway		Arterial	Collector	Alley	Local	
"Safe Routes to School" program	No					Yes	2
Slope (%)		4 < X ≤ 5	3 < X ≤ 4	2 < X ≤ 3	1 < X ≤ 2	0 < X ≤ 1	
ALL PROJECTS							
Impervious Area (%)	X < 40	40 ≤ X < 50	50 ≤ X < 60	60 ≤ X < 70	70 ≤ X < 80	80 ≤ X < 100	
Hydrologic Soil Group		D	Unknown	C	B	A	
Proximity to Flood-prone Channels (miles)	Not in sub-basin	3 < X		1 < X ≤ 3		X ≤ 1	2
Contains PCB Risk Areas	None			Moderate		High	2
Currently planned by City or co-located with another City project	No					Yes	2
Drains to TMDL water	No					Yes	
Above groundwater basin	No		Yes				
Augments Water Supply	No	Yes					
Water Quality Source Control	No	Yes					
Reestablishes Natural Hydrology	No	Yes					
Creates or Enhances Habitat	No	Yes					
Community Enhancement	No	Yes					

The results of the SRP project prioritization are provided in a webviewer created by C/CAG: http://54.183.214.51/maps/SMC_project_prioritization. Prioritization maps for the City of Half Moon Bay are provided in Appendix C.

4.4 Potential Collaborations with Outside Agencies

The City may seek collaboration opportunities with outside agencies which fall within the City's limits but are in non-jurisdictional areas (areas not subject to the MRP under the City's MS4 permit). These include the following:

Public School Districts

There is 1 public school district within the City of Half Moon Bay and 6 public schools, as listed in Table 12.

Table 11. *Public Schools in the City of Half Moon Bay.*

Public School Districts	Public Schools	
Cabrillo Unified School District	**Elementary Schools**	**High Schools**
	Alvin S. Hatch Elementary School	Half Moon Bay High School
	El Granada Elementary School	Pilarcitos Alternative High School
	Middle Schools	**Adult Schools**
	Manuel F. Cunha Intermediate School	La Costa Adult School

The City does not have full planning and building authority over public school properties, though the City does require compliance with the Local Coastal Program, which enables the City to review early improvement plans and require GI as a condition of a Coastal Development Permit. The City does not have the opportunity to review these plans or monitor construction after the Coastal Development Permit is received.

As of early 2019, stormwater discharges from K-12 School Districts and Community College Districts are regulated through the Phase II Small Municipal Separate Storm Sewer System (MS4) Program[25] (Phase II Permit). State Universities were already covered under the Phase II Permit. The Phase II permit does not require the development of a GI Plan but does require the incorporation of GI measures through the Post Construction Storm Water Management Program (Provision E.12 of the Phase II Permit). Prior to 2019, school districts were not required to construct stormwater treatment measures, except in some municipalities (for example, as a required mitigation measure under a Coastal Development Permit).

Other Possible Agency Partners

- San Mateo County – Encroachment
- Caltrans – Local Assistance, Encroachment
- SamTrans –Bus Routes 17, 18, and 294

[25] As of the writing of this section, the amended Small MS4 General Permit was adopted by the California State Water Resources Control Board (CSWRCB) on December 19th, 2018, but is not yet certified by the CSWRCB clerk.

5.0 PROJECT TRACKING

5.1 Introduction

Provision C.3.j of the MRP states that each Permittee shall develop the following:

> *"A process for tracking and mapping completed projects, public and private, and making the information publicly available."*

Tracking and mapping both existing and potential Green Infrastructure (GI) projects facilitates the implementation of a GI program in several ways:

1. Keeps the community engaged by providing an ongoing list of existing and potential GI projects.
2. Facilitates management of and associated inspections for a GI Operations and Maintenance Program.
3. Keeps the focus on potential GI projects in the City, to encourage a continued effort to transition the City from "gray" to "green", and ensure these projects continue to make progress.
4. Allows the City to ascertain the treatment area for potential GI projects and continue to refine this area as projects develop.
5. Enables tracking of projects in different areas of the City, which may have different land uses and priorities.
6. Helps measures progress towards water quality objectives.

5.2 City Internal Project Tracking System

As part of the development of the GI Plan, the City mapped all existing and potential areas treated by GI in a Geographic Information System (GIS), which is a graphical framework for gathering, analyzing, managing, and representing data. In addition, projects are tracked on an internal Excel spreadsheet, which includes additional data, such as the type of treatment measures installed. The Excel spreadsheet is updated on a continuous basis and is also used to manage the City's GI Operations and Maintenance program.

The City will aim to update the GIS exhibit which maps existing and potential areas treated by GI (**refer to the last exhibit of Appendix C**) on an annual basis and prior to preparation of the Annual Report to reflect the following:

1. Projects which moved from "potential" to "existing" (i.e., were constructed).
2. Development projects that come in for planning review (either entitled or in pre-application status if the project is likely to be submitted as a formal application).
3. CIP Projects which are newly identified as having GI potential.

The City's internal tracking system is intended to be used until the Countywide Project Tracking System becomes available. At that time (estimated 2021), the City may consider reassessing the need for an additional internal project tracking tool. So as not to duplicate efforts, the City may consider the following options:

- Retire the internal project tracking system and use the Countywide tool instead. This will save on upfront costs and could even save on future costs if the City has a small number of GI projects.
- Should the City determine that, in addition to the Countywide tool, a more robust internal tracking tool with greater functionality is needed, the City may transition the Excel spreadsheet and GIS layer into a stormwater compliance database, which would require significant upfront expense but could reduce future costs if the City has enough existing GI projects. This would allow City staff to complete the following:
    - Complete inspection reports electronically.
    - Match the inspection data more quickly to the project list.
    - Facilitate the exporting of data.

Bioretention area located at Cameron's Best Western.

5.3 O&M Tracking Systems and Procedures

Proper maintenance is essential to maximizing the environmental, social, and economic benefits of GI, as well as ensuring that projects perform as expected. Written plans and procedures ensure proper long-term maintenance and are critical components to the success of any GI measure.

The City's goal is to ensure that public, private, Regulated, and Non-Regulated GI measures are maintained sufficiently to perform as designed by implementing the City's Enforcement Response Plan (ERP) and Standard Operating Procedures (SOPs), and by drawing from SMCWPPP resources, such as Chapter 6, Guidelines and Specifications.

5.3.1 O&M Tracking of Provision C.3.h ("Regulated") Sites

The MRP requires, under Provision C.3.h, that GI installed as part of Regulated projects as well as permeable pavement installations in excess of 3,000 square feet be inspected upon project completion and at least once every five (5) years. Inspection and enforcement procedures are described in the City's Stormwater NPDES Enforcement Response Plan (ERP).

The City maintains an electronic database of sites as required by Provision C.3.h, which includes project data, the contact information of the site representative, the site Operations and Maintenance (O&M) Agreement and Plan, past inspection records, and records of any enforcement actions.

5.3.2 O&M Tracking of Non-Regulated Sites

The City will continue to design, construct, and maintain GI on public properties and rights-of-way. Non-Regulated Project installations of GI are tracked as feasible in the same manner as Regulated projects, except that small measures, such as those installed on single-family homes, will not necessarily be tracked for the purposes of the GI milestones. The City may later opt to track these small projects.

5.4 Countywide Project Tracking Tool

The City/County Association of Governments of San Mateo County (C/CAG) received a Caltrans Adaptation Planning Grant, which is being used to partially fund the Sustainable Streets Master Plan (SSMP). The SSMP and associated deliverables will support C/CAG's member agencies in advancing sustainable stormwater management and creating more resilient transportation networks in San Mateo County in the face of a changing climate.[26]

The SSMP will include the following elements:

[26] Request for Proposals for Technical Support to the City/County Association of Governments of San Mateo County to Develop the San Mateo Countywide Sustainable Streets Master Plan. (2018, August 30).

- **Community Engagement.** Input will be solicited from local agency staff, community stakeholders, and the public to provide a participatory forum for sharing progress and soliciting input on the Master Plan.
- **Climate Adaptation Risk Analysis on Local Transportation Network.** Climate change-related precipitation impacts and stormwater capture benefits will be quantified.
- **High Resolution Data Analysis and Fine-Scale Drainage Delineation.** Data will be collected from member agencies, and then a high-resolution drainage system delineation will be prepared. Sustainable streets opportunities within the public right-of-way will be identified at a street-level scale.
- **Prioritization of Sustainable Streets Opportunities.** The SSMP will build on the existing green street prioritization system that C/CAG developed as part of the SRP by integrating priorities associated with protecting the multi-modal transportation network, pavement maintenance, and bicycle/pedestrian planning. The prioritization will also be subject to a rigorous stakeholder involvement process.
- **Project Concepts.** Up to ten (10) priority pilot projects will be identified and detailed which demonstrate the integration of bicycle and pedestrian improvements with sustainable streets practices.
- **Web-based Sustainable Streets Project Implementation Mapping and Tracking Tool.** An online tracking tool will be developed which can be used by member agencies to track GI implementation. It will include dashboards to show the public and interested stakeholders progress toward building adaptation to precipitation-based climate change impacts as well as water quality improvement. This tool will be publicly available and will allow users to see locations of implemented projects, project benefits, and progress toward long-term goals.

5.5 Adaptive Management

This GI Plan is intended to act as a "living" document, allowing it to shift and adapt to the changing needs of the City. Using an 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 as discussed in Chapter 3, and continued re-evaluation of GI project opportunities. Aspects of the GI program are outside of the City's control—namely, that the development climate is uncertain, and projects that are anticipated to be constructed through future new and redevelopment may not actually come to fruition. Forecasts for development may be higher or lower than what is achieved by the 2040 milestone. If less development occurs over time, more green streets or regional projects on public land may be needed to provide equivalent volume management. Similarly, there are uncertainties in the implementation of public GI—opportunities and funding for GI are likely to change between now and 2040.

There is also a possibility that the screening and prioritization procedure used to develop the SRP is not as restrictive as it needs to be, meaning that there may be many streets identified as having GI potential where incorporation of GI is not actually feasible. Under such a scenario, additional GI measures may be required to be installed in fewer areas. Alternatively, there may be opportunities not identified through the SRP, but through the CIP, which could result in GI implementation.

By taking an adaptive management approach to GI, the City can establish a process that is both driven by the goals set forth in this GI Plan, but that is also flexible, iterative, and allows for continuous improvement. GI is goal-driven, and its effectiveness is measured at a watershed scale. Figure 17 represents the adaptive management process.

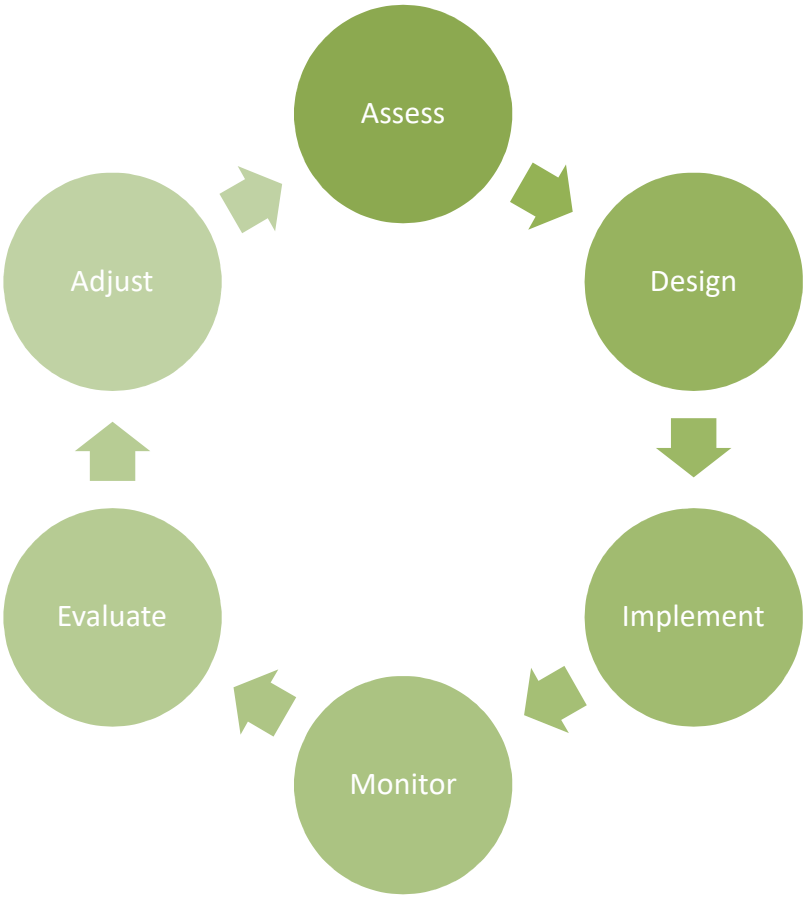


Figure 17. *Adaptive Management Process.*[27]

[27] Green Infrastructure Implementation. (2014). Water Environment Federation. Page 220.

6.0 GUIDELINES AND SPECIFICATIONS

6.1 Introduction

The MRP states that the adopted Green Infrastructure (GI) Plan shall contain the following elements:

> *Provision C.3.j.i.(2)(e): "General guidelines for overall streetscape, and project design and construction so that projects have a unified, complete design that implements the range of functions associated with the projects…. The guidelines should call for the Permittee to coordinate, for example, street improvement projects so that related improvements are constructed simultaneously to minimize conflicts that may impact green infrastructure."*
>
> *Provision C.3.j.i.(2)(f): "Standard specifications and, as appropriate, typical design details and related information necessary for the Permittee to incorporate green infrastructure into projects in its jurisdiction."*
>
> *Provision C.3.j.i.(2)(g): "Requirement(s) that the projects be designed to meet the treatment and hydromodification management 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 different 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)."*

The City has met these requirements through (1) development through the GI TAC and adoption of Countywide GI Guidelines and Standards, which include typical design details and sample specifications; (2) clarification of sizing of Non-Regulated GI projects; and (3) development through the GI TAC and adoption of BASMAA alternative sizing criteria for Non-Regulated green street projects.

6.2 Countywide GI Guidelines and Standards

6.2.1 San Mateo County GreenSuite

The City participated in the GI Technical Advisory Committee (GI TAC)'s development of the "GreenSuite". The GreenSuite is a combination of an updated version of the SMCWPPP C.3 Stormwater Technical Guidance Manual *(C.3 Regulated Projects Guide)* and the newly developed GI Design Guide (*Design Guide*). The key content and organization of these guides is summarized in Figure 18.

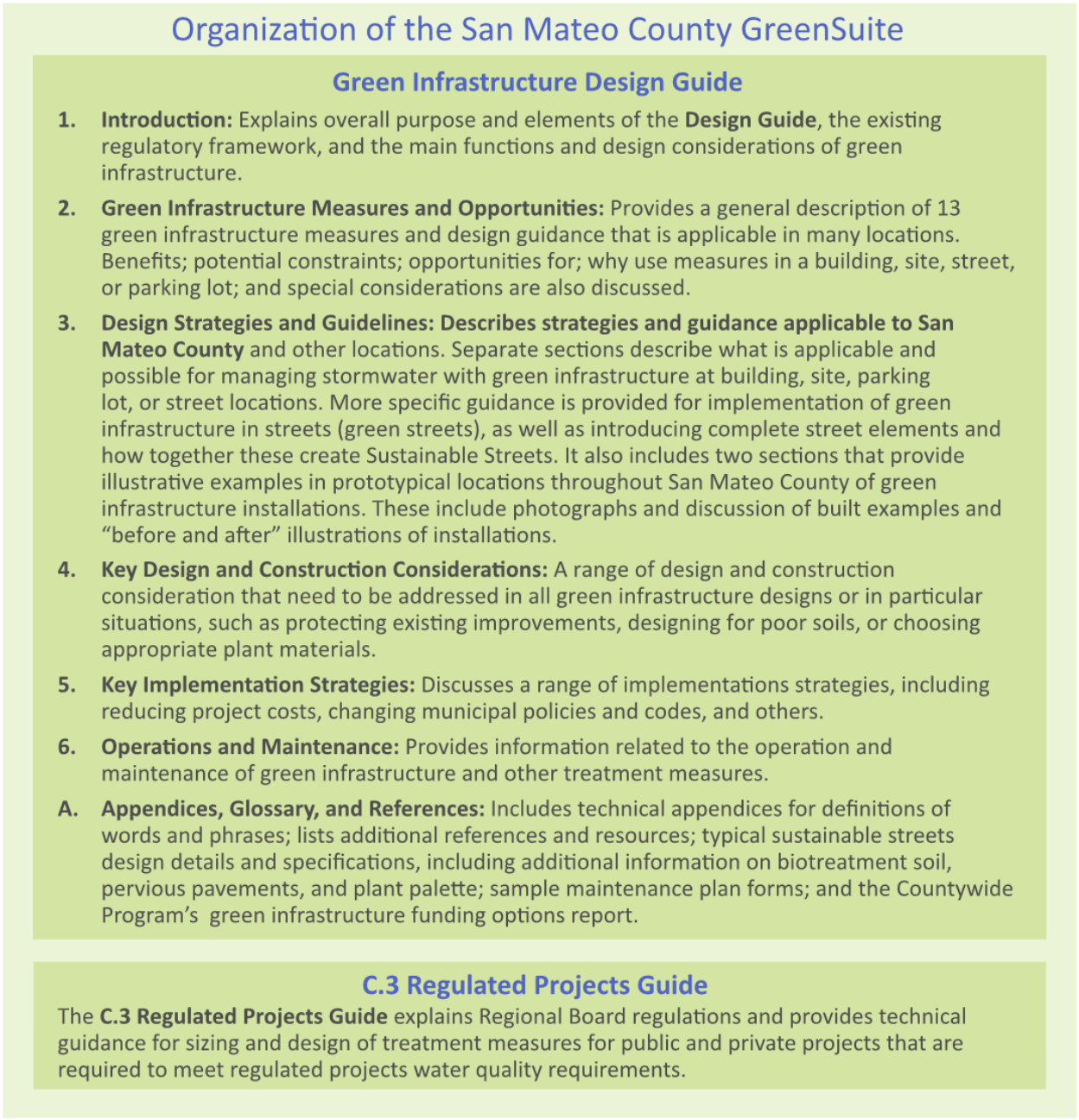


Figure 18. *Key Content and Organization of the San Mateo County GreenSuite.* [28]

Together, these documents allow designers, City staff, and developers to implement a range of GI measures and strategies. They also include model procedures for coordinated and consistent plan review of private projects, scoping and design for public projects, as well as recommendations for ongoing operations and maintenance.

[28] San Mateo County Green Infrastructure Design Guide. (2019b). SMCWPPP. https://www.flowstobay.org/gidesignguide.

In order to design GI facilities, designers would likely use a combination of both the *C.3 Regulated Projects Guide* and the *Design Guide.* Regulated projects must adhere to the specific requirements of the MRP, but Non-Regulated projects may also benefit from the sizing guidance provided in the *C.3 Regulated Projects Guide*. Designers will find more GI options in the *Design Guide* for Non-Regulated projects, because the *C.3 Regulated Projects Guide* does not cover certain measures like green gutters, green walls, stormwater trees, and vegetated swales. If a designer finds that landscape-based measures are not feasible on a project, they might consider mechanical treatment devices, such as media filters or high-flow rate tree wells, which are described in the *C.3 Regulated Projects Guide.* Utilizing both guides allows for flexibility in GI design and implementation on Non-Regulated projects without repeating information already provided for Regulated projects, while keeping the requirements for Regulated projects clear and separate.

6.2.2 Green Infrastructure Design Guide

SMCWPPP, with input and feedback from its member agencies, including the City of Half Moon Bay, 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 GI 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 constrained street projects.

The *Design Guide* includes a range of information related to GI, 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 GI into projects; introduction of complete streets concepts and design; discussion regarding BASMAA's regional approach for alternative sizing for Non-Regulated 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 GI into new and redevelopment projects, whether C.3 Regulated or not.

General guidelines for overall streetscape and project design, construction, and maintenance have been developed so that projects have unified, thoughtful designs and implement the full range of GI capabilities possible. The MRP emphasizes the need for guidance related to green streets functions, and 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 describes practices for incorporating GI following the

principle of "no missed opportunities" as specified in the MRP, Provision C.3.j, and for directing the efficient and effective coordination, review, and implementation of GI in public and private projects.

The Appendices of the *Design Guide* include typical design details and specifications for the design and construction of GI applicable to a variety of applications whether street or site-based projects. These details, as well as those provided in the *C.3 Regulated Projects Guide*, can be adapted for use on local GI projects.

6.2.3 Adoption of Countywide Green Infrastructure Guidelines

The City of Half Moon Bay will use the *Design Guide*, *C.3 Regulated Projects Guide,* and future amended versions to provide support and guidance in implementing GI within the City. As more GI projects are implemented, portions of the Design Guide may be superseded by 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.

C.3 Regulated Projects Guide (formerly known as the *C.3 Technical Guidance)* can be found on the SMCWPPP "Flows to Bay" website at https://www.flowstobay.org/newdevelopment.

For any project identified as having GI potential, a feasibility review will be undertaken to determine the GI options best suited to that project, given its goals, funding source, budget, and constraints. As any such project is developed through concept and plans—including improvement plans—the plans, specifications, details, and project constraints will be reviewed by City Public Works staff for compliance with both the Countywide GreenSuite and City standards. Inconsistencies, if they arise, will be resolved through development of site-specific specifications and details.

Bioretention swale located at Pacific Ridge Subdivision.

6.2.4 Local Green Infrastructure Guidelines

Green infrastructure installed within the City of Half Moon Bay will not be planted, whenever possible, with invasive species as identified and ranked by the California Invasive Pest Council (CalIPC). Instead, the City will prioritize the use of non-invasive, California-native species which are suitable to a Mediterranean climate and dry summers. Bay-Friendly Landscaping methods will be applied during both plant selection and plant maintenance. More guidance about planting in green infrastructure facilities is provided in Section 4.11 and Appendix 4 of the *Green Infrastructure Design Guide,* and Appendix A of the *C.3 Regulated Projects Guide.*

6.3 GI Measure Sizing Approaches

6.3.1 Standard "C.3.d" Sizing

MRP Provision C.3 Regulated Projects will continue to be subject to the treatment and hydromodification sizing requirements of Provision C.3.c and C.3.d. The definition of a "Regulated" project and details of various treatment sizing options are described in the MRP and the SMCWPPP C.3 Stormwater Technical Guidance Manual.

The MRP requires that GI projects be "designed to meet the treatment and hydromodification sizing requirements in Provisions C.3.c. and C.3.d." (Provision C.3.j.i.(2)(g)). This means that, for most projects,

there will be no difference in the sizing requirements between a Regulated and Non-Regulated Project. As a goal, the City will aim to meet the requirements of Provision C.3.d when sizing GI facilities. However, should site constraints preclude fully meeting these requirements, the City will construct a smaller facility **(for green streets projects, refer to Section 6.4.3, "Alternative Sizing Approach", which describes the BASMSAA Alternative Sizing Criteria)**. In designing GI facilities, the City will pursue a flexible, adaptive approach. In other words, even if a small facility is constructed with a proposed project, smaller facilities still provide measurable stormwater treatment, and future facilities can be constructed to provide stormwater treatment for areas not addressed by the initial installation. Where feasible, bioretention facilities can be designed as "off-line" facilities, meaning they would treat a fraction of runoff generated, preventing high-volume flows and/or bypassing some of the runoff to be treated downstream.

Non-Regulated GI projects may use the full range of stormwater treatment measures described in both the *C.3 Regulated Projects Guide* and *Design Guide*, including mechanical treatment measures such as tree well filters and media filters, without the restrictions imposed on Regulated Projects. The *C.3 Regulated Projects Guide* summarizes the technical aspects of GI measures, including how they should be sized for treatment. The *Design Guide* introduces some GI measures which are not discussed in the *C.3 Regulated Projects Guide*. For these, it is not clear how to size the GI measures for treatment.

Measures which are not considered treatment for Regulated Projects (and therefore have no associated sizing criteria for Non-Regulated Projects) are as follows:

- Vegetated Swale
- Green Gutter
- Stormwater Tree
- Green Wall

Three (3) of these measures (vegetated swale, green gutter, and stormwater tree) can optionally be constructed with the same cross section as a stormwater planter (18 inches of bioretention soil, and 12 inches of Class 2 Permeable Material). If these measures are built to the same standards as a stormwater planter under the GreenSuite, the same sizing factors as those that apply to stormwater planters would apply. Otherwise, a customized sizing approach would need to be proposed by the designer and verified by the City, with appropriate factors of safety applied.

For green walls, there is no like-measure with established sizing criteria. Therefore, when designing green walls, no minimum sizing criteria pertain, and as such, green walls can be constructed to fit the site-specific context and available wall space.

6.3.2 Defining Drainage Management Areas

Regulated projects must be sized to provide treatment for the effective impervious area which drains to them. For more information about defining catchment areas for projects, refer to the *C.3 Regulated Projects Guide* and Chapter 4 of the *Design Guide.*

Non-Regulated public street applications of GI measures must also be sized to provide treatment for the effective impervious which drains to them, with an exception – they need not be designed to treat contributing private areas, such that the drainage management area (also called "catchment area") is limited to the street right of way, or in some cases, the back of sidewalk. If the sidewalk drains to a planter strip, the drainage management area can be limited to the back of curb, since the sidewalk is "treated" by the landscaped planter strip. This approach was first established in the 2009 San Mateo County Sustainable Green Streets and Parking Lots Guidebook (refer to Chapter 5) and has been deemed acceptable for the purposes of sizing projects for the 2018 C/CAG Safe Routes to School (SRTS) and Green Streets Infrastructure Pilot Program. Sizing for public street applications is not discussed in the GreenSuite.

The City will aim to map drainage management areas for both Non-Regulated and Regulated Projects in GIS or similar format. **See Section 5.2, "City Internal Project Tracking System", for more information about how the City will track existing and potential GI projects.**

6.3.3 Alternative Sizing Approach

6.3.3.1 Alternative Approach Description (MRP C.3.j.2.g)

All GI projects should be designed to meet the treatment requirements of Provisions C.3.c and C.3.d of the MRP (and hydromodification requirements, where applicable). However, an alternative regional sizing approach was developed for street projects where site constraints preclude fully meeting the sizing requirements of Provision C.3.d.

BASMAA was tasked with developing Alternative Sizing Criteria on a regional basis. Per the MRP, GI facilities must be sized using either a flow, volume, or combination flow and volume method, depending on the type of treatment measure used and based on the engineering judgment of the project designer. The least conservative method is the combination flow and volume method, which specifies that treatment facilities should be sized to treat at least 80 percent of the total runoff over the life of the project, using local rainfall data. Using the combination flow and volume method and a continuous simulation analysis, BASMAA's consultant, Dubin Environmental Consulting, assessed which sizing factors are needed—assuming a standard bioretention area cross section—to achieve the MRP sizing requirements. It was determined that bioretention facilities with a standard cross section can both capture and treat the required amount of Provision C.3.d runoff when sized to 1.5% – 3% of the tributary equivalent impervious area, depending on the project location.

Hydromodification management control requirements were also assessed. Dubin Environmental Consulting determined that a standard bioretention facility sized to 4% of the tributary equivalent impervious area, having a 6-inch deep surface storage layer, 2-inches of freeboard, 18 inches of bioretention soil, and 12-inch deep gravel storage layer would meet the hydromodification standard at any location in the Bay Area.

Detention basin located at Half Moon Bay Golf Links.

6.3.3.2 Conditions Under Which the Alternative Approach May Be Used

The BASMAA Alternative Sizing Criteria can be used when site constraints are present which preclude fully meeting the sizing criteria.

Where feasible, bioretention facilities on street projects should be sized as large as possible. There are several reasons to design and build facilities larger than the Provision C.3.d minimum:

- Promotes better performance
- Ensures compliance with Provision C.3.d despite minor flaws in either design, construction, or maintenance
- Allows for an engineering safety factor
- Maximizes removal of pollutants
- Allows the facilities to operate as full trash capture devices
- Facilitates management of hydromodification effects, as relevant

However, existing streetscapes can be challenging to retrofit, making it difficult to build large GI facilities. These constraints include the following:

- Limited project funding

- Larger facilities can result in more parking loss and more impacts to residential driveways
- The presence of existing underground utilities can create restrictions in either the footprint or depth of a GI facility. Typically, clearances are required by the utility owner between the existing utility, the GI facility and any associated storm drain piping. In addition, having utilities in the GI facility can create issues in the future, as a utility owner must be careful not to destroy the GI facility or impair its function when performing repairs on their utility lines. Utility crews are typically not familiar with the construction requirements or functionality of GI facilities.
- The presence of existing or proposed above-ground structures and fixtures such as streetlights, fire hydrants, and utility boxes can reduce the amount of functional cross-sectional area of the GI facility.
- Larger bioretention facilities are likely to impact existing mature trees and root systems. It may be preferable to reduce the treatment area in order to preserve a tree, especially given that mature trees offer many stormwater quality benefits.
- Sometimes, the elevations of nearby storm drain facilities, or the lack of storm drain facilities, put restrictions on either the depth or use of an underdrain facility or overflow structure.
- It is difficult to define and control catchment areas for street projects, because both public areas (streets, curbs, and sidewalks) and private areas (residential or commercial areas, some of which may be treated by onsite facilities) drain to the bioretention areas. Typically, it would make the project infeasible to aim to treat the entirety of public and private runoff.
- The in-situ soil permeability and strength are often low. Protection of the adjacent roadway structure (e.g., via deep retaining curbs) is often necessary to prevent compromising the roadway by oversaturation. This can increase project costs.
- In some cases, it may be preferable to limit the depth of the facility adjacent to the roadway or sidewalk, or to introduce 3:1 side slopes to promote safety. These modifications for safety can reduce the effective area of the treatment measure.
- Right-of-way is highly limited, and the City must always consider the site context and various City objectives when designing a project. Truck turning radii, the presence of bike lanes and pedestrian walkways, parking loss, through lane widths, and driveway impacts are all considerations when designing GI facilities on a public street.

7.0 INTEGRATION WITH OTHER PLANNING DOCUMENTS

7.1 Introduction

To ensure implementation of the Green Infrastructure (GI) Plan, the MRP states that the GI Plan shall contain the following:

> *C.3.j.i.(2)(h): "A summary of the planning documents the Permittee has updated or otherwise modified to appropriately incorporate Green Infrastructure requirements, such as: General Plans, Specific Plans, Compete Street Plans, Active Transportation Plans, Storm Drain Master Plans, Pavement Work Plans, Urban Forestry Plans, Flood Control or Flood Management Plans, and other plans that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's jurisdiction, including, but not limited to, streets, alleys, parking lots, sidewalks, plazas, roofs, and drainage infrastructure. Permittees are expected to complete these modifications as a part of completing the Green Infrastructure Plan, and by not later than the end of the permit term."*
>
> *C.3.j.i.(2)(h): "To the extent not addressed above, a work plan identifying how the Permittee will ensure that Green Infrastructure and low impact development measures are appropriately included in future plans (e.g., new or amended versions of the kinds of plans listed above)."*

7.2 Evaluation of Planning Documents

The City undertook a review of its existing planning documents to determine if the documents: (1) contained opportunities for GI implementation; (2) have existing language and policies supporting GI implementation; and (3) hold potential for updates to further implement GI. The City presents the key planning documents which include or will include language that supports or relates to GI implementation in Section 7.3. The City's workplan for planning document updates is discussed in Section 7.4.

7.3 Planning Documents Which Support GI Implementation

The implementation of GI is addressed in many of the City's existing and proposed planning documents' policies, goals, and objectives. Because of the multiple benefits that can be achieved through GI, the City can implement GI as a strategy for flood reduction, climate change adaptation, traffic calming, and other City goals. Table 13 summarizes the City's existing documents and the method by which each document supports GI implementation.

Table 12. *Existing planning documents which support GI implementation.*

Planning Document	Related Sections and Pages
Local Coastal Land Use Plan Update DRAFT – Chapter 2: Development 2019 Draft	Land Use Map and Designations Planned Development Conservation Areas General Development Policies
The Development chapter of the DRAFT Local Coastal Land Use Plan (LUP) includes the Land Use Map, land use classifications, standards for density and intensity, and limitations on development in Half Moon Bay. New development is constrained by the ability to provide or expand public infrastructure and the capacity of existing facilities, the presence of environmentally sensitive habitat areas, agriculture, coastal hazards, and visual resource protection. Land Use Plan policies aim to define Half Moon Bay's physical development, preservation and restoration priorities which reinforce the community's vision. Policies within the Land Use Designations, general Development policies, Planned Developments, and Conservation Areas support the use of Green Infrastructure and the implementation of the GI Plan.	
Local Coastal Land Use Plan Update DRAFT – Chapter 5: Coastal Access and Recreation 2019 Draft	Coastal Access Policies Bicycle and Pedestrian Coastal Access Policies Coastal Recreation
The Coastal Access and Recreation Chapter of the DRAFT Local Coastal Land Use Plan (LUP) documents includes existing coastal access conditions and public recreation facilities, evaluates local and visitor demand for recreational facilities, identifies priority improvements, assesses the recreational needs of the community, and describes improvements needed to enhance access to the coast for people arriving by all modes of transportation. Policies within the Coastal Access design section specifically calls out Green infrastructure in the siting a design of coastal access points. This local Coastal Land Use Plan chapter supports GI Implementation.	

Local Coastal Land Use Plan Update – DRAFT Chapter 6: Natural Resources 2019 Draft	Biological Resources Policies Natural Shorelines Policies Hydrology and Water Quality Policies
The Natural Resources chapter of the DRAFT Local Coastal Land Use Plan (LUP) identifies sensitive habitat areas and special status species and require site-specific studies in association with development proposals to make up-to-date determinations on natural resources. Policies provide for protection and enhancement of Half Moon Bay's natural resources, including biological resources, natural shorelines, hydrology, and coastal water quality. In addition, policies within the Hydrology and Water Quality section directly calls for the use of Green Infrastructure to manage and treat stormwater. Therefore, the Natural Resources chapter of the LUP supports GI implementation.	
Local Coastal Land Use Plan Update DRAFT – Chapter 7: Coastal Hazards 2019 Draft	Climate Change Policies Geologic and Seismic Hazards Policies Flood Hazards and Flood Hazards Policies
The Coastal Hazard chapter of the DRAFT Local Coastal Land Use Plan (LUP) considers climate change as a coastal hazard, in addition to the hazards that have long been known to be present in Half Moon Bay, including seismicity, flooding, erosion, debris flow, and fire. The purpose of these chapter is to ensure the safety of community members, property and the coastal environment, and to avoid or mitigate potential impacts from known natural and man-made hazards. Policies within the Climate Change and Flood Hazards sections directly call for the use of Green Infrastructure as a strategy to mitigate the impacts of multiple hazards. Therefore, the Coastal Hazard chapter of the LUP supports GI implementation.	
Parks Master Plan Adopted 2019	Overall Plan: Opportunity to implement GI as part of upcoming parks improvement projects
The Parks Master Plan includes the development and redevelopment of public infrastructure and provide opportunities to implement green infrastructure. The plan includes multiple references to green infrastructure, including the identification of sites for mitigation banks and stormwater retention. Therefore, the Parks Master Plan supports the implementation of green infrastructure.	

General Plan – Circulation Element Existing - 2013	Policy Framework - Complete Streets Circulation Goals, Policies, and Implementing Actions
The Circulation Element addresses the classification of the city's roadways, support for various transportation modes, performance standards, and planned improvements to the circulation system. The Circulation Element takes a Complete Streets approach to ensure adequate attention is given to all modes in transportation planning, design, funding and implementation within the city. The Circulation Element includes policies and actions that support green streets implementation. The implementation of green streets reduces impervious surfaces areas compared to traditional roadways and support the goals of the GI Plan.	

7.4 Workplan for Future Updates

The City of Half Moon Bay is currently creating the City's Climate Action Plan and General Plan with tentative completion dates in 2019 and 2020 respectively. During the update process, Planning Department and Public Works Staff will have the opportunity to review the existing language for opportunities to build on policies that support the implementation of Green Infrastructure. Planning Department and Public Works staff will be involved with future planning documents in a similar fashion to ensure that the requirements of the GI Plan are incorporated.

Pervious Pavers located at the Half Moon Bay Public Library.

8.0 FUNDING OPTIONS

8.1 Introduction

Provision C.3.j.i.(2)(k) of the MRP states that the Green Infrastructure (GI) Plan shall contain the following:

> *"An evaluation of prioritized project funding options, including, but not limited to: Alternative compliance funds; grant monies, including transportation project grants from federal, State, and local agencies; existing Permittee resources; new tax or other levies; and other sources of funds."*

To undertake an evaluation of potential funding options and sources, the City (1) reviewed the GI program elements and associated costs; (2) participated in the development of a Nexus Funding Evaluation, which identified and evaluated the feasibility of various funding strategies through the GI TAC; (3) assessed the funding strategies of the Nexus Funding Evaluation for local applicability; (4) discussed opportunities for public and private cooperation; and (5) developed a process for funding GI through integration into the City's existing CIP.

A single source of revenue for GI is unlikely to cover all the various elements of a GI program. Instead, implementation of GI will require a range of funding sources. This chapter is a starting point to both gauge funding needs and develop a suite of funding options for use with GI. As the program develops, the funding needs and opportunities may change. This chapter and the City's approach to funding may be revisited in the future as more information becomes available and more awareness is brought to the GI policies and requirements.

8.2 GI Program Elements and Funding Needs

8.2.1 Current Assessment of GI Costs

Implementation of GI measures is expensive. It is estimated that the cost to install the GI required to be in place by 2040 per the MRP ranges in the tens of millions of dollars for the capital (construction) costs alone. Additional costs include management of the GI program, planning, design, tracking of completed projects, as well as operations and maintenance.

One of the difficulties of developing funding for GI is that few funding sources are available which can be used for all the elements of a GI program throughout its lifecycle. For example, grants can be used to fund design and construction costs, but not overall management of the GI program or operations and maintenance costs.

GI costs may include the following:

- **Program Management.** Though the City has managed MRP compliance for many years, GI implementation will take additional staff time beyond permit compliance activities which occurred prior to 2016. In addition to reviewing CIP projects for GI potential, City staff will track

GI projects and monitor progress toward achieving the milestones for GI implementation for 2030 and 2040. Participation in the SMCWPPP GI TAC will also likely continue to be necessary past the date when the GI Plan is submitted in September 2019 to assist in developing the Countywide Sustainable Streets Master Plan and to coordinate with other San Mateo County agencies on GI implementation and tracking efforts. Interdepartmental meetings among the Public Works, Planning, and Parks and Recreation Departments will also likely continue to be necessary to ensure that GI is implemented successfully on private and public projects.

- **Capital Costs.** GI capital costs depend on the type of measure(s) to be implemented, the size of the facility, the ease with which such measure(s) can be incorporated on a project that includes other elements, and the local context (such as the ease of connecting to existing drainage systems, how steep the area is sloped, space limitations, and nearby existing utilities).

  Because of the limited construction cost data available for public GI projects in San Mateo County, it is difficult to estimate their cost. Several private projects have been constructed in San Mateo County, but often the City does not have access to the detailed cost data for the GI component(s). Private project and public project costs differ in several ways: public projects must contend with the removal and modification of existing street infrastructure, utility conflicts, space limitations, pedestrian safety and grade limitations, and must be constructed with prevailing wage labor forces. San Mateo County also tends to have higher construction costs than other Bay Area counties, and California in general has higher construction costs than the nationwide average. In addition, GI detailing can vary widely from jurisdiction to jurisdiction, making it difficult to make cost comparisons among projects.

  Current (2019) capital costs for a bioretention area can range from $50 to $150 per square foot, a span highly dependent on local context, grading required, water and power sources, storm drain connection proximity, and selected plant palette and irrigation system. Permeable paving can range from $25 to $100 per square foot, depending on the depth of the section and whether it is necessary to work around existing utilities or trees. Capital costs of $129,000 to $187,000 per acre of impervious area managed[29] were quoted for projects in Onondaga County, New York, which would work out to roughly $258,000 to $374,000 for curb extensions installed at an intersection which treats 2 acres of impervious surface area. Limited recent local bid result data suggest that the same project would cost in excess of $500,000 to construct in San Mateo County.

- **Planning and Design Costs.** Planning and design costs for CIP projects are typically around 10-20% of the capital costs. Integrating GI into other capital programs can reduce both the construction costs for GI as well as the design costs. The SMCWPPP Green Infrastructure Design Guide (*Design Guide)* clarifies the application of GI on public projects. As GI becomes more common on public

[29] The Real Costs of GI, Stormwater Report. (2015, December 2). https://stormwater.wef.org/2015/12/real-cost-green-infrastructure/.

projects and GI designs are standardized, GI projects will become less expensive to plan and design.

- **Operation and Maintenance (O&M) Costs.** Limited data are available on maintenance costs, because maintenance is often performed by City staff as part of their regular course of business, making it difficult to separate time spent on maintenance of standard City landscaping and streets versus GI. Due to the specialized nature of the maintenance of GI measures, and due to a declining maintenance workforce being at capacity on maintenance of other City infrastructure, the City may need to contract maintenance work to an outside vendor. Vendors may in the future have special GI maintenance certifications not held by staff, such as the Bay Friendly Landscaping certification or the National Green Infrastructure certification by the Water Environment Federation. In Onondaga County, New York, maintenance costs for bioretention areas were approximately $2,000 per acre of impervious area managed per year.[30] This would be $4,000 per year for curb extensions installed at an intersection which treats 2 acres, or $200,000 in total over a 50-year life of the system. Again, these costs are likely lower than what would be anticipated in San Mateo County, and do not reflect inflation or the rising cost of construction projects. The *Design Guide* further clarifies GI maintenance needs, leading to standardized maintenance practices and lower maintenance costs.

- **Outreach and Education Costs.** The City will continue to participate in outreach and education for stormwater quality through the SMCWPPP Public Information and Participation (PIP) subcommittee. However, due to its limited budget and various priorities (e.g., trash and litter reduction as well as outreach to businesses and construction sites to coordinate with the stormwater inspection programs), the PIP subcommittee may have limited ability to offer GI-related outreach. However, ongoing outreach and education is an important facet of GI implementation, because it can lead to not only a better understanding of the measures being installed, but also could build support for a dedicated GI or environmental protection funding source. This may result in the construction of GI elements within individual homes and businesses on a voluntary basis.

- **Inspection Program Costs.** The City inspects private GI projects in accordance with its Enforcement Response Plan and Provision C.3.h of the MRP. The City's O&M agreement template allows for the City to seek reimbursement of the inspection costs. A typical inspection, including time for coordinating with the site representative and writing an inspection report, takes approximately three (3) hours per site. If follow-up inspections are required, an additional three (3) hours is often required for each follow-up visit. The frequency of inspections is specified in the City's ERP, but generally sites are inspected on a 5-year interval or more frequently, and 20% of

[30] *The Real Costs of Green Infrastructure.* (2015, December 2). Stormwater Report. https://stormwater.wef.org/2015/12/real-cost-green-infrastructure/.

the City's private GI projects are inspected each year. It is estimated that two (2) C.3 Regulated sites and two (2) Non-C.3 Regulated sites are inspected each year, at a total cost of approximately $4,000 - $6,000 per year. As additional GI projects are constructed, this cost will increase.

Figure 19 depicts the estimated relative costs of the GI program elements for a GI project with an assumed $500,000 construction cost consisting of stormwater curb extensions at an intersection. Limited data are available to ascertain these relative costs, so they have been assumed until more data becomes available.

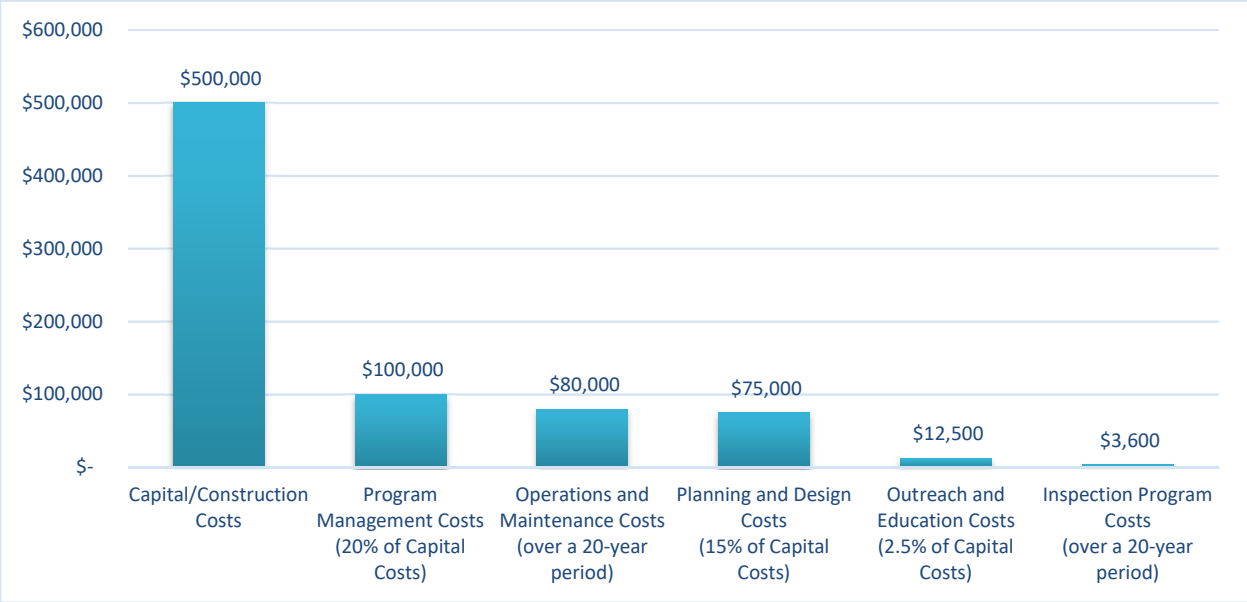


Figure 19. *Estimated Relative Costs of GI Program Elements.*

8.2.2 Future Assessment of GI Costs

Section 8.2.1 describes the costs associated with the various elements of a GI program based on limited funding information available in San Mateo County and in other areas of the United States. Estimated costs for GI will be improved over time with agency-specific and County-specific knowledge as the GI program is implemented. Future sources of cost estimating data will include bid results from GI projects, proposals received from designers and construction management firms to design and inspect GI projects, actual consultant and staff time spent providing program management, planning, and outreach services, public works maintenance staff time performing maintenance on GI systems, and time spent performing inspections. It will likely be difficult to assess time spent by staff on tasks relating to GI, as it will not necessarily be tracked separately from other staff time.

The City may also draw from other published resources available to estimate the costs of GI. For example, the SFPUC has made its cost estimating model available to other municipalities to use for planning-level analyses. This Excel-based model can be used as a planning tool to plan and budget for GI maintenance obligations for labor and costs. The user will be able to input user-defined project attributes (e.g., BMP type, size, date), and the model will yield long-term maintenance costs and staffing obligations as outputs.

Permeable pavers located at Mac Dutra Plaza.

8.3 Funding Strategies

Through the GI TAC, the City and SMCWPPP developed a GI Funding Nexus Evaluation document for jurisdictions within San Mateo County with the goal of expanding on existing stormwater funding sources and supplementing them with strategies in line with GI implementation goals. The Nexus Funding Evaluation describes and evaluates funding mechanisms, outlines funding needs, and provides strategies to procure such funding for design and construction of new GI. This subsection is intended to describe the City-specific approach to the funding strategies discussed in the Nexus Evaluation. Rather than repeating the information available in the Nexus Evaluation, this subsection can be used in connection with the Nexus Evaluation to further explore those funding options that align with the City's priorities. It is anticipated that the evaluation of funding options for GI is an ongoing process and will be revisited as the program develops.

BALLOTED APPROACHES

The most sustainable and formative funding approach, but also the most challenging. Successful balloted approaches are most inclined to provide significant funding for stormwater management and stormwater-related projects. The two (2) biggest challenges for balloted approaches are planning the strategy for the proposed project/program and effectively presenting the project and vision to the voting community. Examples of balloted approaches include the following:

- **Parcel Taxes**
- **Other Special Taxes**
- **Property-Related Fees**
- **General Obligation Bonds**

City-Specific Approach: At this time, the City does not plan to pursue GI-specific parcel taxes, other special taxes, property-related fees, or general obligation bonds, but may revisit these funding approaches as the program develops. Other local agencies may implement these funding strategies in the coming years. By delaying implementation of these funding strategies, the City can build upon the efforts of these early adopters.

NON-BALLOTED APPROACHES

These include funding strategies that do not require a ballot or voter approval. Non-balloted approaches may encounter lack of support from the general public; therefore, a nexus study/cost analysis is required to determine the middle ground cost that would not be considered a tax to the payer of the fees. Examples of non-balloted approaches include the following:

- **Senate Bill 231**
- **Regulatory fees**
- **Developer Impact Fees**
- **Re-Alignment**
- **Grants**
- **Loans**

City-Specific Approach: The City has already successfully pursued grants for GI and will continue to pursue grant opportunities as they arise. One example of a grant-funded GI project was the Correas Street Reconstruction Project, which was funded by a C/CAG Safe Routes to School / Green Infrastructure Pilot Program grant and included bioretention areas at the intersection of Correas Street and Purissima Street. At the Countywide level, the City will help to lobby for the inclusion of GI funding in transportation grants, stormwater grants, and other grants for capital programs that lend to integration with GI.

Senate Bill 231, signed by Governor Brown on October 6, 2017, helps to clarify that “sewer” is intended to be used interchangeably to mean “storm sewer” and “sanitary sewer” to gain access to funds made available by Proposition 218. However, there is no legal precedent for an agency’s instituting stormwater

fees without a ballot measure, and it is important for any agency considering such an approach to consult with other agencies and industry groups to coordinate their efforts in a strategic manner. The City will continue to support Senate Bill 231 at a Countywide level through SMCWPPP and C/CAG.

The City of Half Moon Bay has developer funds for the Highway 1 Safety – North project from the Pacific Ridge Subdivision but does not have developer impact fees for other purposes, such as storm drainage or green infrastructure. The City is interested in pursuing a developer impact fee for stormwater, which could also be used to fund green infrastructure measures. GI is a stormwater management strategy which can detain or retain stormwater flows, thereby reducing localized flooding and lessening the impacts of stormwater runoff on the storm drain system. It can also provide capacity, either above or below ground, to accommodate future development. By integrating GI in the City's stormwater management toolbox, the City can use funding normally reserved for storm drain improvements.

SPECIAL FINANCING DISTRICTS

Financial frameworks that were constructed by the local government to levy fees, taxes, and assessments for any improvements and services conducted. Most special financing districts are required to conduct a ballot that includes affected property owners, but in most cases, these affect small areas or an individual landowner. Examples of special financing districts include the following:

- **Benefit Assessments**
- **Community Facilities District**
- **Business Improvement Districts**
- **Enhanced Infrastructure Financing Districts (EIFD)**

City-Specific Approach: The City does not have special financing districts nor is currently considering a special financing district for green infrastructure but may revisit this approach as the program develops. The City has several streets with a rural character which do not have traditional sidewalk, curb and gutter. Residents may like to see improved with lighting, sidewalks, drainage facilities, and other streetscape improvements, and therefore may be interested in a special district to help construct these elements in their neighborhood. GI can be integrated with these improvements to manage and treat stormwater and provide neighborhood green spaces.

PARTNERSHIPS

Partnerships are effective strategies to acquire additional funds and resources needed for GI improvement projects. Collaborative efforts do not guarantee direct additional funding, but they can establish alternative benefits that will supplement the overall resources necessary to complete proposed GI projects. By distributing resources and funding throughout different entities, GI improvement projects and programs are capable of being delivered more cost-effectively. Examples of partnerships include the following:

- **Multi-Agency Partnerships (includes Regional Projects)**
- **Transportation Opportunities**
- **Caltrans Mitigation Collaboration**
- **Public-Private Partnerships (P3)**
- **Financial Capability Assessment**
- **Volunteers**

City-Specific Approach: The City will investigate opportunities to partner with other agencies to construct regional projects which help improve water quality Countywide and contribute to the City's GI implementation goals. The City may pursue transportation funding which can be used to mitigate transportation challenges as well as construct GI. The City is interested in collaborating with Caltrans for a project in the vicinity of Caltrans right-of-way (such as Highway 1).

The City will continue to work with SMCWPPP to advertise how GI can bring economic vitality to the surrounding areas, and through this outreach, may be able to convince local businesses of the benefits of GI. As the program develops, the City will continue to look for opportunities to promote public and private partnerships, such as partnering with local community groups to clean up GI measures. The City already partners with volunteers for regular creek cleanups, which increases civic engagement and helps the City to divert funds to tasks which require trained staff, such as storm drain maintenance.

ALTERNATIVE COMPLIANCE

Previously, the SFRWQCB has provided alternative compliance options in Provision C.3.e.i of the MRP 2.0 which can be utilized on Special Projects that meet certain criteria and cannot feasibly install the required amount of LID treatment onsite. The alternative options include the following:

- Construction of a joint stormwater treatment facility with the ability to treat combined runoff from two or more regulated projects
- Construction of a stormwater treatment system off-site
- Payment of an in-lieu fee for regional projects

These and other alternative compliance options can also be used on Non-Regulated projects, but with more flexibility than what could be used on regulated projects. On regulated projects, the alternative compliance site must be within the same watershed as the site to be mitigated and must be constructed within three (3) years of the site to be mitigated. Regional project timelines may be extended up to five (5) years. These same restrictions do not apply to Non-Regulated projects.

Examples of alternative compliance include the following:

- In-Lieu Fees
- Credit Trading

City-Specific Approach: Under the terms of the current MRP, in-lieu fees cannot be implemented simply enough to ensure successful funding of GI projects. If the regulations change to offer more flexibility, the City may reassess opportunities for in-lieu fees on regulated projects.

The City is interested in a future credit trading program and will continue to work with SMCWPPP and the GI TAC to explore this option further. As more GI projects are identified through the CIP screening process (see Chapter 4, Project Identification and Prioritization), there will be more opportunities to utilize alternative compliance.

8.4 Economic Vitality Benefits and Public-Private Cooperation

By communicating the benefits of GI to local businesses and residents, the City hopes to encourage voluntary implementation of GI and/or build support for a special financing district to avoid needing to resort to additional blanket-style requirements on developers. On a project-by-project basis, the City can assess opportunities to meet water quality goals, and scale implementation to fit the project constraints. The City will continue to explore public and private cooperation opportunities as the GI program develops.

GI can help to support economic vitality by providing access to landscape and green spaces, which results in the following direct benefits to residential and commercial areas[31]:

- Higher property values and rent value
- Increased consumer spending in commercial districts
- Energy savings
- Reduced lifecycle and maintenance costs (for some treatment measures)
- Lower possibility of flood damage
- Lower water bills, if rainwater harvesting is used
- Reduced crime
- Improved health and job satisfaction for office employees
- Healthier and more sustainable communities
- Community placemaking
- Improved worker productivity
- Increased potential that patrons will linger longer on retail main streets
- Higher occupancy rates for apartments and shorter periods between leases

8.5 Integration of GI with the Capital Improvement Program

One obstacle to funding a GI program is that the City must balance the many needs of its community to both keep the City operational and well-maintained while working towards the goals and vision set forth in the City's General Plan. Pavement maintenance, replacement and repair of underground utilities, transportation improvements, performing facility needs assessments and making facility upgrades, and parks improvements are all key facets of the City's CIP. The City can adopt innovative approaches to working within the framework of the existing CIP and budget in order to fund GI.

Though it is primarily an outgrowth of a stormwater or environmental program, GI can be considered an expansion of many different CIP projects because it provides benefits beyond simply improving water quality (see Figure 20).

[31] *GI Design Guide,* 1st Edition. (2019, June). San Mateo County Water Pollution Prevention Program. Pages 1-13.

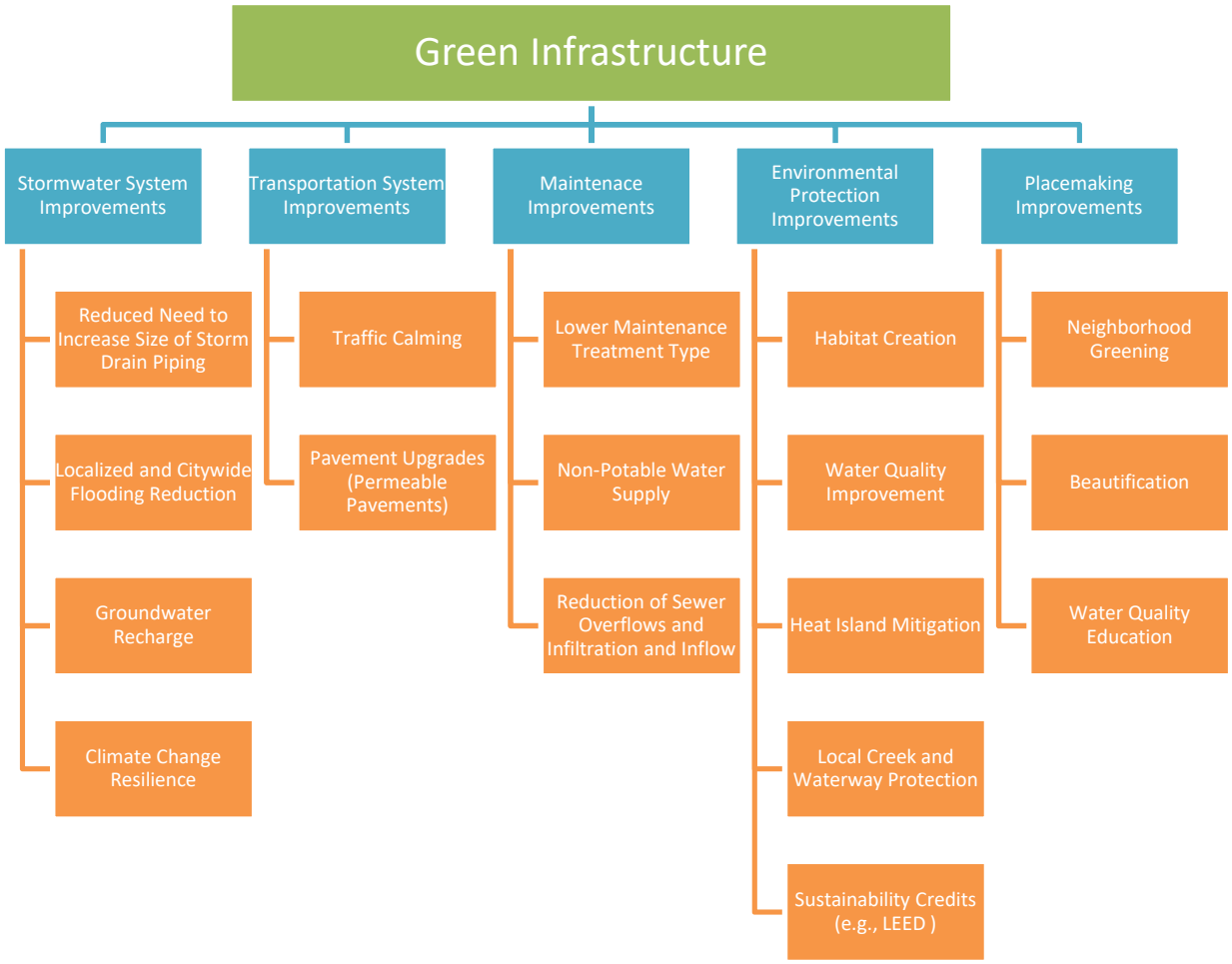


Figure 20. *Integration of GI with other types of improvements.*

By recognizing the many direct and ancillary benefits of GI, it becomes possible to integrate GI on several CIP Program projects, if the project goals align with the GI benefits. Examples of projects that potentially lend to integration with GI include the following:

- Park or facility upgrades
- Pavement rehabilitation
- Creek channel repairs
- Storm drain repairs
- Complete streets projects

Some cost reduction is achieved by early incorporation of GI. By integrating GI into the project scope early, the project can incorporate GI more seamlessly, and in a way that does not greatly increase project costs. Prioritization and early screening of CIP projects is discussed in Chapter 4, Project Identification and Prioritization.

Flow-through planter located at the Half Moon Bay Public Library.

8.6 Integration of Green Infrastructure with Adopted Budget

The City of Half Moon Bay currently uses a combination of federal and state grants along with local funding sources to fund construction of projects in its Capital Improvement Program (CIP) and other projects.

The City's major funding sources are listed below, and are more particularly described in the City's 2018-2019 Adopted Budget:

- General Fund – Capital improvements
- Development Impact Fees
- Measure A Funds
- State Gas Tax
- Measure M Vehicle Registration Tax
- Coastal Conservancy Grant
- Department of Water Resources and Other State Sources
- San Mateo County Transportation Authority

In order to facilitate the future integration of GI in the CIP, a sample list of potential GI measures which may be integrated into various types of projects is shown in Table 14.

Table 13. *Sample Integration of Potential GI Measures with Adopted Budget.*

TYPES OF PROJECTS	FUNDING SOURCES	POTENTIAL GREEN INFRASTRUCTURE MEASURES										OTHER TREATMENT MEASURES
		Stormwater Planter / Rain Garden	Stormwater Curb Extension	Tree Well / Stormwater Tree / Interceptor Tree	Infiltration System	Pervious Pavement	Green Roof	Rainwater Harvesting	Vegetated Swale	Green Gutter	Green Wall	Hydrodynamic Separator Media Filter High-Flow Rate Tree Well Filter
Pavement Rehabilitation • City Parking Lots Reconstruction • Other Future Potential Projects	General Fund State Gas Tax Measure A Fund Special Fund	✓	✓	✓	✓	✓			✓	✓		
Transportation • Correas Street Reconstruction between Main and Church Street • Poplar Street Complete Street Project • Kelly Ave/SR 1 Drainage and Intersection Improvement • Kelly Complete Street Project • Other Future Potential Projects	General Fund State Gas Tax Measure A Fund	✓	✓	✓	✓	✓			✓	✓		
Stormwater • Storm Drain Master Plan Implementation • Kehoe Ditch Improvements • Roosevelt Ditch Improvements • Other Future Potential Projects	General Fund Development Impact Fees	✓	✓	✓	✓							✓
Non-Stormwater / Facilities • Smith Field T-Ball Field & Tot Lot • Half Moon Bay Library Replacement Project* • Fire Department Training Lot* • Other Future Potential Projects	General Fund Special Fund	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
**Existing Green Infrastructure Projects*												

9.0 OUTREACH AND EDUCATION

9.1 Introduction

The MRP states that each Permittee under a Green Infrastructure (GI) Plan shall perform the following tasks:

> *Provision C.3.j.i.(4)(a): "Conduct public outreach on the requirements of this provision, including outreach coordinated with adoption or revision of standard specifications and planning documents, and with the initiation and planning of infrastructure projects. Such outreach shall include general outreach and targeted outreach to and training for professions involved in infrastructure planning and design."*
>
> *Provision C.3.j.i.(4)(b): "Train appropriate staff, including planning, engineering, public works maintenance, finance, fire/life safety, and management staff on the requirements of this provision and method of implementation."*
>
> *Provision C.3.j.i.(4)(c): "Educate appropriate Permittee elected officials (e.g., mayors, city council members, county supervisors, district board members) on the requirements of this provision and methods of implementation."*

The three primary goals of the outreach and education effort are summarized in Table 15:

***Table 14**. Outreach and Education Goals, Objectives, and Audiences.*

Outreach and Education Goal	Objective	Audience
Public Outreach	Conduct public outreach on the GI requirements, including outreach coordinated with adoption or revision of GI guidelines and standards as well as planning documents, and with the initiation and planning of infrastructure projects.	Both the general public and professionals involved in GI planning and design.
Train Appropriate Staff	Conduct training on the GI requirements and the methods of implementation.	Community Development Department, Department of Engineering and Public Works Maintenance, Finance, Fire/Life Safety, and Management Staff.
Education of Elected Officials	Conduct outreach on the GI requirements and methods of implementation.	Mayor, City Council, and Planning Commission.

One of the first steps in the development of a GI Plan is educating department staff, managers, and elected officials about the purposes and goals of GI, the benefits of GI, the required elements of the GI Plan, and the steps needed to develop and implement the GI Plan. It is vital to earn the support of City Council, City staff, and members of the public to ensure successful implementation of the GI Plan. Outreach and

education efforts began in FY 15-16 and will continue even after GI Plan adoption.

9.2 Public Outreach

9.2.1 Local Efforts

As part of the development of the GI Plan, the City created a Green Infrastructure, which features selected existing and potential green infrastructure projects within the City. Maps of both existing and potential projects can be accessed from the City website at http://www.half-moon-bay.ca.us/617/Green-Infrastructure. This allows the public to visualize green infrastructure throughout the City. These maps area also included in Appendix C.

The City conducted outreach in coordination with approval of the GI Workplan and GI Plan. **Refer to Section 9.4, Education of Elected Officials.**

Bioretention area located on Correas Street.

9.2.2 SMCWPPP Efforts

SMCWPPP has several committees which discuss ideas, plans, and schedules for new and ongoing participation in processes to promote GI, such as the New Development (ND) Committee, GI Technical Advisory Committee (GI TAC), and the Public Information and Participation (PIP) Committee.

SMCWPPP's PIP Committee releases an internal bimonthly document detailing its recent and future outreach efforts. This outreach work includes distribution of information about rain barrel rebates, provision of public-facing GI presentations and outreach materials, and dissemination of information about public outreach and citizen involvement events, as well as the Flows to Bay website which explains GI basics and provides links to documents relevant to municipal staff and elected officials, such as the *C.3 Regulated Projects Guide* and *Design Guide* (see Figure 21).

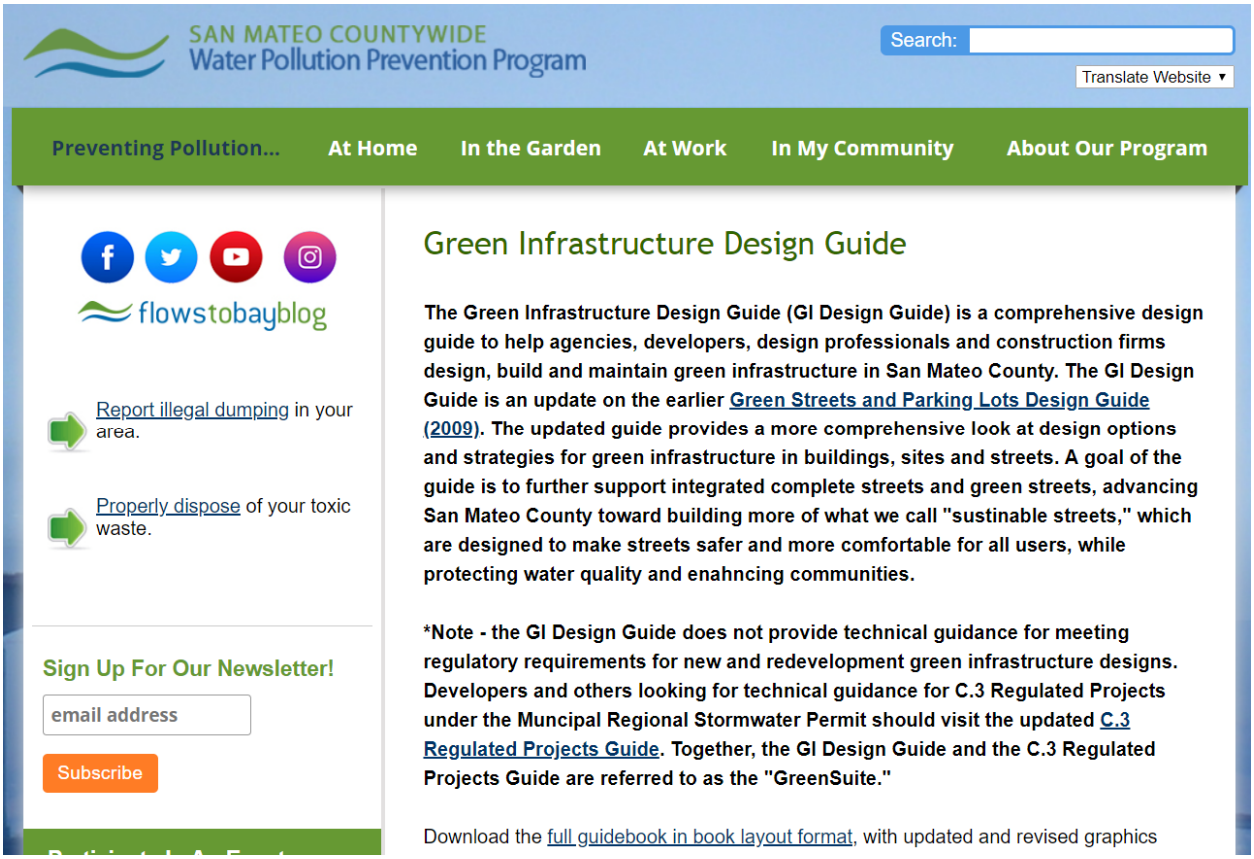


Figure 21. *SMCWPPP "Flows to Bay" Webpage, featuring the Green Infrastructure Design Guide.*[32]

On June 18, 2019, SMCWPPP hosted a training event for municipality staff and design professionals to cover the new and updated guidance documents produced, including the *Design Guide*, and *C.3 Regulated Projects Guide*.

[32] *San Mateo County Green Infrastructure Design Guide.* (2019b). SMCWPPP. https://www.flowstobay.org/gidesignguide.

SMCWPPP also engaged the public during the development of the Stormwater Resources Plan (SRP), which established a prioritization protocol for GI projects and an initial list of prioritized projects. Key public engagement efforts included the following (SMCWPPP 2017):

- Four (4) presentations to the SMCWPPP Stormwater Committee (public meetings) between January and November 2016.
- C/CAG staff presented on the SRP planning process at the Sustainable San Mateo County's November 2015 Water Indicator Summit and San Mateo County's Office of Sustainability's Sea Level Rise in July 2016.
- When the draft SRP was complete, C/CAG hosted three (3) public workshops to solicit public and stakeholder feedback in January 2017. At these workshops, C/CAG described the upcoming GI plans and how the SRP relates to that effort.
- C/CAG staff and consultants promoted the SRP workshops through social media (Facebook and Twitter).
- A press release was distributed to local media outlets, including both print and online publications to advertise the workshop. The press release also called attention to the Flows to Bay website (www.flowstobay.org), where the public could review the draft SRP and submit comments.

Bioretention area located at Half Moon Village Senior Complex.

9.3 Train Appropriate Staff

Permittees must conduct training for appropriate staff on the requirements of the MRP GI and methods of GI implementation. The City began this process in FY 15-16 with the development of the GI Workplan and continued to engage staff to discuss GI implementation. Interdepartmental coordination and staff training efforts included the following:

- Convened interdepartmental meetings with affected department staff and management to discuss GI requirements and GI plan development. Key departments involved included the Department of Engineering and Public Works and the Community Development Department. Outside of meetings, communication was maintained via email to update staff on the progress of the GI Plan and to receive feedback on a regular basis.
- Discussed the potential for incorporation of GI on CIP projects and continued to refine and add to the City's list of planned and potential GI projects. This list will continue to be updated in future years as part of the GI Plan implementation process.
- Participated in SMCWPPP training events.
- Participated in the SMCWPPP GI Subcommittee, New Development Subcommittee, and PIP Subcommittee. All these subcommittees discussed GI implementation and outreach.

9.4 Education of Elected Officials

On June 20, 2017, the City of Half Moon Bay City Council approved a Green Infrastructure Workplan under Resolution C-2017-36. The Workplan and presentation included educational material about green infrastructure and were reviewed by the Council ahead of the official submission. They raised awareness of what green infrastructure looks like, why it's important, and how it can benefit the quality of life and health of residents. When elected officials have a better understanding of green infrastructure and its benefits, they are much more likely to support its development.

The City of Half Moon Bay will conduct outreach to elected officials in coordination with GI Plan approval. The GI Plan sets milestones for green infrastructure, defines process and approaches for identifying and prioritizing projects, and has been crafted to align with other local planning documents. It will help to define the way in which the City approaches infrastructure on projects which have GI potential over the next 20 years and beyond. Therefore, the City felt it was appropriate and important to receive City Council buy-in and support.

Any future changes made to local planning documents and municipal code to support GI implementation will be reviewed by the Planning Commission prior to their adoption by the City Council.

9.5 Next Steps

The City will continue to engage the public while implementing the GI plan to advertise the many benefits of GI and build support for GI projects.

As part of the SMCWPPP FY 18-19 Annual Report, a plan and schedule for new and ongoing participation in processes to promote GI at the regional level will be developed. The following future approach and potential activities were discussed at a recent New Development Subcommittee:

- Continue actions related to the Regional Roundtable and reconvene the Roundtable with key participants such as San Francisco Bay Area Planning and Urban Research Association (SPUR), Caltrans, Save the Bay, and others. Bay Area Stormwater Management Agencies Association (BASMAA) and San Francisco Estuary Partnership (SFEP) will conduct tasks that address this idea, including creating an Executive Summary and Action Plan for the Roundtable "Roadmap" under a supplemental contract as part of the *Urban Greening Bay Area* grant.
- Continue to work with Caltrans on GI implementation funding opportunities along State routes.
- Continue to work with MTC to integrate GI into transportation plans and funding.
- Conduct workshops and trainings on asset management for GI, possibly in coordination with CASQA, the SFRWQCB, and/or the EPA.

10.0 IMPLEMENTATION APPROACH

10.1 Overview

MRP Provision C.3.j.i.(3) requires each Permittee to complete the following:

> *"Adopt policies, ordinances, and/or other appropriate legal mechanisms to ensure implementation of the Green Infrastructure Plan in accordance with the requirements of this provision."*

The various elements of the Green Infrastructure (GI) Plan comprise an implementation toolbox (Figure 22 on the next page) that the City will access over the life of the GI Plan to foster improved water quality through design and construction of public and private GI facilities. As the GI program develops, the City will apply adaptive management strategies for flexibility in the face of changing conditions, development climates, and forecasts. Additional implementation strategies may be evaluated in the future.

Bioretention area located at the fire department training lot.

Figure 22. *City's starting Green Infrastructure Implementation Toolbox.*

10.2 Private Development Program and Policies

10.2.1 Standard Operating Procedures

The City is committed to shifting its conventional "gray" storm drain infrastructure to more resilient, sustainable stormwater management which reduces runoff volumes, disperses runoff to vegetated areas, harvests and uses runoff where feasible, promotes infiltration and evapotranspiration, and utilizes natural processes to detain and treat runoff. This will include implementing, to the extent practicable, Low Impact Development (LID) features and facilities such as pervious pavement, bioretention facilities ("rain gardens"), green roofs, and rainwater harvesting systems.

The City will continue to use its planning, zoning, and building authorities to require proposed new and redevelopment projects to incorporate LID features and facilities in accordance with the New Development and Redevelopment (Provision C.3) requirements and the current edition of the San Mateo County Water Pollution Prevention Program C.3 Guidelines.

The City's development review process is summarized in flowcharts in Appendix D for each of the following project phases:

- Entitlement Pre-Application Review
- Development and Redevelopment C.3 Applicability Review
- Entitlement Review
- Plan Review
- Construction Oversight
- Closeout / Acceptance / Occupancy

These flowcharts summarize the process by which both Provision C.3 Regulated and Non-C.3 Regulated Projects are reviewed (as well as the level of detail required) for each project phase. They demonstrate the coordination efforts required between City departments and external agencies. Documenting this process and integrating key information from the MRP helps to avoid information or department "siloing", where the requirements or process are only understood by a few key individuals. The City will aim to use these flowcharts to train new staff. City staff will periodically update the flowcharts as necessary to reflect new MRP requirements.

The City of Half Moon Bay utilizes Standard Conditions of Approval during the entitlement review and plan review phases to implement GI in private developments. The standard conditions include requiring applicants to complete C.3. and C.6. checklists and impervious surface data collection worksheets to require GI features in projects where impervious surface disruption thresholds are met. The City also requires strict adherence to the Local Coastal Plan, which has many environmental protection policies. In addition, the conditions require NPDES Best Management Practices (BMPs) to be inserted into plans and observed during construction to contain runoff and pollutants.

10.2.2 Municipal Code

The City reviewed its existing ordinances and other regulatory polices to identify whether sufficient legal authority existed to implement the GI Plan and comply with the MRP. Based on the existing Municipal Code, the City currently holds the legal authority to require implementation of GI in both public and private projects which are Provision C.3 Regulated under the MRP. The following sections of the City of Half Moon Bay Municipal Code provides the City with the authority to require GI implementation:

- Chapter 13.04 Water Conservation in Landscaping Regulations
    - 13.04.120 Storm water management. *Storm water best management practices should be implemented into the landscape and grading design plans to minimize runoff and to increase on-site retention and infiltration and should be consistent with city and county storm water management requirements.*
- Chapter 13.15 Storm Water Management and Discharge Control
    - 13.15.050 Construction and application. *This chapter shall be construed to assure consistency with the requirements of the Federal Clean Water Act and acts amendatory thereof or supplementary thereto, applicable implementing regulations, and NPDES Permit No. CA0029921 and any amendment, revision or reissuance thereof.*
    - 13.15.110 (C) Best Management Practices for New Developments and Redevelopments. *Any construction contractor performing work in the city shall endeavor, whenever possible, to provide filter materials at the catch basin to retain any debris and dirt flowing into the city's storm sewer system. City may establish controls on the volume and rate of storm water runoff from new developments and redevelopments as may be appropriate to minimize the discharge and transport of pollutants.*
    - 13.15.110. (D) Compliance with Best Management Practices. *Where best management practices guidelines or requirements have been adopted by the city for any activity, operation, or facility which may cause or contribute to storm water pollution or contamination, illicit discharges, and/or discharge of non-storm water to the storm water system, every person undertaking such activity or operation, or owning or operating such facility shall comply with such guidelines or requirements (as may be identified by the director of public works). (Ord. 5-94 §1(part), 1994).*
- Chapter 18.38 Coastal Resource Conservation Standards
    - 18.38.120 Water quality protection--Exceptional lots. (A) *On-Site Retention and Infiltration. To the maximum extent feasible, development shall not result in an increase in the peak rate or average volume of off-site storm water discharge from the pre-development discharge. This requirement shall be achieved by maximizing on-site storm water retention and infiltration. […]*

- 18. 38.120 Water quality protection--Exceptional lots. *(D) Development shall be undertaken in accordance with the following post-construction phase best management practices. […] Post-construction phase BMPs may include but are not limited to:*
  - *(1) Use permeable materials for driveways and walkways to the maximum extent feasible.*
  - *(3) Direct rooftop and driveway runoff to on-site pervious areas such as landscaped areas, and avoid routing rooftop runoff to the roadway, drainage ditches, or other storm water conveyance systems.*
- 18.38.120. Water quality protection – Exceptional lots. This section describes several measures which promote water quality protection in connection with the City's Coastal Resource Conservation Standards, including on-site retention and infiltration, prevention of discharge of pollutants, and implementation of post-construction phase best management practices.
- 18.38.121 Water quality protection--Mobile home parks. (A) *On-Site Retention and Infiltration. To the maximum extent feasible, development shall not result in an increase in the peak rate or average volume of off-site storm water discharge from the pre-development discharge. This requirement shall be achieved by maximizing on-site storm water retention and infiltration […]*

In addition, the City is in the process of amending Title 18, Coastal Resources, for clean-ups related to the Local Coastal Land Use Plan Update. The amendment is tentatively scheduled to be complete in 2020.

Bioretention area located at Hatch Elementary School.

10.3 Maintenance Programs and Policies

An effective maintenance program helps ensure that GI measures continue to perform as designed. Compared to conventional "gray" pipe-based stormwater facilities, GI measures are much more maintenance-intensive, and their performance depends on the level of maintenance effected. A successful maintenance program has three (3) key elements: (A) consideration of maintenance issues during design of GI measures, (B) development of an Operation and Maintenance (O&M) agreement, and (C) implementation and enforcement of this O&M agreement.

The City is responsible for ensuring that storm sewer system components within the City's right-of-way, such as conveyance pipes, manholes, catch basins, GI measures, and other BMPs are maintained and in good working order. Maintenance of these measures falls under the City's standard operating procedures for stormwater assets. **Additional information about maintenance of stormwater treatment measures is provided in the SMCWPPP Green Infrastructure Design Guide, Chapter 6.**

Most on-site stormwater facilities located in the City of Half Moon Bay are owned and maintained by private property owners—not the City. These property owners include, but are not limited to,

homeowners associations (HOAs), property management companies, school districts, commercial/industrial site owners, and residential homeowners. They are responsible for the care and management of their facilities and are expected to conduct regular stormwater inspections.

To ensure successful maintenance of installed GI measures on development projects, the City requires the project proponent to sign a statement accepting responsibility for operation and maintenance through an O&M Agreement. Through such an agreement, the project proponent accepts responsibility for O&M of the installed GI measures until such responsibility is legally transferred to another entity. Acceptance of maintenance responsibility can be documented via another legally enforceable agreement or mechanism allowed per Provision C.3.h. of the MRP. Assumption of responsibility for O&M may be documented through various means. Such means may include written text included in project deeds or conditions, covenants and restrictions (CCRs) for multi-unit residential projects that require the homeowner's association, or, if there is no association, each individual owner, to assume responsibility for the O&M of the installed GI measures.

The minimum requirements of any O&M Agreement are listed below:

- Full description of the stormwater treatment measures to be maintained;
- An O&M Plan describing the schedule for maintenance;
- Provisions for access by SFRWQCB staff, mosquito and vector control agency staff, and City staff;
- Requirements for property owner(s) to maintain the function of the stormwater treatment system(s) and, if applicable, hydromodification management control(s); and
- Mechanism for denoting that O&M responsibilities "run with the land" (that is, are conveyed to the new owner when a property is transferred).

The City has developed a Business Inspection Plan (BIP) and Enforcement Response Plan (ERP) describing the process by which the City inspects GI measures on development projects for enforcement of proper installation and maintenance.

10.4 Implementation of Public Green Infrastructure

10.4.1 Internal Policies that Support GI Implementation

The City maintains an ongoing list of prioritized GI opportunities, based on a screening of its CIP, as discussed in Chapter 4. This list is updated annually with new opportunities. The City will strive to incorporate GI on the following types of projects:

- New construction and substantial upgrades to City facilities—including public buildings, offices, stations, parking lots, and corporation yards—which are found to have GI potential.
- Transportation projects for which the City is a sponsor or participant, including roadway widening or reconstruction, streetscape improvements, "complete streets" projects, traffic calming, safe

routes to schools, and other projects that involve roadway reconfiguration which are found to have GI potential.

- Storm drain capacity improvement or reconfiguration projects which are found to have GI potential. The complete Storm Drain Master Plan includes green infrastructure recommendations applicable to various areas in the City. Specific design details will be determined during the design of future storm drain improvement projects.
- Parks improvements projects which are found to have GI potential.
- Private development projects which are under review by the City.

When a project is found to be Provision C.3 Regulated, measures will be installed in accordance with the Provision C.3 requirements of the MRP. Non-regulated projects will use either the Provision C.3 sizing criteria or alternative sizing criteria, as discussed in Section 6.3.3.

If a project is reviewed for GI potential and it is found that GI implementation is infeasible, the reasons for infeasibility will be documented internally, and the project removed from the City's map and list of prioritized projects.

Vegetated area at the Coastside Senior Housing which receives stormwater runoff from adjacent sidewalk areas.

10.4.2 Early Project Implementation

During the development of this GI plan, the City has also begun exploring various green infrastructure opportunities which are appropriate to the context and character of the City.

These opportunities include:

- **Highway 1 Safety – South.** This project will provide operational and safety improvements to Highway 1 between Wavecrest Road and Seymour Street. It also includes a controlled pedestrian/bicycle access point to serve Naomi Patridge Trail and Smith Field Park.
- **Highway 1 Safety - North.** This project includes operational and safety improvements to Highway 1 between North Main Street and Kehoe Ave. It also includes lane intersection improvements for signalization. This project includes the development of multi-use trail on the east side of Highway 1 from Main Street North to Kehoe Ave. The project will minimize impervious surfaces to accommodate vehicular safety and conservation of natural areas where possible. The project is approved to install biotreatment areas.
- **John L. Carter Park Improvement.** The Parks Master Plan identified John L. Carter Memorial Park as an opportunity to create a more actively utilized space by adding improvements to facilitate greater opportunities for performances and day camps. The purpose of this project is to develop a long-term plan for the site and identify projects that may be completed in the near-term to improve the site. The City will assess the potential for incorporating GI measures on this project as a strategy to manage stormwater runoff onsite.
- **Kehoe Ditch Implementation.** The project involves project design and consultation with resource/permitting agencies to address hydrologic and hydraulic issues within the 21,648 linear foot watershed. Habitat enhancement may be included as a desired outcome as part of the consultation, scoping, and grant-seeking process. The City would like to explore incorporating either in-line or off-line GI measures as a means of enhancing habitat and addressing the hydrologic/hydraulic issues.
- **Kelly Avenue Complete Street.** This project will improve 4,532 feet of Kelly Avenue, including improved pedestrian/bicycle access and drainage. The project will be assessed for GI potential as it develops.
- **Kelly Avenue / Highway 1 Drainage and Intersection Improvement.** This project will improve pedestrian circulation, traffic flow, and drainage at the 15,000 square foot Highway 1 and Kelly Avenue intersection. The project is intended to provide improved and safer pedestrian crossing and extend the southbound left-turn lane per Caltrans requirements. The project will likely include a bioretention area.
- **Naomi Patridge Trail Extension.** This project will extend the Naomi Patridge Trail from Wavecrest Road to Miramontes Point Road. Various GI measures will be considered during project design

development. The project could include bioretention areas, or the trail surface could be constructed of permeable surfacing materials, such as porous asphalt.

- **New Magnolia/Seymour Park.** This project will convert an existing vacant lot into a new neighborhood park. The new park design will integrate GI if feasible.
- **Ocean Colony Trail Repair North.** This project involves rehabilitation of an existing trail. Various GI measures will be considered during project design development, including bioretention areas.
- Ocean View Park Restroom Replacement.
- **Poplar Street Complete Street Project.** This project will improve pedestrian/bicycle access and drainage on Poplar Avenue. Various GI measures will be considered during project design development, including bioretention areas.
- **Seymour Ditch Erosion Repair.** Currently, this project includes erosion repair over 300 linear feet of Seymour Ditch. The City will assess the possibility of adding GI to this project, such as an off-line or upstream facility which treats runoff prior to entering Seymour Ditch.
- **Smith Field T-Ball Field / Smith Field Tot Lot.** The City anticipates significant improvements to Smith Field, including the addition of a T-Ball Field and Tot Lot. There may be opportunities to construct GI, including bioretention areas, when constructing these improvements.
- **Walkway Extension from Cameron's to Smith Field.** This project will provide an all-weather use, 2,162 linear foot walkway along Wavecrest Road to encourage multimodal transportation to Smith Field park. The project will consider the addition of GI, such as the use of permeable surfacing.

10.4.3 Workplan to Complete Prioritized Projects

MRP Provision C.3.j.i.(2)(j) requires each Permittee to complete the following:

> *"A workplan to complete prioritized projects identified as part of a Provision C.3.e. Alternative Compliance program or part of Provision C.3.j. Early Implementation."*

The schedule and early implementation concept sheet in Appendix E and the City's CIP serve as the initial workplan to complete prioritized projects. The City's list of prioritized projects will be continuously updated and will eventually include projects identified through the San Mateo Countywide SSMP.

Bioretention area located at the Half Moon Bay Library.

10.5 Plan Updates Process

The GI Plan is intended to be a "living" document, periodically updated to reflect the outcomes of the City's adaptive management process, adjusting to reflect lessons learned and used to track GI implementation progress. The text of the GI Plan need not necessarily be updated in the future; however, as time progresses, the City may reassess the adequacy of its tools or implementation strategies to secure achievement of GI Plan milestones. Table 16 proposes a preliminary schedule for when various elements of the GI Plan may be revisited. The City may change or modify this schedule without updating this section.

Table 15. *Green Infrastructure Plan Update Schedule.*

GI Plan Implementation Element	GI Plan Reference Section	What will be updated	Update Schedule
GI Milestones Progress	Chapter 3.0, Green Infrastructure Milestones	Tracking of progress towards meeting GI milestones	**Annually.** This will be tracked via the City's internal database until 2021, or when the San Mateo Countywide SSMP is developed.
Capital Improvement Program Screening	Chapter 4.0, Project Identification and Prioritization	City's internal screening database	**Every 2 years,** or mid-cycle, as appropriate.
Tracking of GI Projects	Chapter 5.0, Project Tracking	City's internal database and public GI map	As needed (**annually**, at a minimum).
Tracking of GI Projects	Chapter 5.0, Project Tracking	Chapter 5.0, Project Tracking	**2021**, or when the San Mateo Countywide SSMP is developed.
Guidelines and Specifications	Chapter 6.0, Guidelines and Specifications	GI Guidelines and Standards	**Every 5 years**, the City will reassess the applicability of the Countywide GI Guidelines and Standards and review the potential for updating City-specific standards and details.
Planning Document Updates	Chapter 7.0, Integration with Other Planning Documents	Section 7.6, Future Updates	**2021**, or when planning document modifications are complete.
Funding Options	Chapter 8.0, Funding Options	Section 8.3, Funding Strategies	Revisit **every 5 years** to assess whether funding strategies are adequate.
Outreach and Education	Chapter 9.0, Outreach and Education	Internal outreach and education strategy	Participate at the Countywide level (estimated **2 times per year**) to support outreach and education about GI.
Programs and Policies	Chapter 10.0, Implementation Approach	Standard Operating Procedures, Municipal Code, and Policies	Revisit **every 5 years** to assess whether implementation approach is adequate.

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APPENDIX A: Glossary

Several terms used in this green infrastructure may be unfamiliar to readers. For the reader's convenience, definitions of key terminology have been adapted from various sources in the table below.

Key Term	Definition	References
Bioretention Area	A type of low impact development treatment measure designed to have a surface ponding area that allows for evapotranspiration and filters water through 18 inches of engineered biotreatment soil. After the water filters through the engineered soil, it encounters a 12-inch layer of rock in which an underdrain is typically installed to convey treated water to the storm drain system. Also known as a "Stormwater Planter".	*C.3 Regulated Projects Guide* – Glossary (SMCWPPP 2016) *Green Infrastructure Design Guide* (SMCWPPP 2019b)
Bioswale	See "Bioretention Area".	
Biotreatment	A type of low impact development treatment allowed under Provision C.3.c. of the MRP. Biotreatment areas must be designed to have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate and must use biotreatment soil as specified under the MRP (Appendix K of the C.3 Regulated Projects Guide).	*C.3 Regulated Projects Guide* – Glossary (SMCWPPP 2016)
Bulb-outs	Synonymous with "Curb Extension". Bulb-outs are extensions of the curb, gutter, and sidewalk into the roadway, typically located at street crossings such as intersections or mid-block crosswalks. They are a traffic calming and pedestrian safety enhancement measure that reduce the crossing distance for pedestrians. Stormwater curb extensions are curb extensions that incorporate the use of stormwater treatment	*Green Infrastructure Design Guide*

	through the use of stormwater planters or other green infrastructure measures.	(SMCWPPP 2019b)
Complete Streets	A complete street is 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. Every complete street looks different, according to its context, community preferences, the types of road users, and their needs.	Caltrans Division of Transportation Planning – Office of Smart Mobility and Climate Change
Detention Basin	Detention is the process of providing temporary storage of stormwater runoff in ponds, vaults, bermed areas, or depressed areas to allow treatment by sedimentation and metered discharge of runoff at reduced peak flow rates. In more urban situations, detention can also be provided by using rock filled trenches or suspended paving systems directly adjacent to other treatment measures to allow them to store water and treat it over a longer period.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Directly Connected Impervious Area	The area covered by a building, impermeable pavement, and/or other impervious surfaces, which drains directly into the storm drain without first flowing across permeable land area (e.g., turf buffers).	*C.3 Regulated Projects Guide* – Glossary (SMCWPPP 2016)
Dry Weather Runoff	Runoff that occur during period without rainfall. In a natural setting, dry weather runoff result from precipitation that infiltrates into the soil and slowly moves through the soil to the creek channel. Dry weather runoff in storm drains may result from human activities, such as over-irrigation.	*C.3 Regulated Projects Guide* – Glossary (SMCWPPP 2016)
Evapotranspiration	Evaporating water into the air directly or through plant transpiration.	*C.3 Regulated Projects Guide* - Glossary (SMCWPPP 2016)

Fiscal Year	A fiscal year is twelve consecutive months ending on the last day of any month except December.	IRS.gov
Flow-through Planter Box	A flow-through planter box is a contained landscape area designed to capture and retain stormwater runoff. It is fully lined and connected via an underdrain to a stormwater system.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Green Building	Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction.	United States Environmental Protection Agency https://www.epa.gov/land-revitalization/green-buildings (Accessed 6/12/19)
Green Gutters	Green gutters help capture and slow stormwater runoff within very arrow and shallow landscaped areas.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Green Infrastructure	Green infrastructure comprises a range of natural and built approaches to stormwater management–such as rain gardens, bioretention, and permeable paving–that mimic natural systems by cleaning stormwater and letting it absorb back into the ground. Green infrastructure could reduce the amount of runoff that enters the traditional piped stormwater system below ground and could prevent overflows that pollute nearby water bodies.	United States Environmental Protection Agency
Green Roof	Green roofs are landscaped systems placed on rooftops designed to capture rainfall and allow to evaporate back into the air before runoff is created.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Green Streets	Green Streets are defined as streets that maximize permeable surfaces, tree canopy, and landscaping elements in order to divert stormwater from the sewer system; filter and reduce the amount of polluted stormwater entering rivers and streams;	

	increase urban greenspace; improve air quality and reduce ambient air temperature; and improve watershed health. There is some evidence that Green Streets also improve pedestrian and bicycle safety and promote travel by these modes.	
Gray Infrastructure	Gray infrastructure is defined as traditional brick, mortar, and concrete construction to remove stormwater from its source and transport it to a downstream outfall or treatment facility.	Shamsi, U.M., J.W. Schombert, and L.J. Lennon. 2014. *SUSTAIN Applications for Mapping and Modeling Green Stormwater Infrastructure.* Journal of Water Management Modeling C379. doi: 10.14796/JWMM.C379
Groundwater Recharge	Groundwater recharge is the process in which surface flows are stored for a period sufficient for water to percolate into the soil or groundwater table.	Caltrans Willits Bypass Project Mitigation and Monitoring Proposal
Hydromodification	The modification of a stream's hydrograph, caused in general by increases in flows and durations that result when land is developed (e.g., made more impervious). The effects of hydromodification include, but are not limited to, increased bed and bank erosion, loss of habitat, increased sediment transport and deposition, and increased flooding.	NPDES No. CAS612008 Glossary
Impervious Surface	A surface covering or pavement of a developed parcel of land that prevents the land's natural ability to absorb and infiltrate rainfall/stormwater. Impervious surfaces include, but are not limited to, roof tops; walkways; patios; driveways; parking lots; storage areas; impervious concrete and asphalt; and any other continuous watertight pavement or covering. Landscaped soil and pervious pavement, including pavers with pervious openings and seams, underlain with pervious soil or pervious storage	NPDES No. CAS612008 Glossary

	material, such as a gravel layer sufficient to hold at least the C.3.d volume of rainfall runoff are not impervious surfaces. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether a project is a Regulated Project under Provisions C.3.b. and C.3.g. Open, uncovered retention/detention facilities shall be considered impervious surfaces for purposes of runoff modeling and meeting the Hydromodification Standard.	
Infiltration	The process of slowing, filtering, and soaking stormwater runoff into native soil. Greater infiltration can often be achieved, as necessary, by employing a specified biotreatment soil mix and aggregate storage prior to infiltration into native soil.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Infiltration Trench	Infiltration systems are underground facilities and structures designed to collect and temporarily store runoff, such as a gravel filled trench, pipe or vault, and allows the water to infiltrate into surrounding subsurface soils. In some cases, it can include an underdrain.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Low Impact Development (LID)	A sustainable practice that benefits water supply and contributes to water quality protection. Unlike traditional storm water management, which entails collecting and conveying storm water runoff through storm drains, pipes, or other conveyances to a centralized storm water facility, LID focuses on using site design and storm water management to maintain the site's pre-development runoff rates and volume. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source of rainfall.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Municipality	A municipality is a city, county, city and county,	California Air Resources

	special district, a public agency of the State of California, and any department, division, public corporation, or public agency of this State or two or more entities acting jointly, or the duly constituted body of an Indian reservation or rancheria.	Board FAQ
Non-Potable Water Supply	Any water, including reclaimed water, not meeting current potable water standards. Water which is suitable for beneficial uses excluding human consumption. Specifically excluded from this definition is "gray water."	California State Water Resources Control Board – Guidelines for Distribution of Nonpotable Water (1992).
Percolation	Percolation is the internal drainage rate of a substrate (in mm/hr) in the same way that infiltration indicates the capacity to infiltrate water into the surface of the substrate.	Caltrans Office of Stormwater Prevention – Soil Resource Evaluation
Pervious Surface	A natural, landscaped, or permeable hardscape (e.g., turf block, brick, natural stone, cobbles, gravel) that allows surface runoff to infiltrate into underlying soils.	*C.3 Regulated Projects Guide* – Glossary (SMCWPPP 2016)
Polychlorinated Biphenyls	PCBs are a group of man-made organic chemicals consisting of carbon, hydrogen and chlorine atoms. The number of chlorine atoms and their location in a PCB molecule determine many of its physical and chemical properties. PCBs have no known taste or smell, and range in consistency from an oil to a waxy solid. PCBs belong to a broad family of man-made organic chemicals known as chlorinated hydrocarbons. PCBs were domestically manufactured from 1929 until manufacturing was banned in 1979. They have a range of toxicity and vary in consistency from thin, light-colored liquids to yellow or black waxy solids. Due to their non-flammability, chemical stability, high boiling point and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications.	EPA.gov
Public Right-of-	Public right-of-way is defined as the right of passage	Black's Law Dictionary

Way	held by the public in general to travel on roads, freeways, and other thoroughfares.	1351 (8th ed. 2004).
Reasonable Assurance Analysis (RAA)	From a regulatory perspective, reasonable assurance is defined as the demonstration that the implementation of control measures will, in combination with operation of existing or proposed storm drain system infrastructure and management programs, result in sufficient pollutant reductions over time to meet total maximum daily load (TMDL) wasteload allocations, water quality-based effluent limits (WQBELs), or other water quality targets specified in a municipal separate storm sewer system (MS4) permit1 (United States Environmental Protection Agency [USEPA], 2017). From the perspective of a stakeholder in the watershed who is focused on the improvement of water quality or restoration of a beneficial use of a waterbody, reasonable assurance is the demonstration and a commitment that specific management practices are identified with sufficient detail (and with a schedule for implementation) to establish that necessary improvements in the receiving water quality will occur. From the perspective of an MS4 Permittee, reasonable assurance is a detailed analysis of TMDL wasteload allocations (WLAs), associated permit limitations, and the extent of stormwater management actions needed to achieve TMDL WLAs and address receiving water limitations. RAAs may also assist in evaluating the financial resources needed to meet pollutant reductions based on schedules identified in the permit, TMDL, or stormwater management plan, and in preparing associated capital improvement plans.	BASMAA (Bay Area Stormwater Management Agencies Association). 2017. *Bay Area Reasonable Assurance Analysis Guidance Document.* BASMAA, Oakland, CA.

[1] All references to a permit in this document refer to the 2015 version (MRP 2.0).

Rainwater Harvesting	Rainwater harvesting is defined as a method for inducing, collecting, storing, and conserving local surface runoff for agriculture in arid and semi-arid regions.	Boers, T. M. *Rainwater Harvesting in Arid and Semi-Arid Zones*. International Institute for Land Reclamation and Improvement, 1997.
Regulated Projects	Development projects as defined in provision C.3.b.ii	NPDES No. CAS612008 Glossary
Special Projects	Certain types of smart growth, high density and transit-oriented development projects that are allowed, under Provision C.3.e.ii of the MRP, to receive LID treatment reductions.	*C.3 Regulated Projects Guide* – Glossary (SMCWPPP 2016)
Sustainable Streets	Sustainable streets are multimodal rights of way designed and operated to create benefits relating to movement, ecology and community that together support a broad sustainability agenda embracing the three E's: environment, equity, and economy.	*Green Infrastructure Design Guide* - Chapter 3 (SMCWPPP 2019b)
Vegetated Swale	Shallow landscaped areas designed to capture, convey, and potentially infiltrate stormwater runoff as it moves downstream.	*Green Infrastructure Design Guide* (SMCWPPP 2019b)
Wasteload Allocation	A portion of a receiving water's TMDL that is allocated to one of its existing or future point sources of pollution.	NPDES No. CAS612008 Glossary
Watershed	A watershed is defined as the area where precipitation drains to a common waterway, such as a stream, lake, estuary, wetland, or the ocean.	Merrick JRW, Parnell GS, Barnett J, Garcia M (2005). *A multiple-objective decision analysis of stakeholder values to identify watershed improvement needs.*

APPENDIX B: Capital Improvements Program GI Potential Screening Flowcharts

Part 1: Initial Screening	
No Potential	**Eliminate from List**
No exterior work (e.g., interior remodel)	
Exterior building upgrades or equipment	
Development or funding of municipal programs	
Technical studies, data collection, or training	
Construction of streetlights and traffic signals	
Minor bridge and culvert repairs/replacement	
Non-stormwater utility projects	
Equipment purchase or maintenance	
Irrigation system installation, upgrades, or repairs	
Too Late to Change	
Project has gone to bid or is under construction	
Project is too far along in design stage to make changes (up to Agency judgment based on schedule and budget considerations)	
Too Early to Assess	**Eliminate from list, but reconsider next FY**
Not enough information to assess project for GI potential	
Maintenance/Minor Construction	**Eliminate from List**
Project is for maintenance purposes only or is minor in nature, and maintains the existing lines, grades, and capacity of the original facility. In addition, the project is not concentrated in one location and includes multiple work orders throughout various locations in the City. For example:	
1. Pavement maintenance/replacement	
2. Sidewalk, curb and gutter repairs	
3. ADA ramps and other improvements	
Project meets the above criteria but includes at least 5,000 SF of impervious surface created or replaced in a single contiguous area.	**Move to Part 2**
All other projects	

Part 2: Assessment of GI Potential	
Project involves: Alternations to existing building's roof drainage New/replaced pavement or drainage structures Concrete work Landscaping, including tree planting Streetscape and intersection improvements	**Move to Part 3**
Project is of these retrofit types: Road Diet Bike/Ped Facilities Pavement Reconstruction Street Beautification Tree Planting Park/Landscaping Retrofit Drainage Reconstruction Parking Lot Building	
Project is a master planning document, such as a Bike/Ped Master Plan, Parks Master Plan, or Storm Drain Master Plan	Assess possibility of integrating green infrastructure into these Master Planning Documents. **Associated individual projects move to Part 3**
Project is subject to C.3 requirements	Project must include GI per Provision C.3 Requirements.
None of the above categories apply	Individually assess for GI Potential. If no potential exists, document why GI is impracticable.

Part 3: Preliminary Design

Step 1: Information Collection / Reconnaissance

- Locate roof leaders and discharge points.
- Look for opportunities to substitute pervious pavements for impervious pavements.
- Identify available landscaped or paved areas adjacent or downgradient from paved or roof areas.
- Locate nearby storm drains.
- Assess potential for infiltration and groundwater depth.
- Assess potential for connection of underdrain (typ. 2-2.5 below bioretention area surface).

Step 2: Preliminary Sizing and Drainage Analysis

- Delineate drainage areas.
- Identify pathways to direct drainage from roof and pavement areas to potential GI facilities.
- Preliminary sizing of GI facilities.

Step 3: Barriers and Conflicts

- Identify barriers and conflicts:
  - Utility conflicts.
  - Property ownership.
  - Availability of water supply for irrigation.
  - Integration of GI features vs. "add-on".
- Presence of barriers or conflicts does not necessarily mean GI is infeasible but may affect cost or public acceptance.

Step 4: Budget and Schedule

- Budget considerations:
  - Sources of funding that might be available for GI.
  - Potential savings achieved by integrating with other planned projects (e.g. bike/ped, beautification, etc.) or reducing cost of "gray" drainage facilities.
- Schedule considerations:
  - Constraints on schedule due to regulatory mandates, grant requirements, etc.
  - Whether schedule allows time for any design changes needed to incorporate GI.
  - Whether schedule allows time to align separate funding for GI features.

Step 5: Results of Assessment

- Does the project have GI potential?
  - Consider results of previous steps.
  - Consider ancillary benefits of GI.
- Does it make sense to include GI in this project, if funding was available for the incremental costs of GI elements?

APPENDIX C: Green Infrastructure Project Prioritization Maps

a. **Water Resources**

b. **FEMA 100-Year Flood Plain**

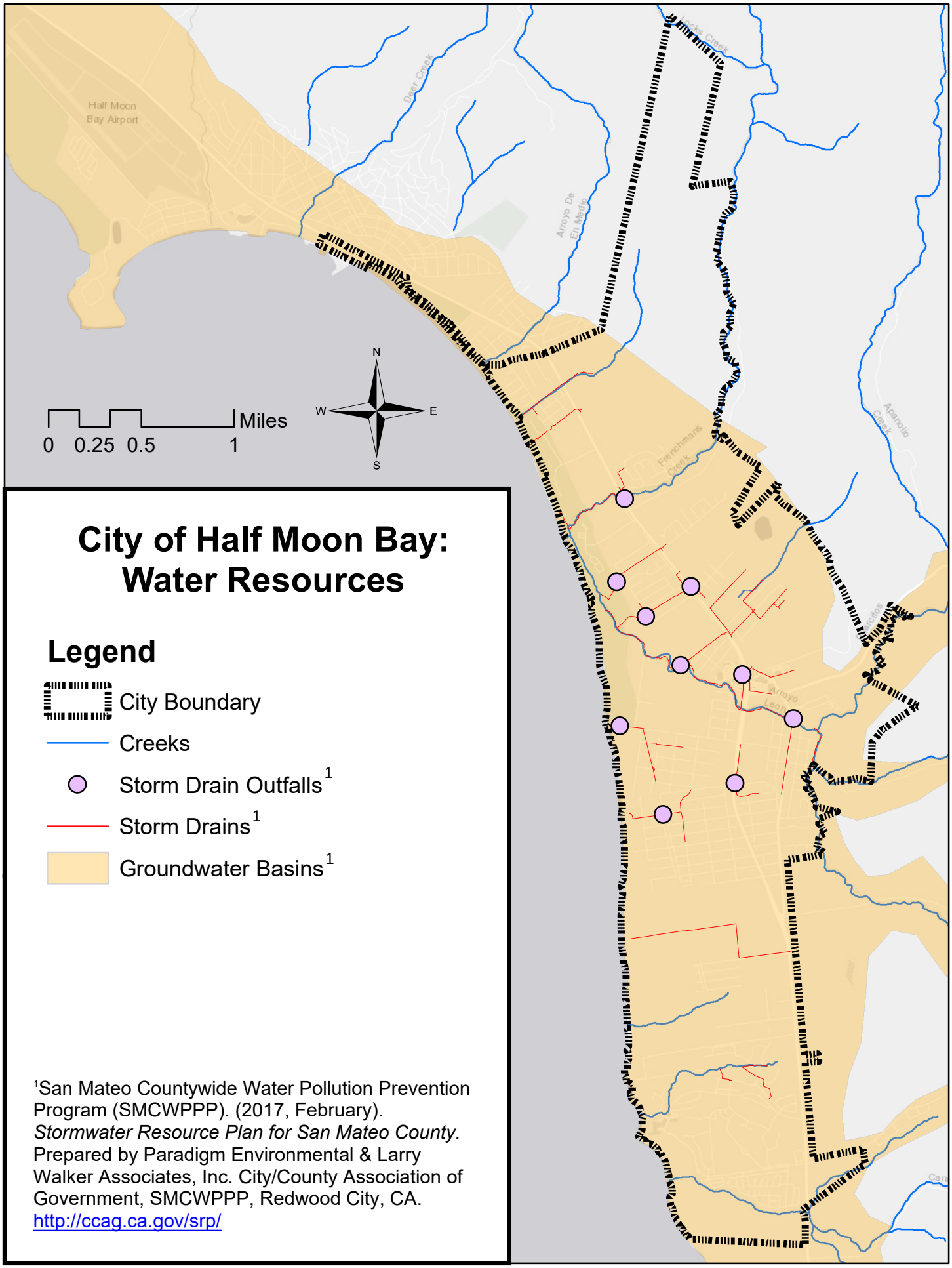
c. **Sea Level Rise**

d. **Prioritized Green Streets**

e. **Prioritized LID and Regional Projects**

f. **Existing Green Infrastructure Projects in Half Moon Bay**

g. **Potential Green Infrastructure Projects in Half Moon Bay**

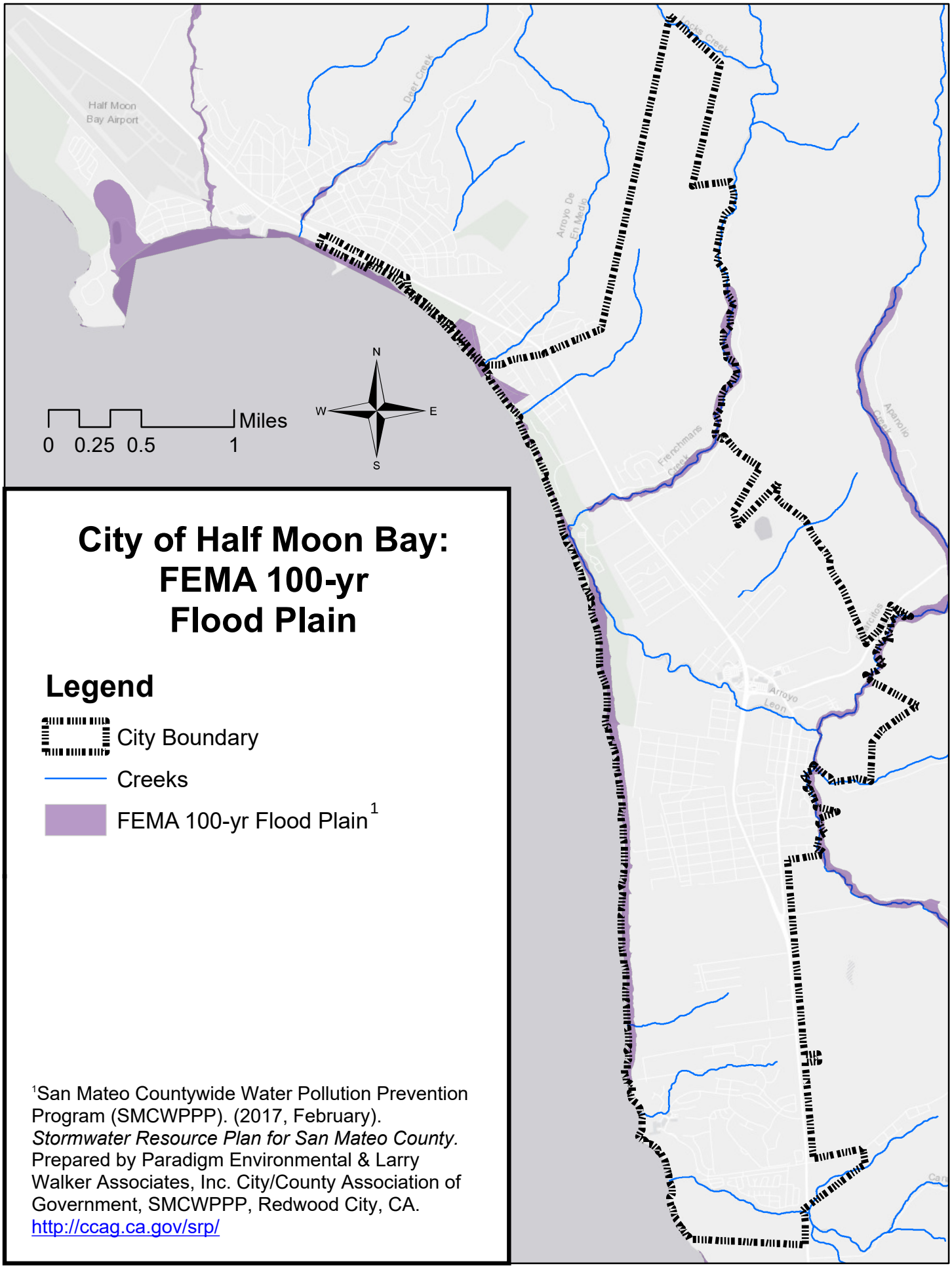


City of Half Moon Bay: Water Resources

Legend

- City Boundary
- Creeks
- Storm Drain Outfalls[1]
- Storm Drains[1]
- Groundwater Basins[1]

[1]San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). (2017, February). *Stormwater Resource Plan for San Mateo County.* Prepared by Paradigm Environmental & Larry Walker Associates, Inc. City/County Association of Government, SMCWPPP, Redwood City, CA. http://ccag.ca.gov/srp/

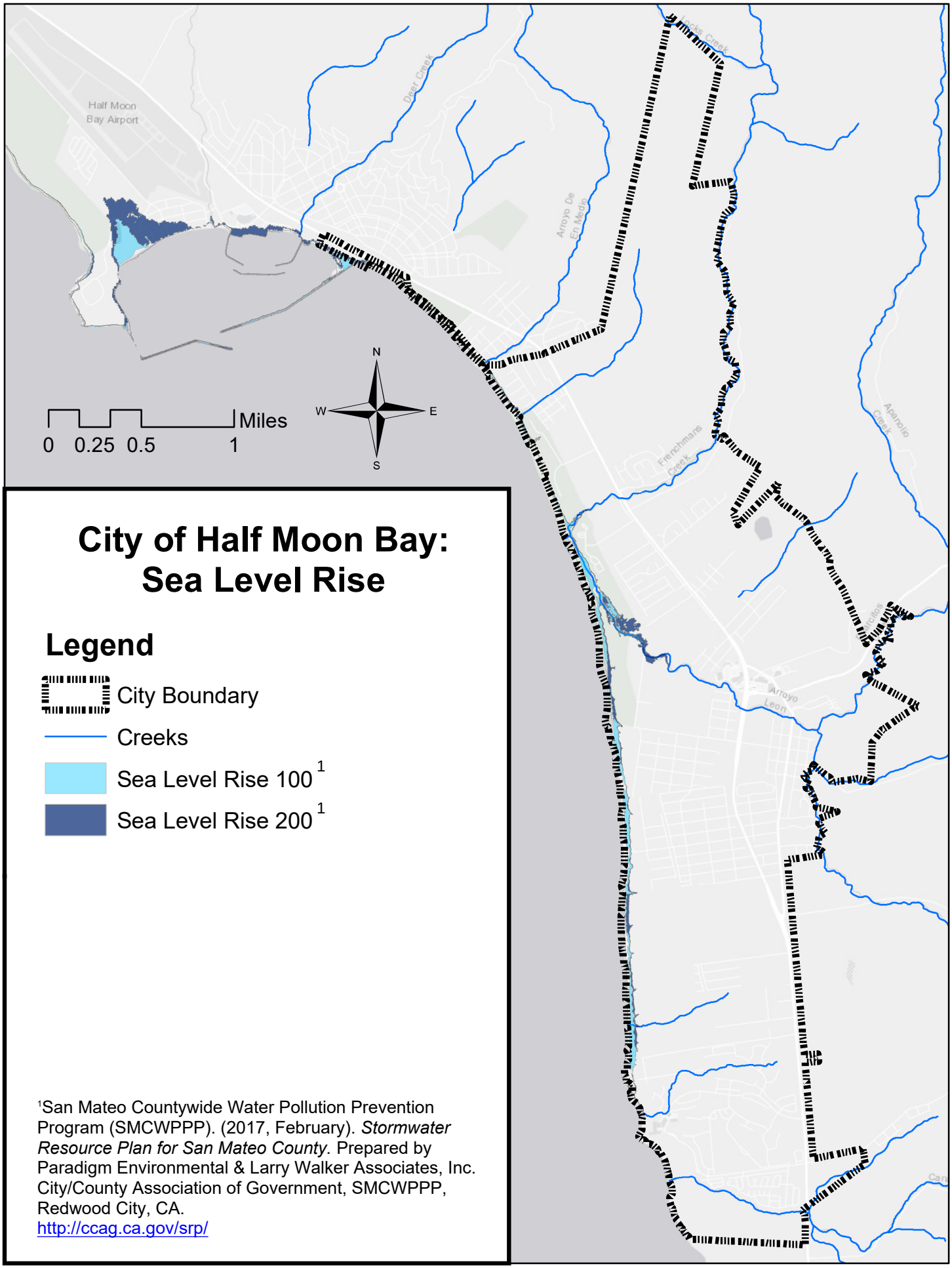


City of Half Moon Bay: FEMA 100-yr Flood Plain

Legend

- City Boundary
- Creeks
- FEMA 100-yr Flood Plain[1]

[1]San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). (2017, February). *Stormwater Resource Plan for San Mateo County.* Prepared by Paradigm Environmental & Larry Walker Associates, Inc. City/County Association of Government, SMCWPPP, Redwood City, CA. http://ccag.ca.gov/srp/

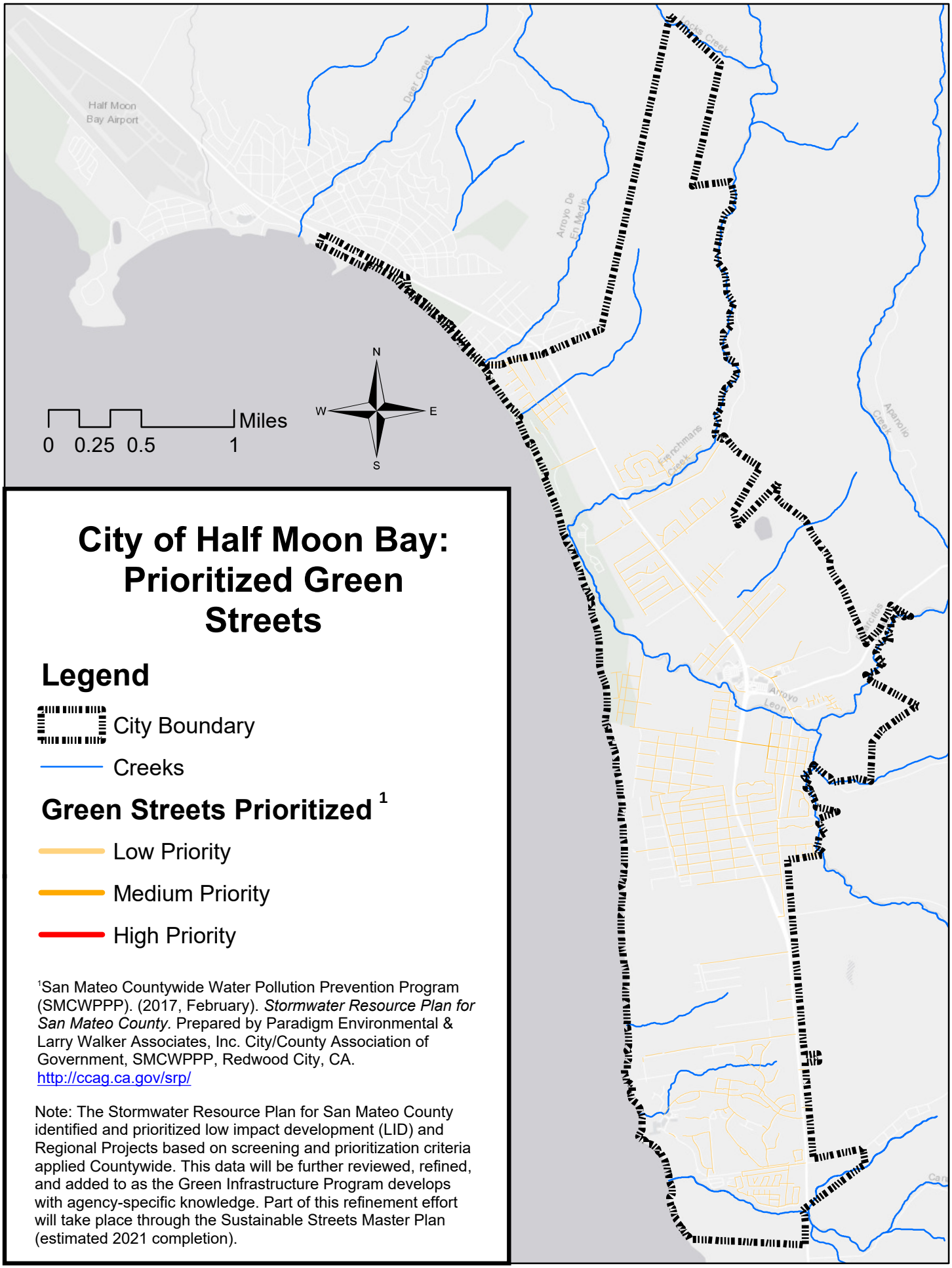


City of Half Moon Bay: Sea Level Rise

Legend

- City Boundary
- Creeks
- Sea Level Rise 100 [1]
- Sea Level Rise 200 [1]

[1]San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). (2017, February). *Stormwater Resource Plan for San Mateo County.* Prepared by Paradigm Environmental & Larry Walker Associates, Inc. City/County Association of Government, SMCWPPP, Redwood City, CA.
http://ccag.ca.gov/srp/



City of Half Moon Bay: Prioritized Green Streets

Legend

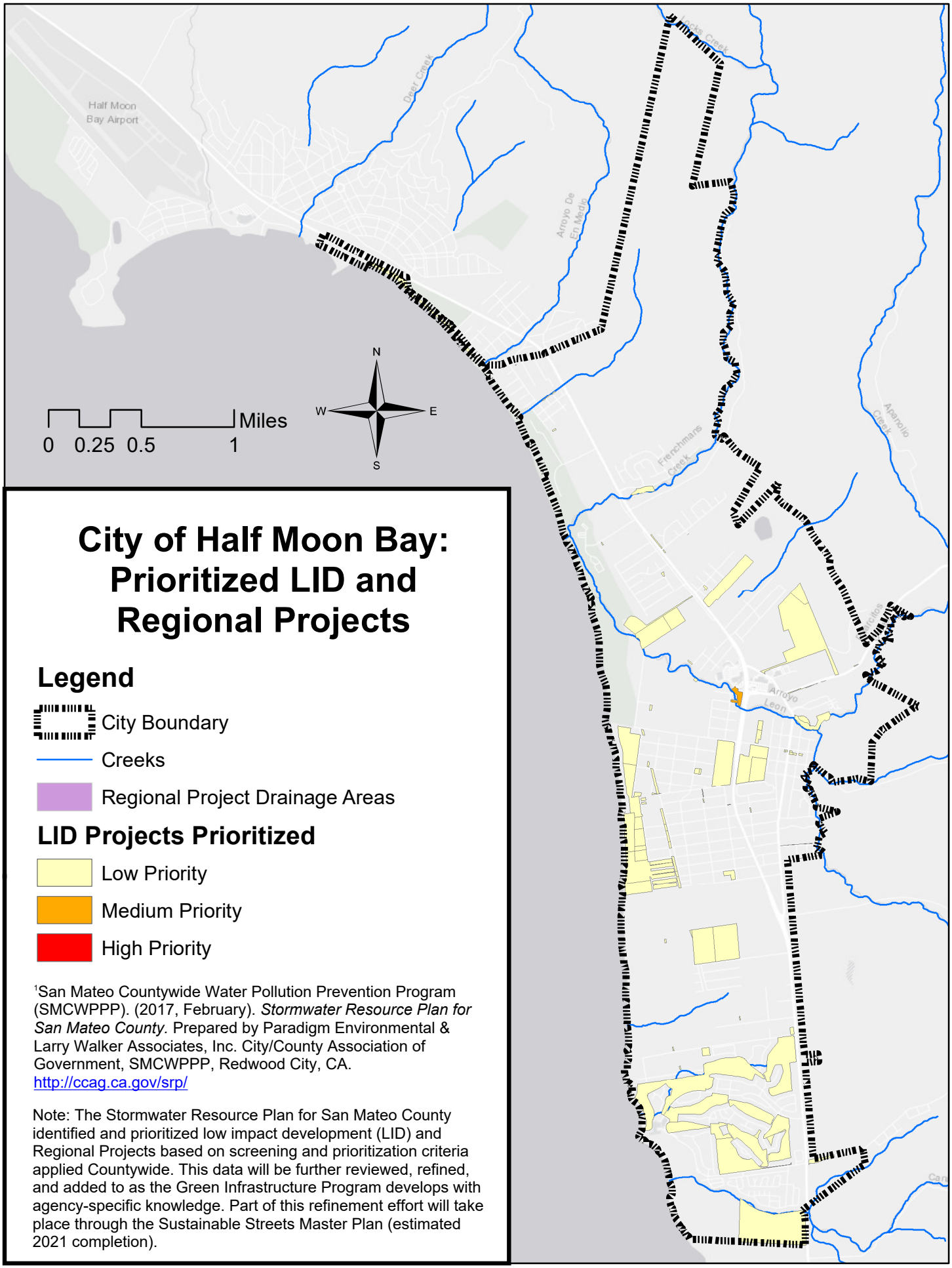
- City Boundary
- Creeks

Green Streets Prioritized [1]

- Low Priority
- Medium Priority
- High Priority

[1]San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). (2017, February). *Stormwater Resource Plan for San Mateo County.* Prepared by Paradigm Environmental & Larry Walker Associates, Inc. City/County Association of Government, SMCWPPP, Redwood City, CA. http://ccag.ca.gov/srp/

Note: The Stormwater Resource Plan for San Mateo County identified and prioritized low impact development (LID) and Regional Projects based on screening and prioritization criteria applied Countywide. This data will be further reviewed, refined, and added to as the Green Infrastructure Program develops with agency-specific knowledge. Part of this refinement effort will take place through the Sustainable Streets Master Plan (estimated 2021 completion).



City of Half Moon Bay: Prioritized LID and Regional Projects

Legend

- City Boundary
- Creeks
- Regional Project Drainage Areas

LID Projects Prioritized

- Low Priority
- Medium Priority
- High Priority

[1]San Mateo Countywide Water Pollution Prevention Program (SMCWPPP). (2017, February). *Stormwater Resource Plan for San Mateo County.* Prepared by Paradigm Environmental & Larry Walker Associates, Inc. City/County Association of Government, SMCWPPP, Redwood City, CA. http://ccag.ca.gov/srp/

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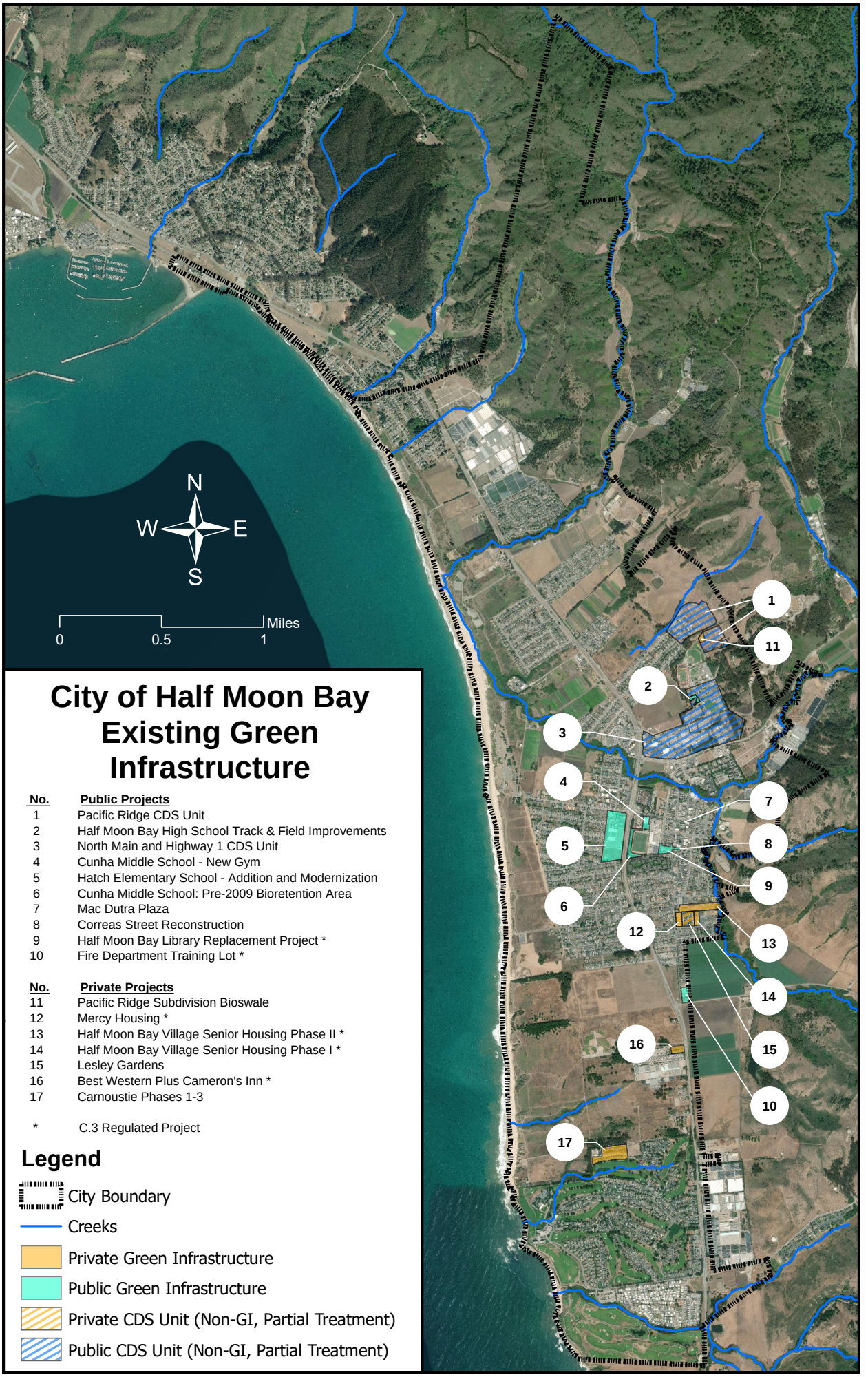


City of Half Moon Bay Existing Green Infrastructure

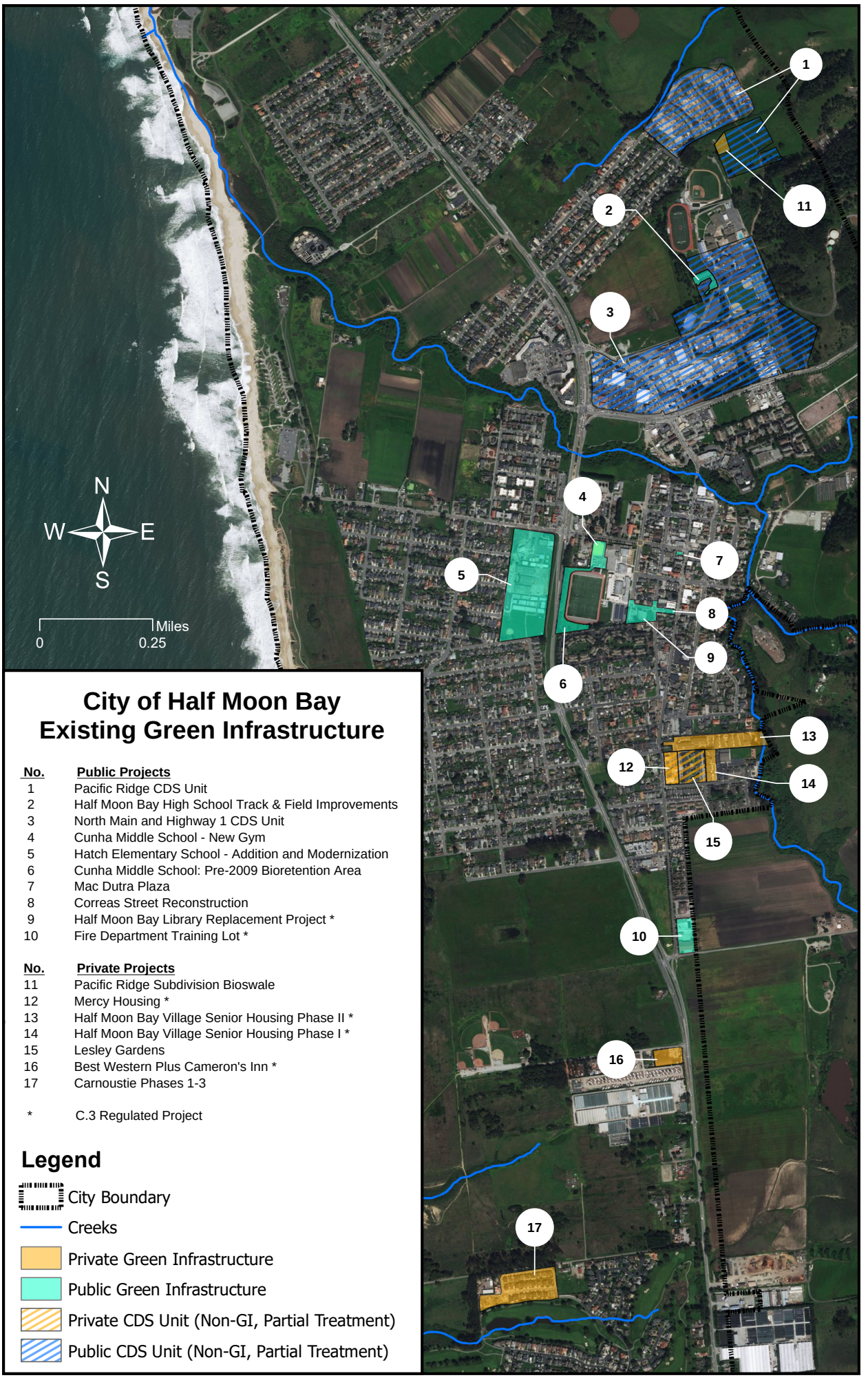
No.	Public Projects
1	Pacific Ridge CDS Unit
2	Half Moon Bay High School Track & Field Improvements
3	North Main and Highway 1 CDS Unit
4	Cunha Middle School - New Gym
5	Hatch Elementary School - Addition and Modernization
6	Cunha Middle School: Pre-2009 Bioretention Area
7	Mac Dutra Plaza
8	Correas Street Reconstruction
9	Half Moon Bay Library Replacement Project *
10	Fire Department Training Lot *

No.	Private Projects
11	Pacific Ridge Subdivision Bioswale
12	Mercy Housing *
13	Half Moon Bay Village Senior Housing Phase II *
14	Half Moon Bay Village Senior Housing Phase I *
15	Lesley Gardens
16	Best Western Plus Cameron's Inn *
17	Carnoustie Phases 1-3

* C.3 Regulated Project

Legend

- City Boundary
- Creeks
- Private Green Infrastructure
- Public Green Infrastructure
- Private CDS Unit (Non-GI, Partial Treatment)
- Public CDS Unit (Non-GI, Partial Treatment)



City of Half Moon Bay
Existing Green Infrastructure

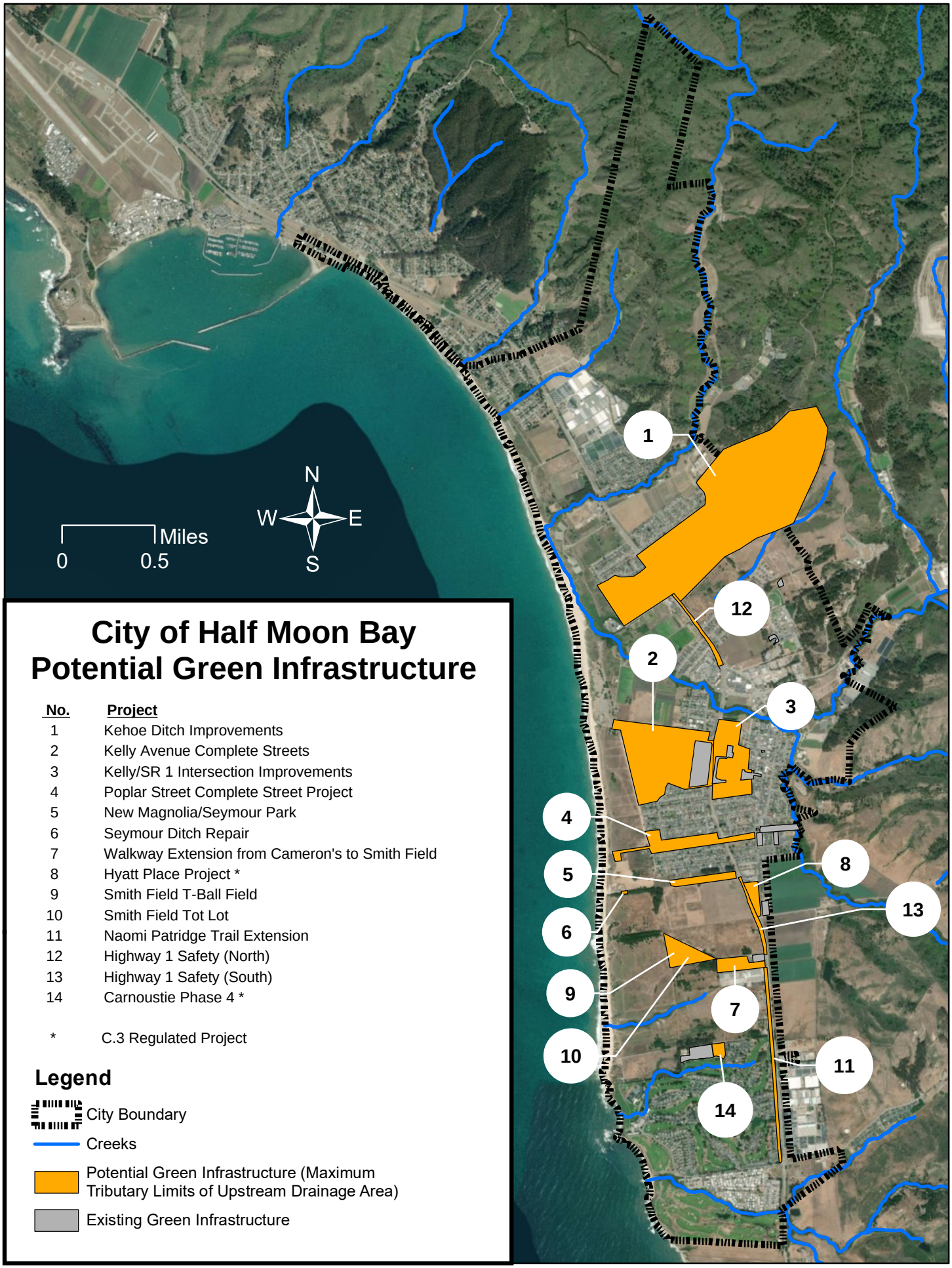
No.	Public Projects
1	Pacific Ridge CDS Unit
2	Half Moon Bay High School Track & Field Improvements
3	North Main and Highway 1 CDS Unit
4	Cunha Middle School - New Gym
5	Hatch Elementary School - Addition and Modernization
6	Cunha Middle School: Pre-2009 Bioretention Area
7	Mac Dutra Plaza
8	Correas Street Reconstruction
9	Half Moon Bay Library Replacement Project *
10	Fire Department Training Lot *

No.	Private Projects
11	Pacific Ridge Subdivision Bioswale
12	Mercy Housing *
13	Half Moon Bay Village Senior Housing Phase II *
14	Half Moon Bay Village Senior Housing Phase I *
15	Lesley Gardens
16	Best Western Plus Cameron's Inn *
17	Carnoustie Phases 1-3

* C.3 Regulated Project

Legend

- City Boundary
- Creeks
- Private Green Infrastructure
- Public Green Infrastructure
- Private CDS Unit (Non-GI, Partial Treatment)
- Public CDS Unit (Non-GI, Partial Treatment)



City of Half Moon Bay
Potential Green Infrastructure

No.	Project
1	Kehoe Ditch Improvements
2	Kelly Avenue Complete Streets
3	Kelly/SR 1 Intersection Improvements
4	Poplar Street Complete Street Project
5	New Magnolia/Seymour Park
6	Seymour Ditch Repair
7	Walkway Extension from Cameron's to Smith Field
8	Hyatt Place Project *
9	Smith Field T-Ball Field
10	Smith Field Tot Lot
11	Naomi Patridge Trail Extension
12	Highway 1 Safety (North)
13	Highway 1 Safety (South)
14	Carnoustie Phase 4 *

* C.3 Regulated Project

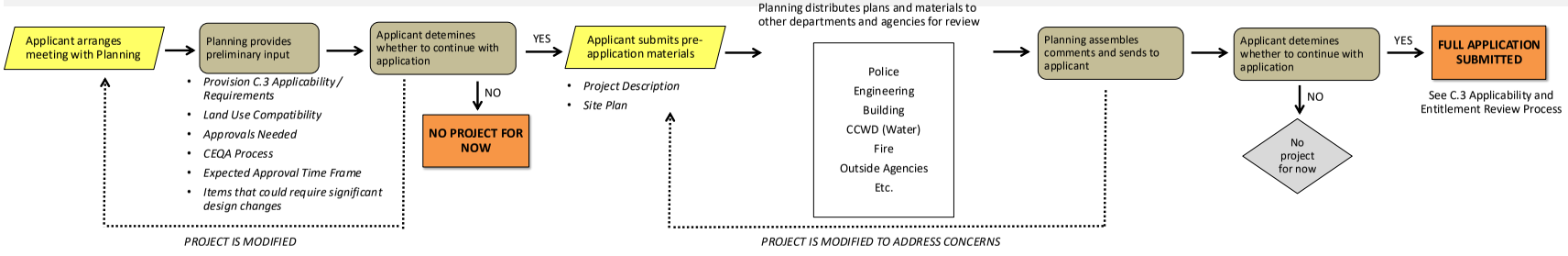
Legend

- City Boundary
- Creeks
- Potential Green Infrastructure (Maximum Tributary Limits of Upstream Drainage Area)
- Existing Green Infrastructure

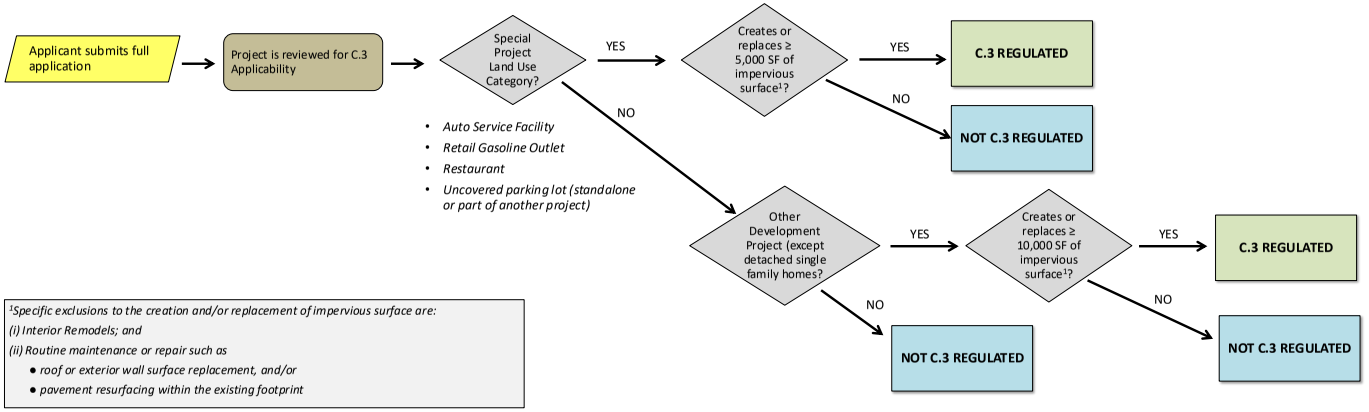
APPENDIX D: Development Review Flowcharts

DEVELOPMENT REVIEW PROCESS

Entitlement Pre-Application Review



Development and Redevelopment C.3 Applicability Review



[1]Specific exclusions to the creation and/or replacement of impervious surface are:
(i) Interior Remodels; and
(ii) Routine maintenance or repair such as
- roof or exterior wall surface replacement, and/or
- pavement resurfacing within the existing footprint

C.3 REGULATED PROJECT MEASURES

Applicant to complete the "C.3 and C.6 Development Review Checklist", and select appropriate:

- *Site Design Measures*
- *Source Control Measures*
- *Construction Best Management Practices*
- *Stormwater Treatment Measures*
- *Hydromodification Management Controls (if applicable)*

NON-C.3 REGULATED PROJECT MEASURES

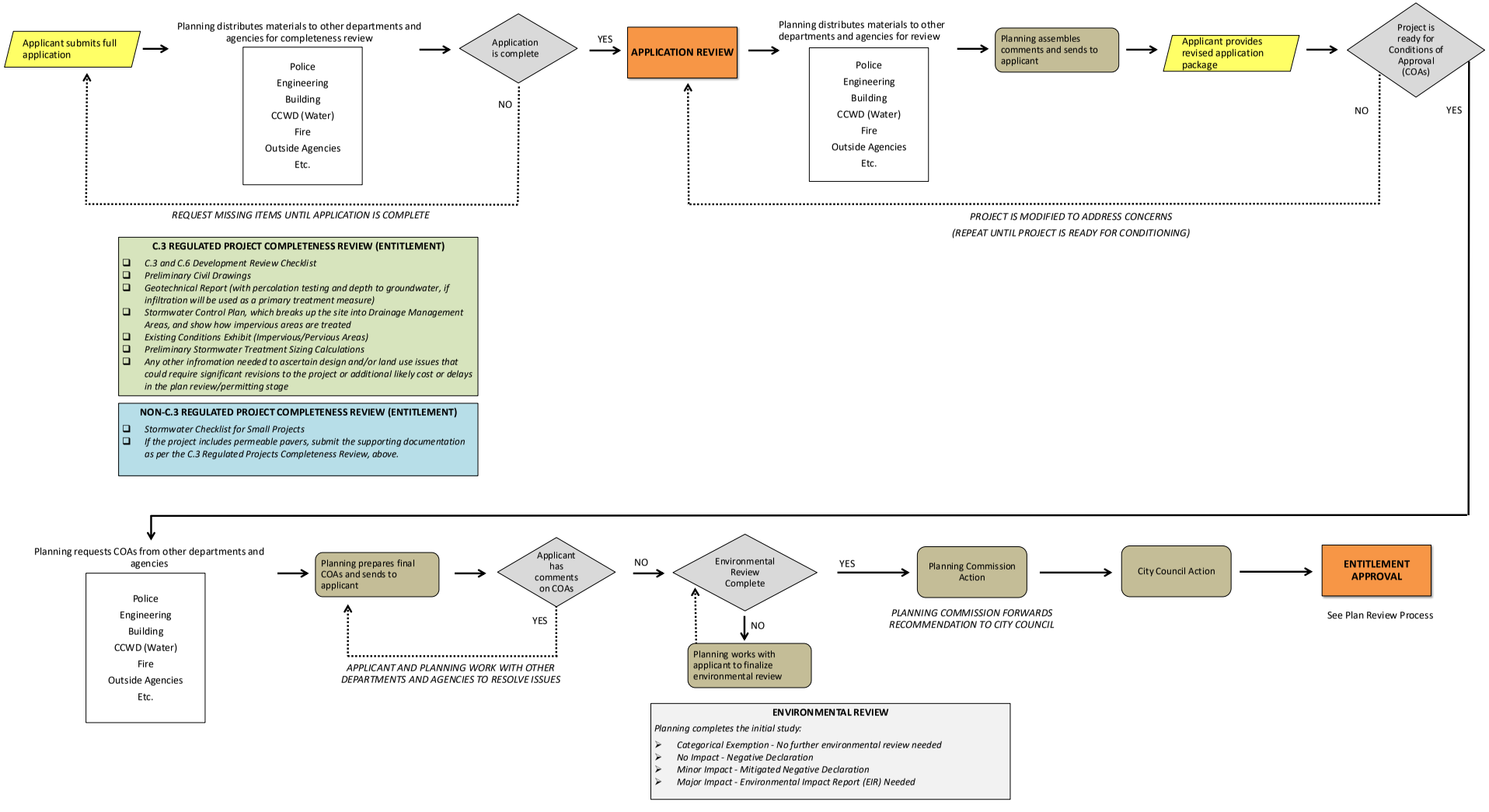
Applicant to complete the "Stormwater Checklist for Small Projects", and select appropriate:

- *Site Design Measures**
- *Source Control Measures*
- *Construction Best Management Practices*

**One or more site design measures are required for projects that create and/or replace 2,500 square feet or more of impervious surface. Otherwise, these measures are optional.*

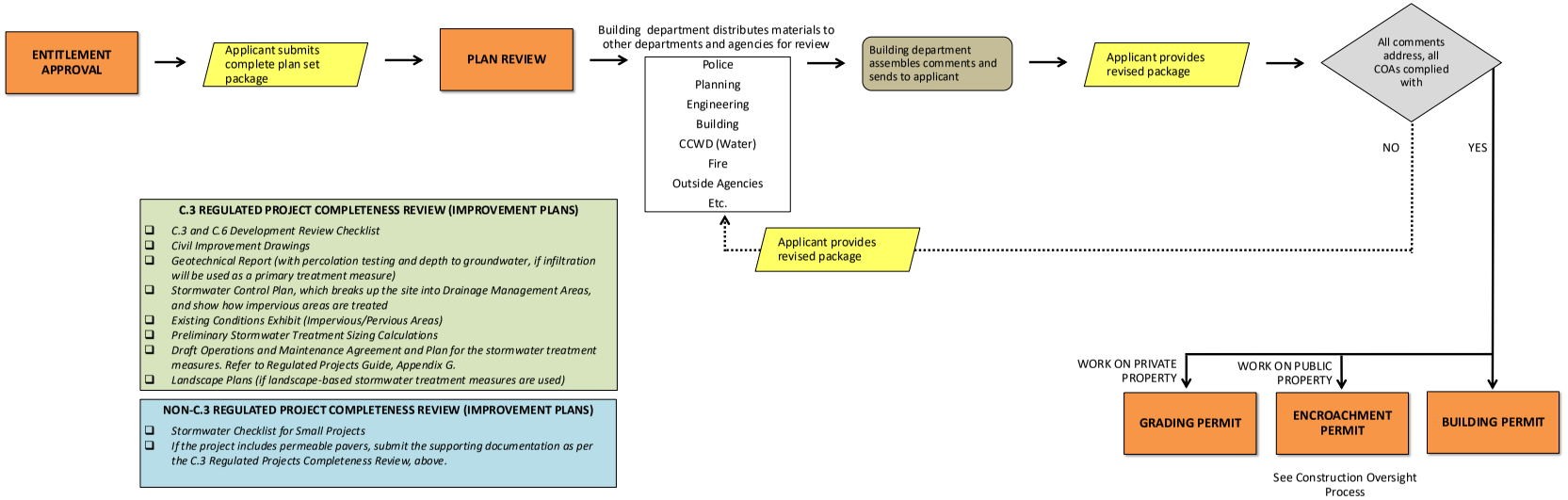
DEVELOPMENT REVIEW PROCESS

Entitlement Review

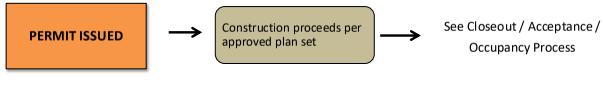


DEVELOPMENT REVIEW PROCESS

Plan Review



Construction Oversight



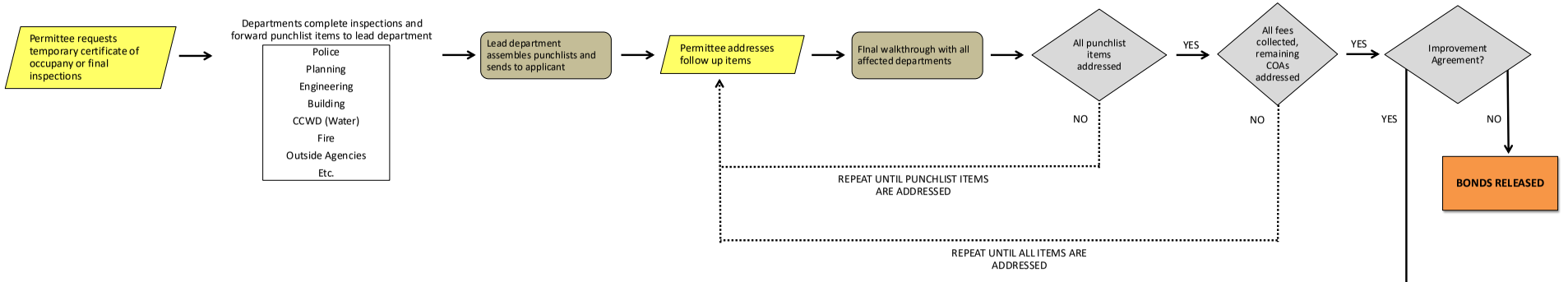
IN-PROGRESS C.3 REGULATED PROJECT INSPECTIONS

In-progress inspections of stormwater treatment measures are optional under the Municipal Regional Stormwater NPDES Permit (MRP), though are recommended to ensure the measures are constructed in accordance with the approved plan set. Any issues identified can be corrected in a timely fashion, well before project closeout. Inspections should occur at several stages of construction, for example:

- *Subgrade preparation*
- *Placement of material layers (filter fabric, subbase, base, soil, etc.)*
- *Installation of storm drain piping and structures*
- *Reinforcing steel and concrete formwork placement (if applicable)*
- *Installation of irrigation and planting*
- *After final landscaping*

DEVELOPMENT REVIEW PROCESS

Closeout / Acceptance / Occupancy



C.3 REGULATED PROJECT PUNCHLIST ITEMS

- ❑ *Final inspection performed for stormwater treatment measures and hydromodification management measures and found all measures to be constructed per plans and fully operational, with no observed issues*
- ❑ *As-built plans which fully reflect the field conditions*
- ❑ *Operations and Maintenance (O&M) Agreement, per local standards, has been reviewed and recorded*
- ❑ *O&M Plan, per Appendix G of the Regulated Projects Guide and local standards, has been reviewed and attached to the O&M Agreement*

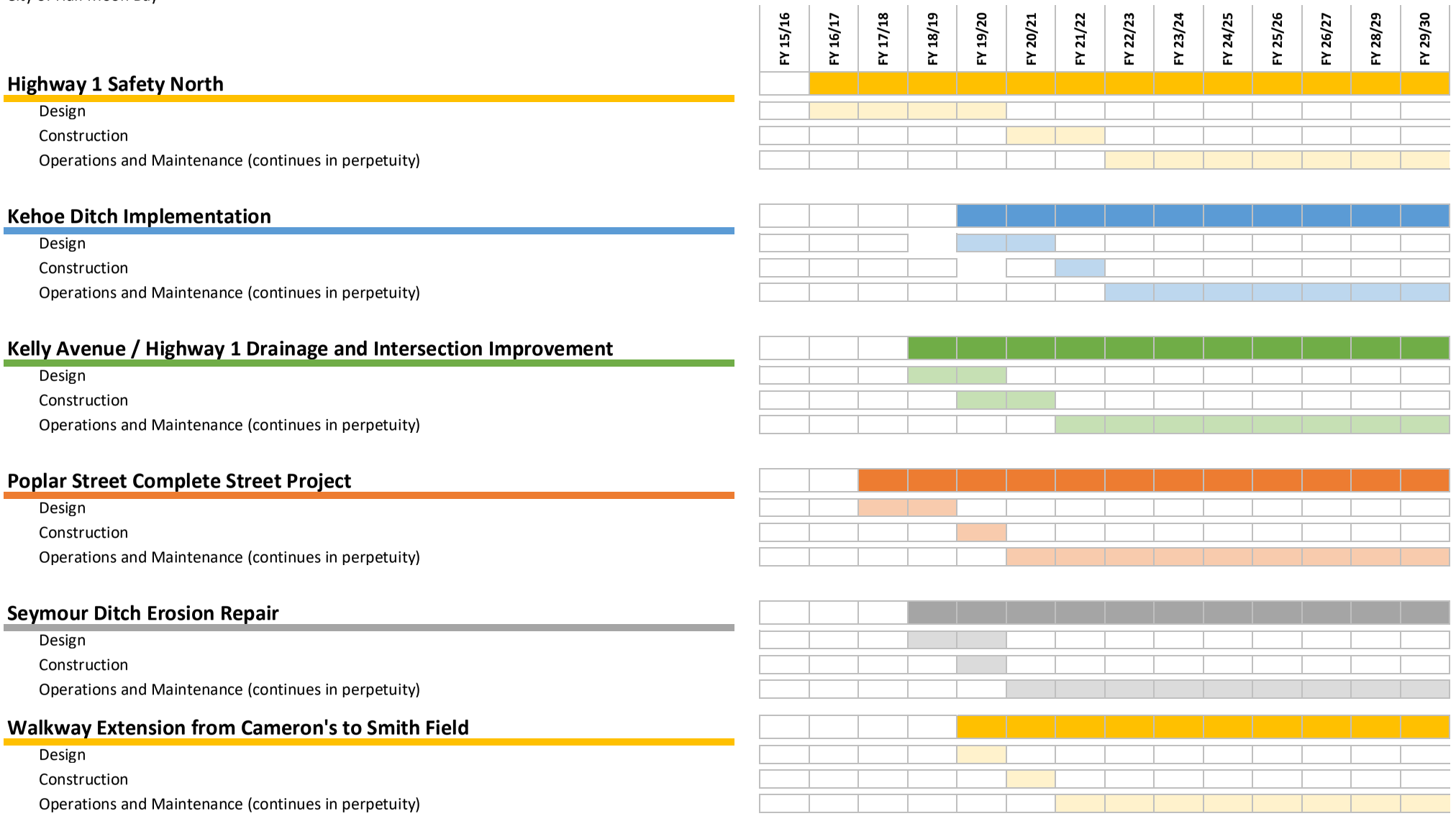
NON-C.3 REGULATED PROJECT PUNCHLIST ITEMS

- ❑ *As-built plans which fully reflect the field conditions*
- ❑ *If the project includes permeable pavers, submit the C.3 Regulated Projects Punchlist Items, above.*

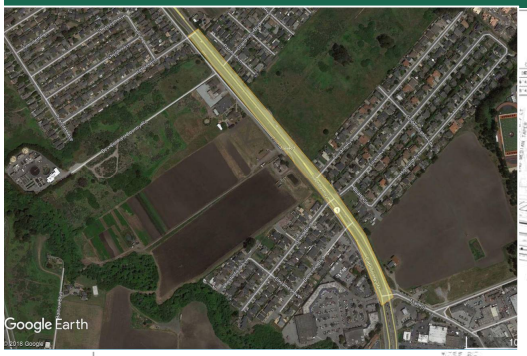
APPENDIX E: Early Project Implementation Concept Sheets

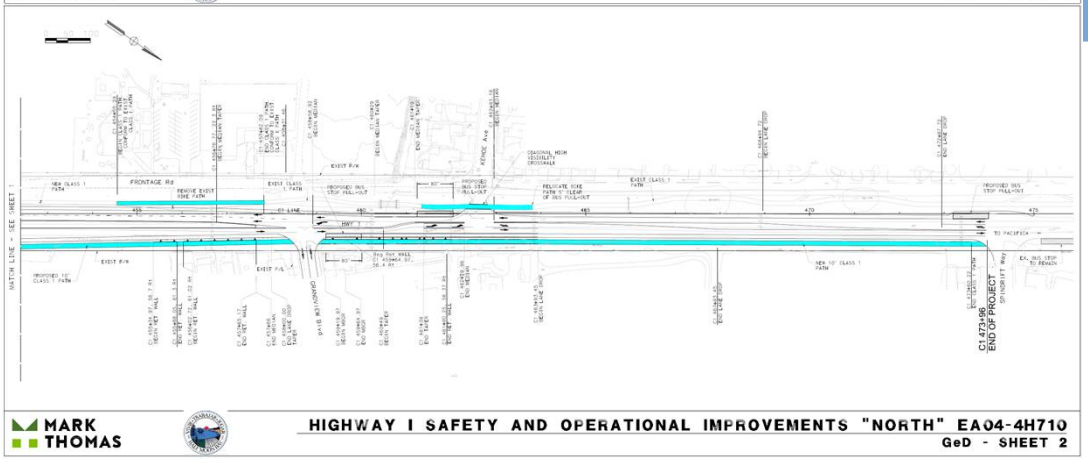
DRAFT SCHEDULE FOR PRIORITIZED GI PROJECTS

City of Half Moon Bay



Prioritized Project: Highway 1 Safety North





Site Information:

Location	Highway 1 North, from North Main Street to Spindrift Way
Capture Area (SF)	TBD
Impervious Area (%)	100%
GI Measures	Biotreatment areas

Project Schedule:

The project is currently in the design phase. The design was initiated in FY 16-17 and will carry over into FY 19-20 due to delays in the review and permitting process. Construction is anticipated to occur in FY 20-21.

Project Description:

This project includes operational and safety improvements to Highway 1 between North Main Street and Kehoe Ave. It also includes lane intersection improvements for signalization. This project includes the development of multi-use trail on the east side of Highway 1 from Main Street North to Kehoe Ave. The project will minimize impervious surfaces to accommodate vehicular safety and conservation of natural areas where possible. The project is approved to install biotreatment areas.

This project is principally funded through a grant from San Mateo County Transportation Authority and also includes development related impact fees from the Pacific Ridge Subdivision (Ailanto) and is currently funded. It is estimated to cost $7,910,000.

Prioritized Project: Kehoe Ditch Implementation

Image Source: Google Earth 2018.

Site Information:

Location	Pilarcitos Creek to Frontage Road
Capture Area (SF)	TBD
Impervious Area (%)	TBD
GI Measures	TBD

Project Schedule:

The project duration is scheduled between FY 19-20 and FY 21-22.

Project Description:

The project involves project design and consultation with resource/permitting agencies to address hydrologic and hydraulic issues within the 21,648 linear foot watershed. Habitat enhancement may be included as a desired outcome as part of the consultation, scoping, and grant-seeking process.

The City has conducted a hydrology/hydraulic study and identified broad recommendations for implementation. The City would like to explore incorporating green infrastructure measures as a means of enhancing habitat and addressing the hydrologic/hydraulic issues. Both in-line and off-line green infrastructure measures will be considered. Typically, green infrastructure measures are better suited to low flows, and would bypass high flows.

The project has a total allocated budget of $7.85 million, of which $7.44 million is funded by a state grant. The remaining project funds are from the City's general fund.

Prioritized Project: Kelly Avenue / Highway 1 Drainage and Intersection Improvement

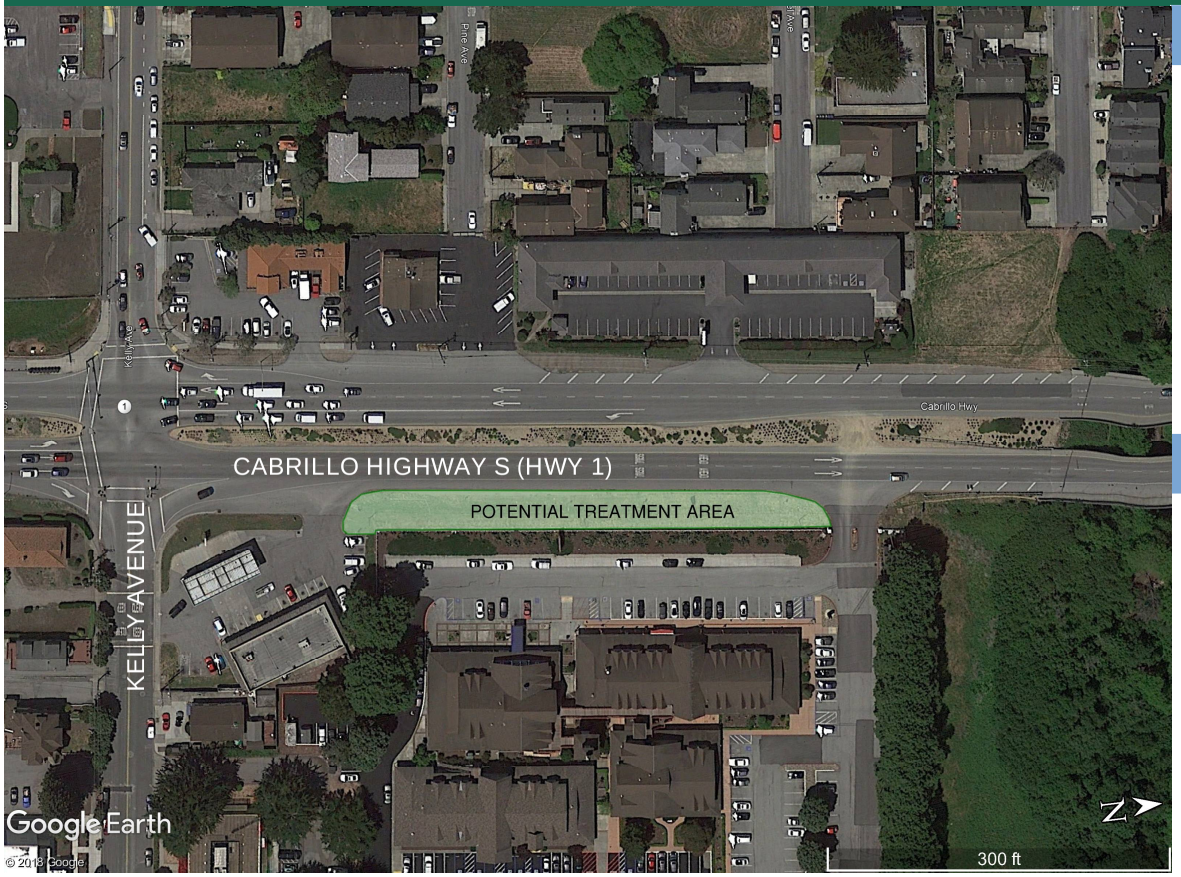


Image Source: Google Earth 2018.

Site Information:

Location	Kelly Avenue and Highway 1
Capture Area (SF)	15,000 SF
Impervious Area (%)	100%
GI Measures	Bioretention area

Project Schedule:

The project duration is scheduled between FY 18-19 and FY 20-21. Project conceptual design is underway.

Project Description:

This project will improve pedestrian circulation, traffic flow, and drainage at the 15,000 square foot Highway 1 and Kelly Avenue intersection. The project is intended to provide improved and safer pedestrian crossing and extend the southbound left-turn lane per Caltrans requirements. The project will likely include a bioretention area. A possible location for a bioretention area would be a 13,500 SF existing vegetated area which currently acts as a drainage swale, receiving runoff from Cabrillo Highway S (Highway 1). The lowest portion of this area could be converted to a bioretention area.

$1.7 million is allocated to this project's funding, of which $1.22 million is from Federal and Measure A funding sources.

Prioritized Project: Kelly Avenue Complete Street

Image Source: TBD

Site Information:

Location	Kelly Avenue, west of Highway 1
Capture Area (SF)	<5,000 SF
Impervious Area (%)	100%
GI Measures	To be determined

Project Schedule:

The project schedule will be determined when the project receives funding.

Project Description:

This project will improve 4,532 feet of Kelly Avenue, including improved pedestrian/bicycle access and drainage. The project will be assessed for GI potential as it develops.

The project is estimated to cost $1,375,000 but is currently unfunded.

Prioritized Project: Naomi Patridge Trail Extension

Image Source: TBD

Site Information:

Location	Wavecrest Road to Miramontes Point Road
Capture Area (SF)	48,000 SF (assuming 8-ft trail width)
Impervious Area (%)	100%
GI Measures	TBD

Project Schedule:

The project schedule will be determined when the project receives funding.

Project Description:

The project includes the extension of the Naomi Patridge Trail from Wavecrest Road to Miramontes Point Road. As part of initial work, the City will evaluate whether a single trail on the east side of Highway 1, a single trail on the west side, or a trail on each side is functionally and financially best. The large number of private driveways on the west side of Highway 1 is of concern for user safety. Various GI measures will be considered during project design development. The project could include bioretention areas, or the trail surface could be constructed of permeable surfacing materials, such as porous asphalt.

The project is estimated to cost $2,100,000 but is currently unfunded.

Prioritized Project: Poplar Street Complete Street Project

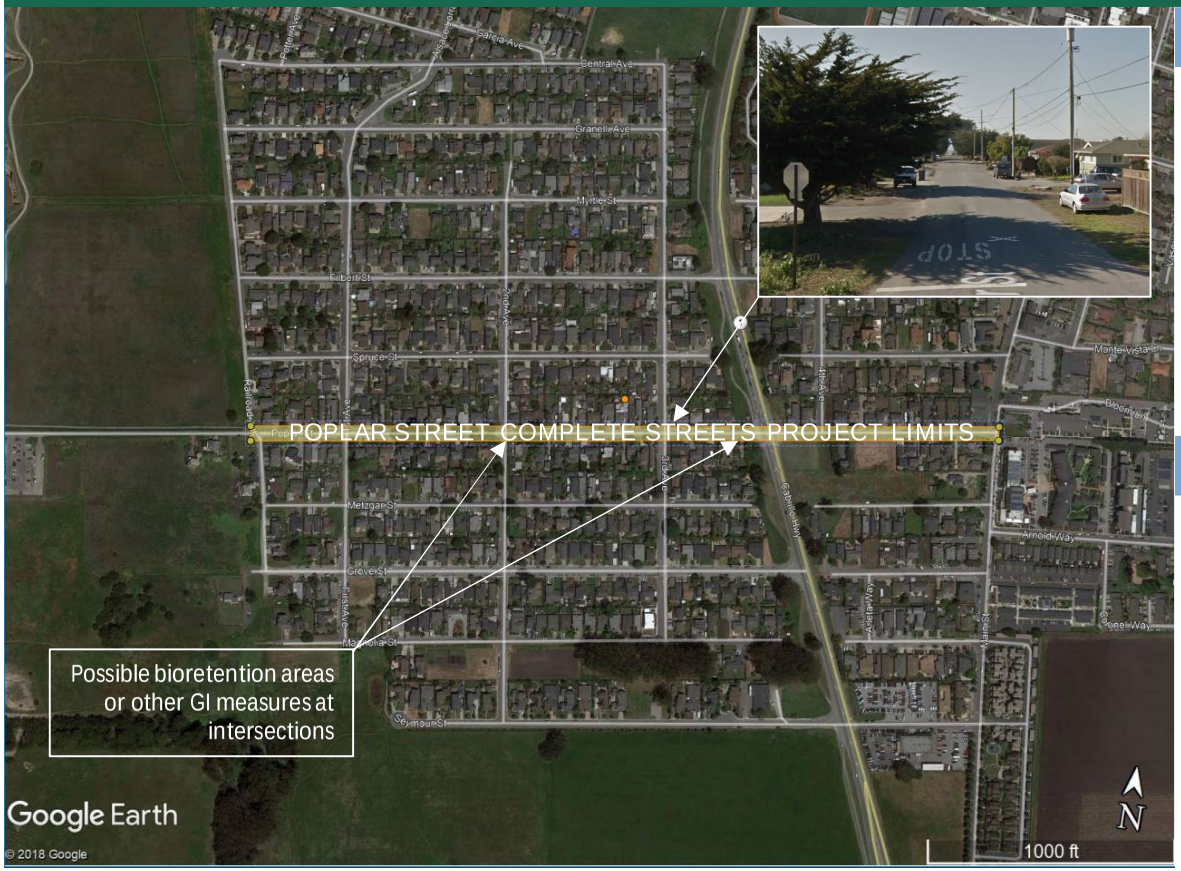


Image Source: Google Earth 2018

Site Information:

Location	Poplar Street Between Main St. and Railroad Ave.
Capture Area (SF)	TBD
Impervious Area (%)	100%
GI Measures	TBD

Project Schedule:

The City has released a Request for Proposals (RFP) for the project design. The project began in FY 17-18 and is expected to be constructed in FY 19-20.

Project Description:

This project will improve pedestrian/bicycle access and drainage on Poplar Avenue to and from the Poplar Beach and the Coastal Trail for residents and visitors. Various GI measures will be considered during project design development, including bioretention areas.

The project received grant funding in FY 17-18 from the Metropolitan Transportation Commission and is estimated to cost $1,754,000.

Prioritized Project: Seymour Ditch Erosion Repair

Image Source: Google Earth 2018

Site Information:

Location	Seymour Ditch, west of Seymour Pedestrian Bridge
Capture Area (SF)	TBD
Impervious Area (%)	100%
GI Measures	TBD

Project Schedule:

The project is expected to be designed and constructed in FY 18-19 and FY 19-20, respectively, with project monitoring to occur until FY 25-26.

Project Description:

In consulting with resource agencies and adjacent property owners, the condition of the Seymour Drainage was assessed, alternatives were evaluated. There will be various permitting involved for the preferred alternatives and construction. The project will include wetlands restoration and some new storm drain piping. Opportunities for GI measures will be considered during project design.

This project involves finalizing the design and environmental components for the permanent Coastal Development Permit (CDP) for erosion stabilization of the Seymour Ditch. The project will require partnership with San Mateo County, resource agencies and adjacent property owners (Peninsula Open Space Trust), analysis of erosion stabilization alternatives, design of the preferred alternative, permitting for the preferred alternative and ultimately construction of permanent stabilization measures for the Seymour ditch.

The project is estimated to cost $1,210,000 but it is currently unfunded.

Prioritized Project: Walkway Extension from Cameron's to Smith Field

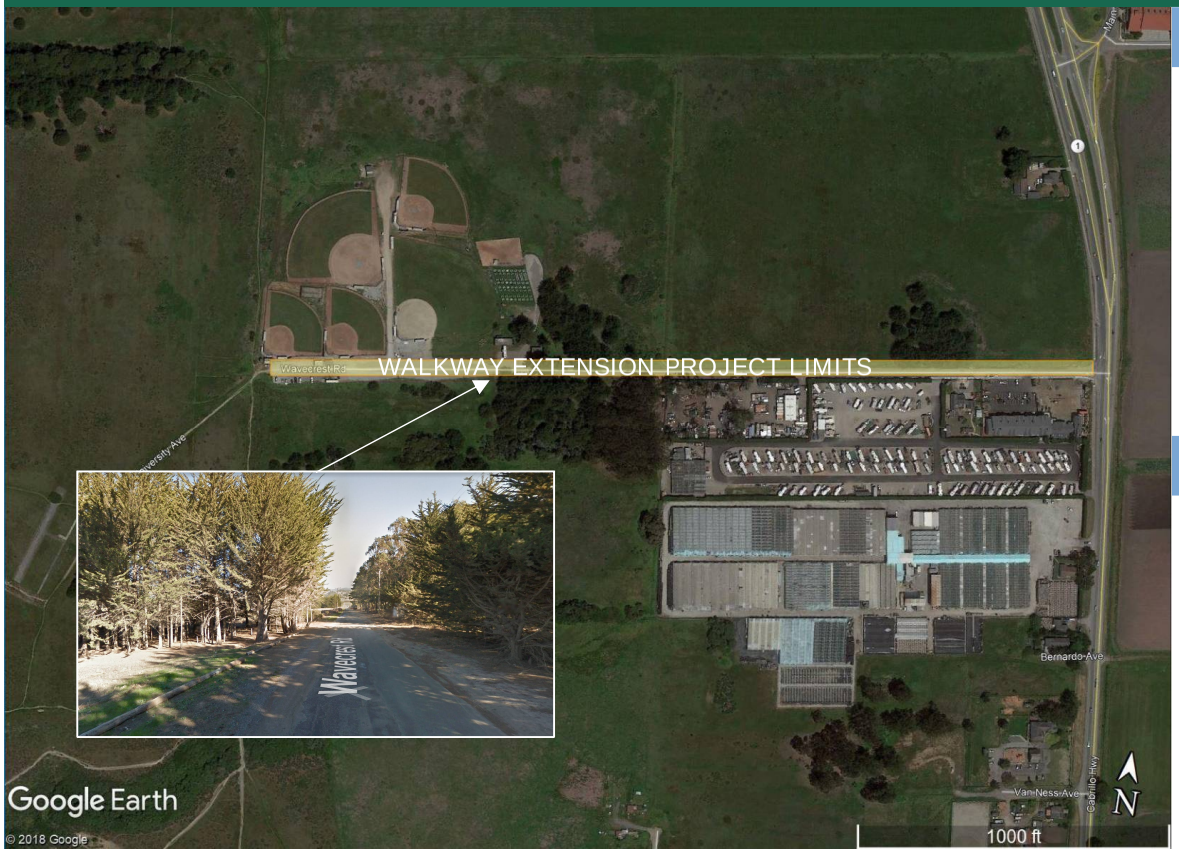


Image Source: Google Earth 2018

Site Information:

Location	West of Cameron's Inn to Smith Field on Wavecrest Rd., west of Hwy. 1
Capture Area (SF)	TBD
Impervious Area (%)	100%
GI Measures	TBD

Project Schedule:

The project design phase is scheduled for FY19-20 and construction during FY20-21.

Project Description:

This project will provide an all-weather use, 2,162 linear foot walkway along Wavecrest Road to encourage multi-modal transportation to Smith Field Park. Potential GI measures can include a permeable paver walkway or bioretention area planter strip.

The project is estimated to cost $268,000.