01
Worksession Item

CITY OF BERKELEY
Office of the City Manager

WORK SESSION
June 18, 2019

To: Honorable Mayor and Members of the City Council

From: Dee Williams-Ridley, City Manager

Submitted by: Phillip L. Harrington, Director, Department of Public Works

Subject: City of Berkeley Green Infrastructure Plan

SUMMARY

The City of Berkeley Green Infrastructure Plan (GI Plan) is a requirement under the Stormwater NPDES Municipal Regional Permit 2 (MRP2). The GI Plan was developed in coordination with the SF Bay Regional Water Quality Control Board (Water Board) to meet regulatory requirements and provide guidance for prioritizing GI projects in the City. Applying the GIS based analysis, the GI Plan identified 11 priority sites for GI facilities for the City. The GI Plan predicts the City will need to treat runoff from an additional 17 acres of the City to meet regionwide PCB and mercury reduction goals by 2030, and 19 acres of the City to meet regionwide PCB and mercury reduction goals by 2040. The information on the 11 priority sites and the additional areas to be treated by 2030 and 2040 is used on a regionwide basis to allow MRP2 permittees and the Water Board to assess how well the stormwater agencies are reducing pollution to the San Francisco Bay. MRP2 requires the GI Plan be submitted to Water Board by September 30, 2019.

CURRENT SITUATION AND ITS EFFECTS

The GI Plan was prepared according to the framework adopted by Resolution 68,041—N.S. on June 13, 2017 (see Attachment 1). The GI Plan is a planning document required under MRP2, to guide selection and development of GI projects beginning in 2020, and assure reductions of polychlorinated biphenyls (PCB) and mercury in urban stormwater discharges. Adopting the GI Plan supports the City's Strategic Plan Priority Goal of being a global leader in addressing climate change, advancing environmental justice, and protecting the environment.

Staff made GI Plan presentations to the Public Works Commission (PWC), the Public, and to the Council's Facilities, Infrastructure, Transportation, Environment, and Sustainability Committee. The Public Works Commission submitted an off agenda memo dated April 10, 2019 providing recommendations to Council (Attachment 2). Staff's responses to their comments are as follows:

1. PWC recommends staff develop metrics that educate readers about the economic benefits of the plan in reducing flooding and increasing water supply by

infiltrating runoff. The purpose of the GI Plan is to improve urban runoff quality and includes outreach and education for the general public and developers on the requirements for implementing GI in projects, and the purpose is not to reduce flooding and increase water supply.

2. PWC recommends staff meet with Regional Board staff to be sure that the plan will be acceptable. The GI Plan was developed in consultation with Water Board staff to understand their expectations, and to meet the requirements set forth in MRP2.
3. PWC recommends City work with Caltrans to develop a comprehensive Green Infrastructure approach for San Pablo Avenue, in a manner similar to the approach for the Adeline Corridor. The GI Plan requires urban runoff water quality and GI be incorporated into the City's planning processes.
4. PWC requests the GI Plan model be applied to additional options such as the center median of Sacramento and other historic streetcar lines. The assessment of the Sacramento median showed that it does not rank as high in priority as other sites at this time. The Sacramento median and other historic streetcar line can be reassessed in the future and compared as project development changes.

BACKGROUND

Implementing Green Infrastructure (GI) or Low Impact Development (LID) in Berkeley has been happening in various forms for many years. Tracking GI improvements began under Municipal Regional Stormwater NPDES Permit 1 (October 2009 to November 2015) and has continued into the current MRP2 with over 50 such installations completed to date. These installations include permeable pavement applications (Allston Way), bio-swale retrofits into existing conditions (Presentation Park at California Street/Allston Way), complete street applications of bio-swales (Hearst Avenue/Oxford Street), flow-through planters (BART Plaza), and green roofs (Dona Spring Animal Shelter). These past GI projects have been incorporated into the GI Plan.

The GI Plan performs several functions including prioritizing areas for GI projects, tracking GI projects, tracking compliance with regionwide reductions in pollutants including PCB and mercury, identifying other City planning documents to incorporate GI considerations, and exploring funding options for GI projects.

Prioritizing and Identifying GI Projects. A major tool in reducing pollutant loading in urban runoff is addressing impacts created by impervious surfaces. The GI Plan uses the UrbanSim[1] Model to forecast future potential development areas and the corresponding impervious area where GI will be implemented to treat urban runoff. These predictions are combined with the City's planned projects and projections to develop target amounts of impervious surface treatment for the milestone years of

[1] http://www.urbansim.com/

2020, 2030, and 2040. Two GIS based tools are used to prioritize projects for the GI Plan. The first tool (Multi-Benefit Prioritization Tool) ranks based on characteristics that include ground slope, soil permeability, potential for pollutant reduction and augmenting groundwater, flood control benefit, potential to restore habitat, trash capture, and public involvement. The second tool (Micro-Watershed Tool) uses specific drainage area or Micro-Watershed to refine how urban runoff is collected and delineates specific drainage areas for placing GI facilities. These two tools were applied and the priority sites that were identified include:

- Page Street between Fourth Street and the RR Tracks (Gilman Watershed)
- Jones Street between Fourth Street and RR Tracks (Gilman Watershed)
- Channing Way at the RR Tracks (Potter Watershed)
- Heinz Avenue near RR Tracks (Potter Watershed)
- Dwight Way between Fourth Street and the RR Tracks (Aquatic Park Watershed)
- Grayson Street near the RR Tracks (Aquatic Park Watershed)
- Tenth Street at Codornices Creek (Codornices Watershed)
- Ninth Street at Codornices Creek (Codornices Watershed)
- Piedmont Avenue Median between Durant Avenue and Channing Way (Potter Watershed)
- Piedmont Avenue Traffic Circle (Potter Watershed)
- San Pablo Park at Ward Street (Potter Watershed)

Tracking and Regionwide Compliance. These values are shared regionally to determine how well targeted reductions in pollutants such as mercury and PCBs are reduced through treating urban runoff by GI facilities. The Alameda Countywide Clean Water Program (ACCWP) and Contra Costa Countywide Clean Water Program combined efforts to develop a tracking and load reduction accounting tool. This ArcGIS Online web application (AGOL Tool) is an online GIS application to track GI projects and will be open to the public when fully implemented.

Planning Documents. The GI Plan provides the most current information on methods and locations for optimal pollutant load reductions in urban runoff. This information must be incorporated into the City’s planning documents. This will require inter-departmental cooperation and communications. The planning documents identified include:

- City of Berkeley General Plan
- Downtown Berkeley Design Guidelines

- Downtown Streets and Open Space Improvement Plan
- Downtown Area Plan
- Berkeley Strategic Transportation Plan (BeST Plan)
- Watershed Management Plan
- Adeline Corridor Plan (in progress)
- Pedestrian Master Plan (update in progress)
- Southside Complete Streets (in progress)

ENVIRONMENTAL SUSTAINABILITY
The GI Plan is designed to work in conjunction with existing City planning documents and programs with the goal of coordinating and ensuring GI opportunities are identified and implemented.

POSSIBLE FUTURE ACTION
The GI Plan requires green infrastructure considerations be incorporated in planning documents including City's General Plan, and specific plans.

Staff is working with ACCWP to finalize some attachments in the GI Plan. Once finalized, the GI Plan will be brought for adoption to the City Council at its meeting on September 10, 2019. The Draft GI Plan is provided as Attachment 3.

FISCAL IMPACTS OF POSSIBLE FUTURE ACTION
The cost for constructing the eleven prioritized GI projects identified above is estimated to be $1.7 million (2018 dollars). This estimate is based on construction costs for recently completed projects at Rose Street at Hopkins Street, and at Hearst Avenue at Oxford Street. Ongoing maintenance of these 11 City facilities will cost approximately $100,000 per year (2018 dollars).

The City's goal is to treat an additional 17 acres between 2020 and 2030. The estimated cost for installing GI to treat 17 acres is $8.9 million (2018 dollars) spread over the ten year period from 2020 to 2030. The corresponding ongoing annual maintenance cost would increase by approximately $550,000 per year (2018 dollars).

The City's goal in the GI Plan from 2030 to 2040 is to treat an additional 19 acres. The estimated cost for installing GI to treat 19 acres is $10.0 million (2018 dollars) spread over ten year period from 2030 to 2040. The corresponding ongoing annual maintenance cost would increase by approximately $620,000 per year (2018 dollars).

Funding Options. The property owners in the City voted on and approved the 2018 Clean Stormwater Fee as certified by Council Resolution 68,483—N.S. In 2019, the ACCWP completed the Countywide Storm Water Resource Plan, which makes

Berkeley and other agencies in Alameda County eligible for California Proposition 1 grants. It is envisioned that revenue from the City's Clean Stormwater Fee will be used to satisfy matching or local fund contributions to obtain grant funding. However, to implement the goals of the GI Plan additional funding sources will need to be identified.

CONTACT PERSON

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Danny Akagi, Associate Civil Engineer, 981-6394

Attachments:
1: Resolution 68,041—N.S.
2: Public Works Commission Off-Agenda Memo, Dated April 10, 2019
3: Draft City of Berkeley Green Infrastructure Plan

RESOLUTION NO. 68,041–N.S.

FRAMEWORK FOR GREEN INFRASTRUCTURE PLAN DEVELOPMENT

WHEREAS, in order to be in compliance with Provision C.3.j of the reissued Municipal Regional Stormwater Permit (MRP 2) adopted by the San Francisco Bay Regional Water Quality Control Board on November 19, 2015 (Order No. R2-2015-0049); the City of Berkeley is required to prepare a Green Infrastructure Plan for the inclusion of low impact development drainage design into appropriate projects on public and private lands to address the adverse water quality impacts and pollutants from urban stormwater runoff and urbanization, including paving of roadways and parking lots; and

WHEREAS, the goal of low impact development drainage design is to reduce runoff, minimize land disturbance, minimize pavement and other impervious cover, and remove pollutants from stormwater runoff using methods that employ natural processes of storage, detention, infiltration, evapotranspiration, and filtering of runoff through soil media as described in Provision C.3.c of MRP 2; and

WHEREAS, the Green Infrastructure Plan shall meet the following milestones specified in Provision C.3.j of MRP 2:

1. Approval of a framework for the Green Infrastructure Plan by June 30, 2017.
2. Approval of the Green Infrastructure Plan by June 30, 2019.
3. Submittal to the San Francisco Regional Water Quality Control Board of the Green Infrastructure Plan with the City of Berkeley's Annual Stormwater Report by September 30, 2019; and

WHEREAS, in order to be in compliance with MRP 2, a Framework for Green Infrastructure Plan Development has been prepared and presented to applicable City of Berkeley Commissions including Public Works Commission, Planning Commission, and Community Environmental Advisory Commission.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Berkeley that it hereby adopts the Framework for Green Infrastructure Plan Development.

The foregoing Resolution was adopted by the Berkeley City Council on June 13, 2017 by the following vote:

Ayes: Bartlett, Davila, Droste, Hahn, Harrison, Maio, Wengraf, Worthington and Arreguin.

Noes: None.

Absent: None.

Jesse Arreguin, Mayor

Attest:

Mark Numainville, City Clerk

Public Works Commission

April 10, 2019

To: Honorable Mayor and Members of the City Council

From: Public Works Commission

Submitted by: Ray Yep, Chair, Public Works Commission

Subject: Status of Green Infrastructure Plan

On February 7, 2019, the Public Works Commission heard a briefing on Berkeley's Green Infrastructure Plan (GI Plan) from Mitch Buttress, who is overseeing preparation of the plan. Such a plan is required to be approved and implemented under the City's stormwater permit.

There is much to like in the draft plan nearing completion. The plan includes an estimate of 119 acres of impervious surface to be treated by green infrastructure by 2040. Using newly developed mapping tools, City staff and their consultants have identified 11 different projects that would provide water quality, flood control, and infiltration benefits. It appears that the City can choose elements of these projects over the next decade to meet stormwater permit requirements. Once the city has completed an analysis of the feasibility of these options, projects that qualify for grant funding from outside sources, or that should be a high priority for funding under Measure T1, will be identified.

The Public Works Commission has several recommendations for implementing the GI Plan to make it more effective and to communicate the benefits of the plan. First, staff should develop metrics that educate readers about the economic benefits of the plan in reducing flooding and increasing water supply by infiltrating runoff. Second, we recommend that City staff meet with Regional Board staff to be sure that the plan will be acceptable. Third, we strongly urge that the City work with Caltrans to develop a comprehensive Green Infrastructure approach for San Pablo Avenue, in a manner similar to the approach for the Adeline Corridor. We expect to see redevelopment of these two areas the next twenty years, and the plan should provide a vision for redevelopment that incorporates green infrastructure into that redevelopment.

We would ask that the model that has been developed to date be used to evaluate some additional options such as using the center median of Sacramento and other historic streetcar lines for green infrastructure. Developing additional options could help the City increase groundwater recharge, improve flood control, and provide additional water supply.

We are encouraged by staff's practical and analytical approach to planning green infrastructure projects to meet Berkeley's needs and look forward to seeing the feasibility analysis as the projects develop.

Sincerely,

Nicholas Dominguez
Watershed Subcommittee
Public Works Commission

DRAFT Green Infrastructure Plan

City of Berkeley

May 2, 2019

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List of Appendices

List of Acronyms

Acronym	Definition
ACCWP	Alameda Countywide Clean Water Program
AGOL	ArcGIS Online
BAHM	Bay Area Hydrology Model
BASMAA	Bay Area Stormwater Management Agencies Association
DMA	Drainage management area
GI	Green infrastructure
LID	Low impact development
MRP	Municipal Regional Stormwater Permit
HM	Hydromodification management
RWQCB	Regional Water Quality Control Board, San Francisco Bay
PCBs	Polychlorinated biphenyls
TMDL	Total maximum daily load

1. Introduction

1.1 Statement of Purpose

The purpose of this Green Infrastructure Plan (GI Plan) is to guide the identification, implementation, tracking, and reporting of green infrastructure projects within the City of Berkeley in accordance with the Municipal Regional Stormwater Permit (MRP), Order No. R2-2015-0049, adopted by the San Francisco Bay Regional Water Quality Control Board on November 15, 2015. "Green infrastructure" refers to a sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and/or uses bioretention and other low impact development practices to improve the water quality of stormwater runoff.

1.2 Physical Setting[1]

The City of Berkeley, approximately 10.5 sq miles, is located in northern Alameda County on the eastern shoreline of the San Francisco Bay and extends east to the ridgelines of the East Bay Hills. In general, the physiography of the Berkeley watersheds reflects their general position or alignment in relation to the primary geologic structures in the East Bay. The watersheds in Berkeley typically drain to the west out of the steeper headwaters (Berkeley Hills, with a maximum elevation of approximately 1,770' at Chaparral Peak), across a transitional alluvial fan zone, and then across the more gently sloping Bay plain before discharging into the San Francisco Bay (approximately at sea-level). One exception is the Wildcat watershed which runs along the eastern side of the ridgelines of the Berkeley Hills and drains to Wildcat Creek. There are 10 watersheds wholly or partially within the City of Berkeley (not including the Marina). Moving from north to south, these are: Wildcat, Cerrito, Marin, Codornices, Gilman, Schoolhouse, Strawberry, Aquatic Park, Potter, and Temescal (Figure 1). Several watersheds extend past Berkeley's municipal boundaries into the Cities of Emeryville and Oakland to the south, and the Cities of Albany and El Cerrito to the north. The City of Berkeley is predominately urban; however drainage from approximately 2 sq. mi. of non-urban area outside the City boundary flows into the City from Strawberry Canyon and Claremont Canyon east of the City. Detailed characteristics of Berkeley's watersheds are provided in Appendix A.

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[1] Excerpt from City of Berkeley, 2011. *Watershed Management Plan, Public Works Engineering, Version 1.0,* October.

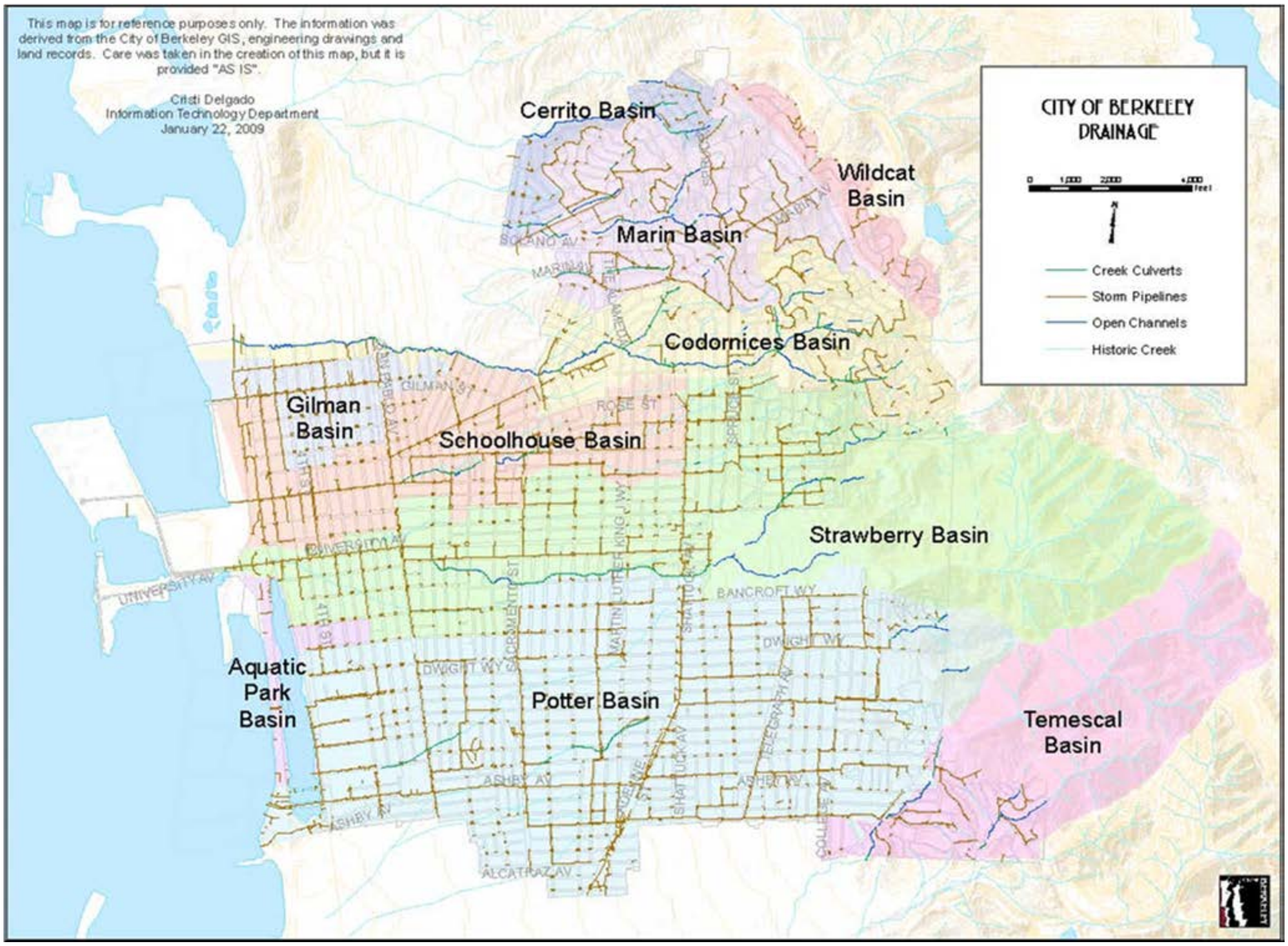

Figure 1 – Map of Watersheds in the City of Berkeley, California

1.3 Existing Green Infrastructure in Berkeley

Since the early 2000s, green infrastructure facilities have been installed in Berkeley at a rapid pace. As of 2019, over 50 public and private green infrastructure facilities have been installed in Berkeley. These facilities have been installed as parts of City "Green Streets" initiatives and as a result of Low-Impact Development (LID) requirements for private development projects. Additionally, some private landowners have voluntarily installed green infrastructure facilities on their properties. Figure 2 shows the locations of existing Green Infrastructure/Low-Impact Development (GI/LID) facilities in Berkeley. Figures 3 through 8 provide examples of existing GI/LID facilities. In 2012, the City adopted its Watershed Management Plan (WMP, Appendix A). Chapter 3 of the WMP provides detailed explanations and compares the benefits of different types of GI/LID facilities.

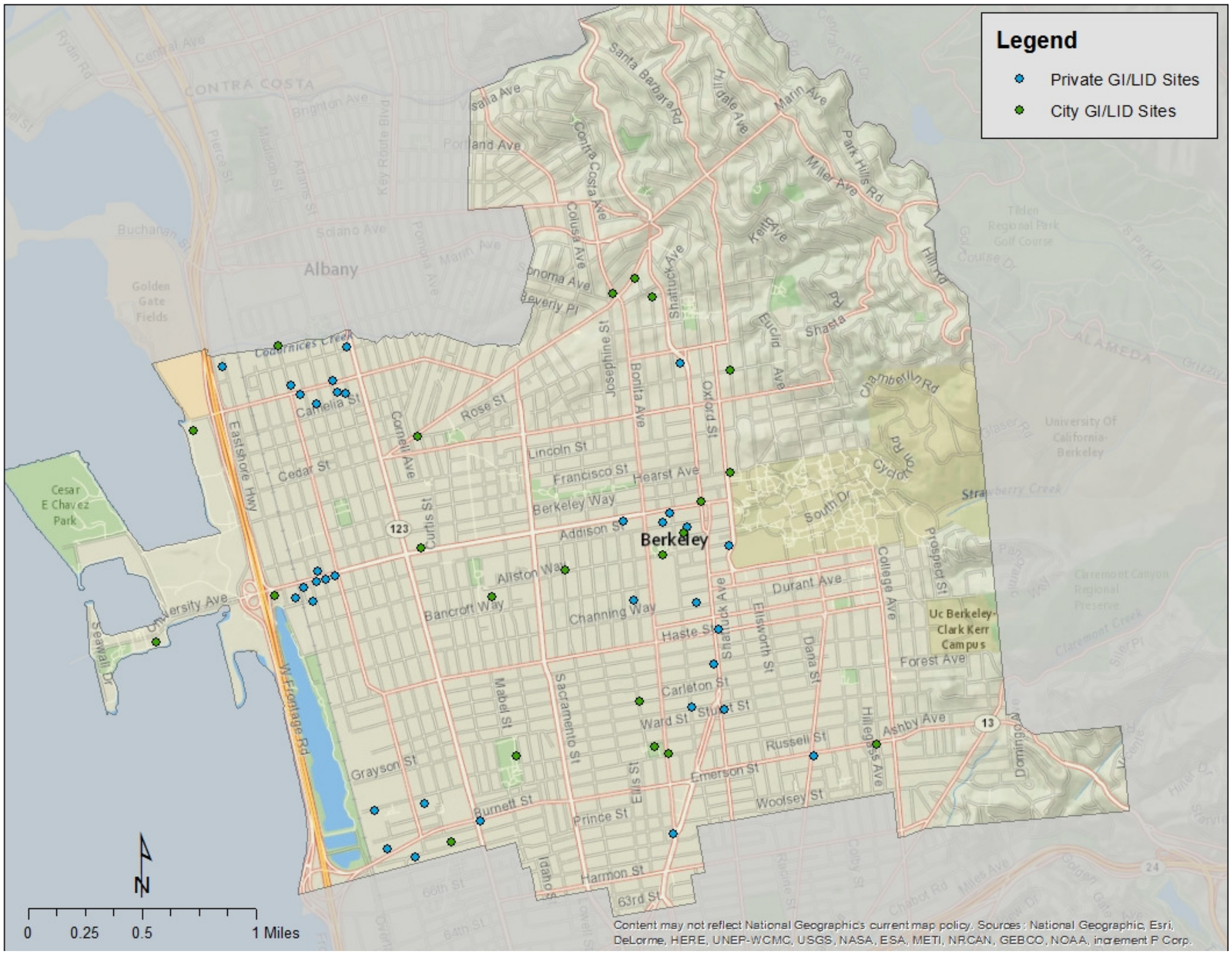

Figure 2 – Existing Green Infrastructure/Low-Impact Development (GI/LID) Sites as of 2019 in the City of Berkeley, California

Figure 3 – The entire block of Allston Way between Milvia Street and Martin Luther King Jr. Way is paved with permeable pavers.

Figure 4 – Permeable pavers combined with underground flow detention at Milvia and Hopkins Streets.

Figure 5 – A large concrete traffic island/median was reconstructed with a bioretention facility at Rose and Hopkins Streets.

Figure 6 – A bioretention facility was installed along with pedestrian and cyclist safety improvements as part of the Hearst Complete Streets Project.

Figure 7 – Connected bioretention features in a traffic circle and corner bulb-out at Spruce and Vine Streets.

Figure 8 – The green roof at the City of Berkeley's Dona Spring Animal Shelter.

1.4 MRP Requirements

This Green Infrastructure Plan has been developed to comply with Green Infrastructure Plan requirements in Provision C.3.j of the MRP, which states in part:

> *The Plan is intended to serve as an implementation guide and reporting tool during this and subsequent Permit terms to provide reasonable assurance that urban runoff TMDL wasteload allocations (e.g., for the San Francisco Bay mercury and polychorinated biphenyls [PCBs] Total Maximum Daily Loads [TMDLs]) will be met, and to set goals for reducing, over the long term, the adverse water quality impacts of urbanization and urban runoff on receiving waters. For this Permit term, the Plan is being required, in part, as an alternative to expanding the definition of Regulated Projects prescribed in Provision C.3.b to include all new and redevelopment projects that create or replace 5,000 square feet or more of impervious surface areas and road projects that just replace existing imperious surface area. It also provides a mechanism to establish and implement alternative or in-lieu compliance options for Regulated Projects and to account for and justify Special Projects in accordance with Provision C.3.e.*
>
> *Over the long term, the Plan is intended to describe how the Permittees will shift their impervious surfaces and storm drain infrastructure from gray, or traditional storm drain infrastructure where runoff flows directly into the storm drain and then the receiving water, to green—that is, to a more-resilient, sustainable system that slows runoff by dispersing it to vegetated areas, harvests and uses runoff, promotes infiltration and evapotranspiration, and uses bioretention and other green infrastructure practices to clean stormwater runoff.*
>
> *The Plan shall also identify means and methods to prioritize particular areas and projects within each Permittee's jurisdiction, at appropriate geographic and time scales, for implementation of green infrastructure projects. Further, it shall include means and methods to track the area within each Permittee's jurisdiction that is treated by green infrastructure controls and the amount of directly connected impervious area. As appropriate, it shall incorporate plans required elsewhere within this Permit, and specifically plans required for the monitoring of and to ensure appropriate reductions in trash, PCBs, mercury, and other pollutants.*

Table 1-1 below links each section of this plan to the applicable MRP provision.

Table 1-1: Green Infrastructure Plan Sections and Applicable MRP Provisions

Section of Green Infrastructure Plan	Applicable MRP Provision
1. Introduction	C.3.j
2. Impervious Surface Retrofit Targets	C.3.j.i.(2)(c)
3. Prioritizing and Mapping Planned and Potential Projects	C.3.j.i.(2)(a),(b),(j)
3.1Approach for Prioritizing and Mapping Projects	C.3.j.i.(2)(a)
3.2High Priority Projects	C.3.j.i.(2)(b)
3.3 Early Implementation Projects	C.3.j.i.(2)(j)
4. Tracking and Mapping Completed Projects	C.3.j.i.(2)(d) & C.3.d.iv.(1)
5. Summary of General Guidelines for GI Projects	C.3.j.i.(2)(e), C.3.j.i.(2)(f), C.3.j.i.(2)(g)
6. Integration of GI Requirements in Other City Planning Documents	C.3.j.i.(2)(h) & (i)
7. Evaluation of Funding Options	C.3.j.i.(2)(k)

2. Impervious Surface Retrofit Targets

The City of Berkeley has identified targets for the amount of impervious surface, from public and private projects within its jurisdiction (including redevelopment projects regulated under Provision C.3.b of the MRP), to be retrofitted by 2020, 2030, and 2040. The targets are presented in Table 2-1. The time schedules shown in this table are consistent with the timeframes for assessing load reductions for mercury and PCBs specified in Provisions C.11 and C.12 of the MRP. The City is currently participating in a regional effort to perform a Reasonable Assurance Analysis that demonstrates how green infrastructure will be implemented to achieve PCB and mercury load reductions.

Target amounts of impervious surface to be retrofitted by Private Development are based on the UrbanSim Model used by the San Francisco Bay Area Metropolitan Transportation Commission. Target amounts of impervious surface to be retrofitted by Public Development, City Green Streets, and Regional GI Projects are based on local knowledge of planned future development, anticipated availability of funding, High Priority Projects discussed in Section 3.2, and Early Implementation Projects discussed in Section 3.3. Due to uncertainties related to the funding of public green infrastructure projects and the reliability of projections for private development projects, The City of Berkeley will track the progress toward achieving the targets presented in Table 2-1, identify any challenges that arise in achieving these targets, and propose solutions, in coordination with other MRP Permittees.

Table 2-1

Impervious Surface Retrofit Targets through 2040

City of Berkeley 2019 Green Infrastructure Plan

Future Year	Project Category	Total Area Treated by GI (acres)	Estimated Impervious Surface Retrofitted (acres)
2020	Private Development*	21	21
	Public Development	9	9
	City Green Streets and Regional GI Projects	15	11
	Total Targets:	**45**	**41**
2030	Private Development*	38	38
	Public Development	16	16
	City Green Streets and Regional GI Projects	25	19
	Total Targets:	**79**	**73**
2040	Private Development*	59	59
	Public Development	25	25
	City Green Streets and Regional GI Projects	35	26
	Total Targets:	**119**	**110**

*: Based on UrbanSim development projections provided by the San Francisco Bay Area Metropolitan Transportation Commission

3. Prioritizing and Mapping Planned and Potential Projects

Section 3 describes the use of a mechanism for prioritizing and mapping green infrastructure projects as required in Provision C.3.j.i.(2)(a), provides descriptions of planned and potential green infrastructure projects and other outputs of the mechanism per Provision C.3.j.i.(2)(b), and discusses early implementation projects.

3.1 Approach for Prioritizing and Mapping Projects (GI Mechanism)

This section describes the Green Infrastructure Mechanism ("GI Mechanism") used to prioritize and map areas for planned and potential green infrastructure projects in the City of Berkeley. The mechanism consists of the Alameda Countywide Multi-Benefit Metrics Prioritization Protocol ("Multi-Benefit Prioritization Tool"), the City of Berkeley Land-Use-Based Micro-Watershed Pollutant Load Estimation Tool ("Micro-Watershed Tool"), and the Alameda County/Contra Costa Project Tracking and Load Reduction Accounting Tool ArcGIS Online web application ("AGOL tool").

As described below, the mechanism includes criteria for prioritization, such as specific logistical constraints, water quality drivers (load reductions of mercury and PCBs consistent with TMDLs), and opportunities to treat runoff from private parcels in street right-of-way (ROW). It also produces outputs, including maps and project lists, which can be incorporated into the City of Berkeley's long-term planning and capital improvement processes.

Multi-Benefit Prioritization Tool

The Multi-Benefit Prioritization Tool is a stepwise GIS analysis documented in the Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum[2] and summarized below.

Step 1. Identify planned projects – Planned future green infrastructure projects within Alameda County were identified and entered into a GIS layer, based on project information provided by local agencies within the county.

Step 2. Identify opportunity sites – Additional potential project locations were identified and catalogued by the Alameda Countywide Clean Water Program consultant Geosyntec using a GIS-based opportunity analysis. The project opportunity analysis followed the steps listed below:

a. Identify publicly-owned parcels.
b. Screen identified public parcels to include only those that are at least 0.1 acre in size and with an average slope of less than 10 percent. Parcels that met these criteria were screened for physical feasibility.

[2] Geosyntec. 2017. *Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum*. December 13.

c. Identify non-interstate highway public right-of-way (ROW) within urban areas. Roadways considered included state and county highways and connecting roads and local, neighborhood, and rural roads.
d. Identify land uses or adjacent land uses of the sites resulting from steps b and c.
e. Screen sites identified in steps b and c to remove sites with the following physical constraints:
    i. Regional facilities were not considered for sites that were greater than 500 feet from a storm drain due to limited feasibility in treating runoff from a larger drainage area;
    ii. Parcel-based facilities were not considered for sites that were more than 50% undeveloped due to the limited potential for pollutant reduction of concern load reduction;
    iii. Sites with more than 50% of their drainage area outside of the urbanized area, as these sites would not provide opportunity for significant pollutant of concern load reduction;
    iv. Sites with more than 50% overlying landslide hazard zones to avoid the potential for increasing landslide risk.

Step 3. Classify planned projects and opportunity sites in preparation for metrics-based evaluation – A GIS analysis was performed to classify the planned projects identified in step 1 and the opportunity sites identified in step 2 according to four parameters listed below:

a. Green infrastructure project type – Each project received one of the following classifications: parcel-based, regional, or ROW/green street project.
b. Infiltration feasibility - Each project location received one of the following classifications for infiltration: infeasible, partially feasible, or feasible.
c. Facility type – Each project received one of the following classifications: green infrastructure[3], non-green infrastructure treatment control facility, water supply augmentation, flood control facility, hydromodification control, public use area or public education area, programmatic stormwater management opportunity.
d. Drainage area information – A drainage area was identified for each project.

Step 4. Score projects using an automated metrics-based evaluation – A quantitative metrics-based multiple benefit evaluation was performed using an automated process. Projects or opportunity sites received a score of 0, 1, or 2 for each of the metrics listed below. The automated scores were used to preliminarily rank the projects by watershed, jurisdiction, project type, and/or project stakeholder(s). Geosyntec provided a jurisdiction-specific list of planned projects and opportunity sites located in the City of Berkeley including an automated score for each project.

[3] All opportunity sites identified in step 2 were classified as GI projects. Based on information provided by local agencies in step 1, other classifications were assigned, where appropriate, to planned projects. Projects that were not classified as GI have co-benefits that may include GI.

Spatial data for the projects included in the list were provided in both GIS shape file and Google Earth KMZ file formats.

a. Parcel area (for regional and parcel-based projects only)
b. Location slope
c. Infiltration feasibility
d. PCBs/mercury yield classification in project drainage area
e. Regional facility
f. Removes pollutant loads from stormwater
g. Augments water supply
h. Provides flood control benefits
i. Re-establishes natural water drainage systems
j. Develops, restores, or enhances habitat and open space
k. Provides enhanced or created recreational and public use areas with potential opportunities for community involvement and education
l. Trash capture co-benefit

The results of the multiple benefit evaluation were compiled into a countywide Master List of Prioritized Planned and Potential Projects which is included in the Alameda Countywide Clean Water Program's Storm Water Resource Plan[4]. The City of Berkeley maintains a GIS database of the results of the multiple benefit evaluation within the City's boundaries. This database includes a GIS layer depicting the prioritization score for each section of right-of-way and applicable publicly owned parcel that can be displayed along with other City GIS layers to inform current and future planning decisions. A citywide evaluation performed using the Multi-Benefit Prioritization Tool is depicted in Figure 9.

[4] Alameda Countywide Clean Water Program. 2019. *Storm Water Resource Plan*. January.

Micro-Watershed Tool

The City of Berkeley developed the Land-Use-Based Micro-Watershed Pollutant Load Estimation Tool ("Micro-Watershed Tool") as a complimentary tool to the Multi-Benefit Prioritization Tool. The purpose of the Micro-Watershed Tool is to evaluate small drainage areas in Berkeley for pollutant load reduction potential based on the historical land-use classifications contained within them. The MRP requires permittees to plan and implement green infrastructure projects to achieve load reductions of PCBs and mercury. The Micro-Watershed Tool is designed to assist with siting green infrastructure installations in locations that maximize PCBs and mercury load reductions. The Micro-Watershed Tool is based on the Bay Area Stormwater Management Agencies Association's Interim Accounting Methodology for TMDL Loads Reduced (Interim Accounting Methodology)[5], which states:

> *A land-use-based yield is an estimate of the mass of a contaminant contributed by an area of a particular land use per unit time. Essentially, different types of land uses yield different amounts of pollutants because land use types differ in their degree of contamination resulting from differing intensities of historic or ongoing use of pollutants. The land use categories used to land use-based yields were identified from studies conducted to identify potential Pollutant of Concern (POC) sources and source areas.*
>
> *A number of preliminary GIS data layers were developed using existing and historical information on land use and facility types that were located in the Bay Area during the early to mid-20th century. GIS data layers developed included a revised "Old Industrial" land use layer that attempted to depict industrial areas that were present in the year 1968 and an "Old Urban" land use layer that depicts urbanized areas developed by 1974, other than Old Industrial areas. The year 1974 was used as this was the closest year to 1968 for which data were available. The other categories include "New Urban", which depicts areas urbanized after 1974; "Open Space", which represents undeveloped land; and "Other", which consists of airport and military areas. "Source Property" areas are located in historically industrial or other areas where PCBs were used, released, and/or disposed of and/or where sediment concentrations are significantly elevated above urban background levels.*

Assumed average PCBs and Mercury yields (in milligrams per acre per year) were developed for each of the six Historical Land Use categories listed above.

For the Micro-Watershed Tool, the City of Berkeley's drainage maps were digitized using GIS software. The result is a GIS Shapefile with roughly 1,000 polygons representing drainage areas as small as that contributing to a single catch basin/inlet. The drainage areas layer was overlain with the Historical Land Use Layers described in the Interim Accounting Methodology and calculations were run to determine the amount of each category of historical land use contained within each drainage area. A second round of calculations were then run to determine the assumed land-use-based PCBs yield for each drainage area based on the

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[5] BASMAA. 2017. *Interim Accounting Methodology for TMDL Loads Reduced*. Prepared by Geosyntec Consultants and EOA, Inc. March 23.

formulas provided in the Interim Accounting Methodology. Finally, the assumed land-use-based PCBs yields were multiplied by the Efficiency Factor for green infrastructure treatment (0.7), then divided by the total area of each drainage area to produce a PCB reduction potential per acre treated value for each Micro-Watershed in the City. The City maintains the Micro-Watershed Tool in the form of a GIS database which includes a GIS layer depicting the PCBs reduction potential for each Micro-Watershed in Berkeley that can be displayed along with the other City GIS layers to inform current and future planning decisions. Figure 10 depicts the land-use-based PCBs reduction potential for each Micro-Watershed in Berkeley.

3.2 High Priority Projects

Using the tools of the GI Mechanism described above, the City of Berkeley has identified the high priority potential green infrastructure projects described in this section that may be used to help meet the impervious surface retrofit targets presented in Section 2. This is only a current list of projects. It is envisioned that as future capital projects and City plans are developed, the tools of the GI Mechanism will be used to identify additional high priority green infrastructure projects that can be constructed as parts of broader City efforts.

Watershed Management Plan Projects

As part of the Watershed Management Plan (WMP), hydraulic models were developed for the Potter and Codornices Watersheds in Berkeley. The results of modelling in the Potter Watershed suggested that installation of surface-level bioretention combined with underground storage facilities (that would divert peak flows, then slowly meter flows back to the storm drain) in the upper watershed would result in incremental flood reductions throughout the watershed. The WMP identifies twenty five locations for GI/storage units in the upper Potter Watershed. As part of the current green infrastructure planning effort, the City reexamined these locations using the GI Mechanism to determine which locations are most likely to provide multiple benefits in addition to flood control. Figure 11 shows a conceptual cross section of a green infrastructure/storage unit as proposed in the WMP. Figure 12 shows the WMP-proposed GI/storage unit locations overlain with the Multi-Benefit Prioritization Tool GIS layer. Table 3-1 shows the Multi-Benefit Prioritization Scores for each location.

Table 3-1
Watershed Management Plan Proposed GI Sites - Potter Watershed
Multi-Benefit Prioritization Scores
2019 City of Berkeley Green Infrastructure Plan

Project Description	Multi-Benefit Prioritization Score*
2 GI/Storage Units - Piedmont (Forest to Derby)	15
2 GI/Storage Units - College (Parker to Derby)	15
2 GI/Storage Units - Ashby (Benvenue)	15
2 GI/Storage Units - Bowditch (Channing to Haste)	15
2 GI/Storage Units - Shattuck (Bancroft to Kittredge)	15
2 GI/Storage Units - Ellsworth (Channing)	15
2 GI/Storage Units - Shattuck (Channing)	15
2 GI/Storage Units - Adeline (Ashby)	15
2 GI/Storage Units - Adeline (Oregon)	15
2 GI/Storage Units - Shattuck (Blake)	15
2 GI/Storage Units - Ellsworth (Dwight)	15
2 GI/Storage Units - Ashby (Telegraph)	15
1 GI/Storage Unit - Woolsey (Tremont)	15
2 GI/Storage Units - Piedmont (Durant to Channing)	14.5
2 GI/Storage Units - College (Channing to Dwight)	13.5
2 GI/Storage Units - Derby (Telegraph to Regent)	13.5
2 GI/Storage Units - Webster (College)	13.5
2 GI/Storage Units - Wheeler (Prince to Woolsey)	13.5
3 GI/Storage Units - Derby (Warring)	13.5
2 GI/Storage Units - Telegraph (Stuart)	13.5
2 GI/Storage Units - Woolsey (Eton)	12.5
2 GI/Storage Units - Bancroft (Bowditch)	12.5
2 GI/Storage Units - Dwight (Prospect)	12.5
2 GI/Storage Units - Stuart (College to Cherry)	12.5
2 GI/Storage Units - Woolsey (Dana)	12

*: Maximum Multi-Benefit Prioritization Score for Berkeley = 15.

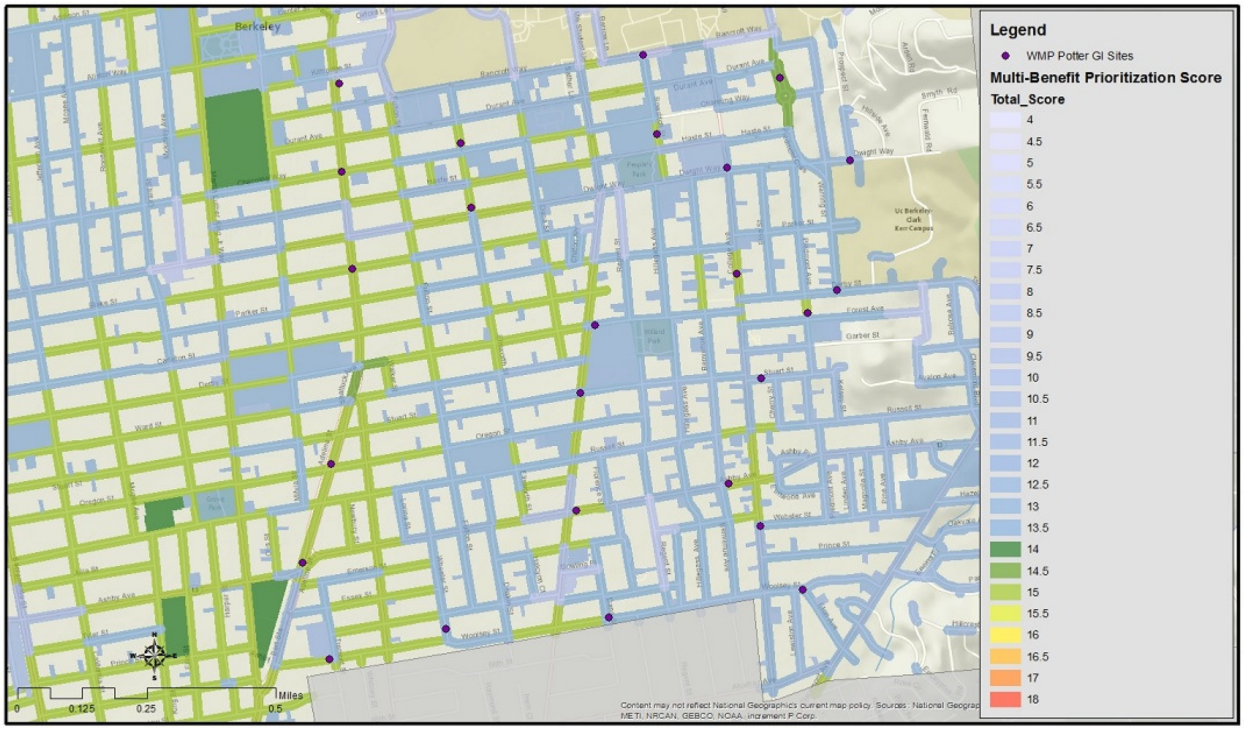

Figure 12 – WMP-Proposed GI/Storage Unit Locations in the Upper Potter Watershed Plotted Against Multi-Benefit Prioritization Scores

Woolsey Street Bioretention and Underground Flow Detention Facility

City staff has selected Woolsey Street at Tremont Street as the first WMP-proposed GI/storage unit to be constructed in the Potter Watershed. This location was selected for the following reasons:

- Synergy with the City's Paving Program;
- High level of constructability relative to other proposed locations;
- Relatively few space constraints;
- Multi-Benefit Prioritization Score of 15 (maximum);
- High visibility location adjacent to the Ed Roberts Campus and the Ashby Bart Station.

The Woolsey Street project is fully designed and the City is currently in the process of retaining a contractor for construction.

Piedmont Avenue Traffic Circle and Medians

The City of Berkeley and the University of California, Berkeley (UC Berkeley) have identified the large traffic circle and medians on Piedmont Avenue between Durant Avenue and Haste Street (Figure 13) as a potential site for a joint green infrastructure project. This is the location of a WMP-proposed GI/storage unit with a high Multi-Benefit Prioritization Score of 14.5. As Piedmont

Avenue is one of the main roads leading into the UC Berkeley campus, this is a very high visibility location to students and visitors alike. The large size of the traffic circle, ability to team with UC Berkeley, existing storm drain infrastructure, and location in the upper Potter Watershed make this an attractive project.

Figure 13 – The large grassy traffic circle at Piedmont Avenue and Channing Way could be retrofitted into a bioretention feature to treat runoff from the street.

Codornices Watershed Projects

The WMP identifies a number of potential sites for green infrastructure installations in the Codornices Watershed. Two proposed locations that received relatively high scores from the Multi-Benefit Prioritization Tool and have relatively high PCBs Reduction potential are Ninth Street at Codornices Creek and Tenth Street at Codornices Creek (Figures 14 and 15).

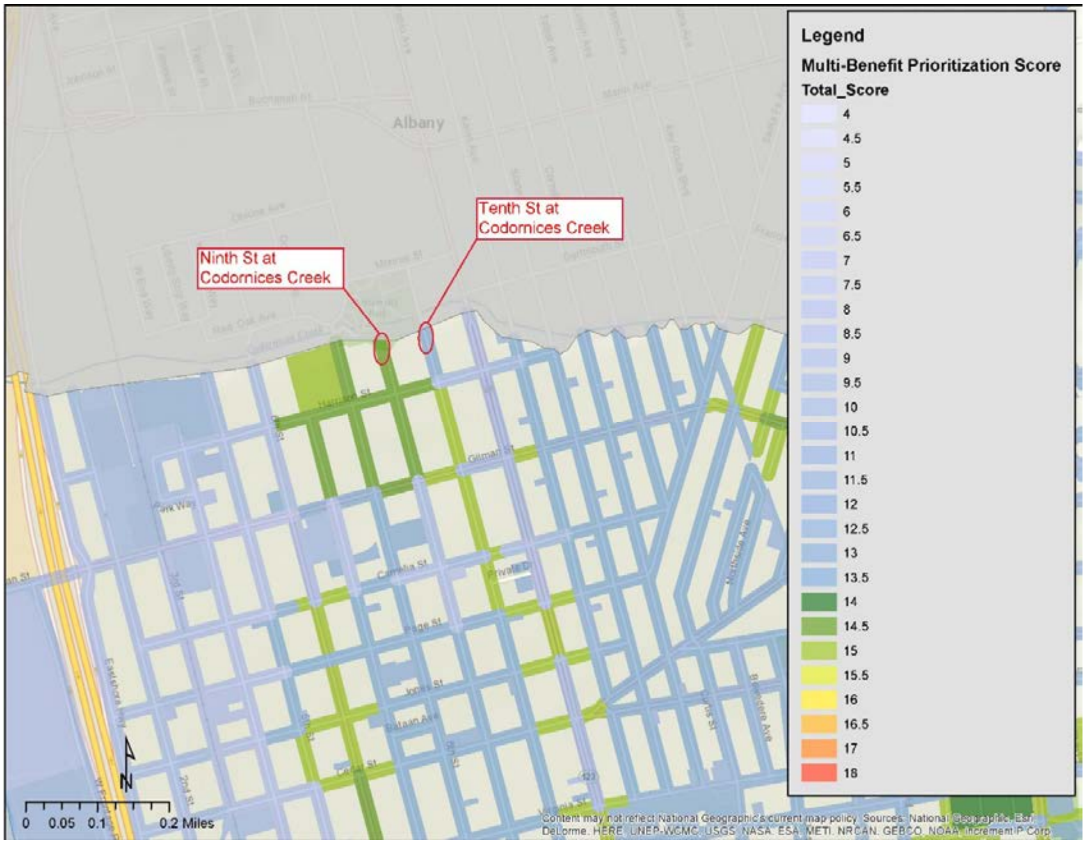

Figure 14 – Lower Codornices Watershed Potential GI Sites, Multi-Benefit Prioritization Scores

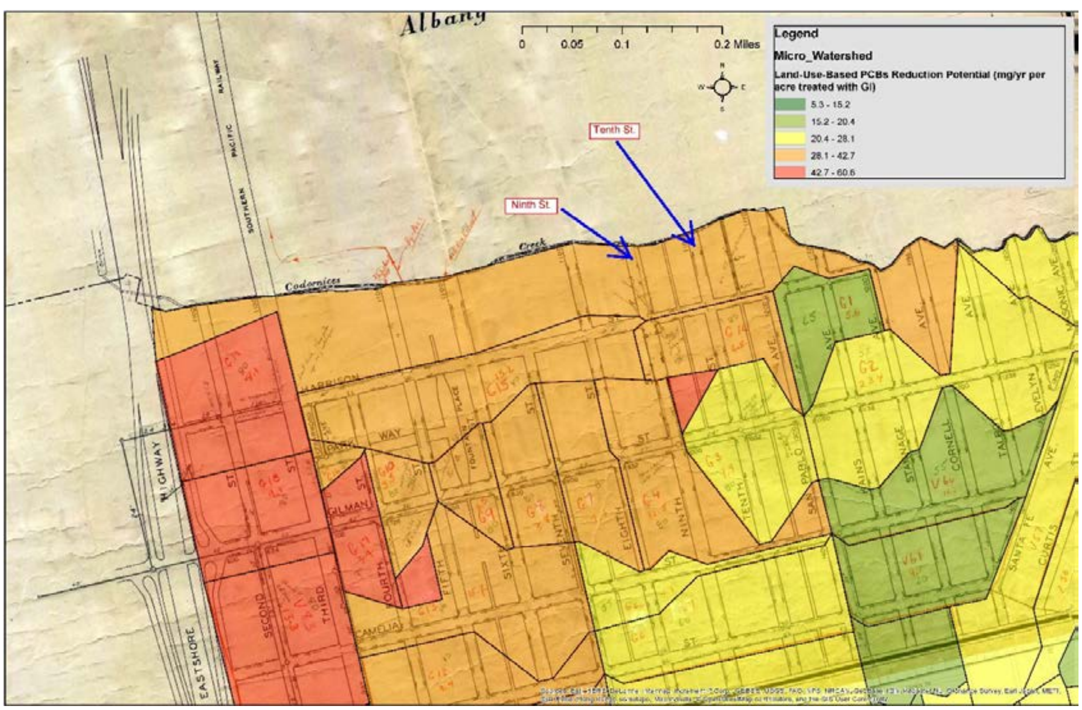

Figure 15 – Lower Codornices Watershed Potential GI Sites, PCBs Reduction Potential

As shown in Figure 16, a large raised concrete surface currently occupies the dead-end of Ninth Street at Codornices Creek. A portion of this concrete island could be converted into a bioretention unit to treat runoff from the street before it enters the creek. This retrofit could be completed concurrent with other improvements to the right-of-way and stabilization and restoration of the creek. In order for the City to complete this project, cooperation from upstream and downstream land owners on both sides of the creek would be necessary.

Figure 16 – A portion of the raised concrete surface on Ninth Street at Codornices Creek could be converted into a bioretention feature.

As shown in Figure 17, the parking lanes on both sides of Tenth Street at Codornices Creek are potential locations for bioretention features to treat runoff from the street prior to entering the creek. A similar project was previously completed on Sixth Street at Codornices Creek (Figure 18).

Figure 17 – Bioretention features could be installed in the parking lanes on Tenth Street at Codornices Creek.

Figure 18 – Existing bioretention features on Sixth Street that treat runoff from the street prior to running into the creek show how similar treatment at Tenth Street could be implemented.

Parks Projects

As the City of Berkeley is relatively built out, space constraints often limit opportunities for green infrastructure in the public right-of-way. Alternative opportunities may exist to install green infrastructure on City property such as parks. In some cases, green infrastructure can be installed along the perimeter of a park to treat runoff from the adjacent roadway. A bioswale in Presentation Park at the intersection of Allston Way and California Street (Figure 19) is an existing example of this type of project in Berkeley. City staff have identified San Pablo Park in southwest Berkeley as a potential site for a bioswale. As shown in Figure 20, the park itself has a relatively high Multi-Benefit Prioritization Score of 14. Many of the residential streets in the vicinity of the park have even higher Multi-Benefit Prioritization Scores (up to 15). Potential sites for a bioswale on the north end of the park (along Ward Street) or the east side of the park (along Park Street) could be used treat runoff from the surrounding neighborhood.

Figure 19 – An existing bioswale at Presentation Park detains, treats, and infiltrates runoff from Allston Way.

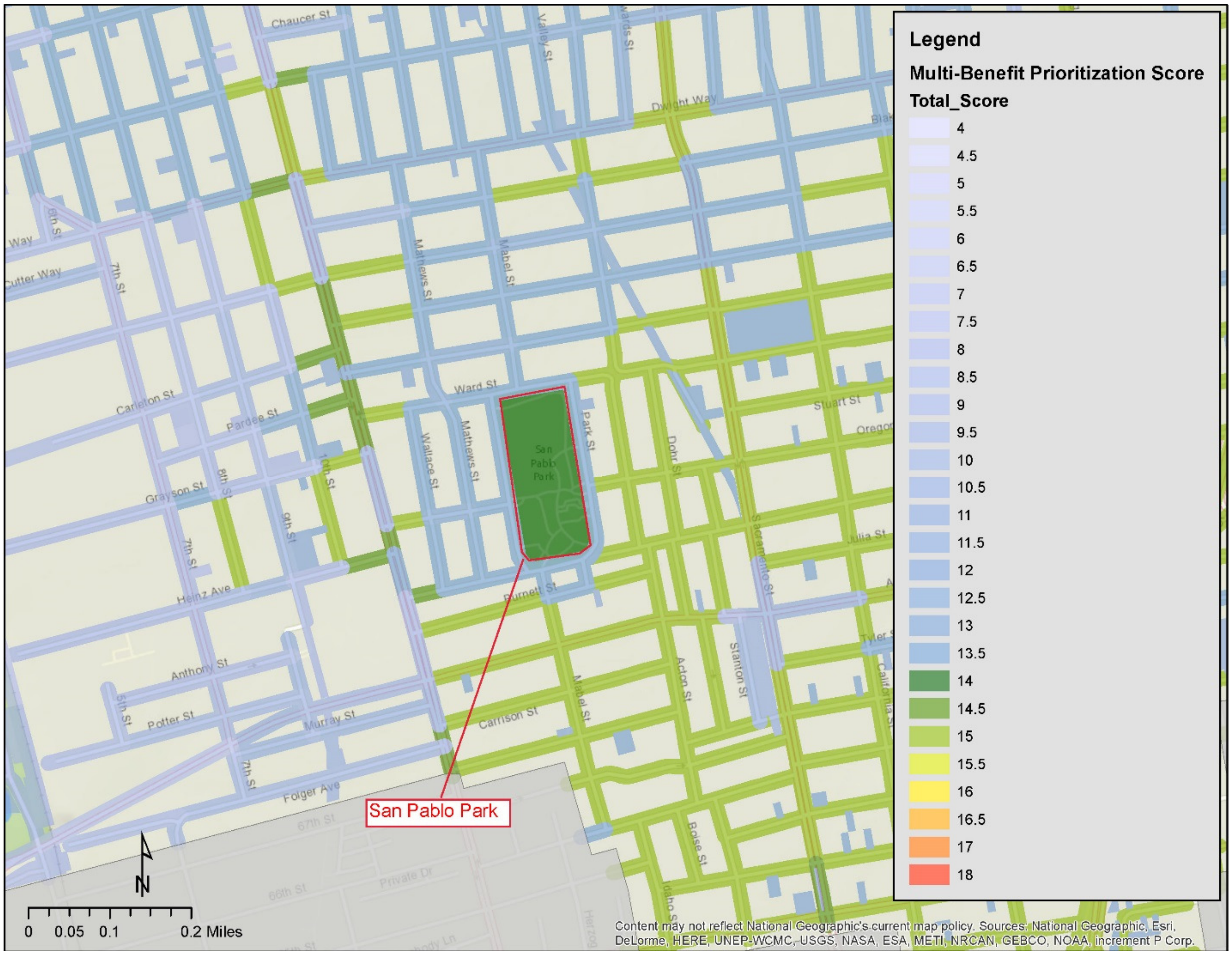

Figure 20 – Results from the Multi-Benefit Prioritization Tool for San Pablo Park and Surrounding Areas

West Berkeley Projects

As illustrated in Figure 10, the greatest opportunities in Berkeley to reduce PCBs (and Mercury) from stormwater runoff exist in Micro-Watersheds to the west of San Pablo Avenue. Utilizing outputs from the GI Mechanism, City staff conducted field and remote reconnaissance to determine where green infrastructure installations might be feasible in west Berkeley. Considering factors such as slope, space constraints, and existing storm drain infrastructure, seven west Berkeley Micro-Watersheds (or combinations of adjacent Micro-Watersheds) were identified for potential green infrastructure projects (Figure 21). Potential projects in the northernmost highlighted Micro-Watershed (adjacent to Codornices Creek) are discussed earlier in this section. Potential projects from the remaining highlighted Micro-Watersheds are discussed below.

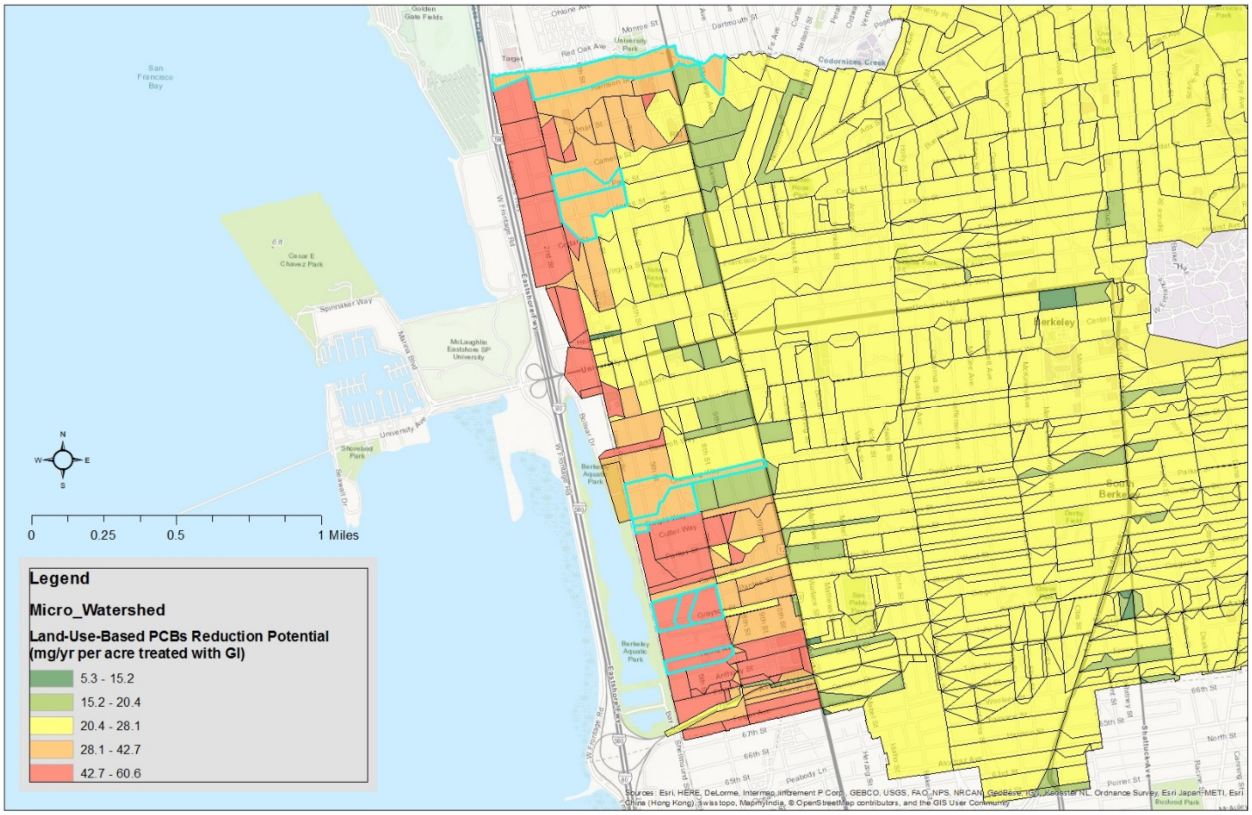

Figure 21 – Micro-Watersheds in West Berkeley with Identified Potential Green Infrastructure Opportunities (Outlined in Cyan)

Several east-west running streets in west Berkeley dead-end at the Union Pacific Railroad (UPRR) Right-of-Way (Third Street). At the locations discussed below, existing storm drain inlets are present near the UPRR dead-end, which could be retrofitted into surface-level bioretention features. These locations present a unique opportunity to treat runoff from Old Industrial parcels in west Berkeley. As the streets are closed to through traffic, space limitations for surface-level green infrastructure are minimized. As groundwater may be relatively shallow at these locations and groundwater contamination plumes may be present, additional feasibility studies will be required to properly assess subsurface conditions. Potential bioretention features at these locations may need to be lined to prevent interaction with groundwater.

Page Street at Railroad Right-of-Way

As illustrated on Figures 22 and 23, the dead end of Page Street at the UPRR Right-of-Way is a promising potential location for a bioretention feature. A 9.6-acre Micro-Watershed (including 3.9 acres of Old Industrial and 4.3 acres of Old Urban Historical Land Uses) drains to this location. Existing storm drain inlets on the north and south sides of Page Street should allow for a relatively straightforward retrofit. This Micro-Watershed has an average Land-Use-Based PCBs Reduction Potential of 34.3 milligrams per year per acre treated (mg/yr/ac) and is located in the Gilman Watershed.

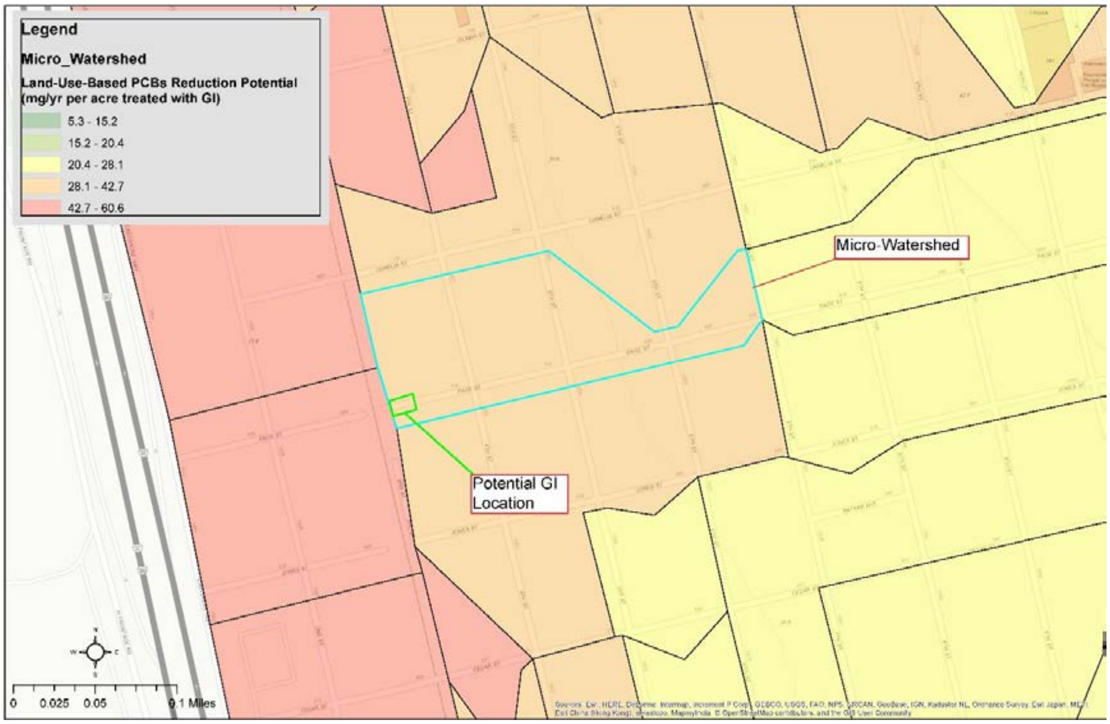

Figure 22 – Potential Location for a Bioretention Feature on Page Street at the UPRR ROW and Tributary Micro-Watershed

Figure 23 – Potential Location for a Bioretention Feature on Page Street at the UPRR ROW

Jones Street at Railroad Right-of-Way

Similar to Page Street, the dead end of Jones Street at the UPRR Right-of-Way is another potential location for one or more bioretention features (Figures 24 and 25). A 15.4-acre Micro-Watershed (including 5.2 acres of Old Industrial and 7.9 acres of Old Urban Historical Land Uses) drains to this location. An existing storm drain inlet on the south side of Jones Street at the UPRR Right-of-Way could be converted into a green infrastructure facility. Under current conditions, stormwater ponds at the southwest corner of Jones Street at Fourth Street. Installation of one or more bioretention features along the south side of Jones Street between Fourth Street and the UPRR Right-of-Way could be combined with drainage improvements to alleviate localized flooding. This Micro-Watershed has an average Land-Use-Based PCBs Reduction Potential of 31.8 mg/yr/ac and is located in the Gilman Watershed.

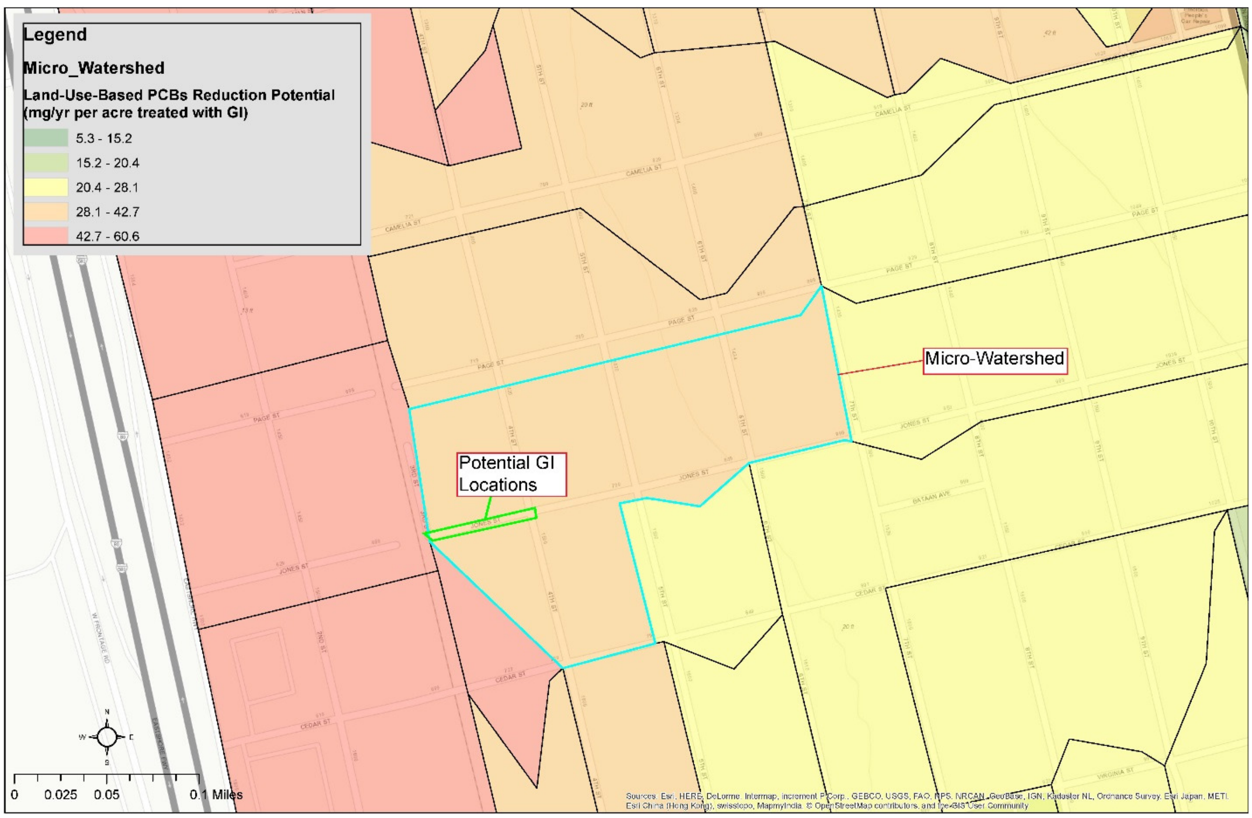

Figure 24 – Potential Location for a Bioretention Feature on Jones Street at the UPRR ROW and Tributary Micro-Watershed

Figure 25 – Potential Location for a Bioretention Feature on Jones Street at the UPRR ROW

Channing Way at Railroad Right-of-Way

As illustrated on Figures 26 and 27, the dead end of Channing Way at the UPRR Right-of-Way is a potential location for a bioretention feature. A 15.8-acre Micro-Watershed (including 5.1 acres of Old Industrial and 9.6 acres of Old Urban Historical Land Uses) drains to this location. Existing storm drain inlets on the north and south sides of Channing Way should allow for a relatively straightforward retrofit. This Micro-Watershed has an average Land-Use-Based PCBs Reduction Potential of 32.7 mg/yr/ac and is located in the Potter Watershed.

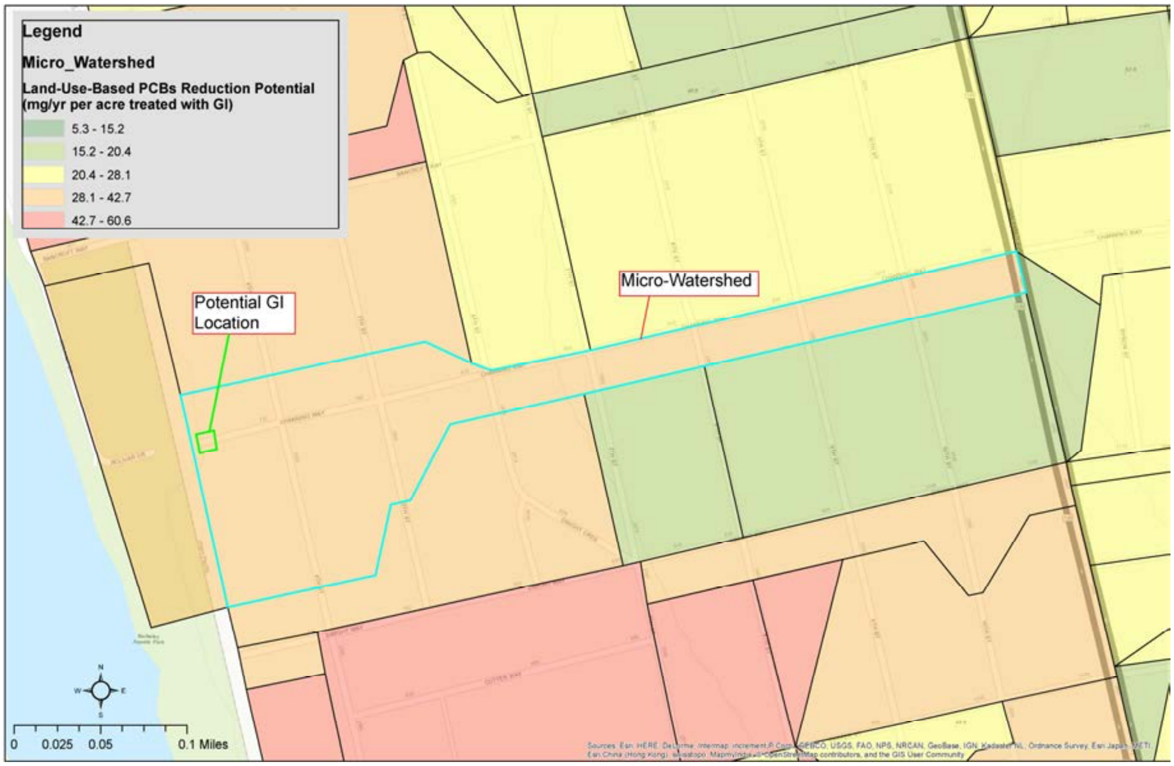

Figure 26 – Potential Location for a Bioretention Feature on Channing Way at the UPRR ROW and Tributary Micro-Watershed

Figure 27 – Potential Location for a Bioretention Feature on Channing Way at the UPRR ROW

Heinz Avenue at Railroad Right-of-Way

As illustrated on Figures 28 and 29, the dead end of Heinz Avenue at the UPRR Right-of-Way is a potential location for a bioretention feature. A 6.5-acre Micro-Watershed drains to this location. An existing storm drain inlet on the west end of the Heinz Avenue turn-around could be converted into a bioretention feature. This Micro-Watershed has an average Land-Use-Based PCBs Reduction Potential of 48.4 mg/yr/ac and is located in the Potter Watershed.

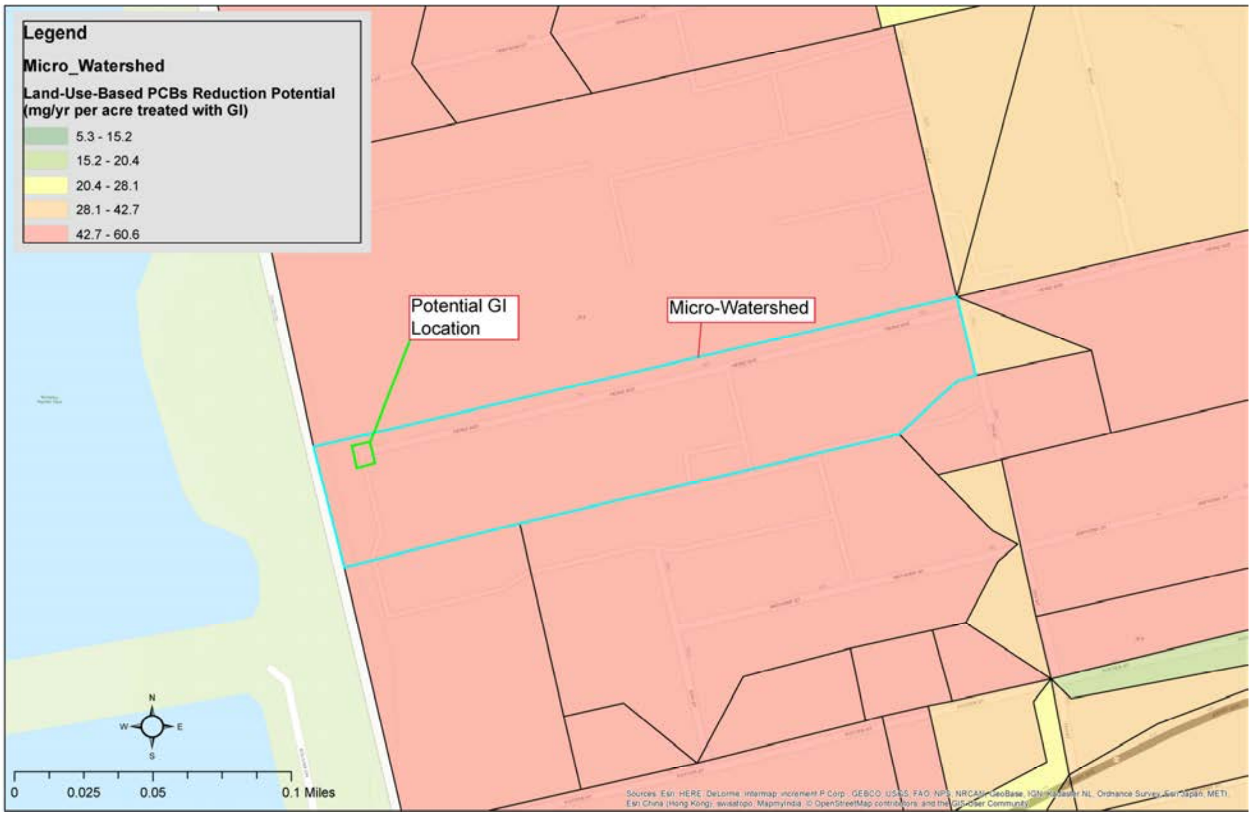

Figure 28 – Potential Location for a Bioretention Feature on Heinz Avenue at the UPRR ROW and Tributary Micro-Watershed

Figure 29 – Potential Location for a Bioretention Feature on Heinz Avenue at the UPRR ROW

Additional opportunity sites for green infrastructure facilities have been identified on Dwight Way and Grayson Street in west Berkeley. For each of these locations, construction of a bioretention feature at the UPRR Right-of-Way dead-end may not be feasible due to access constraints. However, extension and retrofit of existing sidewalk planter strips into bioretention features may be an effective way to manage and treat stormwater runoff. Potential locations for bioretention features have been identified on Grayson Street between Seventh Street and the UPRR Right-of-Way (Figure 30) and on Dwight Way between Fourth Street and the UPRR Right-of-Way (Figure 31). Table 3-2 provides a comparison of the high priority potential green infrastructure projects identified in this section.

Figure 30 – Extension and retrofit of existing sidewalk planter strips into bioretention features may be feasible on Grayson Street between Seventh Street and the UPRR ROW.

Figure 31 – Extension and retrofit of existing sidewalk planter strips into bioretention features may be feasible on Dwight Way between Fourth Street and the UPRR ROW.

3.3 Early Implementation Projects

The projects listed in Appendix B have been identified by the City of Berkeley as Early Implementation Green Infrastructure Projects in accordance with MRP Provision C.3.j.ii. Of the six projects listed, four were completed prior to 2019. The remaining two projects (San Pablo Avenue Storm Water Spine and Woolsey Street Bioswale and Flow Detention) are funded and designed, with construction anticipated to begin in 2019.

4. Tracking and Mapping Completed GI Projects

The process for tracking and mapping completed GI projects, both public and private, and making the information publicly available, as required by Provision C.3.j.i.(2)(d), is described below. This process was developed by the ACCWP, which participated in regional coordination with BASMAA, to comply with the requirement in Provision C.3.j.iv.(1) that "Permittees shall, individually or collectively, develop and implement regionally-consistent methods to track and report implementation of green infrastructure measures including treated area and connected and disconnected impervious area on both public and private parcels within their jurisdictions."

4.1 Project Tracking and Load Reduction Accounting Tool

As a member agency of the ACCWP, the City of Berkeley uses an ArcGIS Online (AGOL) web application-based tool, the C3 Project Tracking and Load Reduction Accounting Tool ("AGOL Tool"), which ACCWP developed in cooperation with the Contra Costa Clean Water Program to assist its member agencies in meeting the requirements described above. Detailed information and instructions on the tool can be found in the C3 Project Tracking and Load Reduction Accounting Tool Guidance Document (ACCWP 2017).

The general process for entering GI projects into the AGOL Tool involves logging in to the ArcGIS Online web application, opening the tool, and entering data. There are two methods for entering data, but, in general both involve: locating the project area, drawing the project boundary, entering project attributes, drawing the stormwater treatment facility(ies), and entering facility attributes. Project attributes include jurisdiction, location description, type of project, project name, and additional optional fields that can be populated if the information is known. Facility attributes include hydraulic sizing criterion, project ID, facility type, treatment, and percent of project area treated by the facility.

The City of Berkeley has incorporated the use of the AGOL Tool into its processes for reporting C.3 Regulated Projects and non-C.3 Regulated projects that include green infrastructure – encompassing both public and private projects. The tool includes a feature for generating tables of C.3 Regulated Projects and GI projects that include MRP-required project data for annual reporting purposes.

4.2 Making Information Publicly Available

As required by the MRP, the process for tracking and mapping completed projects (public and private) includes making the information generated by the tool publicly available. Information from the tool will be made publicly available as follows.

- On an annual basis, include in the Annual Report for the City of Berkeley's Stormwater Program information from the tool in the form of (1) a list of GI projects (public and private) that are planned for implementation during the permit term as required in Provision C.3.j.ii, and (2) a list of Regulated Projects approved during the fiscal year reporting period as required in MRP Provision C.3.b.iv.

- Coordinate with ACCWP to develop a viewable version of the AGOL tool, which is anticipated to be embedded on ACCWP's public website and may also be accessible via the City of Berkeley's website.

5. Summary of General Guidelines for GI Projects

General Guidelines are presented in Appendix C to guide the City of Berkeley in designing a project that has a unified, complete design that implements the range of functions associated with GI projects, and in providing for appropriate coordination of projects and project elements. The General Guidelines include hydraulic sizing guidance, standard specifications, and typical designs for GI projects. Additional information about the General Guidelines is summarized below.

5.1 Implementing Projects with a Unified, Complete Design

The General Guidelines presented in Appendix B focus on designing and coordinating projects that implement a range of functions appropriate to the type of project. For example, the guidelines for designing street projects address a range of functions including pedestrian travel, use as public space, for bicycle, transit, vehicle movement, and as locations for urban forestry. The guidelines for coordination identify measures for implementation during construction to minimize conflicts that may impact green infrastructure.

5.2 Hydraulic Sizing Requirements

Provision C.3.j.i.(2)(g) of the MRP states that GI projects are required to meet the treatment and hydromodification management (HM) sizing requirements included in Provisions C.3.c and C.3.d of the MRP. However, an exception to this requirement is provided in Provision C.3.j.i.(2)(g) for street projects that are not Regulated Projects under Provision C.3.b ("non-Regulated Projects").

The General Guidelines in Appendix C provide hydraulic sizing guidance for GI projects, addressing the hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d, as well as the alternate sizing approach for constrained street projects developed by the Bay Area Stormwater Management Agencies Association. These guidelines do not address Regulated Projects as defined in Provision C.3.b of the MRP.

Please note that some non-Regulated Projects are required to implement site design measures in accordance with Provision C.3.i of the MRP. Appendix L of the ACCWP C.3 Technical Guidance Manual (ACCWP 2017b) explains how to determine whether Provision C.3.i applies to your project, and how to incorporate applicable site design measures, if required.

Table 5-1 presents a summary of resources for hydraulic sizing guidance, and other applicable guidance, for different types of projects.

Table 5-1: Hydraulic Sizing Guidance and Other Guidance Resources- by Project Type

Type of Project	Where to Find Guidance	
	Provision C.3.i or HM Guidance, if Applicable	**Hydraulic Sizing Guidance**
Non-Regulated Green Infrastructure Project (public or private project) that is NOT subject to Provision C.3.i[6]	Not applicable	Appendix C – General Guidelines for GI Projects
Non-Regulated Green Infrastructure Project (public or private project) that IS subject to Provision C.3.i	ACCWP C.3 Technical Guidance (Appendix L, Site Design Requirements for Small Projects)	
Regulated Project that is NOT a Hydromodification Management (HM) Project[7]	Not applicable	ACCWP C.3 Technical Guidance (Section 5.1, Hydraulic Sizing Criteria)
Regulated Project that IS an HM Project	ACCWP C.3 Technical Guidance (Chapter 7, Hydromodification Management Measures)	

5.3 Standard Specifications and Typical Designs

Appendix C of this GI Plan includes typical design drawings and standard specifications for GI projects, which address various types of land-use, transportation, and site characteristics. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance Manual for other types of low impact development storm water treatment facilities, subject to City staff approval.

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[6] MRP Provision C.3.i applies to projects that create and/or replace at least 2,500 but less than 10,000 square feet of impervious surface; and Individual single family home projects that create and/or replace 2,500 square feet or more of impervious surface.

[7] An HM Project is a Regulated Project that creates and/or replaces one acre or more of impervious surface, will increase impervious surface over pre-project conditions, and is located in a susceptible area, as shown on the ACCWP default susceptibility map.

6. Integration of GI Requirements in Other City Planning Documents

Provision C.3.j.i.(2)(h) of MRP 2.0 requires permittees to update planning documents that may affect the future alignment, configuration, or design of impervious surfaces within the Permittee's planning authority. City of Berkeley documents and programs that include GI elements are listed below.

- City of Berkeley General Plan
- Downtown Berkeley Design Guidelines
- Downtown Streets and Open Space Improvement Plan
- Downtown Area Plan
- Berkeley Strategic Transportation Plan (BeST Plan)
- Watershed Management Plan
- Hazard Mitigation Plan
- Adeline Corridor Specific Plan (in progress)
- Pedestrian Master Plan (update in progress)
- Southside Complete Streets (in progress)

Adeline Corridor Specific Plan

The Adeline Corridor Specific Plan (Adeline Plan) was developed between 2015 and 2019, coinciding with development of the GI Plan. The concurrent development of these two plans represented an opportunity to create an example showing how the GI Plan can be integrated with an area-specific plan. As shown in Figure 32, several sections of Right-of-Way and parcels within the Adeline Corridor Area rank highly as GI opportunity sites according the Multi-Benefit Prioritization Tool. The Adeline Plan presents a conceptual redesign of portions of Adeline Street and Shattuck Avenue in South Berkeley. Green infrastructure opportunities identified in the Adeline Plan include the use of permeable pavement in the parking lanes, walkways, and medians, and potential bioretention features in the buffers strips, medians, and newly developed public open spaces. Along the Adeline Corridor, the underlying BART Tunnel may render some types of stormwater infiltration facilities unfeasible. However, flow-through planters completed above the Downtown Berkeley BART Station in 2018 (Figure 33) provide a great example of the types of GI facilities that could be installed above the BART Tunnel.

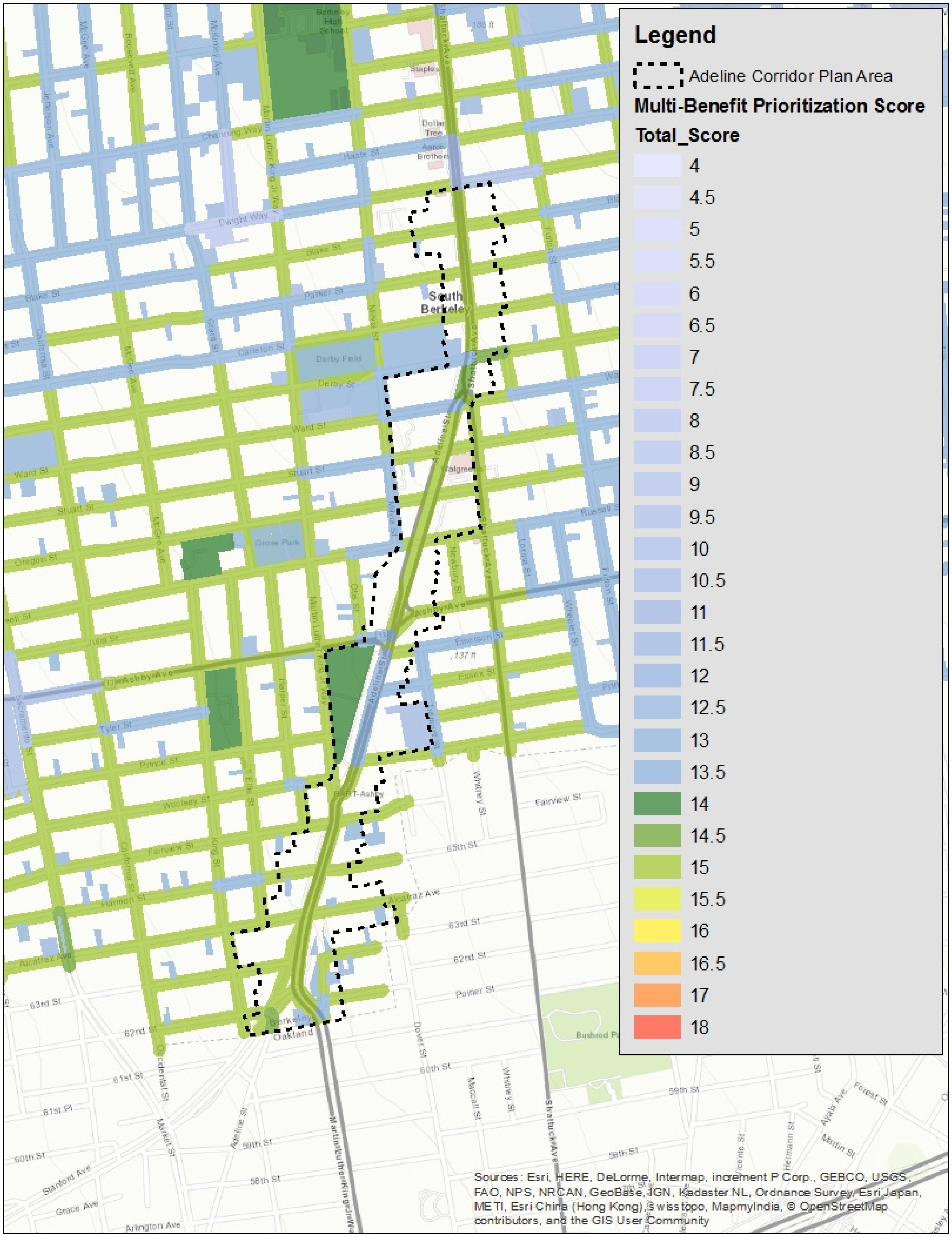


Figure 32 – Outline of the Adeline Corridor Specific Plan Area Overlain with Results from the Multi-Benefit Prioritization Tool

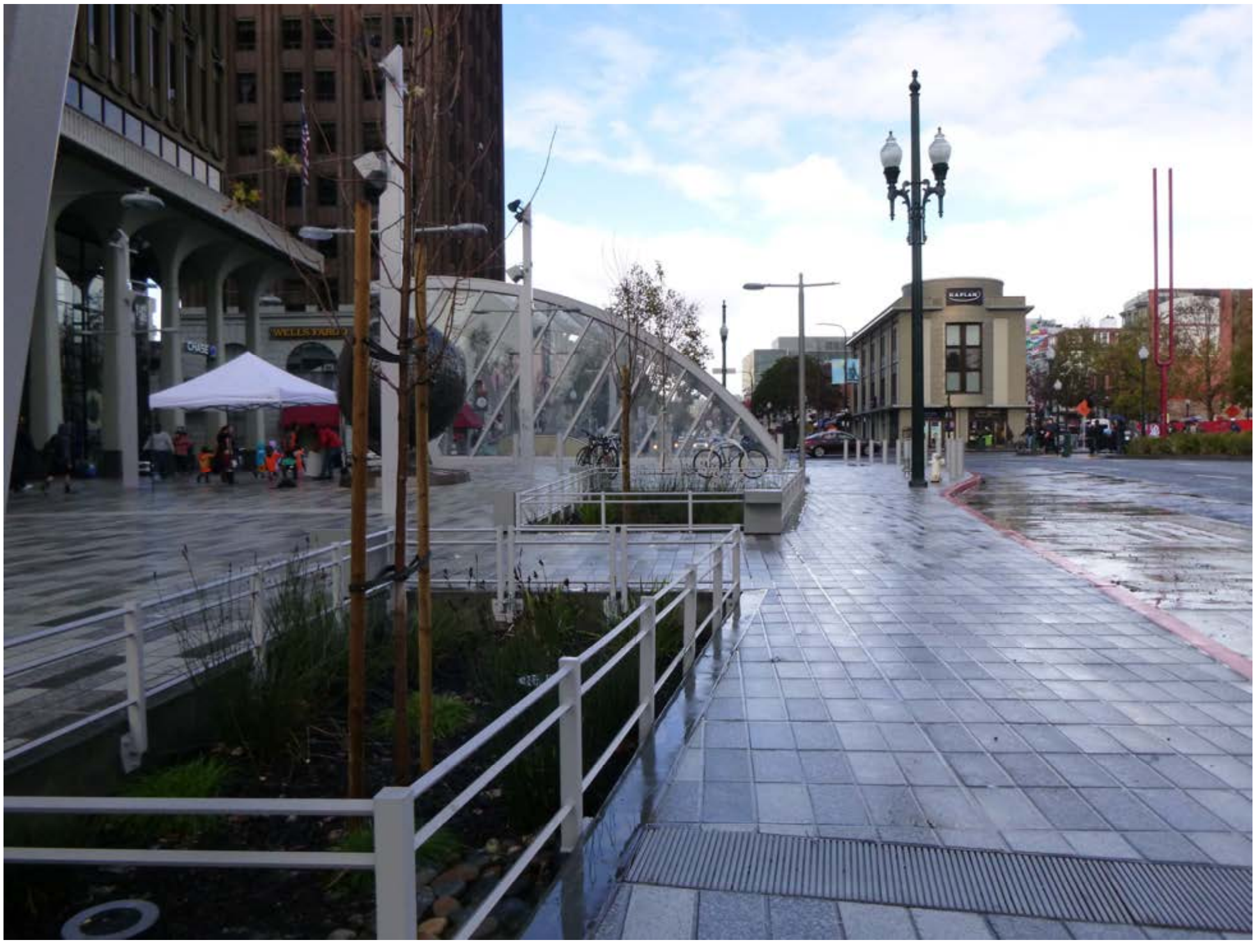


Figure 33 – Flow-through planters installed above the Downtown Berkeley BART Station treat runoff from Shattuck Avenue.

Watershed Management Plan

As discussed in previous sections, the City of Berkeley's 2011 Watershed Management Plan (WMP) includes many references to green infrastructure. As discussed in Section 3 of the GI Plan, potential green infrastructure projects identified in the WMP have been reevaluated using the tools of the GI Mechanism. Hydraulic models of the Potter and Codornices Watersheds were developed for the WMP. The City hopes to develop models for additional watersheds as recommended in the WMP. If potential green infrastructure sites are identified through future modelling efforts, those locations will also be evaluated using the tools of the GI Mechanism to inform prioritization.

Green Infrastructure Plan Adaptability

The Green Infrastructure Plan is intended to be an adaptable, living document and the tools of the GI Mechanism are meant be modular and compatible with other current and future City prioritization protocols. As future City plans are developed, the tools of the GI Mechanism should be utilized to help identify potential green infrastructure locations that are complimentary to the scope of those plans. As the tools of the GI Mechanism are GIS-based, they can be overlain with other current or future City GIS layers and GIS analytical tools may be used to run updated prioritization analyses.

7. Evaluation of Funding Options

As required by provision C.3.j.i.(2)(k) of the MRP, The City of Berkeley has evaluated funding options for implementation of green infrastructure projects. An evaluation of funding options for the City's Stormwater Program performed by MWH in 2015 is included as Appendix D. Additionally, Chapter 9 of the WMP (Appendix A) contains a discussion of funding options for the City's Stormwater Program. As recommended in the MWH evaluation, a Proposition 218-compliant process to increase of the City's Clean Stormwater Fee was undertaken in 2018. After a series of productive public meetings and input from the community, the citizens of Berkeley voted to pass the fee increase (Appendix E).

In 2019, the ACCWP completed the countywide Storm Water Resource Plan. Completion of this plan makes Berkeley and the other entities that contributed to the plan eligible for California Proposition 1 grants. It is envisioned that revenue from the City's Clean Stormwater Fee, potentially supplemented by grant monies will be the primary sources of funding for green infrastructure in Berkeley in the short term. There has been some interest in exploring the feasibility of an In-Lieu Fee program as a source of funding for green infrastructure in the future.

8. References

Alameda Countywide Clean Water Program. 2017. C3 Project Tracking and Load Reduction Accounting Tool Guidance Document.

Alameda Countywide Clean Water Program. 2017b. C.3 Technical Guidance Manual, Version 6.

Alameda Countywide Clean Water Program. 2019. Storm Water Resource Plan. January.

City of Dublin, California. 2018. Typical Green Infrastructure Designs and Standard Specifications.

City of Berkeley, Public Works Engineering. 2011. Watershed Management Plan, Version 1.0. October.

Geosyntec. 2017. Alameda Countywide Stormwater Resource Plan Screening and Prioritization using Multi-Benefit Metrics Technical Memorandum. December 13.

National Association of City Transportation Officials. 2017. Urban Street Stormwater Guide.

San Francisco Bay Regional Water Quality Control Board. 2015. Order No. R2-2015-0049, Municipal Regional Stormwater Permit (MRP). November 19.

San Mateo Countywide Water Pollution Prevention Program. 2009. San Mateo County Sustainable Green Streets and Parking Lots Design Guidebook.

Appendix A

City of Berkeley Watershed Management Plan

Appendix B

Early Implementation Projects Table

Appendix B
Early Implementation Projects
City of Berkeley
2019 Green Infrastructure Plan

Project Name and Location	Project Description	Planning or Implementation Status	Green Infrastructure Measures Included
Rose-Hopkins Bioswale: Intersection of Rose St, Hopkins St, and Curtis St., Berkeley, CA	Remove concrete traffic island and replace with a bioswale and make required drainage modifications.	Construction Complete	Bioswale, drainage improvements.
Bus Pad Renovation at NW Corner Shattuck Ave at University Ave, Berkeley, CA	Remove existing impermeable bus pad and replace with flow through concrete pavers.	Construction Complete	Permeable pavers with <5mm gap openings to capture trash and promote infiltration.
Hearst Ave. Complete Streets: Hearst Ave. between Shattuck Ave. and Gayley Rd, Berkeley, CA	A bioretention planter was installed at Hearst and Oxford along with bike lane and pedestrian crossing improvements.	Construction Complete	Bioretention planter.
BART Plaza Transit Area Improvement Project: Shattuck Avenue between Allston Way and Center St, Berkeley, CA	Reconstruct City-owned BART Plaza, replace existing bus shelters and BART station entry structures, new lighting, landscaping, etc. 4 bioretention planters installed on the Plaza along Shattuck collect and treat runoff from Shattuck.	Construction Complete	4 Bioretention planters.
Bioswale and underground flow detention facility at Woolsey St between Adeline St and Tremont St, Berkeley, CA	Install underground flow detention facility, bioswale to treat local runoff, and improve existing treewells to promote tree health.	Construction planned for 2019.	Bioswale, improve flow attenuation.
San Pablo Avenue Storm Water Spine: 1198 San Pablo Ave, Berkeley, CA.	S.F. Estuary Institute/Caltrans/Berkeley project to install bioswale in front of fast food restaurant.	Construction planned for 2019.	Bioswale.

Appendix C. General Guidelines for GI Projects

These General Guidelines have been developed to guide the City of Berkeley in designing a project that has a unified, complete design that implements the range of functions associated with GI projects, and in providing for appropriate coordination of projects and project elements. The guidelines apply to projects that incorporate GI into an existing roadway segment or a previously developed public parcel and are **not** Regulated Projects as defined in Provision C.3.b of the MRP. The guidelines are organized as follows.

Section C.1	Functions Associated with GI
Section C.2	Guidelines for GI Retrofits of Existing Streets
Section C.3	Guidelines for GI Retrofits of Public Parcels
Section C.4	Guidelines for Coordination of Projects
Attachment C-1	Hydraulic Sizing Criteria
Attachment C-2	Worksheet for Calculating the Combination Flow and Volume Method
Attachment C-3	Mean Annual Precipitation Map of Alameda County
Attachment C-4	Standard Specifications and Typical Designs
Attachment C-5	Capital Improvement Projects Sign-Off Form

C.1 Functions Associated with GI

The functions associated with GI retrofits of existing streets and GI retrofits of public parcels are identified below.

C.1.1 Functions Associated with GI Retrofits of Existing Streets

The following functions are associated with GI retrofits of existing streets:

- Street use for stormwater management, including treatment;
- Safe pedestrian travel;
- Consistency with and support of neighborhood functionality;
- Compatibility with underground infrastructure;
- Use as public space for bicycle, transit, and vehicle movement/parking; and
- Use as locations for urban forestry.

C.1.2 Functions Associated with GI Retrofits of Public Parcels

Existing facilities on public parcels may be retrofitted with GI. Although there are potentially a wide range of public uses that could occur on various parcels, key issues are associated with the outdoor use of public parcels for landscaping and parking. The following functions are associated with GI retrofits of public parcels:

- Site use for stormwater management and landscaping
- Circulation and parking within the site

C.2 Guidelines for GI Retrofits of Existing Streets

Streets must perform the range of functions described in Section C.1.1. The following are general guidelines for designing and constructing GI facilities within the right-of-way of existing streets, to address the full range of functions. Additional design guidance for GI facilities, which are also referred to as low impact development (LID) stormwater treatment facilities, is provided in Chapters 5 and 6 of the Alameda Countywide Clean Water Program's C.3 Technical Guidance, which may be downloaded at, www.cleanwaterprogram.org (click Businesses, then Development).

C.2.1 Guidelines Addressing Street Use for Stormwater Management

The GI guidelines to support street functionality for stormwater management are organized around the following objectives:

- Convey stormwater to GI facilities;
- Identify the appropriate GI typical designs for the project site;
- Apply appropriate hydraulic sizing criteria; and
- Convey stormwater away from transportation facilities.

Convey Stormwater to GI Facilities

GI retrofits of existing streets must be designed to convey stormwater runoff from the roadway surface to the proposed GI facilities. Key issues include working with the street profile, working with the existing drainage system, and considering conveyance facilities where needed.

Work with the Existing Street Profile

Modifying the profile of an existing street is costly. Therefore, the designs of GI street retrofits should generally maintain the existing street profile. The street profile affects how stormwater runoff flows off of a street, and is considered in the design of GI facilities. The most common street profile is crowned, although some streets may be reverse crowned, or may drain to one side, as illustrated in Figures C-1 through C-3. Occasionally, a street may have a flat profile, such as the example shown in Figure C-4, as could be used for a pervious pavement street. Unless pervious pavement is used for the full width of the street, GI facilities would be located downslope from the roadway surface. In a crowned street, this may allow for GI facilities on both sides of the street. In a reverse crowned street, GI facilities may be considered in the median; and in a side-sloping street, GI facilities would be located on the downslope side.

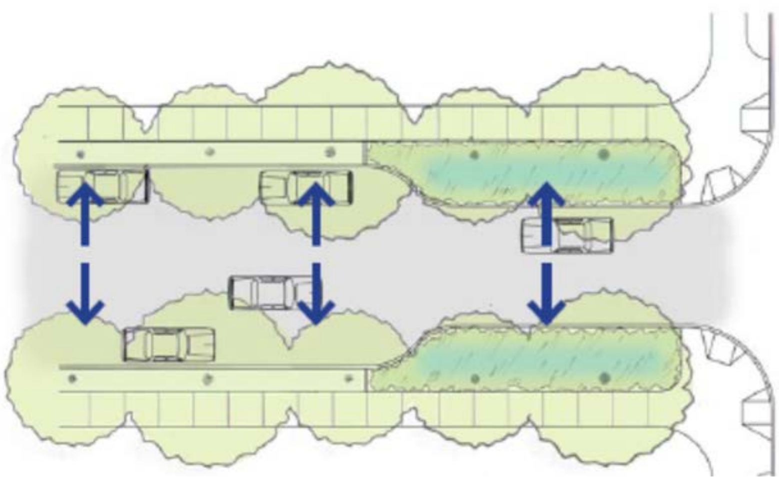


Figure C-1. Crowned Street Profile. A crowned street is designed so that the highest elevation is in the middle of the street, such that stormwater runoff drains to the sides of the street. GI facilities may be located on either side of the street.

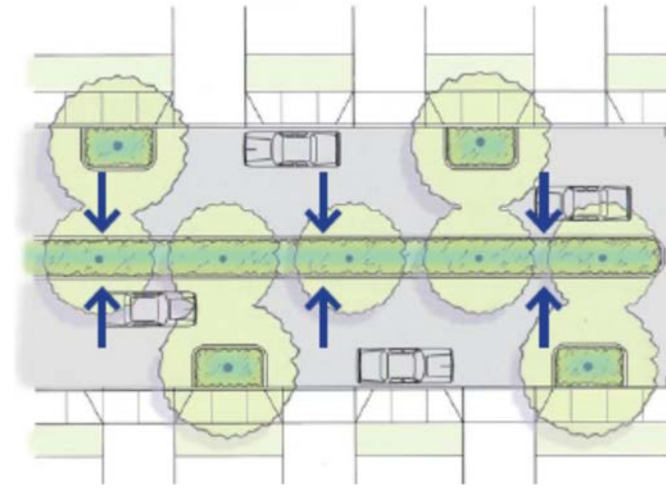


Figure C-2. Reverse Crowned Street Profile. A reversed crowned street is the opposite of a crowned street and directs runoff to the center line of the street. GI facilities may be considered in the median.

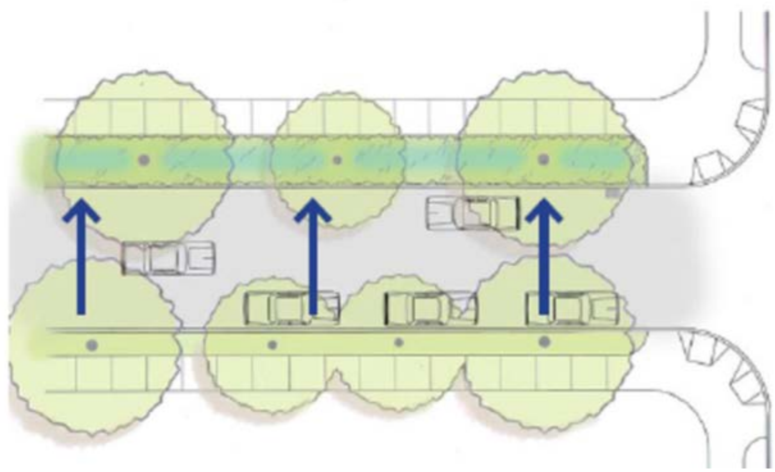


Figure C-3. Side Shed Street Profile. Side shed streets are designed to shed all water to one side of the street. GI facilities would be located on the downslope side.

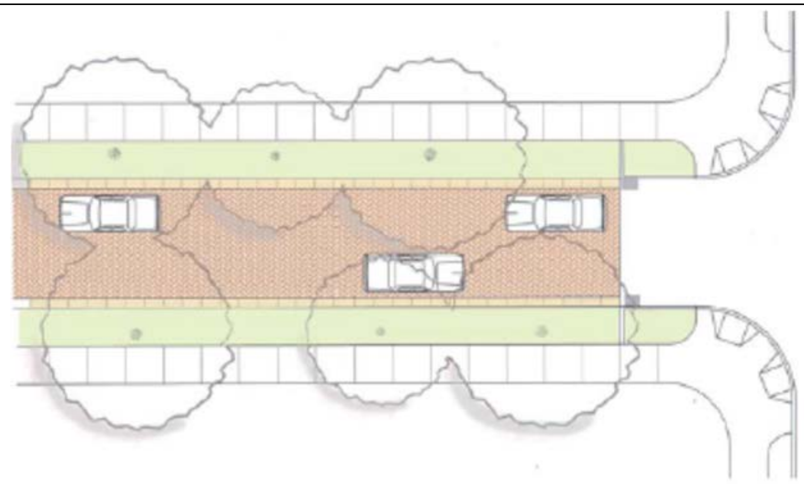


Figure C-4. Flat Street Profile. Flat streets are designed to drain through pervious paving. While these facilities do not have a marked slope, they may be graded slightly so that they drain to the sides or center of the street when there is too much water.

Source: San Mateo Countywide Water Pollution Prevention Program/Nevue Ngan

Work with the Existing Drainage Facilities

If an underdrain will be included in the GI facility design, a street retrofit site should have an existing storm drain line or creek, to which the underdrain may be connected. If there is no existing storm drain line, subject to municipal approval, in lieu of an underdrain, sites with poorly draining soils may potentially be designed with an oversized reservoir layer of rock below the GI facility. The rock layer would be sized to hold the amount of runoff identified in Section 6, Hydraulic Sizing Requirements. This approach was used in the City of Burlingame's Donnelly Street green street project (Figure C-5), because there was no available storm drain line.

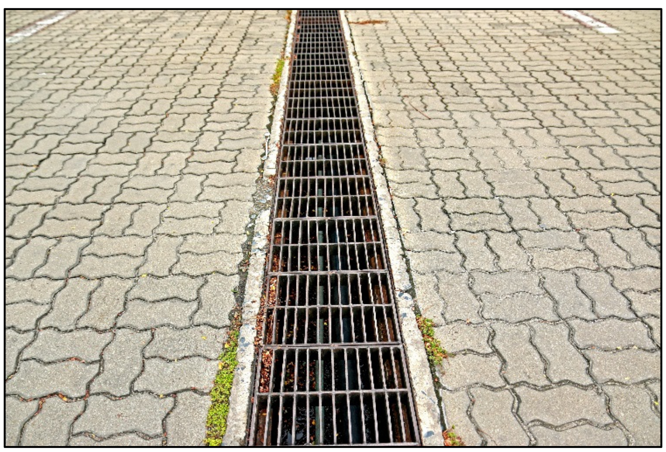
Figure C-5. Donnelly Street Green Street Project. The Donnelly Street Green Street Project includes a rain garden, pictured at right, which captures runoff from the adjacent commercial buildings and parking lot. The rain garden was designed with no underdrain and an enlarged subsurface layer of rock, which serves as a reservoir and allows runoff to slowly infiltrate to the underlying soil. The system was designed for onsite management of flows that exceed the 30-year storm. An overflow to the curb is provided for a 50- to 100-year event scenario.
Source: City of Burlingame

Consider Conveyance Facilities

In some cases, a street retrofit project may be located near an appropriate site for a larger stormwater facility than can be accommodated in the typical street right-of-way. For example, a street retrofit project may be designed to convey stormwater runoff to a bioretention facility that will be constructed on an adjacent park or greenway. This approach is illustrated by the City of El Cerrito's Ohlone Greenway Natural Area and Rain Garden project's incorporation of a rain garden (Figure C-6) that captures and treats stormwater runoff from an adjacent segment of Fairmont Boulevard. Various methods may be considered for conveying runoff to nearby GI facilities, including trench drains (Figure C-7) and vegetated swales or vegetated channels (Figure C-8).

Figure C-6. Ohlone Greenway Natural Area and Rain Garden. This rain garden captures and treats runoff from an adjacent segment of Fairmont Boulevard. In this instance, the rain garden location provided an opportunity to convey and treat stormwater outside the street right-of-way.

Source: PlaceWorks



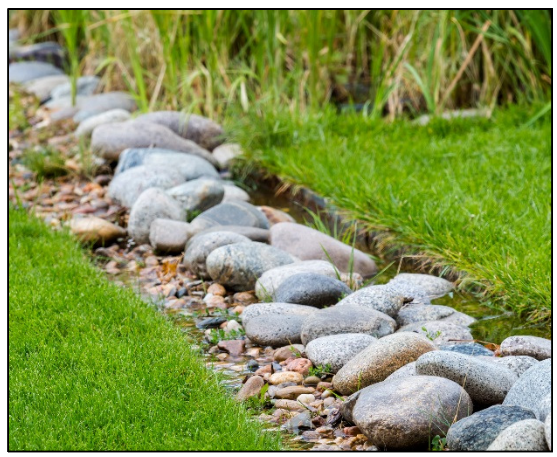


Figure C-7. Trench Drain. A trench drain can be used to convey runoff to GI facilities.

Figure C-8. Pervious Drainage Channel. Pervious, unlined drainage channels can be designed to convey runoff to GI facilities.

Identify the Appropriate Typical Design for Street Project Site

Refer to Attachment C-4 of this appendix to identify appropriate typical design drawings for the project. Typical designs have been developed for various conditions that may occur at a project site. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance manual for other types of low impact development storm water treatment facilities, subject to municipal staff approval.

Apply the Appropriate Hydraulic Sizing Criteria

Refer to Attachment C-1 for guidance on identifying and using the appropriate hydraulic sizing criteria for the proposed project.

Convey Stormwater away from Transportation Facilities

To manage the risk of flooding, adequate drainage facilities must be provided for all segments of roadway, in accordance with the City of Berkeley's storm drainage design standards, including design criteria, standards, policies, and procedures for storm drainage improvements. All storm drainage facilities must be designed in accordance with the applicable standards and accepted engineering principles, as directed by Public Works Department.

C.2.2 Guidelines Addressing Pedestrian Travel within Street Right of Way

To help reduce pollution from automobiles, the City of Berkeley has goals to improve and expand transportation choices, including the pedestrian mode of travel. As part of meeting these goals, the design of GI retrofits of existing streets should incorporate measures that seek to enhance the safety and attractiveness for pedestrians. The following measures may be considered:

- Incorporate into project intersections curb extensions, also referred to as bulbouts, which reduce the street width at intersections and shorten the length of street crossings for pedestrians, while also providing space for GI facilities (see Figure C-9).
- Provide attractive landscaping designs that enhance the sense of place for pedestrians and may potentially include amenities such as shade trees and seating areas.
- Locate the GI facility between the sidewalk and vehicle travel lanes, in order to enhance pedestrian safety by providing protected sidewalks.

Figure C-9. Curb Extension. In addition to reducing the street width and shortening the length of street crossings for pedestrians, curb extensions, or "bulbouts," such as this example in Albany, also provide space for GI facilities.
Source: bluegreenbldg.com

C.2.3 Guidelines Addressing Street Use for Bicycle, Transit, and Vehicle Movement/Parking

Complete streets balance the needs of pedestrian, bicycle, automobile, and public transit modes of travel. To meet the goal of improving and expanding transportation choices, described in Section C.2.2, in addition to pedestrian transportation, GI retrofits of existing streets must also be designed to accommodate bicycles, motor vehicles, and, where appropriate, public transit. The design and construction of each GI project should incorporate appropriate measures to enhance transportation safety and help improve the attractiveness of alternative modes of travel. The following measures may be considered:

<u>Bicycle-Friendly Measures</u>

- Include bicycle lanes in GI retrofits of existing streets.
- Provide a protected bicycle lane by locating a GI facility or other landscaped area, or a lane of parking, between a bicycle lane and lanes of motor vehicle travel.
- Include bicycle racks in GI street retrofit projects.

<u>Public Transit-Friendly Measures</u>

- Enhance the comfort of public transit users by providing shelter, shade, and greenscape at bus stops and other public transit stops.
- Integrate GI into transit facilities, such as boarding bulbs and islands, or rooftops of transit shelters.
- Provide bicycle racks at public transit stops.

<u>Motor Vehicle-Friendly Measures</u>

- Implement GI with geometric changes that reduce vehicle speed and/or improve visibility. This may include "road diet" projects that reduce the number of lanes of travel, or traffic calming projects that incorporate areas of landscaping, such as traffic islands, as visual cues to help slow down traffic.
- Provide visual cues to help slow down traffic and alert drivers to the presence of GI facilities, to help prevent motor vehicles from driving into a stormwater facility. Visual cues may include curbs and landscaping that is readily visible to drivers.

C.2.4 Guidelines Addressing Urban Forestry in Public Right of Way

Increasing the planting of street trees in the City of Berkeley is anticipated to benefit local water quality, air quality, energy efficiency, and property values. GI projects should incorporate measures to preserve existing street trees and promote the planting of new street trees. The following measures should be incorporated, as appropriate:

- Prioritize the preservation of existing mature trees.
- Replace any mature trees that are removed by the project.
- Maximize the planting of new trees in accordance with City standards.
- The planting of trees within a GI facility should follow guidance, including the identification of appropriate species, provided in Appendix B of the ACCWP C.3 Technical Guidance, which may be downloaded at www.cleanwaterprogram.org (click Businesses, then Development).

C.3 Guidelines for GI Retrofits of Public Parcels

Public parcels must perform the range of functions described in Section C.1. The following guidelines provide general guidelines for GI retrofitting of public parcels, to address the full range of functions. Additional design guidance for GI facilities, which are also referred to as low impact development (LID) storm water treatment facilities, is provided in Chapters 5 and 6 of the ACCWP C.3 Technical Guidance, which may be downloaded at, www.cleanwaterprogram.org (click Businesses, then Development).

C.3.1 Guidelines to Address Parking Lot Use for Landscaping and Stormwater Management

Parking lots often contain excess parking spots and oversized parking spaces and drive aisles. GI retrofits of public parcels should consider options to reduce any unnecessary parking areas, in order to provide space for landscaping, stormwater management, and pedestrian walkways. The following measures may be considered:

Consider Specifying Pervious Paving Pervious paving may be used in parking lot designs. Where pervious paving is underlain with pervious soil or pervious storage material sufficient to hold the Municipal Stormwater Regional Permit Provision C.3.d volume of rainfall runoff, it is not considered impervious and can function as a self-treating area. Please see Section 6.6 of the C.3 Technical Guidance for further design guidance for pervious pavement installations.

Convey Stormwater to GI Facilities

GI retrofits of existing sites must be designed to convey stormwater runoff from impervious surfaces (roofs and/or parking lots) to the proposed GI facilities. Key issues include working with the existing drainage system, and considering conveyance facilities where needed.

<u>Work with the Existing Drainage System</u>

If an underdrain will be included in the GI facility design, the site should have access to an existing storm drain line, to which the underdrain may be connected. If there is no existing storm drain line, subject to municipal approval, in lieu of an underdrain, sites with poorly draining soils may potentially be designed with an oversized reservoir layer of rock below the GI facility. The rock layer would be sized to hold the amount of runoff identified in Section 6, Hydraulic Sizing Requirements. This approach was used in the City of Burlingame's Donnelly Street green street project (Figure C-5), because there was no available storm drain line.

<u>Consider Conveyance Facilities</u>

Various methods may be considered for conveying runoff from impervious surfaces to GI facilities, including trench drains (Figure C-7) and vegetated swales or vegetated channels (Figure C-8). In parking lots that include speed bumps, consider using speed bumps to help direct stormwater runoff to GI facilities.

Identify the Appropriate Typical Design for the Project Site

Refer to Attachment C-4, included in this appendix, to identify appropriate typical design drawings for the project. Typical designs have been developed for various conditions that may occur at a project site. GI projects may also utilize design guidance provided in Chapter 6 of the C.3 Technical Guidance manual for other types of low impact development storm water treatment facilities, subject to municipal staff approval.

Apply the Hydraulic Sizing Criteria Identified in Provisions C.3.c and C.3.d

Refer to Attachment C-1 for guidance on using the appropriate hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d as applicable to design GI projects that are not regulated by Provision C.3.b ("non-Regulated Projects).

Prioritize Tree Preservation and Planting

In order to benefit local water quality, air quality, energy efficiency, and property values, GI projects on public parcels should incorporate measures to preserve existing street trees and promote the planting of new trees. The following measures should be incorporated, as appropriate:

- Prioritize the preservation of existing mature trees.
- Replace any mature trees that are removed by the project.
- Maximize the planting of new trees in accordance with City Standards.

- Incorporate trees in landscaped areas within parking lots – which serves to shade vehicles and paved surfaces, improve air and water quality, intercept stormwater in the tree canopy, and take up stormwater through the root system.
- The planting of trees within a GI facility should follow guidance, including the identification of appropriate species, provided in Appendix B of the ACCWP C.3 Technical Guidance, which may be downloaded at www.cleanwaterprogram.org (click Businesses, then Development).

C.3.2 Guidelines to Address Parking Lot Use for Vehicular Parking

GI retrofits of public parcels should provide for adequate motor vehicle and bicycle parking for the proposed public use. The following measures may be considered:

- Include bicycle parking facilities.
- Provide pedestrian walkways within parking lots, including bridged walkways across GI facilities.
- Provide safe pedestrian access to and directional signage for adjacent public transit stops.
- Consider other improvements to enhance existing pedestrian circulation and safety.
- Depending on the type of use, larger public parcel retrofits should consider providing bicycle storage, changing rooms, and preferred parking for carpooling

C.4 Guidelines for Coordination of Projects

Installing GI components at a project prior to the completion of that project, or the construction of an adjacent project, has the potential to degrade the functioning of the GI facility. Street improvement or other infrastructure projects, the development of public parcels, and other public and private projects should therefore include coordination of construction schedules to minimize impacts to GI.

The following measures shall be implemented in all GI projects to protect investments in GI:

1. GI facilities shall not be used as temporary sediment basins during construction.
2. Erosion control plans shall include protections for GI; erosion control plans are subject to applicable requirements.
3. Installed GI facilities shall be protected from construction runoff and kept offline until the contributing drainage area is stabilized.

Contractors are encouraged to construct GI facilities at the end of a project, to help protect the facilities from construction-related impacts.

Attachment C-1: Hydraulic Sizing Criteria

This provides guidance on the following topics:

- Hydraulic sizing criteria in MRP Provisions C.3.c and C.3.d as applicable to GI projects that are not regulated by Provision C.3.b ("non-Regulated Projects)
- Alternate sizing approach for constrained street projects

C1.1 Hydraulic Sizing Criteria in MRP Provisions C.3.c and C.3.d

Provision C.3.c requires the use of low impact development (LID) stormwater controls. To meet the MRP definition of LID, bioretention facilities must have a surface area no smaller than what is required to accommodate a 5 inches/hour stormwater runoff surface loading rate, and infiltrate runoff through biotreatment soil media at a minimum of 5 inches per hour.

Provision C.3.d of the MRP includes volume-based, flow-based, and the combination volume- and flow-based hydraulic sizing criteria. Bioretention areas may be sized using a simplified flow-based hydraulic sizing method, known as the "4 percent method," in which the surface area of the bioretention area is 4 percent of the effective impervious surface area that is treated. However, by using a combination volume- and flow-based hydraulic sizing approach, it may be possible to provide a bioretention area that is less than 4 percent of the effective impervious surface area, which can help reduce costs. Step-by-step instructions for using the 4 percent method and the volume-based sizing criteria are provided in Section 5.1 of the C.3 Technical Guidance. Guidance for using the combination flow and volume criteria from Section 5.1 of the C.3 Technical Guidance document are copied below. The worksheet for using this method is provided in Attachment C-2.

The implementation of LID stormwater treatment facilities designed in accordance with Provisions C.3.c and C.3.d of the MRP will provide hydromodification management benefits by infiltrating and detaining stormwater runoff.

Step-by-Step Guidance for Combination Flow and Volume Method

To apply the combination flow and volume approach, use the following steps, which may be performed using the combination flow and volume sizing criteria Excel worksheet provided in Attachment C-2 of this appendix.

1. **Mean Annual Precipitation**
    - Determine the mean annual precipitation (MAP) for the project site using the Mean Annual Precipitation Map of Alameda County (Attachment C-3). Use the Oakland Airport unit basin storage volume values from Table C1-1(below) if the project location's mean annual precipitation is 16.4 inches or greater and the San Jose values if it is less than 16.4 inches.

- In order to account for the difference between MAP of the project site and the two rainfall locations shown, calculate the ***MAP adjustment factor*** by dividing the project MAP by the MAP for the applicable rain gauge, as shown below: MAP adjustment factor = (project location mean annual precipitation

$$Map\ adjustment\ factor = \frac{(project\ location\ mean\ annual\ precipitation)}{(18.35\ or\ 14.4, as\ appropriate)}$$

2. **Effective Impervious Area for the Drainage Management Area**
   - Based on the topography of the site and configuration of buildings, divide the site into drainage management areas (DMAs), each of which will drain to a treatment measure. Implement the steps below for each DMA with a volume-based treatment measure.
   - Minimize the amount of landscaping or pervious pavement that will contribute runoff to the treatment measures. Refer to Sections 4.1 and 4.2 of the C.3 Stormwater Technical Guidance to design areas of landscaping or pervious pavement as "self-treating areas" or "self-retaining areas," so that they do not contribute runoff to the LID treatment measure and may be excluded from the DMAs for the treatment measures.
   - For each DMA in which the area that will contribute runoff to the treatment measure includes pervious surfaces (landscaping or properly designed pervious paving), multiply the area of pervious surface by a factor of 0.1.
   - For applicable DMAs, add the product obtained in the previous step to the area of impervious surface, to obtain the "***effective impervious area***." (For DMAs that are 100% impervious, use the entire DMA area.)

3. **Unit Basin Storage Volume**
   - The effective impervious area of a DMA has a runoff coefficient of 1.0. Refer to Table C1-1 to obtain the ***unit basin storage volume*** that corresponds to your rain gauge area. For example, using the Oakland Airport gauge, the unit basin storage volume would be 0.67 inches. Adjust the unit basin storage volume for the site by multiplying the unit basin storage volume value by the MAP adjustment factor calculated in Step 1.
   - Calculate the ***required capture volume*** by multiplying the effective impervious area of the DMA calculated in Step 2 by the adjusted unit basin storage volume. Due to the mixed units that result, such as acre-inches, it is recommended that the resulting volume be converted to cubic feet for use during design. For example, say you determined the adjusted unit basin storage volume to be 0.5 inches, and the effective impervious area draining to the bioretention facility is 7,000 square feet. Then the required capture volume would be:

$$Required\ capture\ volume = 0.5\ inches\ \times \left(\frac{1\ foot}{12\ inches}\right) \times 7{,}000\ feet^2 = 292\ cubic\ feet$$

Table C1-1. Unit Basin Storage Volume (Inches) for 80 Percent Capture with 48-Hour Drawdown Time		
		Unit Basin Storage Volume for Effective Impervious Area of Drainage Management Area
Location	**Mean Annual Precipitation (inches)**	**Coefficient of 1.00**
Oakland Airport	18.35	0.67
San Jose	14.4	0.56
Source: CASQA 2003, cited in Table 6-2 of the C.3 Technical Guidance.		

4. **Depth of Infiltration Trench or Pervious Paving Base Layer**
   - Assume that the rain event that generates the required capture volume of runoff determined in Step 3 occurs at a constant rainfall intensity of 0.2 inches/hour from the start of the storm (i.e., assume a rectangular hydrograph). Calculate the ***duration of the rain event*** by dividing the unit basin storage volume by the intensity. In other words, determine the amount of time required for the unit basin storage volume to be achieved at a rate of 0.2 inches/hour. For example, if the unit basin storage volume is 0.5 inches, the rain event duration is 0.5 inches ÷ 0.2 inches/hour = 2.5 hours.

5. **Preliminary Estimate of the Surface Area the Facility**
   - Make a ***preliminary estimate of the surface area*** of the bioretention facility by multiplying the DMA's impervious area (or effective impervious surface if applicable) by the 4 percent method sizing factor of 0.04. For example, a drainage area of 7,000 square feet of impervious surface × 0.04 = 280 square feet of bioretention treatment area.
   - Assume a bioretention area that is about 25% smaller than the bioretention area calculated with the 4 percent method. Using the example above, 280 – (0.25 × 280) = 210 square feet.
   - ***Calculate the volume of runoff that filters through the biotreatment soil*** at a rate of 5 inches per hour (the design surface loading rate for bioretention facilities), for the duration of the rain event calculated in Step 4. For example, for a bioretention treatment area of 210 square feet, with an infiltration rate of 5 inches per hour for a duration of 2.5 hours, the volume of treated runoff = 210 square feet × 5 inches/hour × (1 foot/12 inches) × 2.5 hours = 219 cubic feet. (Note: when calculating ponding depth, the mulch layer is not included in the calculation.)

6. **Initial Adjustment of Depth of Surface Ponding Area**
   - Calculate the portion of the required capture volume ***remaining after treatment is accomplished by filtering*** through the treatment soil. The result is the amount that must be stored in the ponding area above the reduced bioretention area assumed in Step 6. For example, the amount remaining to be stored comparing Step 3 and Step 5 is 292 cubic feet – 219 cubic feet = 73 cubic feet. If this volume

is stored over a surface area of 210 square feet, the ***average ponding depth*** would be 73 cubic feet ÷210 square feet = 0.35 feet or 4.2 inches.

- Check to see if the ***average ponding depth is between 6 and 12 inches***, which is the recommended allowance for ponding in a bioretention facility or flow-through planter.

7. **Optimize the Size of the Treatment Measure**
   - If the ponding depth is greater than 12 inches, a larger surface area will be required. (In the above example, the optimal size of the bioretention area is 190 square feet with a ponding depth of 6 inches.) In order to build conservatism into this sizing method, the Countywide Program recommends that municipalities not approve the design of any bioretention areas or rain gardens that have a surface area that is less than 3 percent of the effective impervious area within the DMA.

Please note that Appendix C of the C.3 Stormwater Technical Guidance includes an example of sizing bioretention areas using the combination flow- and volume-based method.

C1.2 Alternate Sizing Approach for Constrained Street Projects

Provision C.3.j.i.(2)(g) of the MRP allows the jurisdictions subject to the MRP (MRP Permittees) to develop an alternate sizing approach for street projects that are not subject to Provision C.3.b.ii. (non-Regulated Projects) in which project constraints preclude fully meeting the C.3.d sizing requirements. This approach, developed by the Bay Area Stormwater Management Agencies Association, is described as follows.

Instructions for Section C1.2

Section C1.2 template text will be provided separately. This section of your Green Infrastructure Plan will present the alternate sizing approach that is currently being developed by BASMAA, which will apply to street projects that are not subject to Provision C.3.b.ii. (non-Regulated Projects) in which project constraints preclude fully meeting the C.3.d sizing requirements. When the BASMAA guidance is available, template text for Section C1.2 will be provided, and should be placed here.

[Copy the template text for Section C1.2 here.]

Attachment C-2: Worksheet for Calculating the Combination Flow and Volume Method

The worksheet for calculating the combination flow and volume method is provided on the following page. [When the GI Plan is converted to a PDF file, convert the Worksheet for Calculating the Combination Flow and Volume Method (which is available on the Clean Water Program's website as an Excel spreadsheet) to PDF and insert on the following page.]

Attachment C-3: Mean Annual Precipitation Map

The Mean Annual Precipitation Map for Alameda County is provided on the following page. [When the GI Plan is converted to a PDF file, insert the Mean Annual Precipitation Map (which is available on the Clean Water Program's website as a PDF file) on the following page.]

Attachment C-4: Standard Specifications and Typical Designs

Standard specifications and typical design drawings for GI projects are provided on the following pages, as indicated in Table C4-1.

Instructions for Table C4-1

Table C4-1 lists the City of Dublin's GI typical design drawings. If your agency will include all of these drawings, you may remove the yellow highlighting from the table and otherwise include the table as-is. You may also add additional rows to the table if you will include additional drawings/standard specifications.

Table C4-1: GI Typical Designs/Standard Specifications

Sheet No.	Title of Drawing/Standard Specifications	Site Characteristics		
		Land Use	**Street Classification**	**Other**
GI-2A	Bioretention area: Plan view with street parking	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane
GI-2B	Bioretention area: Bulbout plan view	Commercial, industrial, or residential	Arterial, collector, or local streets	Intersection with sidewalks
GI-XX	Bioretention area with bike lane plan view	Commercial, industrial, or residential	Arterial, collector, or local streets	Bike lane
GI-3A	Bioretention Area: Sloped Sides Cross Section	Commercial, industrial, or residential	Arterial, collector, or local streets	Sidewalk
GI-3B	Bioretention Area: Vertical Side Wall Cross Section	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane and sidewalk
GI-4	Bioretention Components: Outlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	--
GI-5	Bioretention Components: Edge Treatment Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	No parking
GI-6A	Bioretention Components: Gutter Curb Cut Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	--

Sheet No.	Title of Drawing/Standard Specifications	Site Characteristics		
		Land Use	Street Classification	Other
GI-6B	Bioretention Components: Trench Drain Curb Cut Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Parking lane and sidewalk
GI-6C	Bioretention Components: Curb Cut At Bulbout Inlet Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Intersection with Sidewalks
GI-7	Bioretention Components: Check Dam Detail	Commercial, industrial, or residential	Arterial, collector, or local streets	Slope requiring check dams

Source: City of Dublin, 2018

Attachment C-5: Capital Improvement Projects Sign-off Form

The Clean Water Program's Capital Improvement Projects Sign-off Form is provided on the following page. This form is used by the agency to document whether a Regulated Project (as defined in Provision C.3.b) has complied with Provision C.3 requirements, and whether a non-Regulated Project has been evaluated for GI potential. [When the GI Plan is converted to a PDF file, insert the Capital Improvement Projects Sign-off Form (which is available on the Clean Water Program's website as a PDF file) on the following page.]

Appendix D

MWH Evaluation of Stormwater Program Funding Options

MEMORANDUM

To: Timothy Burroughs, Chief Resilience Officer, City of Berkeley

Date: February 10, 2016

From: Loren Labovitch, MWH Global

Coauthors Matthew Freiberg, Daniel Cheng, Mark Hildebrand

Subject: Berkeley Stormwater Financing Memo

1. Introduction

In 2015 MWH formed a platform partnership with the 100 Resilient Cities Initiative (100RC), sponsored by the Rockefeller Foundation. As part of this partnership, MWH and its management consulting subsidiary, Hawksley Consulting, is assisting the City of Berkeley (City) with developing resilience around its Stormwater Program. A portion of this work involves the identification of funding options for the City's Stormwater Program.

Problem Statement - Berkeley's Stormwater Program, like many such programs in California, has become increasingly expensive as NPDES permits require increasingly restrictive pollutant discharge limits. These new limits are requiring most stormwater utilities to invest in infrastructure and provide higher service levels. The City's ability to satisfy these new regulatory requirements is undermined by regular budgetary shortfalls in the City's Clean Stormwater Fund. The financial constraints have made meeting basic operation and maintenance (O&M) requirements and regulatory standards challenging, as well as impacting the City's ability to manage and address flooding, water pollution, road and trail washout, and other infrastructure upkeep.[1] Often funding only comes on the heels of an emergency or a mandate which forces a community to take action. In the City of Berkeley, the issue of managing a sustainable stormwater program is complicated by slowly growing revenues and increasing regulatory demands.

The current financial state of the City's Stormwater Program is placing Berkeley in a precarious position for meeting its regulatory requirements and achieving its overall resiliency goals. Deferred maintenance of stormwater infrastructure makes the city vulnerable to flooding and could lead to degradation of water quality.

As such, the City's Stormwater Program is faced with the challenge of either continuing to defer maintenance and risk noncompliance with new regulations, creating a new source of funding, or

[1] Personal communication with Timothy Burroughs, City of Berkeley Chief Resilience Officer on 9/30/15

"doing more with less". This memorandum provides a financial snapshot of the City's Stormwater Program and explores available options for securing additional funding in the future.

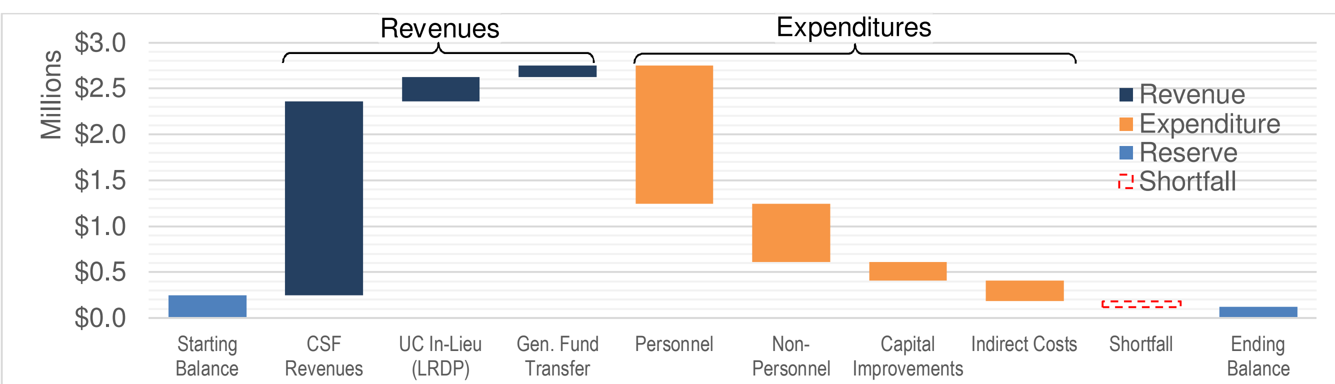
2. Current Stormwater Program Funding

The City's storm drain system and watersheds are managed by the Department of Public Works. Maintenance of the 78 miles of Stormwater system infrastructure is managed by the Streets and Utilities Division. Any capital improvements are delivered by the Engineering Division's Stormwater and Creeks/Watershed Management unit[2]. The City's Clean Stormwater Fund (CSF), which provides funding for the maintenance and improvement of the City's storm water drainage system, is currently funded from three sources[3]:

1. **Clean Stormwater Fund Revenues** – Fees are assessed to property owners that contribute to stormwater runoff. The fee is currently set at a flat $34 annual rate (collected annually on property tax bills), as adopted by voters in 1996 through a Proposition 218 (Prop. 218) process.
2. **UC Long Range Development Plan** – The University of California at Berkeley currently contributes approximately $250,000 as part of its Long Range Development Plan (LRDP).
3. **General Fund Transfer** – In the past the City has provided a $700,000 annual transfer from its General Fund to support the Stormwater Program. This practice ended in FY 2013, but the City has proposed plans to reinstate $130,000 annually starting in FY 2016[4].

Figure 1 shows the CSF cash flow in FY 2016. The Clean Stormwater Fund revenues are balanced through FY 2017 to support basic storm drain maintenance; however, multiple years of annual revenue shortfalls will result in a negative program balance in FY 2018[4].

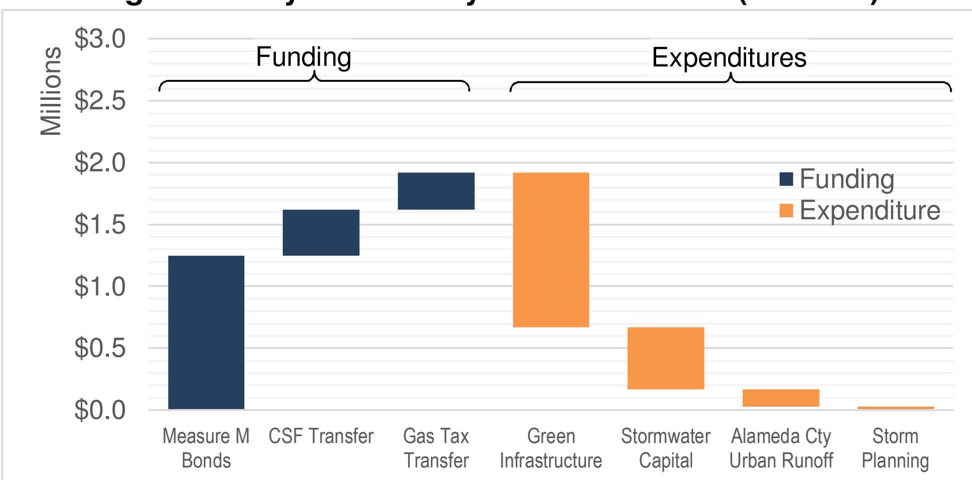
Figure 1: City of Berkeley Clean Stormwater Fund Balance (FY 2016)[4]



[2] Proposed Biennial Budget (FY 2016-2017), City of Berkeley
[3] Proposed Capital Improvement Program (FY 2016-2017), City of Berkeley
[4] Proposed Biennial Budget (FY 2016-2017), City of Berkeley

As shown in Figure 1, only a fraction of the CSF is used to fund the City's Stormwater Capital Improvement Program (CIP) [5]. Currently the CIP is largely funded by proceeds from Measure M bonds, as well as a surplus gas tax transfer from the Streets Program. Figure 2 shows the FY 2016 sources of funding and spending for the Stormwater CIP. It should be noted that Measure M funding will be exhausted in 2019. Measure M, passed during the 2012 voting cycle is currently in effect, and includes funding for green infrastructure projects that provide stormwater management benefits. While the City has been able to implement some green infrastructure projects using Measure M funding, the majority of the funding has been utilized by the Streets Program to address much- needed pavement condition improvement needs.

Figure 2: City of Berkeley Stormwater CIP (FY 2016)[6]



The City's current Watershed Management Plan[7] (WMP) was adopted by City Council in 2012. The WMP establishes an integrated and sustainable strategy for managing urban water resources and addresses water quality, flooding, and the preservation of local creek habitat and the San Francisco Bay. The WMP also identifies capital improvement projects and projected revenue needs for all City watersheds, totaling ~$37 million over the next 5 years to fully fund the envisioned plan ($7.5 million in FY 2016 alone).

The WMP proposed a scaled approach to funding the City's Stormwater Program. The size of programs and projects would be tailored to match four levels of available funding, with Level 4 corresponding to the largest available budget and most comprehensive scope of work. Between 2012 and 2015 funding for the Stormwater Program has stayed *near the most basic level*. Consequently, most of the maintenance for the existing stormwater infrastructure has been

[5] Proposed Capital Improvement Program (FY 2016-2017), City of Berkeley
[6] Proposed Capital Improvement Program (FY 2016-2017), City of Berkeley
[7] 2012 Watershed Management Plan (City of Berkeley)
https://www.cityofberkeley.info/uploadedFiles/Public_Works/Level_3_-_Sewers_-_Storm/WatershedMgtPlan_2011October_Version1.0.pdf

deferred. Going forward, the availability of secured funding deteriorates as the Measure M Bond is set to expire in 2019.

3. Stormwater Funding Options

Funding stormwater programs is a challenge throughout the US, but in California the challenge is further complicated by Prop. 218, a constitutional amendment adopted in 1996 that has procedural and substantive requirements for property-related fees, such as stormwater management fees. The procedural element requires that new or increased property-related fees for services (other than water, sanitary sewer and trash services) be approved by a super majority of property owners (or 2/3 of registered participating voters). Prior to the election, a majority protest hearing, after 45 days' mailed notice to affected property owners, is also required.

Obtaining voter approval for fee increases poses a particular challenge to stormwater utilities because, unlike many other utility services, it cannot be metered and the service often goes unseen to the untrained eye. Since customers often do not understand the need for this service and may even view it as a "rain tax," it is often a challenge to get voter support for new or increased stormwater fees.

There is no "silver bullet" to obtaining stormwater funding. However, the following sections provide a list of rate, grant, and debt financing mechanisms that if used alone or in combination may increase the funding of the CSF and Stormwater CIP.

3.1. Funding Sources

The following sections provide a list of funding mechanisms for the CSF. While not all of these options are necessarily recommended, they have been included to demonstrate the breadth of the options that were considered, as well as to give context to the final recommendation

We have assumed that, at a minimum, the City will retain the $34 Clean Stormwater Fund Flat Fee that is currently assessed to property owners.

3.1.1. Increase Existing Clean Stormwater Fund Flat Fee

A new stormwater fee, adopted within the requirements of Prop. 218, could replace the existing Stormwater Charge. The new rate structure would be supported by an Engineers Report, which would demonstrate that the charge complies with Prop. 218 proportionality requirements, such as assigning the stormwater charges based on the impervious surface of each parcel.

There are multiple approaches to designing stormwater fees that are consistent with Prop. 218 requirements. One example is to allocate costs based on the type and concentration of pollutants that is typically found in the runoff from certain types of land use. This approach would require a complex cost-of service analysis that would consider the specific costs of the Stormwater Program's elements, including the costs associated with remediating each of the

NPDES' pollutants of concern. Less complex approaches could include allocating costs based on impervious surface, property size, or simply by parcel.

Pro & Cons – A new stormwater fee, vetted through the Prop. 218 process, would establish a charge that has a clear nexus with the cost of providing stormwater service to each respective property owner. If adopted, the new fee could include automatic annual rate adjustments based on cost indices for up to 5 years. The drawback to this option, and any option where a new fee is created, is the requirement for voter approval, the cost of designing the new rates, the cost carrying out the election process, and the risk of the expenses if voters do not approve the proposed rates.

Examples – Los Angeles County Flood Control District Clean Water, Clean Beaches Measure and Santa Monica Clean Beaches and Ocean Parcel Tax. In Southern California, many cities and counties are using the Prop. 218 process to generate new revenue to fund their Stormwater Programs. These two examples levied property related water quality fees to finance water quality improvement projects and programs. Their core messaging linked the Stormwater Program to the protection of their shoreline. The City of Berkeley could use a similar approach to promote the multiple benefits of their Stormwater Program[8].

3.1.2. Transfers from the General Fund

The City has the option to increase its CSF funding with money from the City's General Fund. The General Fund's source of revenue includes property taxes, local income tax, general sales tax, franchise fees and other miscellaneous sources. The previous General Fund supplement for the CSF which ended in FY 2013 could be reinstated. This would be in addition to the City's plans to begin an annual transfer of $130,000 in FY 2016 for emergency storm response[9].

Pro & Cons – We assume that relying on additional General Fund monies is not feasible. The City's priorities may evolve over time, resulting in future transfers away from the Stormwater Program. In addition, General Fund allocations are often subject to an annual budgetary process, and are therefore not a secure source of revenue.

3.1.3. Transfers from Other City Utilities and Funds

Fund transfers from other utilities are lawful to the extent that it can be shown that the operations of a utility impose costs on, or receive benefits from, related Stormwater Program services. The transfers cannot exceed those designated costs/benefits. In theory, such utilities may include potable water, solid waste (trash), sewer, and others. For example, it could be argued that the solid waste utility bears responsibility, at least in part, for the litter that needs to

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[8] Stormwater Funding Options, Providing Sustainable Water Quality Funding in Los Angeles County. May 21, 2014. Ken Farfsing, City of Signal Hill and Richard Watson, Richard Watson & Associates, Inc.
[9] Proposed Biennial Budget (FY 2016-2017), City of Berkeley

be cleared from storm drains. This can be justified because activities such as street sweeping provide a dual benefit for streets and storm drain maintenance. Similarly, the sewer system benefits from repairs to the storm drains since stormwater infiltration can increase the cost of operating and maintaining both the collection system and the sewer treatment plant.

Pro & Cons – While passing-through the cost of storm drain maintenance to the sewer utility may be feasible, transfers between programs inherently may limit the City's ability to perform other essential functions.

Example – Currently, the City of Berkeley uses a gas tax to partially fund road improvements. A small percentage of this tax (approximately $300,000 annually) is transferred to the Stormwater Program. To boost transfer funding, the City could leverage the annual surplus currently held by the Measure B Sales Tax Fund. Measure B was developed to fund capital projects for local streets and roads and is currently projecting an annual surplus of over $300,000 a year between FY 2016 and 2018. Measure B funds could be transferred to the Stormwater Program to fund in street LID capital improvement projects, meeting the needs of both the Road and the Stormwater Programs.

3.1.4. Special Tax

The City could opt to create a special tax that would specifically be used to finance the Stormwater Management Program. Special taxes require a 2/3 majority approval by registered voters. Due to Proposition 13, special taxes cannot be imposed based on property value; in this case, it would be a "per parcel" tax, apportioned according to property square footage, estimated impervious surface, or as a flat charge.

Pro & Cons – While implementing a special tax to fund the CSF is viable, the conditions of approval are not as favorable as Prop. 218 requirements. While the voting dynamics in the City may be unique, it is likely that it would be easier to obtain a simple majority (i.e., 50%) approval from property-owners than 2/3 majority approval of all registered voters. In addition, the proceeds of a special tax count toward a local government's Gann appropriations limit.

Examples – Commercial Trash Impact Fee– A 2011 analysis of street litter in 4 Bay Area Cities (Oakland, Richmond, San Jose, and South San Francisco) found that ~49% of street litter comes from fast food or convenience stores. Application of a trash impact fee would apply pressure to the source of the waste[10]. The fee can be used to help fund trash collection projects or City O&M activities aimed at tackling the trash TMDL. The Fee could be waived for companies that embrace waste reduction strategies that can be defined by the City.

In 2006, the City of Oakland assessed such a tax on businesses. An annual tax of $230 to $3,815 is collected annually from businesses using tiered rates that assess fees based on the

[10] Clean Water Fund. December 2011. "Taking Out the Trash: Identifying Sources of Trash in the Bay Area."

annual gross receipts of the business. The fees are used to hire small crews to pick up litter in commercial areas and other trash hot spots in the city. The ordinance allows for reduction in fees for businesses that are already providing trash clean-up in their neighborhoods[11],[12].

The City of Berkeley, following the successful ballot measure on sugar-sweetened beverage products, seems well-positioned to propose a similar General or Special Tax for take-out food, liquor stores, convenience markets, and gasoline station markets to defray the cost of litter and trash clean-ups resulting from their operations. This tax can be used to pay for the trash exclusion devices in storm drains, increased city staff to clean waste, or O&M activities to reduce trash from city streets.

3.1.5. General Tax with Special Advisory

The City could opt to seek approval for a general tax (requiring simple majority approval from registered voters) along with an “advisory measure” (a so called “Measure A-Measure B Strategy”). This involves accompanying the tax measure with an additional measure that provides guidance on how the public feels the funds should be spent. The advisory measure would be non-binding since a general tax, by definition, cannot be legally earmarked for a particular purpose. The idea is that adoption of the advisory measure would hopefully create sufficient political pressure to guarantee that the tax increase will always be used for stormwater management purposes despite being deposited into the general fund.

Pro & Cons – It is not clear whether the terms for voter approval of a general tax are more favorable than enacting a new stormwater fee (a Prop. 218 vote). Distinguishing between the two would require a clear understanding of the opinion of all registered voters versus the opinion of all property owners, which require a comprehensive survey. In the event that no such survey is conducted, enacting a new standalone Prop. 218 compliant user fee is preferable since the revenue would be guaranteed to benefit the Stormwater Program. Like the Special Tax above, the proceeds of a general tax would count toward the City’s Gann appropriations limit.

Example – Orange County, California has instituted a half-cent sales tax to fund the Orange County Transportation Authority’s transportation improvements funding measure. The funds from this sales tax are set aside to fund water quality and environmental clean-up projects with a transportation nexus. This funding allows for both capital and operations improvements.

Similarly, the City of Berkeley could expand on the gas tax to fund new projects designed to offset the contribution of roads and cars to runoff and pollution. If a gas tax is not politically feasible, a similar tax could be applied to other vehicular purchases such as oil changes, tire replacements, or other equipment or repair purchases.

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[11] http://www.oaklandnet.com/government/fwawebsite/revenue/pdf/WEBPAGEELF92206.pdf

[12] “Oakland first city to tax fast-food trash.” USA today. February 8, 2006. http://usatoday30.usatoday.com/news/nation/2006-02-08-fast-food-tax_x.htm

3.1.6. Benefit Assessment

A Benefit Assessment is a charge on properties that receive a “special benefit” from public programs. In other words, Benefit Assessments link the cost of public improvements to those properties which receive a specific benefit from those improvements[13]. Approval requires a simple majority of affected property owners *weighted by financial obligation*.

Benefit Assessments are popular for funding park maintenance efforts and flood programs, but they are less common in funding stormwater programs. A comprehensive engineer’s report is required as the legal basis for the assessment, which may require the creation of separate assessments charges by watershed, based on the relative cost of the Stormwater Program within each watershed. For example, if structural stormwater treatment technologies are required to remediate a particular pollutant of concern that exists in one watershed, but not another, the rules of special assessment may require that those costs should be borne by only those properties within that watershed since only they contribute to the problem.

Pro & Cons – The advantage of a Benefit Assessment is the fact that property owners would pay based on the benefit received. This, however, may not be significantly different from the rate structure of a property-related fee, which charges based on the cost of providing service. It is not clear which is more likely to obtain voter approval: a Benefit Assessment or a Prop. 218 vote. With a Benefit Assessment, the commercial, industrial and institutional (CII) customers would generally pay more and therefore receive a more heavily weighted vote. CII customers would represent a considerable hurdle if they decided to oppose the fee.

3.1.7. Stormwater Impact Fee

Stormwater Impact Fees are assessments on new development and redevelopment projects. They are one-time fees whereby developers “buy into” the existing stormwater infrastructure or pay for the costs of any new infrastructure that is required to accommodate the addition of the development project. California Government Code Sections 66000 through 66009 requires that impact fee revenue only fund capacity-related capital projects. As such, the revenue from the Stormwater Impact Fees could not be used to fund O&M or repair and rehabilitation (R&R) activities. In California, impact fees need to be related to the impact created by the development project, otherwise the fee may fall under a different category, such as a special tax (and thereby require a two-thirds majority voter approval).

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[13] Publicly owned parcels are not exempt from assessments unless the parcels receive no special benefit from the program, which is unlikely given the nature of the stormwater program. Also, because assessments are not defined as taxes, they are not subject to Proposition 13 limitations.

Cities and municipalities that assess stormwater impact fees may provide fee reductions or waivers for developers that incorporate stormwater capture and treatment systems onsite[14].

Pros and Cons – Creating a Stormwater Impact Fee would provide some funding, albeit not reliable, for growth-related CIP projects and allow a larger portion of other stormwater revenue sources to be used for O&M and R&R of existing infrastructure. While impact fees are subject to the provisions and limitation of CA Government Code Sections 66000 et. seq., they are not taxes or special assessments and therefore do not require voter approval to be enacted[15]. That being said, the revenues from these fees are unpredictable since the rate of development depends on the economy or the availability of land for growth or redevelopment. Currently, there are 16 large development projects in Berkeley that are being built or are in the building application process[16]. At the current rate of development, an impact fee could make a material contribution to funding growth-related capital projects.

3.1.8. In-Lieu Fee

Currently, the City of Berkeley complies with the San Francisco Bay Municipal Regional Permit (MRP) Provision C.3[17] requirements by requiring development and re-development projects to complete a stormwater checklist as one requirement for obtaining a zoning permit. Projects that do not meet C.3 requirements are denied either a building permit or a Certificate of Occupancy[18].

In-Lieu Fees[19] are an alternative compliance option for Provision C.3 stormwater capture/treatment requirements for regulated projects, whereby developers can opt out of installing the required on-site stormwater retention BMPs by paying an “in-lieu” fee that is used to construct an equivalent stormwater project offsite[20].

Pros and Cons – In-lieu fees present another opportunity to fund growth-related capital projects, thereby allowing a larger portion of other stormwater revenue to be used for expenses such as O&M and R&R. In-lieu fees are not classified as a tax or special assessment, and therefore do not require voter approval to be enacted. Additionally, in-lieu fees confer

[14] Stormwater Funding Options, Providing Sustainable Water Quality Funding in Los Angeles County. May 21, 2014. Ken Farfsing, City of Signal Hill and Richard Watson, Richard Watson & Associates, Inc.
[15] San Francisco Estuary Partnership. August 2015. Green Infrastructure Funding Mechanisms.
[16] Projects range in size between ~24,000 - >180,000 sq. ft. Personal Communication with Timothy Burroughs, City of Berkeley Chief Resilience Officer, October 2015.
[17] Provision C.3 of the San Francisco Municipal Regional Permit provides requirements for onsite stormwater retention/detention for regulated new and redevelopment projects.
[18] Personal Communication with Timothy Burroughs, City of Berkeley Chief Resilience Officer, October 2015.
[19] In-Lieu Fees are described in the latest draft of the Municipal Regional Stormwater Permit under Provision C.3.e, Alternative or In-Lieu Compliance with Provision C.3.b.
[20] California Regional Water Quality Control Board, San Francisco Bay Region, Municipal Regional Stormwater NPDES Permit.
http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/stormwater/Municipal/TO_Order_Only.pdf

developers with the flexibility to build on parcels that are not well suited for onsite stormwater treatment as required by C.3, thus creating more opportunities for redevelopment.

Creating an in-lieu fee system will require a study to determine the appropriate fee structure and mitigation criteria. There is also an on-going effort that will be needed to administer and oversee the program. Additionally, the MRP has included a 2019 deadline for establishing such Alternative Compliance systems[21]. As with impact fees, the revenues from in-lieu fees are highly dependent on the rate of development, which is a function of the economy and the availability of land for development.

3.1.9. Grants

There are some grants available to stormwater utilities, however the competition to receive those grants is intense. In addition, the application process can be lengthy and there is no guarantee that funding will be granted upon the submission of an application package. Grants that are currently available tend to favor large-scale, multi-benefit projects. The following provides a partial list of grants that may be of interest to Berkeley.

- **California Proposition 1** - In 2014 voters passed California Proposition 1[22], enacting the Water Quality, Supply, and Infrastructure Improvement Act of 2014, authorizing over $7 billion of grants, among which are $1.495 billion for multi-benefit ecosystem and watershed protection and restoration projects and $395 million for statewide flood management projects and activities.
- **Clean Water Act Section 319[23]** - The Clean Water Act has a section that provides funds to "designated state and tribal agencies" to implement their approved "nonpoint source management programs". While the City is ineligible to apply directly for these funds. Increased coordination with the Bay Area Integrated Regional Water Management Plan (IRWMP) may yield opportunities to benefit from regional grant-funded projects.
- **Alameda County Clean Water Program[24]** - The program includes an annual Community Stewardship Grant Program that funds community-based projects that "enhance and protect the health of local waterways". Approximately $25 thousand is available each year. The size of this grant is very small compared to the aggregate need for Stormwater funding. However, it can be a vehicle to engage community groups and create awareness of the need to properly manage the City's watersheds.

Pros and Cons – Grants make sense as a piece of any city's stormwater funding portfolio, but do not represent a sustainable source of funding for long term planning. Grants represent an excellent opportunity to advance the City's Stormwater Program with a large infusion of funds for Capital Improvement projects. However, grants can often come with limitations for how

[21] San Francisco Estuary Partnership. August 2015. Green Infrastructure Funding Mechanisms.
[22] http://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/prop1/
[23] http://water.epa.gov/polwaste/nps/cwact.cfm#apply
[24] http://www.cleanwaterprogram.org/grants.html

funds can be spent, involve a substantial amount of staff time to win, may involve more staff time for continual reporting to the funder, and due to the competitive nature of grant procurement, are not a reliable source of funding.

3.2. Debt

The following discusses debt as a mechanism to secure financing for large capital investments. While this strategy can be effective in avoiding the need for a one-time spike in revenue (by spreading those capital costs over a longer duration), it is important to point out that debt is a tool for managing money but not a *source* of money. The City will only be able to secure debt if a reliable (and adequate) source of long-term revenue is established.

3.2.1. General Obligation Debt Financing

With a current bond rating of Aa2, the proposed CIP says that the City is likely able to "generate new bond proceeds in the range of $57-74 million" while keeping "the total tax rate near the current level over the next 30-years". This suggests that the City has additional capacity to borrow money to finance capital improvements. New bonds however need to be approved by voters.

It is worth noting that any increase in annual revenues will result in the increased ability for the city to secure future debt financing.

3.2.2. Clean Water State Revolving Fund[25]

A portion of the Clean Water State Revolving Fund (SRF) is allocated for financing stormwater projects. The 2015 rate from this program was approximately 3.07%. SRF funds are commonly used to finance large water and wastewater infrastructure projects, and can be pursued if a large stormwater project is identified. The application process is complicated and subject to various restrictions, so projects pursuing SRF funding should allocate additional time and up-front resources to secure the funding. The application process will require the applicant to demonstrate the ability to repay the loan, therefore it needs to be coupled with a rate financing mechanism to be successful.

4. Opportunity for Integrated Planning

Each of the funding strategies in Section 3 are accompanied by risks: increasing rates requires voter approval, grants lack dependability, and transfers between various City funds may only shift funding shortfalls to other City programs (Figure 3).

A promising alternative is to identify synergies between existing City programs. While most City services have separate funding and separate master plans, there are many cases where

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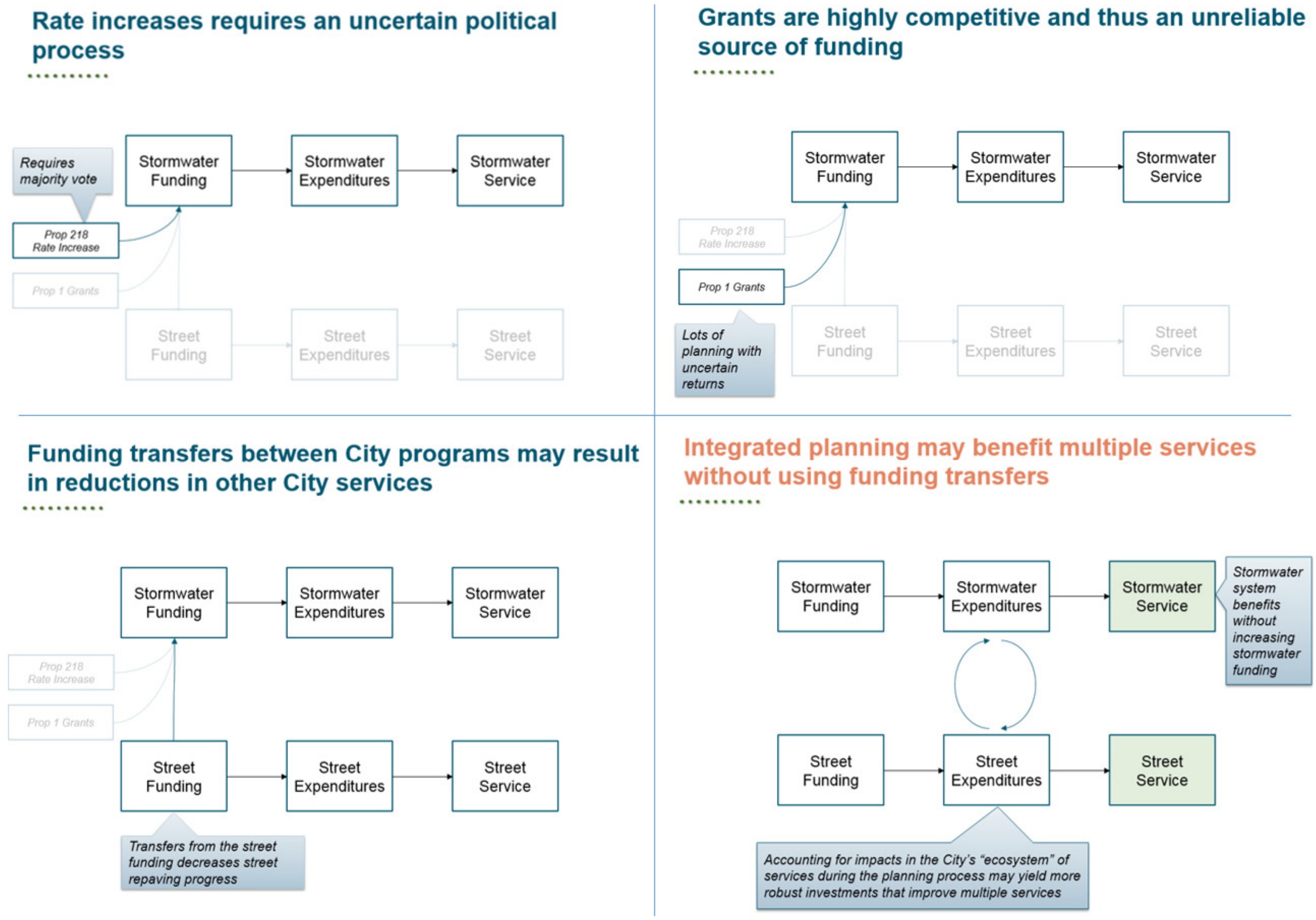
[25] http://www.waterboards.ca.gov/water_issues/programs/grants_loans/srf/

decisions made within one service are likely to affect the performance of another. Integrated planning approaches can be used to identify opportunities to implement projects and programs that serve the needs of multiple City programs. Successful implementation of integrated planning would allow for cost sharing among City programs to achieve equal or greater service at a lower marginal cost. This integrated approach requires a shift in viewing city services as a patchwork of different departments, to a coherent whole, where multiple services work together to produce a desirable environment.

Currently, a large portion of the City's capital expenditures are spent on rehabilitating its streets, which has corresponding (but unexplored) impacts on its stormwater system. Meanwhile the City's Stormwater Program lacks the funding to implement much needed capital improvement projects to manage the runoff from the City's impervious surfaces. An integrated planning approach could be used to identify opportunities for the Streets and Stormwater Program (and potentially other programs) to pool their resources to implement stormwater enhancement projects within the right-of-way (Figure 3). For example, some preliminary studies have shown that utilizing permeable pavers in roadways can reduce the quantity and improve the quality of stormwater runoff while also extending the life of the roadway when compared to traditional asphalt systems[26, 27]. Projects like these can be implemented in strategic locations to achieve the needs of multiple programs while providing cost savings for each department.

[26] Wang, Ting, John T. Harvey, David Jones (2010) A Framework for Life-Cycle Cost Analyses and Environmental Life-Cycle Assessments for Fully Permeable Pavements. Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-10-48
[27] "Permeable Pavers Score a Triple Double in Bloomington's Cascades Park." Interlocking Concrete Paver Magazine. November 2005.

Figure 3: Integrated Planning May Create Benefits Across Multiple Services



5. Recommendation

The City's Capital Improvement Program has identified $37 million in unfunded liabilities over the next 5 years[28]. Increased funding for the City's Stormwater Program is needed to meet the City's regulatory demands, as well as enhance the community's general aesthetics, environmental protection, and resilience portfolio.

There is no silver bullet to stormwater financing, often stormwater programs remain overlooked and underfunded as communities struggle to allocate limited resources. As an "end game" strategy, we recommend that the City work towards increasing the level of funding from the Clean Stormwater Charge through the Prop. 218 voting process since this would clearly be the

[28] This includes $5 million for unfunded maintenance needs and $32 million for projected capital improvement projects. The total unfunded capital needs of the stormwater system are ~208 million total.

most reliable source of long-term funding. This process will require a rate study, a period of public outreach, and then the voting process, all of which will take time (1 – 2 years).

Obtaining Prop. 218 approval from voters will require a strong public outreach campaign as well as internal support from City Staff. We recommend building a foundation of public support by first establishing an integrated planning approach for other Public Works programs that allow the City to develop and demonstrate multi-benefit projects that efficiently meet city transportation, waste management, and stormwater demands while reducing flooding impacts, improving water quality, and local environmental health of streams and water ways.

This integrated planning mindset may be the best opportunity for the City to achieve long term fiscal sustainability and resiliency. Other stormwater programs across the US have found ways to "do more with less" by creating multi-benefit projects using green infrastructure to improve water quality and reduce the quantity of wet and dry weather runoff, preserve urban open space and reduce flooding risks by creating mixed use recreation and stormwater detention facilities, prepare for increased peak flow events, and enhance their resilience to water supply interruptions by enhancing groundwater infiltration[29,30,31].

By adopting (and demonstrating) an integrated planning process between the multiple Public Works programs (Stormwater, Streets, Trash, and Sewer) to achieve synergistic benefits, the City will be earning the confidence of decision-makers and voters, all of which will improve the chances of successful Prop. 218 campaign.

As a next step, we recommend the City develop an Integrated Stormwater Financing Plan that comprehensively evaluates the City's revenue building and cost sharing options. Such a plan would evaluate the City's operating and capital needs, assess current funding mechanisms, and identify the precise financial needs of the Stormwater Program. The final plan would provide a roadmap for increased revenues that will meet the programmatic demand and all regulatory requirements, as well as identify opportunities for multi-benefit projects that reduce the marginal costs of project implementation for the Stormwater Program and other Divisions of the Public Works Department. Implementation of this plan will result in greater financial stability for the Stormwater Program and put into motion a series of projects that will enhance the city's resiliency portfolio.

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[29] "Improving Community Resiliency with Green Infrastructure." USEPA. http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_resiliency.pdf

[30] "City of LA Releases Seismic Resilience Report and Plans." http://www.planningreport.com/2015/02/26/city-la-releases-seismic-resilience-report-and-plans

[31] "Managing Wet Weather with Green Infrastructure, Municipal Hand Book, Green Streets." USEPA. December 2008

Appendix E

City of Berkeley 2018 Storm Drainage Fee Report and Resolution No. 68,483-N.S.

CITY OF BERKELEY

2018 STORM DRAINAGE FEE REPORT

JANUARY 2018

PURSUANT TO THE ARTICLES XIIIC & D OF THE CALIFORNIA CONSTITUTION,
AND THE GOVERNMENT CODE SECTIONS 38900 – 38901 ET AL.

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INTRODUCTION AND EXECUTIVE SUMMARY

OVERVIEW

The City of Berkeley ("City") has engaged SCI Consulting Group to study, make recommendations, and assist in the implementation of a funding approach for its municipal separate storm sewer system[1] ("MS4") including capital improvements, maintenance and operations, and compliance to all state and federal regulations associated with the National Pollutant Discharge Elimination System ("NPDES").

In 2012, Resolution 65,930 NS, the City adopted a Watershed Management Plan ("WMP") that presented an integrated and sustainable strategy for managing urban water resources. It meant to guide further City efforts in promoting a healthier balance between the urban environment and the natural ecosystem. More specifically, it addressed water quality, flooding, and the preservation of creeks and habitats using multi-objective approaches where possible. The WMP concluded with a set of recommendations that included over $207 million in capital improvements spread across the City's 10 watersheds. The WMP also presented four funding scenarios ranging from existing revenue levels up to a $30 million bond measure and/or a $7.7 million fee program.

In 2017 the City engaged SCI Consulting Group to conduct a comprehensive storm drainage fee study that would include recommendations to update the City's storm drainage fees and the strategic plans to meet the City's storm drainage regulatory compliance requirements. This work was to be done in three phases: 1) Estimate preliminary user rates; 2) Conduct a public opinion survey of Berkeley property owners; and 3) Implement a funding mechanism. This Fee Report ("Report") is the first task of Phase 3.

CITY'S FACILITIES

The City operates and maintains a storm drainage system, as it is empowered to do so per Government Code Sections 38900 and 38901. It is comprised of an integrated system of storm drain pipes, culverts and ditches. Local creeks are not considered part of the City's storm drain system, although they receive most of the urban runoff and are impacted by how the City's storm drainage system functions.

The Berkeley area began experiencing residential development over one hundred years ago. As the community grew, the storm drainage system was developed along with the neighborhoods and commercial areas while still maintaining many native creek segments. Although the City is highly urbanized, there are a large number of open creek segments that cross streets, private properties and roadways through numerous culvert sections.

[1] In this report, the terms "storm sewer", "storm drainage", and "stormwater" are used interchangeably, and are considered to be synonymous.

In the early 1990s, in response to the federal Clean Water Act amendment of 1987, municipalities were, for the first time, required to obtain an NPDES[2] permit from the California Regional Water Quality Control Board to address urban storm drainage runoff pollution. Under this permit, the City works to reduce stormwater pollution, protect and enhance its watersheds, preserve beneficial uses of local waterways, and implement State and federal water quality regulations within the limits of its jurisdiction. Over the years, the range of actions taken by the City has greatly increased in response to evolving regulatory requirements and community needs.

STORM DRAINAGE FUNDING

In response to the NPDES permit requirements, the City implemented a Clean Storm Water Fee in 1991 for all residences and businesses in the City. The City collects approximately $2 million annually from this fee, which has not been increased since its 1991 inception. In addition, the City receives an annual allocation from UC Berkeley's long range development plan ("LRDP") of approximately $277,000. Initially these revenues were sufficient to fund ongoing maintenance, operations and capital improvement projects. Today, those costs well exceed the available storm drainage funding.

Based on the current and projected revenue shortfalls for the City's storm drainage activities, SCI recommends that the City implement a property-related fee as the preferred mechanism[3] to generate revenue for storm drainage services. This Report proposes a new fee structure, to be known as the 2018 Storm Drainage Fee ("Storm Drainage Fee"), that would be implemented without replacing or affecting the existing fee that has been in place for over 25 years.

IMPLEMENTATION PROCESS & LEGAL REQUIREMENTS OF STORM DRAINAGE FEE

Property-related fees are primarily defined by Articles XIIIC and D of the State Constitution, which was approved by voters in 1996 through Proposition 218, as well as the Proposition 218 Omnibus Implementation Act (Government Code Sections 53750 – 53758). In particular, Article XIIID, Section 6 describes the procedures for a property-related fee. Once a proposed fee has been determined, there is a two-step process for approval:

- The City must mail a Notice of the proposed fee to all property owners subject to the fee at least 45 days before a public hearing on the matter. At that hearing, the City shall consider all protests against the fee. If written protests are presented by a majority of owners, the City shall not impose the fee. If a majority protest does not exist, the City may proceed to the next step.

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[2] NPDES stands for the National Pollutant Discharge Elimination System as specified in the Federal Clean Water Act. The City is one of the co-permittees named on the Alameda County NPDES permit issued by the Regional Water Board. The most recent MRP was issued in November 2015, however, these permits typically are renewed every five years, with each new iteration containing additional requirements.

[3] The only other practical option for funding storm drainage programs is a parcel tax, which requires a two-thirds majority as opposed to a 50% majority for a property-related fee.

- No property-related fee shall be imposed until it is submitted and approved by a majority vote of the property owners of the properties subject to the fee[4]. This election, or ballot proceeding, shall not be conducted less than 45 days after the public hearing.

The required public hearing is tentatively scheduled for April 3, 2018, which requires the Notices to be mailed before February 16, 2018. The tentative date for the election (or when mailed ballots are due) is May 29, 2018.

OTHER LEGAL REQUIREMENTS

Any property-related fee must also comply with other requirements of Article XIIID, Section 6. These include the following:

- Revenues derived from the fee shall not exceed the funds required to provide the property-related service.
- Revenues derived from the fee shall not be used for any purpose other than that for which the fee was imposed.
- The amount of a fee upon any parcel or person as an incident of property ownership shall not exceed the proportional cost of the service attributable to the parcel.
- No fee may be imposed for a service unless that service is actually used by, or immediately available to, the owner of the property in question. Fees based on potential or future use of service are not permitted. Standby charges, whether characterized as charges or assessments, shall be classified as assessments and shall not be imposed without compliance with the assessment section of the code.
- No fee may be imposed for general governmental services including, but not limited to, police, fire, ambulance or library services where the service is available to the public at large in substantially the same manner as it is to property owners.

HOWARD JARVIS TAXPAYERS ASSOCIATION V. CITY OF SALINAS (2002) 98 CAL. APP.4TH 1351

According to Article XIIID, Section 6 property related fees for sewer, water and refuse collection services are exempt from the balloting requirement. In 1999, the City of Salinas adopted ordinances that implemented a property related fee to fund NPDES water quality services associated with storm drainage without a ballot proceeding, by relying on "sewer" exemption from balloting. They were legally challenged by the Howard Jarvis Taxpayers Association (the authors and proponents of Proposition 218) which argued that a balloting was required because the services to be funded did not fall within the definition of "sewer". The Court of Appeal made two rulings pertinent to this Report: 1) Storm drainage services are property-related, and 2) Storm drainage does not qualify for the sewer exemption, and therefore must be balloted. However, in making these findings, the Salinas Court concluded that the meaning of "sewer services" was ambiguous in the context of both Section 6c and in Proposition 218 as a whole. As such, the Court ruled in favor the voters' intent to curb the

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[4] Proposition 218 also allows approval by two-thirds of the electorate residing in the area. This is essentially the same requirement as a parcel tax, which was rejected by the City for lack of support.

rise in "excessive" taxes, assessments, and fees exacted by local governments with taxpayer consent.

COMPLIANCE WITH CURRENT LAW

This Fee Report is consistent with the *Salinas* decision and with the requirements of Article XIIIC and D of the California Constitution because the Services to be funded are clearly defined and the City intends to follow both approval steps (including a ballot proceeding).

FACILITIES AND SERVICES

The City operates and maintains a "municipal separate storm sewer system" ("MS4") within its boundaries. The MS4 is made of up man-made drainage systems including, but not limited to, curbs and gutters, ditches, culverts, pipelines, manholes, catch basins (inlets) and outfall structures.

There are about 93 miles of storm drain pipelines under the public right-of-way. There are approximately 8 miles of open creeks in the City, only 7% of which are on public lands. There are about 6.5 miles of creek culverts, with about 60% on public property. All the creeks and storm drains in Berkeley eventually drain to the San Francisco Bay. The rainfall varies generally with elevation. The Bay plain areas receive an average annual rainfall of approximately 18 inches per year, while the hills receive as much as 26 inches annually.

The open creeks and storm drain system serving the University of California at Berkeley ("UCB") campus, located within the City, are owned and maintained by the University, but discharge downstream, primarily to Strawberry Creek. The Lawrence Berkeley National Laboratory, located on University property, also contributes storm drainage runoff to the City's storm drainage system.

The primary storm drainage service provided by the City is the collection, conveyance, and overall management of the storm drainage runoff from improved parcels. By definition, all improved parcels that shed storm drainage into the City's MS4, either directly or indirectly, utilize, or are served by, the City's storm drainage system. The need and necessity of this service is derived from those property improvements, which historically have increased the amount of storm drainage runoff from the parcel by constructing impervious surfaces such as rooftops, concrete areas, and certain types of landscaping that restrict or retard the percolation of water into the soil beyond the conditions found in the natural, or unimproved, state. To the extent that a property is in a natural condition or includes features that hold any increased runoff, that property is exempted from any MS4 service. As such, open space land (in a natural condition), and agricultural lands that demonstrate storm drainage absorption equal to or greater than natural conditions, are typically exempt. The service area is concurrent with the City boundaries.

FINANCIAL NEEDS SUMMARY

SUMMARY OF STORM DRAINAGE SYSTEM NEEDS

As part of the 2018 Storm Drainage Fee implementation task, the SCI team conducted an analysis of the City's storm drain system needs. This analysis is contained in a technical memorandum from the firm of Larry Walker Associates, and is included in Appendix A of this Report. This analysis reviewed existing revenues and estimated the true costs of storm drainage to prevent local flooding and to remain in compliance with the current NPDES permit, commonly known as the Municipal Regional Permit ("MRP") issued by the Water Board to all Phase 1 permittees in the San Francisco Bay area. The first MRP was issued in 2009. The second MRP was issued in 2015, and is referred to as MRP 2.0.

STORM DRAINAGE PROGRAM REVENUES

The first step of the analysis was to review the revenues available to the City's storm drain system. Based on information provided by the City, the existing revenues are projected through Fiscal Year 2021-22 as shown in Table 1 below. The State Transportation Tax and a portion of the Measure M Bond funds were allocated to the Stormwater Capital Improvement Program ("CIP"). Other funds were dedicated to other operational activities.

TABLE 1 – SUMMARY OF STORM DRAINAGE PROGRAM REVENUE

						Shown in millions
Revenue Category	Prior 2016-17	Current 2017-18	Future 2018-19	2019-20	2020-21	2021-22
Stormwater Fees	$ 2.06	$ 2.08	$ 2.08	$ 2.08	$ 2.08	$ 2.08
University in Lieu (LRDP)	0.27	0.28	0.29	0.29	0.30	0.31
General Fund Transfer In	0.13	-	-	-	-	-
Interest *	0.00	-	-	-	-	-
State Transportation Tax	-	0.30	0.30	0.30	0.30	0.30
Measure M Bonds	-	3.26	1.17	-	-	-
TOTAL Revenues	**$ 2.47**	**$ 5.91**	**$ 3.83**	**$ 2.67**	**$ 2.68**	**$ 2.69**

** Actual Interest revenue for FY 2016-17 was $2,697*

STORM DRAINAGE PROGRAM COSTS

The City's storm drainage program is influenced primarily by the requirements to prevent local flooding and to comply with the MRP 2.0. These estimates were based on budgetary and supplemental information provided by the City. In broadly assessing the City's storm drainage program's costs, three main categories were used: Capital Costs ("CIP"); Operations and Maintenance ("O&M") Costs, and Water Quality (NPDES) Costs. These categories reflect how the City generally allocates funds to implement its day-to-day storm drainage-related operations.

More detailed information can be found in Appendix A. The storm drainage program costs are summarized in Table 2 below. (Note: The CIP costs summarized in the table below reflect a relatively minor subset of overall storm drainage capital needs. The City will continue to pursue non-City funding sources to address large-scale CIP costs.)

TABLE 2 – SUMMARY OF STORM DRAINAGE PROGRAM COSTS

Category	Prior 16-17	Current 17-18	Future 18-19	19-20	20-21	21-22	TOTAL *Shown in millions*
CIP	$ 0.16	$ 3.95	$ 2.82	$ 1.70	$ 1.86	$ 2.02	$ 12.51
O & M	1.53	1.23	2.03	1.89	1.95	2.00	10.62
NPDES	0.93	1.05	1.27	1.32	1.37	1.42	7.36
TOTAL COSTS	**$ 2.61**	**$ 6.23**	**$ 6.12**	**$ 4.91**	**$ 5.18**	**$ 5.44**	**$ 30.49**

ANNUAL REVENUE REQUIREMENT

The proposed fee is scheduled to begin in Fiscal Year 2018-19. Therefore, the data presented in Appendix A for prior years will not be considered. What remains for analysis is a four-year window in which existing revenue sources and projected costs are presented.

Over the four fiscal years, the projected costs exceed revenues by $9.77 million. This is the amount that the proposed storm drainage fee would need to generate in order to bring the Stormwater Fund into balance. The resulting revenue requirement is therefore based on an annual revenue, estimated to be adjusted for inflation at 2.8%[5] per year over the four-year period, that totals $9.77 million over those four years. These projections are summarized in Table 3 below.

TABLE 3 – ESTIMATE OF ANNUAL REVENUE REQUIREMENT

Category	Prior 16-17	Current 17-18	Future 18-19	19-20	20-21	21-22	TOTAL *Shown in millions*
Revenues	na	na	$ 3.83	$ 2.67	$ 2.68	$ 2.69	$ 11.87
Expenditures	na	na	6.12	4.91	5.18	5.44	21.65
Shortfall	**na**	**na**	**$(2.29)**	**$(2.24)**	**$(2.49)**	**$(2.75)**	**$ (9.77)**
Fee Revenues *			$ 2.34	$ 2.41	$ 2.48	$ 2.55	**$ 9.77**

** Revenues are increased by 2.8% annually for inflation*

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[5] This Fee Report includes an Annual Cost Indexing factor (see next section) that is equal to the Consumer Price Index ("CPI"), but is capped at 3% in any single year. Since the CPI may not reach 3% in any of the coming four years, a value of 2.8% is used in this analysis.

RATE STRUCTURE ANALYSIS

All properties which generate storm and urban runoff which flow into the City's MS4 are served by the system. The amount of use attributed to each parcel is proportional to the amount of storm and urban runoff flow contributed by the parcel, which is proportional to the amount of impervious surface area (e.g. building roofs, pavement, etc.) on a parcel.

In this Report, the median single-family residential parcel is used as the basic unit of measure, called the single-family equivalent, or "SFE." Accordingly, since the primary quantifiable attribute for this fee structure is impervious surface area, the amount of impervious surface area on the median SFR parcel serves as the basic unit of impervious area.

The basic unit of impervious area can be expressed by the following formula:

Median SFR Parcel Area
x Average SFR Impervious Percentage
= SFE Impervious Area

The median SFR parcel is 0.11 acres (4,792 square feet). Careful analysis[6] revealed that the average percentage of impervious area ("%IA") of the medium class of SFR parcels is 44.82%. Therefore, the amount of impervious area for the SFE is 2,148 square feet. This becomes the basis for calculating the SFEs for all other types of land uses. In order to accomplish this, a representative sample of each land use category was studied through aerial photographs to measure the actual impervious area, which was, in turn, used to calculate the %IA for each land use category (see Appendix B).

SINGLE-FAMILY RESIDENTIAL PARCELS

Berkeley has a wide range of sizes of SFR parcels, which have varying levels of %IA. Generally, smaller parcels tend to have a higher proportion of impervious area than larger parcels, which tend to have a lower percentage of impervious area. (This can be best visualized by the fact that larger residential properties tend to have a larger proportion of *pervious* landscaping, and therefore *less impervious* area.) Therefore, the range of SFRs were broken into three size categories as shown in Table 4 below. Since the size of a parcel is considered in finite groups, the resultant SFEs were calculated on a per-parcel basis for each size category using the formula above.

It should be noted that the SFR category also includes multiplex parcels of two, three or four units, since their lot development characteristics do not vary significantly from the SFR parcels of similar size. In all, this includes the approximately 3,400 multiplex parcels in the

[6] Appendix B includes a summary of results of parcels sampled in each category

City. Any residential structure with five or more units is categorized as multi-family residential ("MFR"), which is calculated separately. For parcels with multiple SFRs, analysis showed that those parcels contained 22% more impervious area than single-home SFRs within the same size category. Therefore, multiple-SFR parcels are computed separately.

SPECIAL NOTES ON CONDOMINIUMS

Condominium units are particularly difficult to categorize as they are often on very small individual parcels, yet share larger common areas that are made up of landscaped (pervious) areas; parking lots and shared roofs (impervious); and other recreational uses (either pervious or impervious). The data for these variables are not readily available, so it is assumed that overall their characteristics were most similar to the small lot make up. Overall, condominium units are smaller than the average SFR, and may include two or more stories of residences in some cases. When combined with the various common areas (which were exempted from the SFE process), the overall effect would be less runoff impact than the median size SFR. Thus, the Small SFR rate was used.

TABLE 4 – SUMMARY OF SINGLE-FAMILY RESIDENTIAL PARCELS

Lot Type	Parcel Size Range	Total Parcels	Total Acres	Median Parcel Size	% Imperv Area	Median Imperv Area	SFE per Parcel	
	Square Footage			SF		SF	Single Home	Multiple Homes
Small	under 3,200	2,358	142	2,614	65.73%	1,718	**0.80**	**0.98**
Medium	3,200 to 7,200	16,371	1,861	4,792	44.82%	2,148	**1.00**	**1.22**
Large	7,200 and over	2,677	680	8,712	29.81%	2,597	**1.21**	**1.48**
Condos	na	2,260	23	na	na	na	**0.80**	**na**
		23,666	**2,706**					

* Total Parcels and Acres do not factor into the basis of the SFE calculation; they are shown for informational purposes only.

NON-SINGLE-FAMILY RESIDENTIAL PARCELS

Unlike the SFR parcels, the non-SFR parcels can vary widely in size as well as characteristics. For this reason, the parcels have been grouped into land use categories according their %IA characteristics (as shown in Appendix B) so that SFE per acre can be computed for each category using the following formula:

$$\frac{(43{,}560\ sf\ /\ acre)\ x\ \%IA}{2{,}148\ sf\ /\ SFE} = SFE\ per\ Acre$$

where 2,148 square feet is the amount of the impermeable area in one SFE.

Table 5 below shows a summary of the non-single-family parcel SFEs for each non-SFR land use category.

TABLE 5 – SUMMARY OF NON-SFR PARCELS

Land Use Category	Total Parcels	Total Acres	% Imperv Area	SFE per Acre
Multi-Family (Apartments)	1,417	291	86%	17.44
Commercial / Retail / Industrial	1,740	630	96%	19.47
Office	236	87	90%	18.25
Institutional / Church	274	94	82%	16.63
School / Hospital	34	432	75%	15.21
Recreational	22	53	58%	11.76
Park	73	91	6%	1.22
Vacant (developed)	620	114	5%	1.01
Open Space / Agricultural	na	na	Exempt	
TOTAL	4,416	1,792		

* Total Parcels and Acres do not factor into the basis of the SFE calculation; they are shown for informational purposes only.

Each individual parcel's SFE is then calculated by multiplying the parcel size (in acres) times the SFE per acre for that land use category, as shown in the following formula:

$$\textit{Parcel Size (acres)} \quad x \quad \textit{SFE per Acre} \quad = \quad \textit{SFE}$$

DEVELOPED VACANT PARCELS

Developed vacant parcels are distinguished from undeveloped vacant land by one of several characteristics. Typically, a developed vacant parcel has been graded to be ready for building construction (possibly as part of the original subdivision or adjacent street grading). In some cases, the parcel was previously improved, but the improvement has been removed. Although developed vacant parcels may have significant vegetative cover, the underlying soil conditions resulting from grading work can usually cause some rainfall to run off into the storm drainage system. The %IA for developed vacant parcels is conservatively assumed to be 5%.[7] Vacant parcels that have significant impervious paving remaining from prior improvements may be classified as Commercial or some other classification best representing the %IA of the parcel.

OPEN SPACE AND AGRICULTURAL PARCELS ARE EXEMPT

The City's MS4 was developed in response to land development over the past several decades. Tracts of land that have not yet been developed, or have been used primarily for

[7] For instance, the City of Sacramento in 2015 used a %IA of 20% for vacant parcels.

agricultural purposes, have not created an impact on the drainage system beyond the natural condition, and are therefore considered to receive no service from the MS4. In practical terms, these parcels generate no additional storm runoff beyond the natural condition. For these reasons, open space and agricultural parcels are exempt from the storm drainage fee.

Berkeley is a City with some open space land, which can be situated on portions of developed parcels. For parcels that have a significant portion that is considered open space (or agricultural), those portions have been taken into consideration in the calculations of the %IA and SFEs. For SFR parcels, these open space lands have been included in the sampled lots size when calculating the average %IA, which produced a lower %IA for the large parcel category, and, thus, a lower SFE and Fee to accommodate the open space areas. For non-SFR parcels the fees are calculated on individual acreage. However, the open space portion has been deducted from the acreage prior to all analyses including %IA as well as SFE and fee calculation.

EFFECTS OF LOW IMPACT DEVELOPMENT

The current NPDES Permit requires certain properties to construct storm drainage treatment and attenuation facilities, also known as low impact development ("LID"). These facilities often are designed to capture a portion of the storm flows, retain them, and enable them to infiltrate into the ground. While this is intended to help filter pollutants from the water, it also can reduce the parcel's storm drainage runoff quantity to some extent. However, LID is designed to capture, retain and treat frequent, but low intensity storms. Conversely, the MS4 is designed around the infrequent, high intensity storms, those storms which will typically overflow most LID facilities. For this reason, no discount in the storm drainage fees is made available for parcels with LID facilities.

STORM DRAINAGE FEE CALCULATION

The primary metric in this analysis is the SFE as illustrated above. To arrive at the fee amount for the various land use categories, the total SFEs must be divided into the total revenue requirement to arrive at the rate per SFE. That calculation is represented by the following formula:

$$\frac{\textit{Total Revenue Requirement}}{\textit{Total SFEs}} = \textit{SFE Rate}$$

Or, using numbers from the analysis, the SFE rate is:

$$\frac{\$2,343,041}{54,629.085\ \ SFEs} = \mathbf{\$42.89\ \ per\ SFE}$$

This SFE rate amount is then multiplied by the SFE per parcel or SFE per acre for the various land use categories to arrive at the Storm Drainage Fee Rate Schedule shown in Table 6 below.

TABLE 6 – STORM DRAINAGE FEE SCHEDULE

Land Use Category					SFE Rate	Proposed Fee	Unit
Single-Family Residential *							
Small	Under		3,200	sf	0.79992	$ 34.31	parcel
Medium	3,200	to	7,200	sf	1.00000	$ 42.89	parcel
Large	over		7,200	sf	1.20933	$ 51.87	parcel
Condominium					0.79992	$ 34.31	parcel
Multiple SFR on a single parcel pay 22% higher rate							
Non-Single-Family Residential							
Multi-Family Residential					17.44360	$ 748.16	acre
Comm / Industrial / Parking					19.47193	$ 835.15	acre
Office					18.25493	$ 782.95	acre
Institutional / Church					16.63227	$ 713.36	acre
School / Hospital					15.21244	$ 652.46	acre
Recreational					11.76429	$ 504.57	acre
Park					1.21700	$ 52.20	acre
Vacant (developed)					1.01416	$ 43.50	acre
Open Space / Agricultural					exempt		

* Single-Family Residential category also includes duplex, triplex and four-plex units

The proposed $42.89 SFR rate is well within the range of storm drainage rates adopted by other municipalities. For a listing of rates adopted by other municipalities, see Appendix C.

ANNUAL COST INDEXING

The storm drainage fees are subject to an annual adjustment tied to the Consumer Price Index-U for the San Francisco Bay Area as of December of each succeeding year (the "CPI"), with a maximum annual adjustment not to exceed 3%. Any increase in the CPI in excess of 3% shall be cumulatively reserved as the "Unused CPI" and shall be used to increase the maximum authorized rate in years in which the CPI is less than 3%. The maximum authorized rate is equal to the maximum rate in the first fiscal year the Fee was approved adjusted annually by the lower of either 3% or the increase in the CPI plus any Unused CPI as described above. Note: In order for the City's dedicated storm drainage revenue sources to satisfy costs requirement into the future, the annual adjustment for each property may be calculated based upon the sum of the storm drainage fee and the existing Clean Storm Water Fee.

COLLECTION, MANAGEMENT AND USE OF STORM DRAINAGE FUNDS

The City shall collect the 2018 Storm Drainage Fees in the same manner as the annual property taxes on each parcel subject to the Fee. The City shall also deposit into a separate account(s) all 2018 Storm Drainage Fee revenues collected, and shall appropriate and expend such funds only for the purposes authorized by this Report. The specific assumptions utilized in this Report, the specific CIP projects listed, and the division of revenues and expenses between the three primary categories (CIP, O&M and NPDES) are used as a reasonable model of future revenue needs, and not intended to be binding on future use of funds.

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APPENDICES

APPENDIX A – FINANCIAL PLANNING AND FUNDING OPTIONS REPORT

On the following pages is regulatory assessment and cost and revenue analyses, drawn from a technical memorandum prepared for this project by Larry Walker Associates. The information contained in this Appendix forms a partial basis for the fee calculations in the main body of this Fee Report, and is referenced as appropriate.

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APPENDIX B – RESULTS OF PERCENTAGE OF IMPERVIOUS AREA SAMPLING

For each land use category, a sample of parcels were analyzed using aerial photography and other data to determine the average percentage of impervious area ("%IA"). Table 7 below shows the results of that analysis.

TABLE 7 – RESULTS OF PERCENTAGE OF IMPERVIOUS AREA SAMPLING

Land Use Category	No. of Parcels	No. of Parcels Analyzed	Total Acres Sampled	Total Acres Impervious Area	Average % I A
Residential					
Small *Under 3,200 sf*	2,333	94	5.69	3.74	65.73%
Medium *3,200 to 7,200 sf*	15,819	401	44.11	19.77	44.82%
Extra Large *over 7,200 sf*	2,590	100	23.28	6.94	29.81%
Multiple Home Lots	664	29	3.77	2.06	54.64%
Condominium	2,260	not sampled			
Non-Residential					
Apartments	1,417	50	8.30	7.16	86.27%
Comm / Industrial / Parking	1,740	79	20.74	19.85	95.71%
Office	236	23	8.69	7.56	89.87%
Institutional / Church	274	32	10.86	8.95	82.41%
School / Hospital	34	28	78.64	59.02	75.05%
Recreational	22	21	51.02	29.76	58.33%
Park	73	15	23.84	1.50	6.29%
Vacant (developed)	620	not sampled			
TOTAL	28,082	872	278.94	166.31	

APPENDIX C – STORM DRAINAGE RATES FROM OTHER MUNICIPALITIES

There have been relatively few voter-approved local revenue mechanisms in the past 15 years to support storm drainage programs in California. A summary of those efforts plus some others in process or being studied is shown in Table 8 below, in roughly chronological order. Amounts are annualized and are for single family residences or the equivalent.

TABLE 8 – RECENT STORM DRAIN MEASURES

Municipality	Status	Annual Rate	Year	Mechanism
San Clemente	Successful	$ 60.15	2002	Balloted Property Related Fee
Carmel	Unsuccessful	$ 38.00	2003	Balloted Property Related Fee
Palo Alto	Unsuccessful	$ 57.00	2003	Balloted Property Related Fee
Los Angeles	Successful	$ 28.00	2004	Special Tax - G. O. Bond
Palo Alto	Successful	$ 120.00	2005	Balloted Property Related Fee
Rancho Palos Verde	Successful , then recalled and reduced	$ 200.00	2005, 2007	Balloted Property Related Fee
Encinitas	Unsuccessful	$ 60.00	2006	Non-Balloted Property Related Fee adopted in 2004, challenged, ballot and failed in 2006
Ross Valley	Successful, Overturned by Court of Appeals, Decertified by Supreme Court	$ 125.00	2006	Balloted Property Related Fee
Santa Monica	Successful	$ 87.00	2006	Special Tax
San Clemente	Successfully renewed	$ 60.15	2007	Balloted Property Related Fee
Solana Beach	Non-Balloted, Threatened by lawsuit, Balloted, Successful	$ 21.84	2007	Non-Balloted & Balloted Property Related Fee
Woodland	Unsuccessful	$ 60.00	2007	Balloted Property Related Fee
Del Mar	Successful	$ 163.38	2008	Balloted Property Related Fee
Hawthorne	Unsuccessful	$ 30.00	2008	Balloted Property Related Fee
Santa Cruz	Successful	$ 28.00	2008	Special Tax
Burlingame	Successful	$ 150.00	2009	Balloted Property Related Fee
Santa Clarita	Successful	$ 21.00	2009	Balloted Property Related Fee
Stockton	Unsuccessful	$ 34.56	2009	Balloted Property Related Fee
County of Contra Costa	Unsuccessful	$ 22.00	2012	Balloted Property Related Fee
Santa Clara Valley Water District	Successful	$ 56.00	2012	Special Tax
City of Berkeley	Successful	varies	2012	Measure M - GO Bond
County of LA	Deferred	$ 54.00	2012	NA
Vallejo San & Flood	Successful	$ 23.00	2015	Balloted Property Related Fee
Culver City	Successful	$ 99.00	2016	Special Tax
County of El Dorado	Studying	NA	NA	NA
County of Orange	Studying	NA	NA	NA
County of San Mateo	In Process	NA	NA	NA
City of Sacramento	In Process	NA	NA	Balloted Property Related Fee
Town of Moraga	In Process	NA	NA	Balloted Property Related Fee
City of Santa Clara	In Process	NA	NA	Balloted Property Related Fee
Town of Los Altos	In Process	NA	NA	Balloted Property Related Fee
County of San Joaquin	In Process	NA	NA	Balloted Property Related Fee
County of Ventura	Studying	NA	NA	Balloted Property Related Fee

In addition to the agencies listed above in Table 8 that have gone to the ballot for new or increased storm drainage fees, there are several other municipalities throughout the State that have existing storm drainage fees in place. Some of these rates are summarized in Table 9 below. Amounts are annualized and are for single family residences or the equivalent.

The City's proposed $42.89 SFR rate is well within the range of storm drainage rates adopted by other municipalities. When coupled with the existing 2018 Storm Drainage Fee (with an average SFR rate of $47.66), the rates are still within the reasonable range for municipal rates.

TABLE 9 – LOCAL STORM DRAINAGE FEES

Municipality	Annual Rate	Type of Fee
Bakersfield	$ 200.04	Property Related Fee
Culver City	$ 99.00	Special tax
Davis	$ 84.94	Property Related Fee
Elk Grove	$ 70.08	Property Related Fee
	$ 190.20	Property Related Fee
Hayward	$ 28.56	Property Related Fee
Los Angeles	$ 27.00	Special tax
Palo Alto	$ 136.80	Property Related Fee
Redding	$ 15.84	Property Related Fee
Sacramento (City)	$ 135.72	Property Related Fee
Sacramento (County)	$ 70.08	Property Related Fee
San Bruno	$ 46.16	Property Related Fee
San Clemente	$ 60.24	Property Related Fee
San Jose	$ 91.68	Property Related Fee
Santa Cruz	$ 109.08	Special Tax
Stockton *	$ 221.37	Property Related Fee
Vallejo Sanitation and Flood Control District	$ 23.64	Property Related Fee
West Sacramento	$ 144.11	Property Related Fee
Woodland	$ 5.76	Property Related Fee

* This is the calculated average rate for the City of Stockton, which has 15 rate zones with rates ranging from $3.54 to $651.68 per year.

RESOLUTION NO. 68,483-N.S.

APPROVING THE FEE REPORT, ACCEPTING THE BALLOT TABULATION RESULTS, AND ORDERING THE LEVY OF THE CITY OF BERKELEY'S 2018 CLEAN STORMWATER FEE (CALIFORNIA CONSTITUTION, ARTICLE XIII D, § 6)

WHEREAS, the City Council ("Council") of the City of Berkeley ("City") has previously authorized the initiation of proceedings to conduct a ballot proceeding to obtain approval of a proposed property-related fee, called the "2018 Clean Stormwater Fee" consistent with the procedures established in Article XIII D of the California Constitution. If approved, the 2018 Clean Stormwater Fee would raise revenue to pay for services and improvements provided by the City that are necessary to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) stormwater permit issued to the City. NPDES stormwater permits require the public agency permittee to take certain prescribed measures to keep pollutants from entering storm drain systems and being discharged into other bodies of water, such as our local creeks and the San Francisco Bay; and

WHEREAS, the City is responsible for installing, operating, and maintaining its catch basins, pipes, and channels, including cleaning them of debris in order to prevent trash and pollutants from entering the creeks and Bay, as well as to prevent local flooding; and

WHEREAS, the City seeks to prevent the formation of sink holes caused, in part, by the failure of old pipes, and which are a hazard to drivers, bicycle riders and pedestrians; and

WHEREAS, on February 13, 2018, the Council adopted Resolution No. 68,334-N.S., to initiate the property related fee process and Resolution No. 68,335-N.S. on February 13, 2018, to establish the balloting procedures for the proposed 2018 Clean Stormwater Initiative consistent with California Constitution Article XIII-D; and

WHEREAS, on April 3, 2018, the Council conducted a public hearing at which a majority protest was not achieved, and subsequently adopted Resolution No. 68,381-N.S. directing the mailing of fee ballots to all property owners of properties within the City subject to the fee; and

WHEREAS, pursuant to the provisions of California Constitution Article XIII-D, the Council has provided a ballot to each record owner of parcels of real property located within the boundaries of the City subject to the fee, and the returned ballots have been received and tabulated.

NOW, THEREFORE BE IT RESOLVED, by the Council of the City of Berkeley, as follows:

SECTION 1. Tabulation of the Ballots. The canvass of the fee ballots submitted by property owners is complete and certified by the City Clerk, and the votes cast are as follows:

Total Number of Valid Ballots Processed:	9,378
Total Number of Votes of Valid Ballots Processed:	10,614
Total Number of "Yes" Ballots Processed:	5,933
Total Number of Votes of "Yes" Votes Processed:	6,448
Percentage of "Yes" Ballots:	63.27%
Total Percentage of "Yes" Votes:	60.75%
Total Number of "No" Votes Processed:	3,445
Total Number of Votes of "No" Votes Processed:	4,166
Percentage of "No" Votes, unweighted	36.73%
Total Percentage of "No" Votes:	39.25%
Total Number of "Invalid" Ballots Processed:	219
Total Number of Votes of "Invalid" Ballots Processed:	246

SECTION 2. Invalid Ballots. 9,597 fee ballots were returned and received prior to the close of the public input portion of the public hearing on May 29, 2018. This represents a 38.7% ballot return rate on the 24,800 ballots mailed. Of the fee ballots returned, 219 ballots were declared invalid, in that they were either not marked with a "Yes" or "No", were marked with both a "Yes" and a "No," were not signed, or the property ownership and barcode information was illegible.

SECTION 2. Ballots Results. As determined by ballots cast, 60.75% of the votes cast by property owners were in support of the measure. Since a majority protest, as defined by Article XIII D of the California Constitution, did not exist, this Council thereby acquired jurisdiction to order the levy of the 2018 Clean Stormwater Fee.

SECTION 3. Findings. The City Council finds that the 2018 Clean Stormwater Fee is being implemented in compliance with the requirements of Proposition 218, as codified in Article XIII D of the California Constitution. Based on the oral and documentary evidence, including the 2018 Storm Drainage Fee Report, received by the Council, the Council expressly finds and determines that it is in the best interest of the City and the public to order the fee to be levied.

SECTION 4. Ordering of the Levies. The Council hereby orders the fees for fiscal year 2018-19 shall be levied at the rates specified in the 2018 Storm Drainage Fee Report.

SECTION 5. CPI. The authorized maximum fee amount to be levied in future fiscal years shall be increased annually based on the San Francisco-Oakland-Hayward Consumer Price Index (CPI), not to exceed 3% per year. The maximum annual CPI adjustment for each property shall be calculated by adding the existing 1991 Clean Stormwater Fee amount to the new 2018 Clean Stormwater Fee amount, and multiplying the sum by the CPI or 3%, whichever is lower. The resulting maximum authorized adjustment will be applied only to the 2018 Clean Stormwater Fee. The fee amount charged in any year cannot exceed the cost to provide the stormwater services and improvements.

SECTION 6. Filing this Resolution. Shortly after the adoption of this Resolution, but in no event later than August 10 following such adoption, the City Clerk shall file a certified copy of this Resolution and a fee levy roll with the Auditor of Alameda County ("County Auditor"). Upon such filing, the County Auditor shall enter on the County assessment roll opposite each lot or parcel of land the amount of fee thereupon as shown in the levy roll. The fees shall be collected at the same time and in the same manner as County taxes are collected and all laws providing for the collection and enforcement of County taxes shall apply to the collection and enforcement of the fees. After collection by the County, the net amount of the fees, after deduction of any compensation due the County for collection, shall be paid to the City of Berkeley.

SECTION 7. Corrections. The 2018 Clean Stormwater Fee, as it applies to any parcel, may be corrected, cancelled or a refund granted as appropriate, by order of the City Council or its designee, by a determination from the City Council or its designee that the fee for that parcel should be revised to be consistent with the fee method established in the Fee Report. Any such corrections, cancellations or refunds shall be limited to the current fiscal year in which the correction, cancellation or refund was requested.

The foregoing Resolution was adopted by the Berkeley City Council on June 12, 2018 by the following vote:

Ayes: Davila, Droste, Hahn, Harrison, Maio and Arreguin.

Noes: None.

Absent: Bartlett, Wengraf and Worthington.

Jesse Arreguin

Jesse Arreguin, Mayor

Attest: Mark Numainville

Mark Numainville, City Clerk