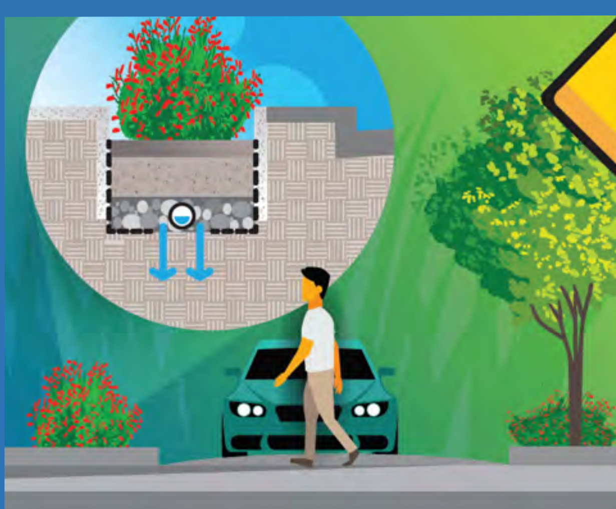
GREEN STREETS CLEAN WATER PLAN

COUNTY OF SAN DIEGO

MARCH 2022



PROGRAM HIGHLIGHTS

INTRODUCTION

The County of San Diego Department of Public Works developed this Green Streets Clean Water (GSCW) Plan to support green stormwater infrastructure and fulfill the direction given by the County Board of Supervisors. This plan builds upon the County's recently developed guidance on green infrastructure to identify and prioritize green streets project opportunities within unincorporated communities. These projects are intended to help reduce urban runoff, improve water quality, and provide a variety of related community benefits.

WATER QUALITY NEED

- Water quality at beaches and creeks throughout San Diego County is impacted by urban runoff pollution, including from County roads
- State regulations require the County to develop Water Quality Improvement Plans (WQIPs) to improve water quality throughout the region
- Each WQIP has specific targets and schedules for providing improvements
- Green streets are an important WQIP strategy to help address urban runoff pollution

ASPIRATIONAL PROGRAM OBJECTIVES

- Identify and prioritize locations for potential projects within County right-of-way that provide a high level of pollutant removal potential
- Optimize environmental, community, and economic benefits
- Leverage existing guidance to make projects simple and implementable
- Distribute green street benefits across watersheds and communities

The Green Streets Clean Water Plan was designed as an intentional benefit-driven effort to address multiple objectives through a narrowing of focus.

Step 1
Highest Need Locations

Step 2
Best-Suited Treatment Systems

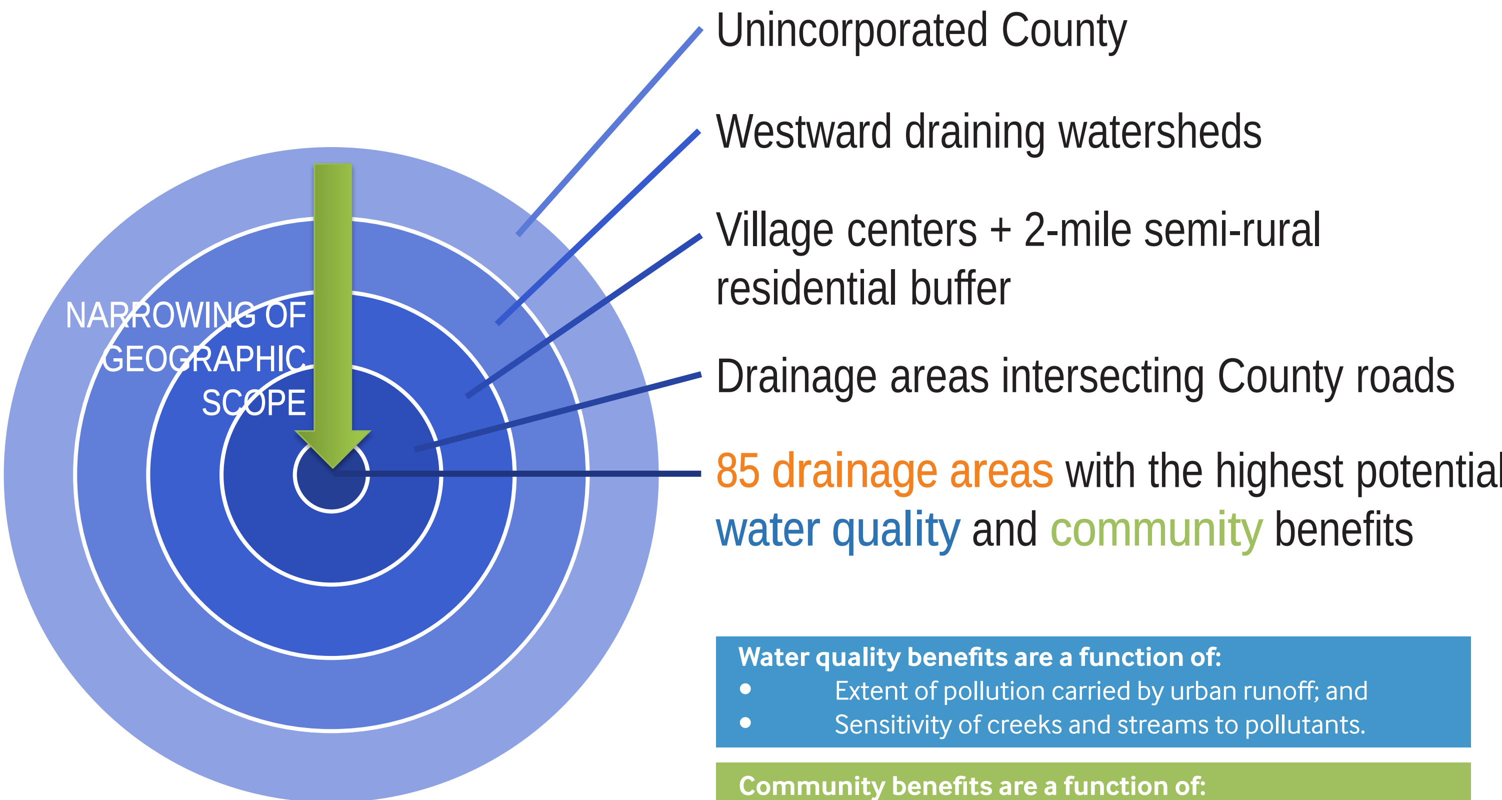
Step 3
Highest Benefit Projects

PROGRAM HIGHLIGHTS

STEP 1: HIGHEST NEED LOCATIONS

DRAINAGE AREA PRIORITIZATION

- The study area was determined by identifying increasingly specific geographic extents for green street implementation, allowing a focus on the highest pollutant-generating areas.
- Water quality and community benefits were quantified and scored within each of the 6,000 potentially applicable drainage areas, intersecting over 1,200 miles of County maintained roads.
- Ultimately, 85 drainage areas with the highest combined potential water quality and community benefits were identified for treatment



Water quality benefits are a function of:

- Extent of pollution carried by urban runoff; and
- Sensitivity of creeks and streams to pollutants.

Community benefits are a function of:

- Pollution burden carried by neighborhoods;
- Disproportionately impacted communities (underserved communities)
- Need for open space;
- Need for shade along pedestrian corridors;
- Potential integration with planned CIP projects; and
- Potential integration with Caltrans projects.

Potential water quality benefit score (WQ) + Potential community benefit score (CB) = Total drainage area prioritization score

STEP 2: BEST-SUITED TREATMENT SYSTEMS

POTENTIAL ELEMENTS OF A GREEN STREET

Green streets typically include natural treatment systems, also known as Best Management Practices (BMPs) or green infrastructure, to remove pollutants from urban runoff. They are located with the public right of way and often integrated with other street design features such as pedestrian and cyclist amenities and strategic landscaping.

STEP 2: BEST-SUITED TREATMENT SYSTEMS

GREEN STREET DESIGN APPROACH

In this Plan, the review of green streets opportunity sites focused on identifying unobstructed segments along the County's right-of-way (ROW) with sufficient space to support green streets treatment systems, as well as opportunities to incorporate other potential benefits to the community. These benefits include: improving pedestrian safety and walkability, adding traffic calming elements, improving existing bikeways, enhancing transit stations, or improving neighborhood aesthetics with additional green space.

To this end, the GSCW Plan process utilized an array of tools and methodologies to select the most effective green streets treatment systems for the prioritized drainage areas. This included visual inspections for opportunities and limitations with the ROW, and a geospatial (Geographic Information System [GIS]) characterization and screening. The visual screening helped identify opportunities and constraints not mapped in the GIS analysis, such as utility boxes, fire hydrants, trees, parking areas, and other obstructions. Each treatment system was further screened based on the particular set of constraints necessary to achieve optimal treatment performance and meet construction requirements.

CONVENTIONAL DESIGN APPROACH
- Impervious median and parking lane
- Stormwater vault in parkway

GREEN STREET DESIGN APPROACH
- Permeable median and parking lane
- Tree wells and biofiltration in parkway

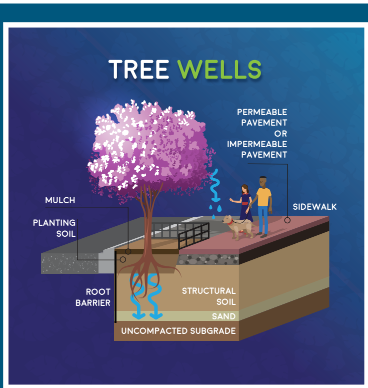
GREEN STREETS CLEAN WATER

PROGRAM HIGHLIGHTS

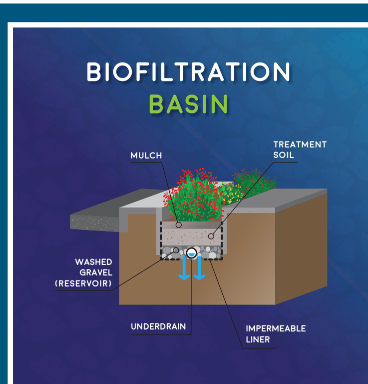
STEP 2: BEST-SUITED TREATMENT SYSTEMS

Treatment system options were selected to generally integrate with the County of San Diego Green Streets Standard Drawings. Hydrodynamic separators and drywells were also considered for areas without above-ground opportunities.

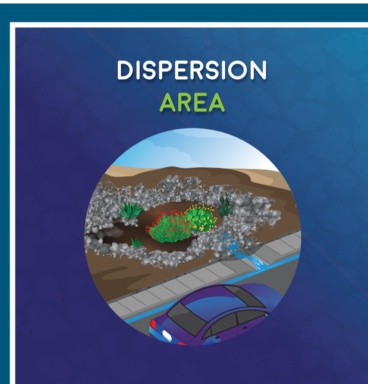
VISIBLE ABOVE GROUND



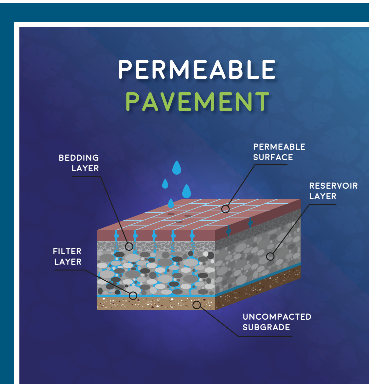
TREE WELLS: Trees that filter stormwater runoff through the root system.



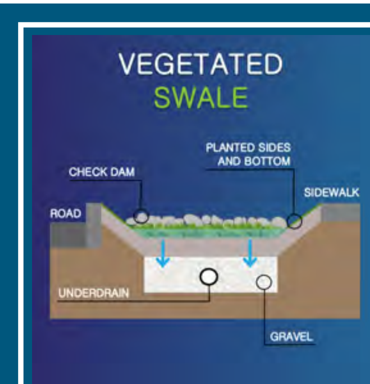
BIOFILTRATION BASIN: Landscaped ditches or basins that filter stormwater runoff through soil and plant root systems.



DISPERSION AREA: Open space ditches or basins, typically covered by rocks or mulch that slow and absorb stormwater runoff.

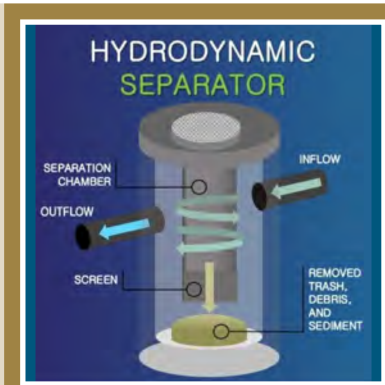


PERMEABLE PAVEMENT: Pavement with small gaps allowing the ground to absorb stormwater.

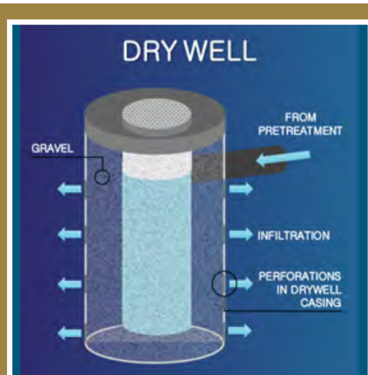


VEGETATED SWALE: Open, shallow channel with short vegetation that collects and conveys runoff to a downstream location.

BELOW GROUND



HYDRODYNAMIC SEPARATOR: Units that force collected runoff into a vortex that removes trash, debris, and sediment via screens,



DRY WELL: Vertically bored holes that allow runoff to enter and infiltrate below ground with minimal surface footprint.

PROGRAM HIGHLIGHTS

STEP 3: HIGHEST BENEFIT PROJECTS

Green Streets projects, or combinations of individual treatment systems, were ranked and prioritized to optimize the combined potential environmental benefits, community benefits, and cost-effectiveness. Each benefit category included multiple benefits.

ENVIRONMENTAL BENEFITS

- **Water Quality:** Pollutant load reduction, helps address Total Maximum Daily Load (TMDL) and/or Priority Water Quality Condition in WQIP, and/or captures trash from priority land use.
- **Natural Environment:** Landscape with native vegetation for drought and fire resistance, increase urban green space, create or enhance wetland and/or riparian habitat, improve water temperatures for the benefit of habitats, reduce greenhouse gases or increase carbon sinks, and reduce operational energy consumption.
- **Flood management:** Reduce peak flow and total runoff volume.
- **Water Supply:** Capture for potential direct uses (irrigation or treatment), capture for indirect uses, capture for direct uses if infiltrating to an aquifer, reduce water use for irrigation during operation, and qualifies as a Priority Project.

COMMUNITY BENEFITS

- Located in an underserved community
- Opportunity for community involvement
- Improves pedestrian safety
- Improves aesthetics
- Opportunity for public education
- Improves community mobility and access
- Adds green space
- Opportunity to integrate with traffic safety improvement

COST-EFFECTIVENESS/RETURN ON INVESTMENT

- Capital construction cost
- Maintenance cost
- Useful life
- End of life replacement cost

OTHER POTENTIAL BENEFITS NOT QUANTIFIED IN PLAN

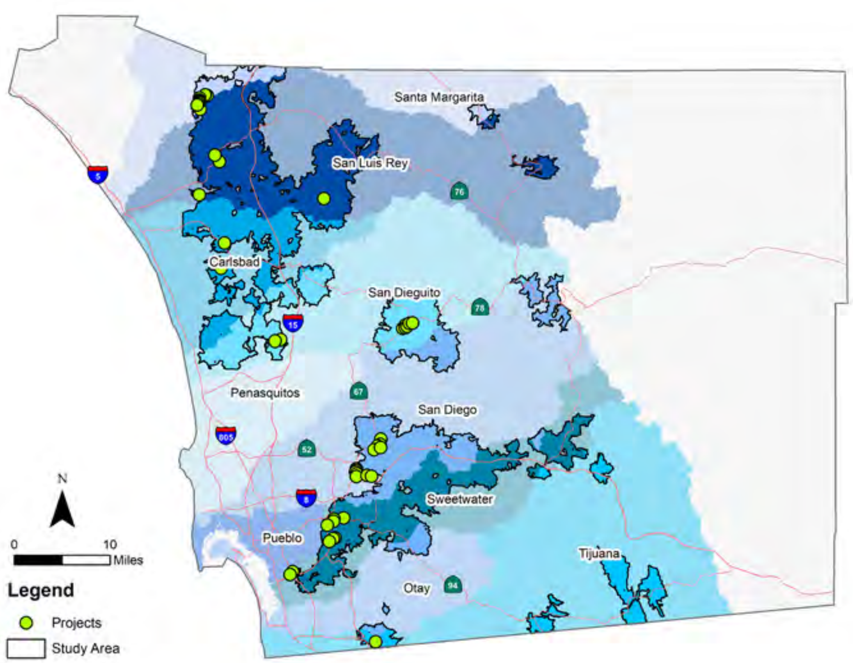
- Improves public health
- Adds/improves bike lanes
- New local jobs
- Increases property values
- Reduces energy costs
- Enhances local tourism

STEP 3: HIGHEST BENEFIT PROJECTS

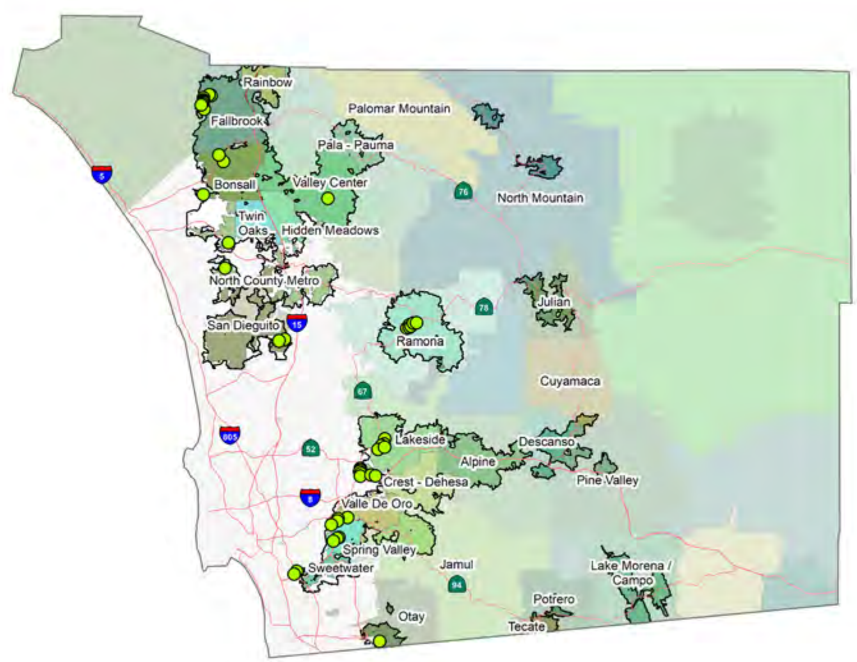
The Green Streets Clean Water prioritization process resulted in individually scored candidate projects based on the total combined environmental benefit, community benefit, and cost-effectiveness (see the primary Green Streets Clean Water Plan for individual project scores). It is important to note, however, that in some cases, specific project attributes (e.g., County and community planning area preferences, constraints, opportunities, available funds, etc.) may advance one project before another, despite a lower overall ranking. For this reason, the projects are considered a "menu of projects" rather than a sequential list, with an implied order of implementation.

Green streets projects can be implemented through several programs and processes, including as elements of larger Capital Improvement Program (CIP) projects. While some potential projects can be considered standalone, others can and should be considered starting points or supplemental aspects of larger projects. It is expected that through the next phases of the planning and design process, project aspects can and will change based on more detailed information that will be reviewed, collected, and evaluated as part of that process.

WATERSHEDS



COMMUNITY PLANNING AREAS



SOUTH MISSION ROAD

Green Streets Biofiltration Project

The South Mission Road Project will use green streets elements to capture and treat dry and wet weather runoff from 12 impervious acres of commercial, transportation, and other land uses along South Mission Road in Fallbrook. Green streets features are proposed to include vegetated tree well biofilters (above ground) and hydrodynamic separators (below ground). The project will support the County's progress toward meeting the Twenty Beaches and Creeks Bacteria Total Maximum Daily Load (TMDL) targets, while also treating runoff for sediment, nutrients, metals, and trash, thus protecting downstream waterbodies.

Other complete streets elements being considered include protected walkways, improved sidewalks, and at least one enhanced transit stop. Shaded pedestrian areas will support increased access to recreation and improved public health, enhancing the overall walkability of the corridor. The project will also provide local jobs, both directly via construction and maintenance of the green streets features, as well as indirectly at local businesses with increased foot traffic.

COMMUNITY	WATERSHED	PROJECT EXTENT	AREA TREATED	PRIORITY POLLUTANTS
Fallbrook	San Luis Rey	0.8 miles; 10,000 sq-ft	Total: 21.7 acres Impervious: 12 acres	Bacteria, nutrients, and sediment

PROJECT COMPONENTS
Tree wells biofilters with underdrains, hydrodynamic separators, and segments of protected walkways.

South Mission Road at Rocky Crest Rd.

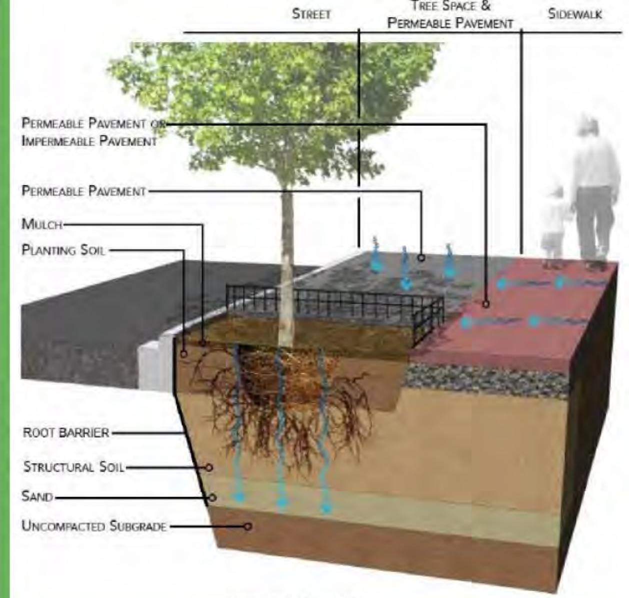
South Mission Road at Almond St.

ENVIRONMENTAL BENEFITS

- Estimated to remove 2,250 lbs. of sediment annually
- Estimated to remove 1.9 x 10^{12} MPN of Fecal Coliform annually, supporting progress toward the Bacteria TMDL target
- Provides peak flow reduction
- Addresses greenhouse gas emissions and vegetative cover in the community

COMMUNITY BENEFITS

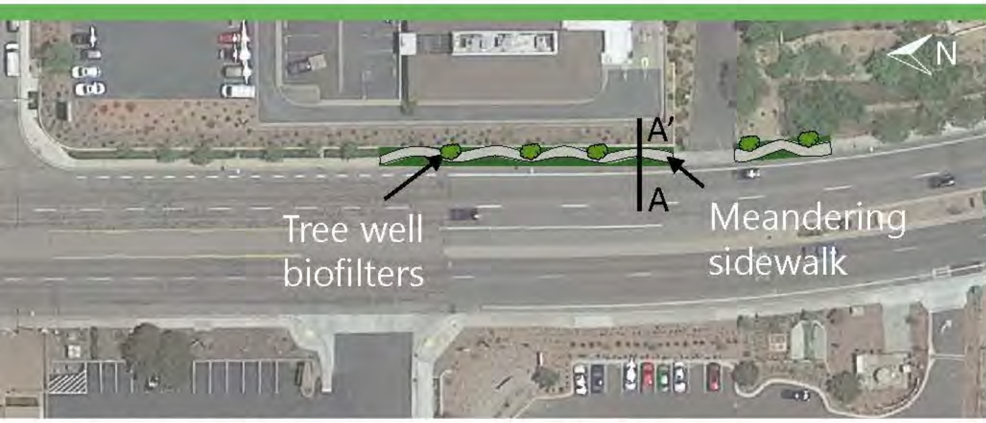
- Project benefits an Underserved Community
- Healthy Places Index = 37.7%
- CalEnviroscreen 4.0 = 48^{th} percentile
- AB1550 Community
- Supports high ranking pedestrian gap needs
- Potential to support pedestrian safety



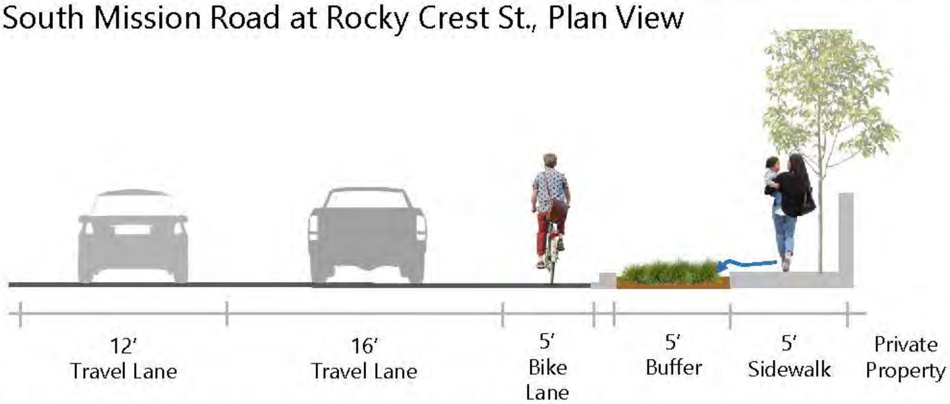
(Source: DDOT, 2014)

ECONOMIC BENEFITS

- Anticipated cost of water quality green streets elements:
  - Capital cost: $1.6M
  - Operations and maintenance cost:
    - Annual: $52,600; Total 30-year (Net Present Value): $864,000
  - 30-year lifecycle cost: $2.4M
- Provides local jobs during construction and maintenance
- Enhances aesthetics, encouraging increased local foot traffic and economic activity



South Mission Road at Rocky Crest St., Plan View



South Mission Road at Rocky Crest St., Profile View (A-A')

South Mission Road Project Extent

PROGRAM HIGHLIGHTS

SUMMARY OF BENEFITS ACROSS TOP 30 PROJECTS

The potential aggregated environmental and community benefits attributable to the full menu of projects are summarized below. Actual benefits will vary based on individual project designs. It can be expected that benefits would decrease as project footprints are reduced due to presently unidentified conflicts (e.g., due to underground utilities) and increase as project footprints are enlarged due to additional site-specific opportunities (e.g., expansion of treatment system footprints into available parking, changes to roadway width, etc.). In fact, it is expected that significant additional benefits can be provided by incorporating these elements into larger transportation network retrofits focused on traffic safety improvements and increased mobility.

ENVIRONMENTAL BENEFITS

TREATED AREA
193 IMPERVIOUS ACRES
283 TOTAL ACRES

TOTAL POLLUTANT LOAD REDUCTION
20.7×10^{12} MPN FECAL COLIFORM
42,700 LBS. SEDIMENT
796 GALLONS TRASH

TOTAL ANNUAL RUNOFF REDUCTION
101,700 CUBIC FEET
OR
760,700 GALLONS

AVERAGE PEAK FLOW REDUCTION
0.8%

GREEN STREETS TREATMENT SYSTEMS
80 BIOFILTRATION TREE WELLS
26 HYDRODYNAMIC SEPARATORS

COMMUNITY BENEFITS

GREEN SPACE
82,300 SQUARE FEET

TREES
1,000+

PROJECTS IN UNDERSERVED COMMUNITIES
30

SIDEWALK IMPROVEMENTS
3 MILES

OPPORTUNITIES FOR LOCAL ROAD SAFETY IMPROVEMENTS
15

COMMUNITY ENGAGEMENT

INFORMATIONAL OUTREACH:

An informational website (www.greenstreetscleanwater.org) was developed and served as a resource for interested stakeholders regarding background information on the program vision, project identification process, and opportunities for public participation. An informational video was also developed to explain the need to treat urban runoff, how green streets treatment systems work, what they look like, and what could be expected in the GSCW Plan.

COMMUNITY INPUT AND SURVEY:

As the Plan was developed, comments received from stakeholders were posted to the project website as part of the public record. Where stakeholders recommended specific project locations, the project team investigated such opportunities as part of the planning process and incorporated them into the Plan where warranted.

An introductory community survey was developed in six languages with the intent of gathering community-specific input on preferences of green street project designs and integration with existing facilities, preferred environmental, community, and economic co-benefits, and potential concerns. The survey also included a request for contact information for interested/relevant local community groups and organizations.

STAKEHOLDER WORKSHOPS:

The GSCW planning process, drivers, and objectives were introduced to interested stakeholders via two public workshops held on July 7 and November 18, 2021. Both workshops were hosted remotely via Zoom, scheduled in the evening hours to increase access and participation, and recorded and posted on the project website for those unable to attend in real-time. Updates on later progress toward the GSCW Plan were also provided upon request at several other community group meetings.

COMMUNITY PLANS

Where projects identified under the GCSW Plan fell within the geographic scope of local community plans, the design components were selected to integrate with objectives and elements of those established plans.

COMMUNITY ENGAGEMENT DOES NOT END AT PLAN DEVELOPMENT – EARLY AND THOROUGH COMMUNITY ENGAGEMENT WILL CONTINUE TO BE AN IMPORTANT PART OF ALL PROJECT IMPLEMENTATION AND AS PART OF ANY EFFORTS TO MODIFY OR ENHANCE THIS PLAN IN THE FUTURE.

GREEN STREETS CLEAN WATER

GREEN STREETS CLEAN WATER PLAN

COUNTY OF SAN DIEGO

MARCH 2022

GREEN STREETS CLEAN WATER

PLAN

TABLE OF CONTENTS

ACKNOWLEDGMENTS

PROJECT TEAM

Project Manager Sheri McPherson
Project Manager Stephanie Gaines
Program Coordinator René Vidales
Civil Engineer Charles Mohrlock

Prepared with assistance from:
Geosyntec Consultants
IVC Media

INTERNAL ADVISORY COMMITTEE MEMBERS

Department of Public Works
Watershed Protection Program
Capital Improvement Program
Environmental Services
Flood Control
Transportation
Private Roads and Landscape Maintenance
Planning and Development Services
Advance Planning
Land Development
Health and Human Services
Live Well

COUNTY BOARD OF SUPERVISORS

COMMUNITY PLANNING GROUPS

PUBLIC MEETING ATTENDEES

SURVEY RESPONDENTS

GREEN STREETS CLEAN WATER PLAN

ACRONYMS

%	Percent
AB	Assembly Bill
ac	acres
BMP	Best Management Practice
bgs	Below ground surface
CASQA	California Stormwater Quality Association
CES	CalEnviroScreen
CIA	Cooperative Implementation Agreement
CIP	Capital Improvement Program
cu-ft	cubic feet
DAC	Disadvantaged Community
DPW	Department of Public Works
EJC	Environmental Justice Community
EMC	Event Mean Concentration
FC	Fecal coliform
FCO	Financial Contribution Only
ft	feet
GAMA	Groundwater Ambient Monitoring and Assessment
GI	Green Infrastructure
GIS	Geographical Information System
GS	Green Street
GSCW	Green Streets Clean Water
HPI	Healthy Places Index
HSG	Hydrologic Soil Group
HSA	Hydrologic Subarea
IRWM	Integrated Regional Water Management
LUEG	Land Use and Environmental Group
MS4	Municipal Separate Storm Sewer System
MPN	Most Probable Number
NGO	Non-Governmental Organization
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
OEHHA	Office of Environmental Health Hazard Assessment
O&M	Operations and Maintenance
PGA	Pedestrian Gap Analysis
ROW	Right-of-Way
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SanGIS	San Diego Geographic Information Source
TBL	Triple Bottom Line
TCu	Total Copper
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorous
TPb	Total Lead
TSS	Total Suspended Solids
TZn	Total Zinc
US EPA	United States Environmental Protection Agency
WPP	Watershed Protection Program
WQE	Water Quality Equivalency

GREEN STREETS CLEAN WATER

PLAN

DEFINITIONS

Best Management Practice (BMP)	A procedure or device designed to minimize the quantity of runoff pollutants and/or volumes that flow to downstream receiving water bodies.
Biofiltration BMPs	Practices that use vegetation and Biofiltration Soil Media to detain and treat runoff from impervious areas. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes, and/or vegetative uptake.
Dispersion Area	The practice of effectively disconnecting impervious areas from directly draining to the storm drain system by routing runoff from impervious areas such as rooftops (through downspout disconnection), walkways, and driveways onto the surface of adjacent pervious areas. The intent is to slow runoff discharges and reduce volumes.
Centrifugal Force	An apparent force that acts outwardly on a body moving around a center, arising from the body's inertia.
Environmental Justice Community	Communities are defined based on data indicators from both CalEnviroScreen 3.0 and Live Well San Diego HC3 communities. Seventeen qualifying census tracts are grouped into four distinct EJ Communities: North El Cajon, North Lemon Grove, Spring Valley, and Sweetwater.
Event Mean Concentration	A flow-weighted average pollutant concentration for a given land-use type.
Green Infrastructure	An approach to stormwater and flood management that protects, restores, and mimics the natural water cycle using vegetation, mulch, soils, and natural processes while creating healthier environments.
Geographical Information System	A system that integrates data creation, management, and analysis with the location of that data on maps.
Green Street	A natural system approach to reduce stormwater flow, improve water quality, reduce urban heating, enhance pedestrian safety, reduce carbon footprints, and beautify neighborhoods. Green Streets integrate Green Infrastructure strategies into roads and right-of-ways.
Gross Pollutants	In stormwater, generally litter (trash), organic debris (leaves, branches, seeds, twigs, grass clippings), and coarse sediments (inorganic breakdown products from soils, pavement, or building materials).
Hydrologic Subarea	Subdivisions of regional watersheds.
Infiltration	The percolation of water into the ground.
Municipal Separate Storm Sewer System (MS4) Permit	A regulatory tool used by the Regional Water Quality Control Board (RWQCB) to regulate stormwater and non-stormwater discharges into MS4s and from MS4s into local water bodies. The MS4 Permit defines the regulatory obligations that agencies must meet to remain in compliance with the Permit and avoid enforcement actions. MS4 Permits are issued to municipalities as owners of the MS4 and are renewed approximately every five years.

DEFINITIONS

National Pollutant Discharge Elimination System (NPDES)	The national program for issuing, modifying, revoking, and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the Clean Water Act.
Right-of-Way	Portions of privately owned land dedicated to the San Diego County for public use (easement). The boundary lines of the County right-of-way are marked out in official survey maps that use survey pins and monuments as reference points. Generally, the County right-of-way extends beyond the actual traffic lanes including 10-feet past the face of curb or edge of the paved road.
Trash Amendments	California State Water Resources Control Board Amendments to the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California and the Water Quality Control Plan for Ocean Waters.
Treatment System	An ecosystem-based network of constructed water quality treatment facilities. Also known as Best Management Practices (BMPs) or green infrastructure.
Tree Well	A stormwater management feature that consists of a tree with a minimum amount of soil media to allow for storage, infiltration, and evapotranspiration of runoff.
Triple Bottom Line	An accounting framework that typically measures success in three areas: community, environmental, and economic.
Total Maximum Daily Load	The maximum amount of a pollutant allowed to enter a water body so that the waterbody will meet and continue to meet water quality standards for that particular pollutant.
Underserved Community	Underserved communities were identified using data from CalEnviroScreen, the California Healthy Places Index, San Diego LiveWell, and the Environmental Justice Element of the County's General Plan.
Vegetated Swale	Shallow, open channels that are designed to remove stormwater pollutants by physically straining/filtering runoff through vegetation in the channel. Swales can be used in place of traditional curbs and gutters and are well-suited for use in linear transportation corridors to provide both conveyance and treatment via filtration.
Water Quality Improvement Plan (WQIP)	Copermittees are required to develop a WQIP for each Watershed Management Area in the San Diego Region. The purpose of the Water Quality Improvement Plans is to guide the Copermittees' jurisdictional runoff management programs towards achieving the outcome of improved water quality in MS4 discharges and receiving waters. WQIPs requirements are defined mainly in the MS4 Permit provision B.

GREEN STREETS CLEAN WATER

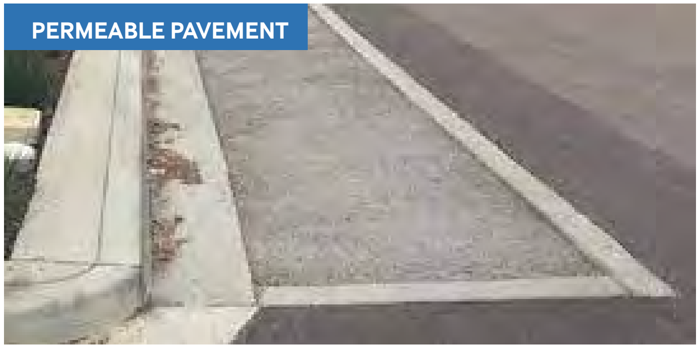
1 INTRODUCTION

1 INTRODUCTION

1.1 WATER QUALITY NEED AND OBJECTIVES

Water quality at beaches and creeks throughout San Diego County is impacted by pollution carried in stormwater runoff from developed areas, including roadways. The Municipal Separate Storm Sewer System (MS4) Permit, issued by the San Diego Regional Water Quality Control Board in 2013 and amended in 2015, requires the County of San Diego and other Copermittees to address this pollution by developing and implementing plans that identify strategies for improving water quality through the management of stormwater runoff. Water Quality Improvement Plans (WQIPs) have been developed for each westward-draining watershed within the county. Progress towards the water quality goals and schedules described in the WQIPs is achieved by implementing actions to limit pollution in urban runoff, including through the use of green stormwater infrastructure.

On August 25, 2020, the County Board of Supervisors unanimously voted to appropriate funds to the Department of Public Works for the development of a plan to support green stormwater infrastructure (Minute Order No. 2, Action 2.8). This Green Streets Clean Water (GSCW) Plan ("Plan") is the fulfillment of the Board's direction. It builds upon the County's recently developed green infrastructure guidelines to identify and prioritize green streets project opportunities within unincorporated communities. These projects are intended to help reduce stormwater runoff, improve water quality, and provide a variety of related community benefits.
This Plan is designed as an intentional benefit-driven effort to address multiple objectives and identify potential projects that provide environmental, community, and economic benefits distributed across multiple watersheds and unincorporated communities. The Plan supports two key outcomes: 1) development of a menu of initial Green Streets projects to facilitate efficient implementation, and 2) documentation of a reproduceable project identification, benefit quantification, and prioritization process that can be extended to additional planning or project-specific efforts. Additional information regarding this Plan and the County's efforts to improve water quality can be found on the Watershed Protection Program's Green Infrastructure website at: https://www.sandiegocounty.gov/content/sdc/dpw/watersheds.html



1.2 GREEN STREETS BASICS

What are green streets?

The use of green infrastructure is a planning and design approach to managing stormwater and urban runoff that helps mimic and restore natural processes to create healthier environments. Green infrastructure refers to a network of natural features integrated into traditional "grey" infrastructure that can provide cleaner water, cleaner air, improved habitats and ecosystems, and flood protection. When these approaches are applied to infrastructure within streets or roads, they are called green streets. More information on common water quality-focused green streets elements can be found in Section 4 of this Plan. Green streets include elements such as specially designed landscaped areas that filter and soak runoff into the ground. General green streets information is available from numerous sources including the U.S. EPA. The County of San Diego provides guidance on the implementation of Green Streets in its Best Management Practices (BMP) Design Manual, Green Streets Guidelines, and Green Streets Standard Drawings (County of San Diego, 2020b, 2019a, 2019b). Green streets elements can also be integrated into comprehensive transportation network planning, design, and implementation as presented in the Federal Highway Administration's Small Towns and Rural Multimodal Networks report (FHWA, 2016).

Why green streets?

Green streets are just one of many tools the County uses to improve water quality and to meet the requirements of various stormwater permits and regulations. Since roadways and adjacent areas collect much of the runoff generated by commercial and residential land uses within developed areas, there are opportunities to remove pollution from runoff within the County right-of-way (ROW) before the runoff can impact downstream receiving waters (beaches, rivers, lakes). Green streets can also be combined with other project elements within the ROW to provide valuable community benefits such as enhanced pedestrian safety, improved mobility and access to schools and parks, reduced urban heating, and neighborhood beautification through greening. The use of green streets is one of the strategies that help the County meet requirements outlined in the MS4 Permit issued by the San Diego Regional Water Quality Control Board as part of the federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES) program (California Regional Water Quality Control Board San Diego Region, 2015). The MS4 Permit requires the County and other public agencies (Copermittees) to assess pollutant loading to the area's receiving waters. It establishes Total Maximum Daily Loads (TMDLs), Receiving Water Limitations, and several other requirements mandating the achievement of water quality standards on defined timelines. These requirements and the County's strategies to address them are documented in WQIPs that have been developed collaboratively with the Copermittees sharing responsibility within each of the eight major watersheds that include unincorporated land. The WQIPs can be accessed on the Project Clean Water website (www.projectcleanwater.org/watersheds), additional information is provided in Section 1.3.

1

What is the Green Streets Clean Water Plan?

This GSCW Plan documents the County of San Diego's strategic approach to identifying and evaluating the potential benefits of green streets projects within the unincorporated County. This approach was designed to help achieve the following outcomes:

1. To the extent practicable, utilize green streets projects to achieve water quality benefits;
2. To the extent practicable, utilize green streets projects to achieve additional community benefits;
3. Engage communities in green infrastructure planning within the road ROW;
4. Identify and prioritize top candidate project opportunities to maximize the County's return on investment in green infrastructure;
5. Summarize the green streets planning process for both public and private projects; and
6. Develop a vision and path forward for the future implementation of green streets.

How are green streets projects initiated and implemented?

Green streets projects can be initiated and implemented in a variety of ways. Sometimes green streets may be initiated as part of private development projects. Green streets may also be initiated by the County to support MS4 Permit compliance associated with roadway-related development or redevelopment. This is typically the case for capital improvement projects initiated for purposes other than water quality improvement such as road widening or realignments and bridge reconstruction, but which still require treatment of stormwater runoff to attain compliance with the MS4 Permit. In other cases, the County has initiated retrofits of its existing roadways to incorporate green street features with the specific goal of water quality improvement in mind. While this Plan focuses largely on the last category, it can also be used as a resource to help guide other types of green streets projects.

1.3 GEOGRAPHIC SCOPE

Green streets projects can be implemented within the unincorporated County, on public roads within the right-of-way (ROW), and on private roads within a private road easement. Within the unincorporated County there are nearly 2,000 miles of County-maintained roads. To focus this planning effort on locations with the optimal potential to combine water quality and community benefits, the study area for this plan was established as the County designated "village areas" with a surrounding two-mile buffer of adjacent rural-residential areas. These areas are more densely developed than outlying areas, can generate higher levels of pollution in runoff, and would most benefit from retrofits using green street elements. The study area was further narrowed to only include areas within the westward-draining watersheds. These watersheds are more densely developed and are highly regulated for stormwater quality under the jurisdiction of the San Diego Regional Water Quality Control Board (Region 9). The resulting study area covers approximately 580 square miles, more than 20 community planning areas, and over 1,200 miles of County-maintained roadway.

1.4 COMPATIBILITY WITH OTHER COUNTY/REGIONAL PLANS

This Plan is one part of a suite of solutions to improve water quality and the County's transportation infrastructure. Where possible, this Plan builds upon or works in coordination with other water quality, environmental, and transportation projects and plans at the unincorporated County and regional levels. Some of the County plans most directly relevant to the GSCW Plan include the County's Green Streets Guidelines, Green Street Standard Drawings, Pedestrian Gap Analysis, Local Traffic Safety Plan, Public Works 5-Year Capital Improvement Program Plan, Best Management Practices (BMP) Design Manual, and the San Diego County Regional Storm Water Resource Plan (SWRP) among others (County of San Diego, 2019a, 2019b, 2016a, 2021b, 2020a, 2020b, ESA, 2017).

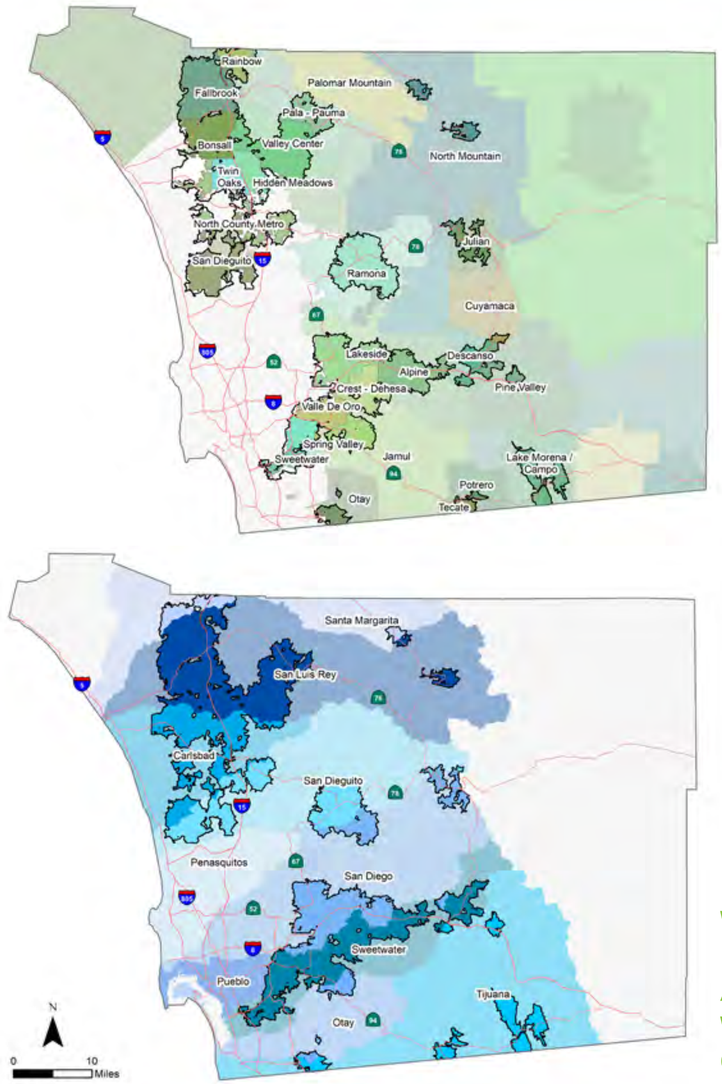
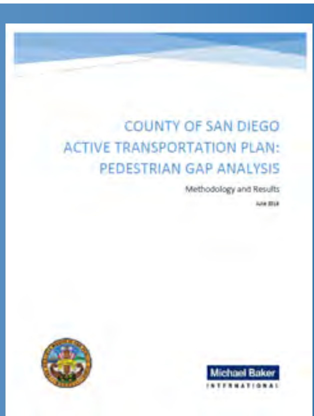
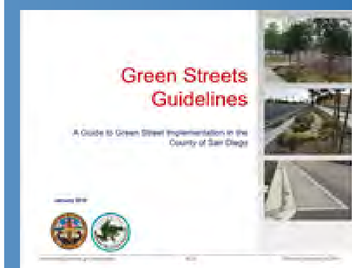
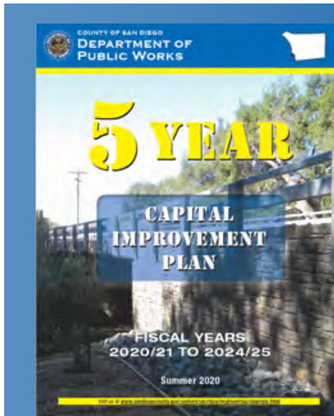
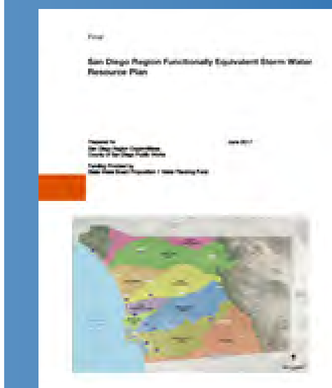


FIGURE 1: GSCW PLAN STUDY AREA WITH COMMUNITY PLANNING AREAS (TOP) AND WATERSHEDS (BOTTOM)

1

TABLE 1: GSCW PLAN COMPATIBILITY WITH OTHER REGIONAL DOCUMENTS

				
Active Transportation Plan: Pedestrian Gap Analysis (PGA)	**Draft Local Road Safety Plan**	**Green Streets Guidelines, Green Streets Standard Drawings & BMP Design Manual**	**5-Year Capital Improvement Program Plan**	**San Diego County Regional Storm Water Resource Plan (SWRP)**
The Pedestrian Gap Analysis (County of San Diego, 2016a) reviewed sidewalk conditions throughout the unincorporated County and developed a scoring system to identify and prioritize areas where new sidewalks or improvements and maintenance to existing sidewalks are needed. The results of this scoring analysis were used in the GSCW Plan to quantify the benefit of coupling green streets and sidewalk improvement projects.	The Local Road Safety Plan (County of San Diego, 2021b) summarizes where collisions are occurring most frequently, what safety improvements could be made, and prioritizes a list of potential improvements. These results (locations of 60 priority intersections and 60 priority roadway segments) were used to identify where green streets projects could potentially be coupled with road safety improvements.	The Green Streets Guidelines, Green Streets Standard Drawings and BMP Design Manual (County of San Diego, 2019a, 2019b, and 2020b) include required and minimum feasibility and design standards for green streets treatment systems. This information was used to inform feasibility screening and potential project site evaluation during the development of project concepts and potential projects included in this plan.	The locations of recently completed CIPs, as well as planned CIPs, (County of San Diego, 2020a) were evaluated and considered in project ranking and prioritization to combine projects where possible and to avoid areas with recently completed projects.	The purpose of the San Diego County Regional SWRP (ESA, 2017) is to identify and prioritize stormwater-related projects which most effectively address watershed-based stormwater quality and beneficial use goals and to qualify these projects for State grant funding. The prioritization and ranking framework developed for this plan incorporated the SWRP framework so that projects would remain eligible for grant funding.

1.5 COMMUNITY ENGAGEMENT

Input from community members has been integrated into the GSCW Plan by tailoring the project locations and types of green infrastructure considered based on preferences for local benefits. Outreach mechanisms used to engage the communities included the development of a website and informational video, two advertised and recorded online stakeholder workshops, integration of specific projects with local community plan objectives, coordination with community planning groups, and a community survey regarding green streets.

Additional input on the GSCW Plan, including specific projects, can be provided to the County directly by visiting the Green Infrastructure page on the Watershed Protection Program's website at: https://www.sandiegocounty.gov/content/sdc/dpw/watersheds.html. Additionally, as projects are advanced to the design stage, local community stakeholders and applicable Community Planning Groups will be engaged in the project concepts, where project-specific input will be welcomed.

> "THIS IS SUCH AN EXCITING AND NECESSARY PLAN. I HOPE IT GETS ALL THE SUPPORT IT DESERVES."
>
> **– SURVEY RESPONDENT**

2 COUNTY-HOSTED ONLINE WEBINARS
JULY 7TH AND NOVEMBER 18TH (RECORDINGS AVAILABLE)

- 100+ views of recorded webinars
- 3 invited community presentations

2-MINUTE INFORMATIONAL VIDEO

- 160+ views in English
- 40+ views in Spanish

7 MONTHS OF PUBLIC SURVEY

- 6 survey languages
- 40+ survey respondents

500 INDIVIDUAL STAKEHOLDER EMAILS

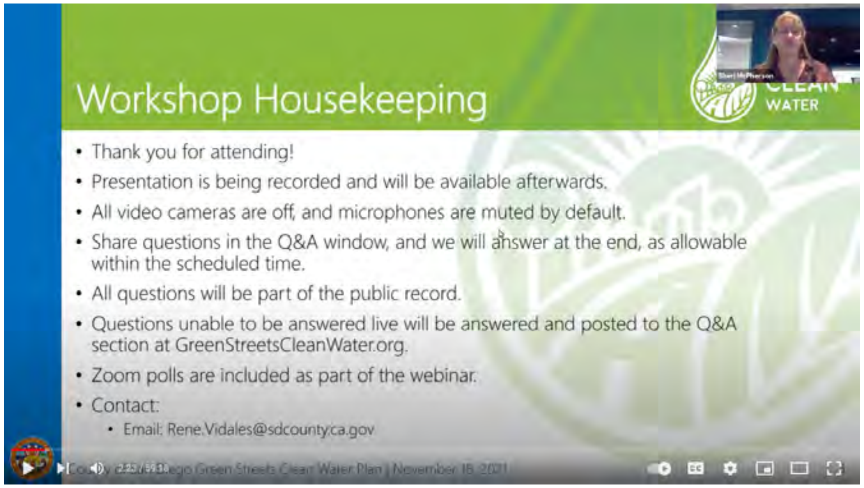
- 40+ community planning sub-groups
- 20+ libraries, community centers, and school districts
- 16+ local environmental groups and non-governmental organizations (NGOs)
- 11+ local chambers of commerce

4 WEEKS OF SOCIAL MEDIA AND PROGRAMMATIC ADVERTISING

- 3 social media platforms (Nextdoor, Twitter, and Facebook)
- 270,000+ programmatic advertising reach
- 870,000+ programmatic advertising impressions

1.5.1 STAKEHOLDER WORKSHOPS AND COMMUNITY MEETINGS

The GSCW planning process, drivers, and objectives were introduced to interested stakeholders via two public workshops held on July 7th and November 18th, 2021. Both workshops were hosted remotely using the Zoom platform, scheduled in the evening to increase access and participation, and recorded and posted on the project website for those unable to attend in real-time. Comments provided during the meetings were posted to the website as part of the public record. Opinion polls were also hosted during the meeting to gather real-time input on the preferences of those in attendance. Where specific project locations were recommended, the project team investigated such opportunities as part of the planning process and incorporated them into the Plan where warranted. Updates on later progress toward the GSCW Plan were also provided upon request at several other community group meetings.



1.5.2 COMMUNITY SURVEY

An introductory community survey was published in six languages (English, Spanish, Arabic, Chinese, Tagalog, and Vietnamese) with the intent of gathering community-specific input. The survey gathered information on:

- The participants' community and familiarity with green streets,
- The preferred or desired environmental, community, and economic benefits that can result from green streets,
- Preferred green streets treatment systems, and integration with existing facilities,
- Any potential concerns with adding green streets, and
- A request for contact information on any local community groups and organizations that would be interested in hearing more about the GSCW Plan.

The information gathered from this survey was used to inform the type and placement of green streets treatment systems. For example, survey respondents noted a strong preference for landscaped systems that would improve the aesthetic appearance of the roadside while also improving walkability through increased shade from trees. Respondents also valued water quality improvements and enhancements that would provide habitat for local wildlife and pollinators. There was a strong preference for tree well and biofiltration systems compared to permeable parking and dispersion areas. Respondent's concerns were primarily focused on the type of vegetation that would be planted as well as the resulting water demand and sustainability of vegetated systems.

The survey responses were used to inform the initial planning stages on a broad geographical scale. The small sample size may not reflect the localized, site-specific preferences expected at the project scale. Importantly, community engagement does not stop with the development of this Plan – early and thorough community engagement will continue to be an important part of all project-specific implementation and as part of any efforts to modify or enhance this Plan in the future.

The survey also gathered open-ended questions and comments. These have been combined with questions submitted during both the public workshops and the community group meetings and are responded to in Attachment A.

1.5.3 INTEGRATION WITH COMMUNITY PLANS

Multiple communities within the study area have developed community revitalization plans (e.g., Campo Road Revitalization Plan [MBI]) or similar long-term planning documents. Where project opportunities identified under the GSCW Plan fall within the geographic scope of these plans, the design components were selected to integrate with the objectives and other planned roadway elements of the established community plans, where feasible.

GREEN STREETS CLEAN WATER

2

GREEN STREETS PLANNING PROCESS

2 GREEN STREETS PLANNING PROCESS

The GSCW Plan is just one step in a larger planning process; it identifies potential project opportunities for further evaluation, preliminary engineering, and design. The Plan is not intended to produce a scheduled list of specific projects; rather, it provides a menu of options with assessed benefits for further development and implementation depending on needs and priorities. To understand the scope and limitations of this Plan it is helpful to understand the overall project planning process.

As described in Section 1, there are several scenarios under which green streets projects may be initiated and implemented (as part of a private development/redevelopment project, as part of a capital improvement project initiated for purposes other than water quality, or as a standalone water quality improvement project). The project planning process is unique under each of these scenarios and depends on the specific permitting and approval process for each project.

This Plan focuses on the requirements for capital improvement and water quality improvement projects as they are similar and most applicable to the project types identified in this plan (for planning requirements for private projects, refer to the BMP Design Manual [County of San Diego, 2020b]).

In general, the project planning process includes the key steps described below:

- **Green Streets Opportunity Identification and Initial Screening** – Identify potential project sites based on factors including water quality need, available space, obvious site constraints, and associated project opportunities; Select locations with the optimal combination of benefits and the greatest potential for further detailed evaluation.
- **Preliminary Engineering and Alternatives Evaluation** – Evaluate potential projects for technical feasibility, refine estimates of benefits and costs, and evaluate project alternatives or scenarios (i.e., minimize impacts to existing infrastructure or maximize benefits by reconfiguring existing infrastructure and/or road geometry).
- **Project Design and Permitting** – Develop project design plans, estimate construction costs, perform community outreach and engagement, and prepare permits for the preferred alternative.

GREEN STREETS CLEAN WATER

PLAN

2

This plan documents a multi-part project identification and quantification approach to optimize the potential benefit of project opportunities, evaluate opportunities across a large study area, and objectively rank and prioritize them. This approach complements the objectives in multiple Water Quality Improvement Plans (WQIPs), which identify distributed green infrastructure (such as green streets) as a critical strategy in achieving numeric water quality goals through pollutant load reduction while also providing multiple community benefits. The approach can be implemented using common geospatial analysis tools, a newly developed water quality quantification tool built as part of this plan, and benefit quantification methods that build upon previous County efforts, the 2017 Stormwater Resource Plan (SWRP) (ESA, 2017), and similar efforts throughout Southern California. This approach can be replicated and extended to additional planning efforts or project-specific analysis using the three-step approach summarized below; additional detail is provided in Sections 3, 4, and 5. For the projects evaluated in this plan, previously developed drainage areas were used as the geographic unit of analysis.

Step 1
Highest Need Locations

Rank drainage areas based on combined pollutant loading and potential for community benefits, aiming to optimize both.

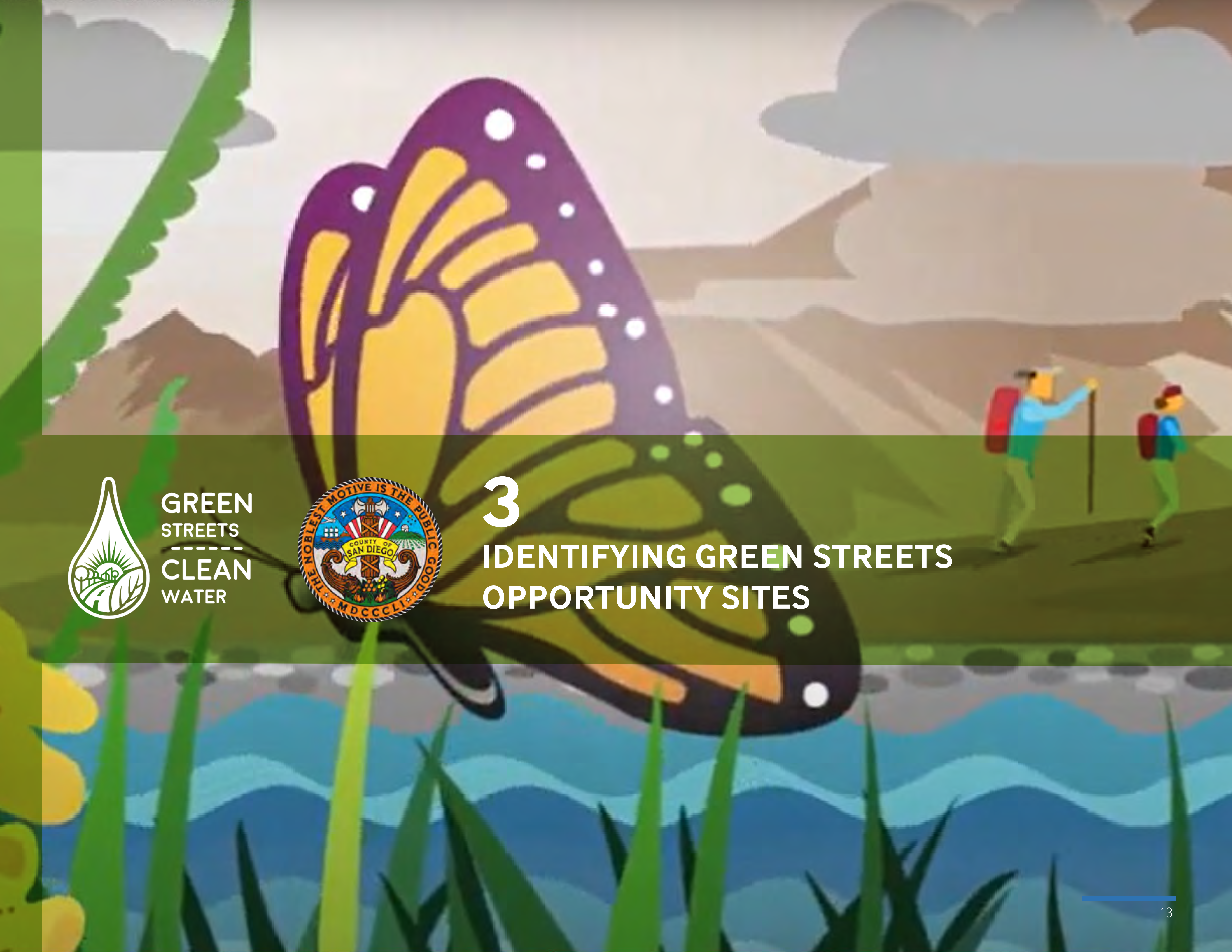
Step 2
Best-Suited Treatment Systems

Within the highest ranked drainage areas, further optimize benefits through the site-specific selection of tailored treatment systems.

Step 3
Highest Benefit Projects

Prioritize groups of treatment systems, or projects, using a detailed analysis of combined environmental, community, and cost-effectiveness.

GREEN STREETS CLEAN WATER



GREEN STREETS CLEAN WATER

3
IDENTIFYING GREEN STREETS OPPORTUNITY SITES

3 IDENTIFYING GREEN STREETS OPPORTUNITY SITES

Step 1
Highest Need Locations

The goal of the opportunity screening analysis is to identify priority drainage areas to allow for more focused project siting in areas with a high combined estimated pollutant loading and potential for community benefits. The opportunity screening is the first step in moving from a large study area to the project scale. Section 3.1 provides a high-level overview of the water quality analysis used to identify the potential water quality benefit of projects at the drainage area scale. Section 3.2 summarizes the community benefit quantification process at the drainage area scale. Together, these two scores are used to perform a relative comparison of drainage areas and identify areas for a more detailed project siting review.

Water quality benefits are a function of:

- Extent of pollution carried by urban runoff; and
- Sensitivity of creeks and streams to pollutants.

Community benefits are a function of:

- Pollution burden carried by neighborhoods;
- Disproportionately impacted communities (underserved communities);
- Need for recreational opportunities, including open space and parks;
- Need for shade along pedestrian corridors;
- Potential integration with Caltrans projects to leverage available funding; and
- Potential integration with planned CIP projects.

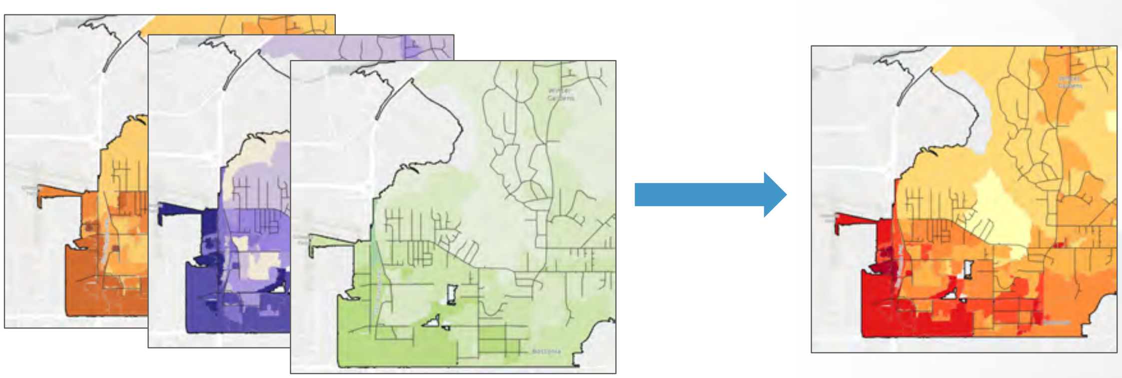
Potential water quality benefit score (WQ) + Potential community benefit score (CB) = Total drainage area prioritization score

3.1 WATER QUALITY IMPROVEMENT OPPORTUNITY

In this plan, the Potential Water Quality Benefit Score quantifies the potential pollutant load reduction for each of the eight priority pollutants. This was calculated using relative pollutant concentration estimates that are generated based on an area's land uses and potential to generate runoff. This relative comparison process was previously developed and documented in the San Diego Regional MS4 Copermittees' Water Quality Equivalency (WQE) Guidance Document that was approved by the San Diego Regional Water Quality Control Board (San Diego Region MS4 Copermittees, 2018).

To estimate annual pollutant loads and runoff volumes, local runoff hydrology was quantified using the commonly applied Hydrologic Response Unit (HRU) methodology. HRUs are geographic areas that represent unique combinations of land use (e.g., residential, commercial, industrial) and land cover (e.g., impervious or pervious). Hydrologic modeling was then used to simulate common rainfall-runoff processes within each HRU, which generates estimates of annual pollutant loads and volumes. Pollutant loads and volumes were then aggregated across all of the HRUs within a defined drainage area, resulting in the total annual pollutant load and volume for that area. This local runoff hydrology estimate is appropriate for making comparisons of annual pollutant loads and runoff volumes between potential treatment system locations.

FC score + TSS score + TN score + TP score + TCu score + TPb score + TZn score + Trash score = Potential water quality benefit score (WQ)



The eight pollutants considered in this analysis include bacteria (as fecal coliform), sediment (as total suspended solids), nutrients (total nitrogen and total phosphorous), metals (total copper, total lead, and total zinc), and trash generated from priority land uses as defined by the California State Water Resource Control Board Trash Implementation Program (Trash Amendments) (California State Water Resources Control Board, 2015). A score was developed for each pollutant; these scores were then combined, resulting in a single quantitative assessment of the potential for water quality benefits within each drainage area.

The subsequent sections provide additional information on some of the key inputs in this process. Attachment C includes detailed documentation of the quantification methodology.

3.1.1 RELATIVE POLLUTANT CONCENTRATIONS

Pollutant scores are dependent on both the hydrologic characteristics of the contributing watershed and the expected pollutant loading within that watershed. This plan used the relative pollutant concentrations developed in the WQE process to represent pollutant concentration in the drainage area screening process. These relative pollutant concentrations were developed as Event Mean Concentrations (EMCs) from data collected during wet weather monitoring and are commonly used for water quality modeling in the San Diego Region. Additional information is included in Attachment C.

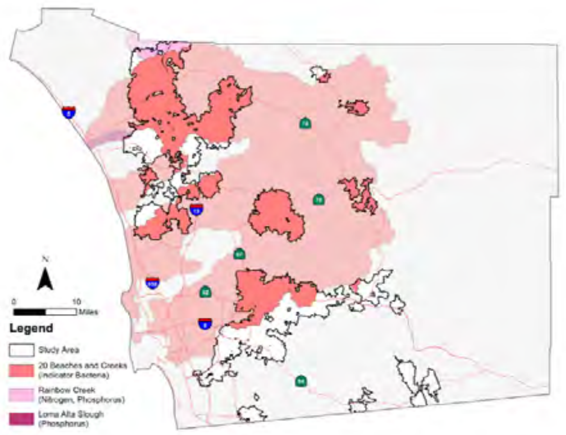
3.1.2 RECEIVING WATER BODY TMDL AND 303(D) LISTINGS

Individual pollutant scores were assigned additional weighting factors in the scoring process if the drainage areas contribute runoff to receiving waters identified by the State of California as impaired.

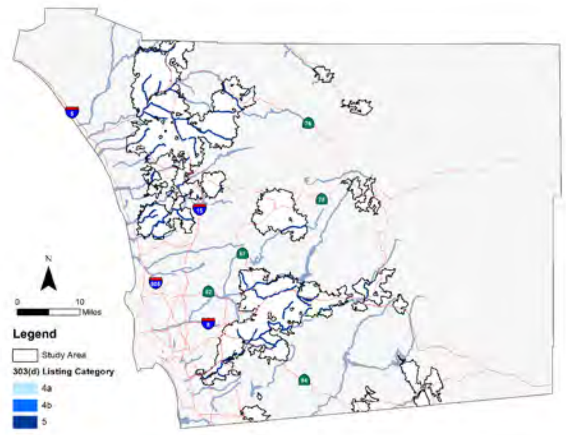
Receiving water TMDLs and impairments on the 2014/2016 303(d) List, as found in the 2014/2016 California Integrated Report (US EPA, 2018), were identified for the pollutants of concern and mapped to the corresponding drainage area based on Hydrologic Subarea (HSA) (see Figure 2). HSAs were used to trace TMDLs and impairments to upstream drainage areas so that all contributing drainage areas could be identified and included in the scoring. 303(d) listings for this analysis were filtered for Category 5 (listing requiring the development of a TMDL) and Category 4b (listing is being addressed by an action other than a TMDL). Category 4a 303(d) listings are addressed by US EPA-approved TMDLs and are included under the receiving water TMDLs. If the drainage area drains to a receiving water with an existing TMDL for the pollutant of concern, a weighting factor of 3 was applied. If the drainage area drains to a 303(d) listed receiving water for the pollutant of concern, a weighting factor of 2 was applied. Additional information is included in Attachment C.

Pollutant Score = Relative Pollutant Concentration × Area Weighted Runoff Coefficient × TMDL Weighting Factor (3) *or* 303(d) Weighting Factor (2)

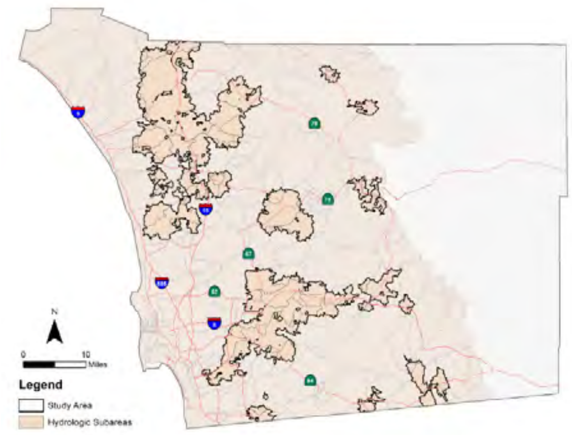
If the drainage area drains to both a 303(d) or TMDL, the TMDL weight factor was utilized.



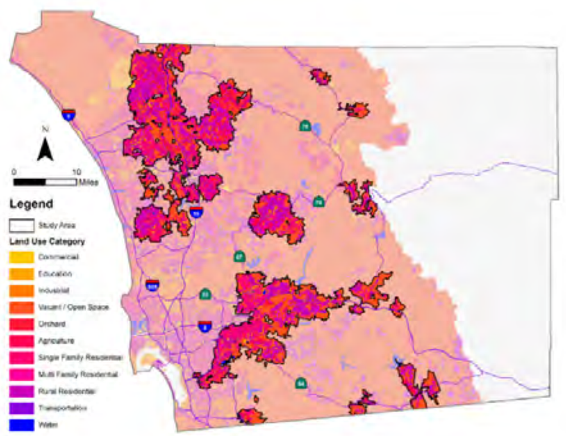
TMDLs within the Study Area



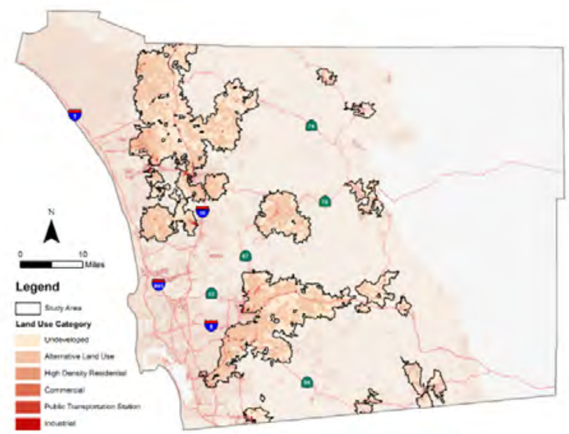
303(d) Listed Waterbodies



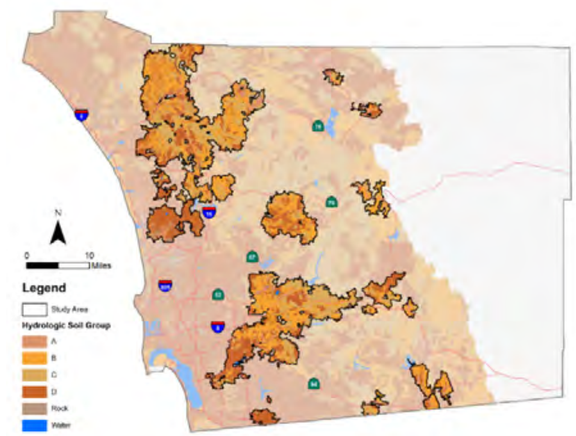
Hydrologic Subareas



Land Use Categories (EMCs)



Priority Land Uses (Trash)



Hydrologic Soil Groups

FIGURE 2: KEY INPUTS FOR WATER QUALITY BENEFIT SCREENING

3.2 COMMUNITY BENEFIT OPPORTUNITY SCREENING

The community benefit opportunity screening assigned points to drainage areas based on the potential for green streets within the drainage areas to provide benefits beyond water quality. Drainage areas meeting the metrics defined in Table 2 received points toward the total community benefit score, resulting in a higher likelihood of that drainage area being prioritized for a potential green streets project. A high priority was placed on identifying opportunities in underserved communities to support environmental justice elements such as adding green space and community enrichment opportunities, mitigating impacts of climate change, encouraging investments through partnerships with other agencies, and/or other benefits. Each metric is described in the sections below, and Appendix B provides a detailed source list for the datasets and layers used for the metrics.

Underserved Communities score + EJC score + Low Income Communities score + Park access score + Tree canopy cover score + Receipt of Runoff from Caltrans ROW score + 5-Year CIP score = Potential community benefit score (CB)

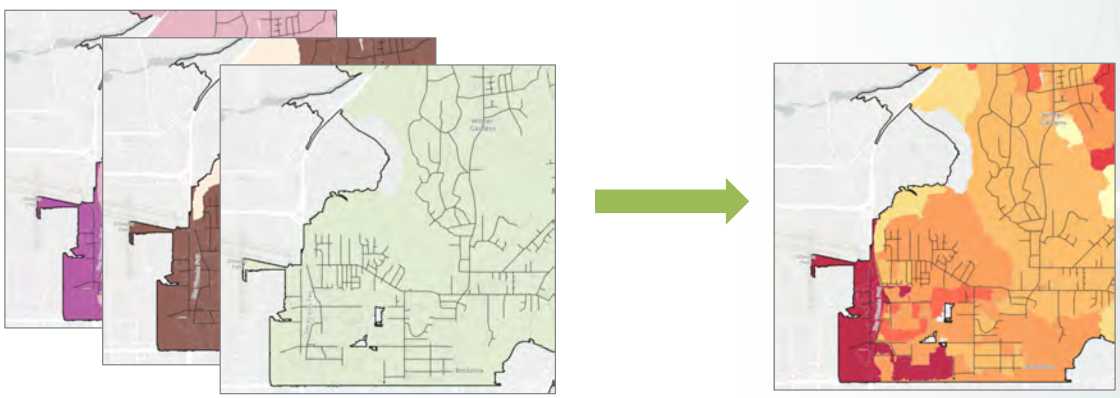


TABLE 2: COMMUNITY BENEFIT DRAINAGE AREA SCORING METRICS

Metric	Criteria	Points Earned	Maximum Points	Relative Contribution to Community Benefit Score
SB 535 Disadvantaged Communities (DACs)	Drainage area intersects mapped DAC Drainage area does not intersect mapped DAC	5.0 0.0	5.0	10%
County Environmental Justice Communities (EJCs)	Drainage area intersects the defined EJC Drainage area does not intersect the defined EJC	7.5 0.0	7.5	15%
AB1550 Low-Income Communities	Drainage area intersects mapped AB1550 low-income community Drainage area does not intersect mapped AB1550 low-income community	20 0.0	20	40%
Public Parks and Open Space – Park Access	Park/open space > ½-mile from residential parcels Park/open space <= ½-mile from residential parcels	5.0 0.0	5.0	10%
Tree Canopy Cover	Bottom 10% of coverage >10-50% >50-90% Top 10% of the highest coverage	5.0 3.0 1.0 0.0	5.0	10%
Drainage area receiving runoff from Caltrans ROW	Drainage area receives runoff from Caltrans ROW Drainage area does not receive runoff from Caltrans ROW	2.5 0.0	2.5	5%
CIP 5-Year Plan	Drainage area intersects a location identified in CIP 5-year Plan Drainage area does not intersect a location identified in CIP 5-year Plan	5.0 0.0	5.0	10%
		Total	**50**	**100%**

3.2.1 DISADVANTAGED COMMUNITIES

California State Senate Bill 535 (SB 535) defines disadvantaged communities or DACs as the top 25% of the census tracks with the highest amount of pollution and low-income populations based on a combination of pollution exposure, environmental effects, sensitive populations, and socioeconomic factors (OEHHA, 2018). For this plan, CalEnviroScreen 3.0 (OEHHA, 2018) was used to identify disadvantaged communities. CalEnviroScreen 4.0 was released in October 2021 and after the GSCW Plan assessment period. The census tracts identified as disadvantaged communities are presented in Figure 3. Disadvantaged communities within the study area account for 265 acres, or 0.07%, of the study area).

By siting green streets projects in disadvantaged communities, local residents would benefit through the reduction of stormwater pollution, enhanced local aesthetics from vegetated surface treatment systems, reduction of heat island effects and improved air quality, and other potential improvements depending on the selected treatment systems and designs details. Projects located in disadvantaged communities may also qualify for state or federal funding (e.g., Integrated Regional Water Management (IRWM)– California Department of Water Resources (CA DWR), US EPA Justice40 Initiative (US EPA, 2021)). As part of the GSCW Plan drainage area prioritization, drainage areas overlying a disadvantaged community received more points and thereby are more likely to be prioritized for green streets projects.

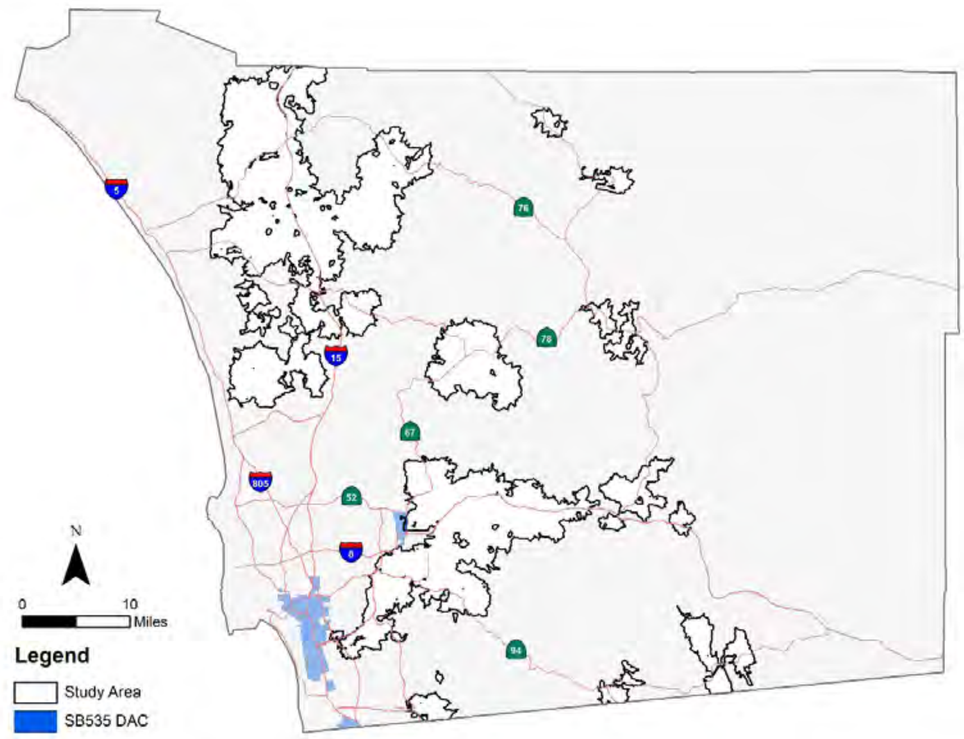


FIGURE 3: DISADVANTAGED COMMUNITIES

3.2.2 ENVIRONMENTAL JUSTICE COMMUNITIES

The County of San Diego General Plan Environmental Justice Element (County of San Diego, 2021e) has defined four Environmental Justice Communities (EJCs) based on a combination of the CalEnviroScreen 3.0 (OEHHA, 2018) pollution burden score (greater than 75%) and Live Well San Diego Healthiest Cities and Counties Challenge (HC3) communities, which addresses wellness and equity for underserved communities. While some of the SB535 disadvantaged communities overlap with the EJCs, there are additional communities within the GSCW Plan study area that qualify as EJCs. The census tracts within the GSCW Plan study area that qualify as EJCs are shown in Figure 4 and account for 8,400 acres, or 2.3%, of the study area. Drainage areas overlying an EJC were prioritized in a similar fashion to disadvantaged communities as described in Section 3.2.1.

LIVE WELL SAN DIEGO

OEHHA
SCIENCE FOR A HEALTHY CALIFORNIA

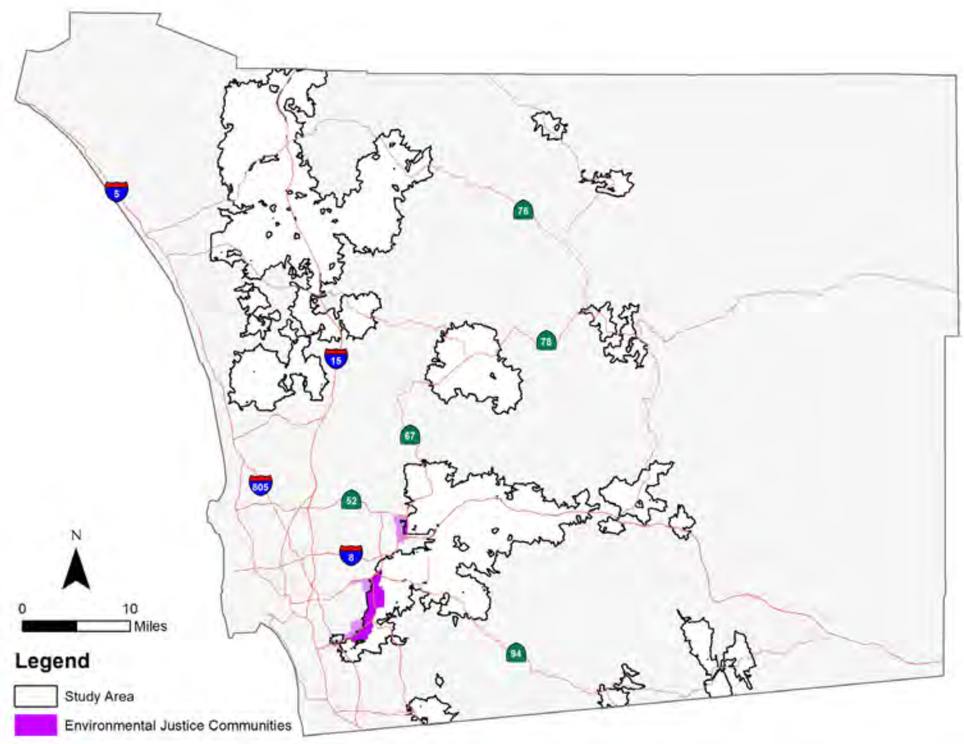


FIGURE 4: ENVIRONMENTAL JUSTICE COMMUNITIES

3.2.3 AB1550 LOW-INCOME COMMUNITIES

"Low-income communities" are defined by California State Assembly Bill 1550 (AB1550) as "census tracts with median household incomes at or below 80% of the statewide median income or with median household incomes at or below the threshold designated as low-income by the Department of Housing and Community Development's State Income Limits adopted under Section 50093" (California Air Resources Board, 2017). The census tracts within the GSCW Plan study area that qualify as low-income communities are shown in Figure 5 and cover 75,500 acres, or 20.5%, of the study area. Drainage areas overlying low-income communities were prioritized in a similar fashion to disadvantaged communities and EJCs, as described in Section 3.2.1.

California Department of Housing and Community Development

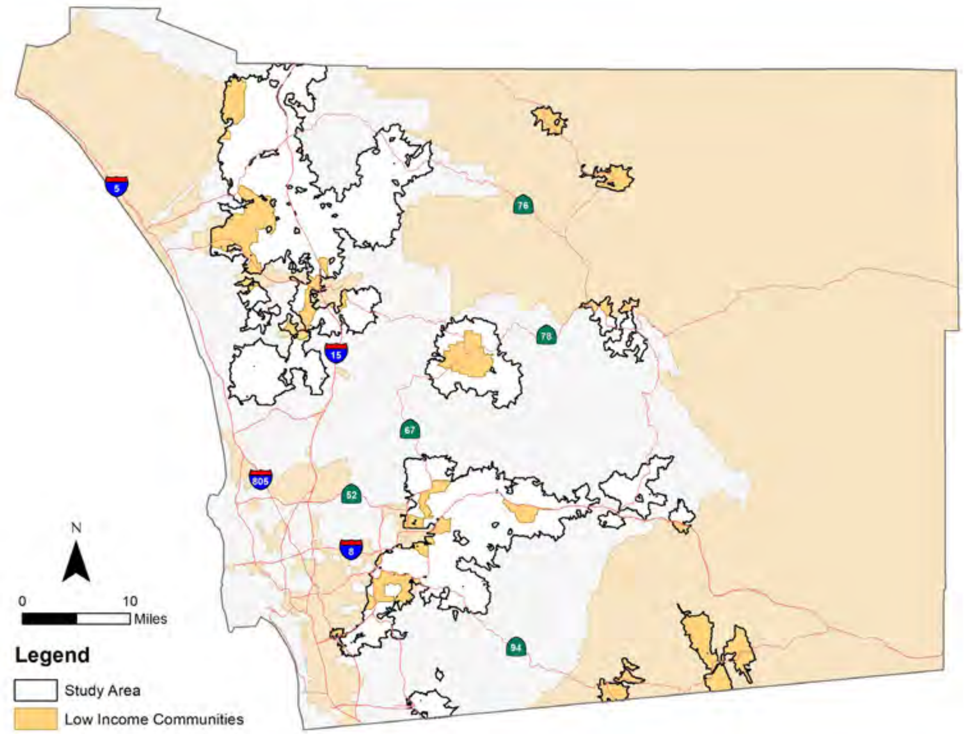


FIGURE 5: LOW-INCOME COMMUNITIES

3.2.4 PARK ACCESS

The siting of vegetated green streets projects in areas without parks that are within walking distance of residential communities can make green spaces more accessible to residents, improving quality of life. As part of the GSCW Plan drainage area prioritization, drainage areas without parks within ½ mile of the residential land uses received more points and thereby were more likely to be prioritized for green streets projects.

The County's Park Land Dedication Ordinance (Chapter 1, Article 1, Section 810.105.a.7) expresses a preference for dedicated park land to be located within ½ mile walking distance of a residential area (County of San Diego, 2020c). To assess where such opportunities exist within the GSCW Plan study area, the County's residential land uses were buffered by ½ mile and then intersected with the County's parks GIS layer. Qualifying areas within the GSCW Plan study area are shown in Figure 6 and account for 146,200 acres, or 39.6%, of the study area.

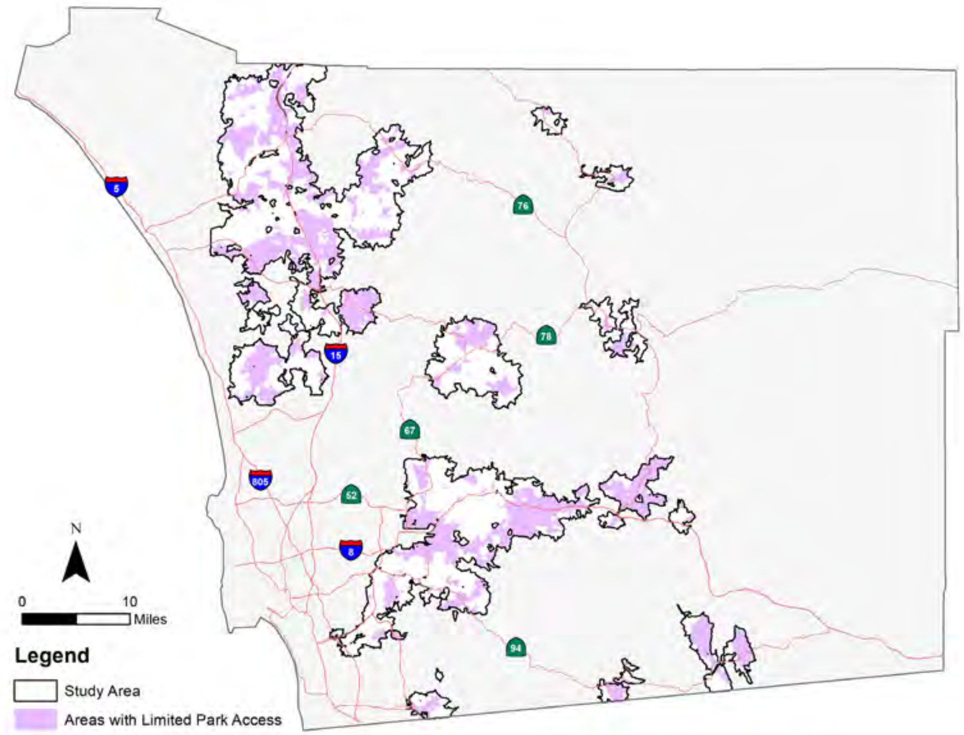


FIGURE 6: RESIDENTIAL GSCW PLAN AREAS WITHOUT PARKS WITHIN ½-MILE

3.2.5 TREE CANOPY COVER

The siting of tree-oriented green streets projects in areas with less tree canopy coverage increases access to shade in public spaces, reducing the localized heat island effect, and enhancing equitable access to outdoor space and recreation opportunities. As part of the GSCW Plan drainage area prioritization, drainage areas with lower tree canopy coverage will receive more points than those with higher coverage and are thereby more likely to be prioritized for green streets projects.

To assess tree canopy coverage, a data layer developed by the County was used which mapped tree canopy coverage as elevated vegetation (≥ 15-ft). The distribution of tree canopy coverage within the GSCW Plan study area is shown in Figure 7.

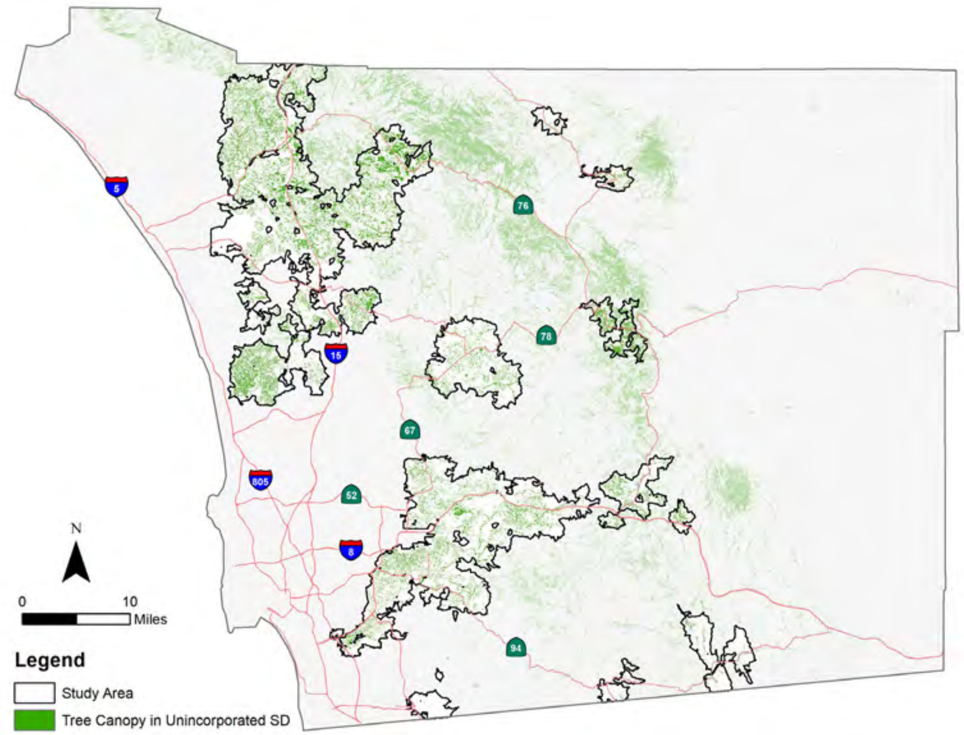


FIGURE 7: TREE CANOPY IN SAN DIEGO COUNTY

3.2.6 DRAINAGE AREA RECEIVING RUNOFF FROM CALTRANS ROW

The siting of green streets projects to treat runoff in areas that would also address Caltrans water quality objectives, would be more likely to receive funding under either the Cooperative Implementation Agreement (CIA) or Financial Contribution Only (FCO) municipal partnership programs (Caltrans, 2021). As part of the GSCW Plan drainage area prioritization, drainage areas overlying a Caltrans-defined significant trash generating area received more points and thereby are more likely to be prioritized for green streets projects.

Both funding programs are designed to provide funding for water quality treatment facilities in which Caltrans is identified as a responsible party or in significant trash-generating areas. While Caltrans is listed as a responsible party in several of the TMDL watersheds within San Diego County, its primary focus within District 11 (San Diego area) is addressing the significant trash-generating areas defined in the Statewide Trash Implementation Plan (Caltrans, 2019).

Caltrans defined significant trash-generating areas within the GSCW Plan study area are shown in Figure 8.

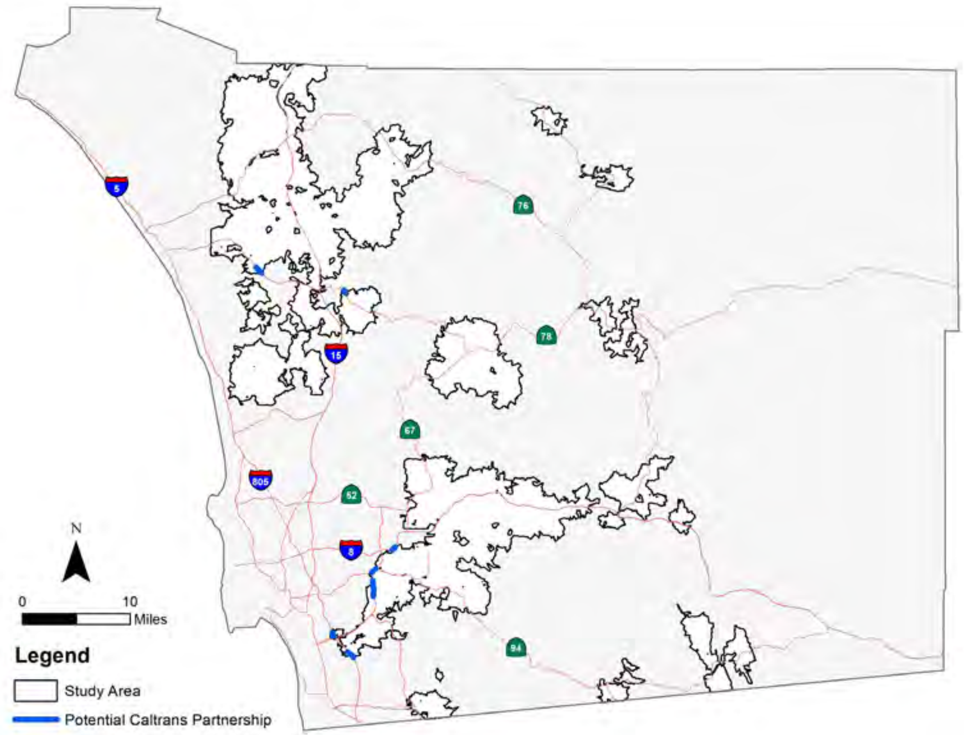


FIGURE 8: POTENTIAL CALTRANS PARTNERSHIPS

3.2.7 CAPITAL IMPROVEMENT PROGRAM 5-YEAR PLAN

By siting green streets projects in areas where improvements are already planned under the County's Public Works Capital Improvement Program (CIP), cost savings can be achieved by integrating green streets components into the planned improvements, minimizing traffic disruptions by constructing projects simultaneously, accelerating implementation, and sharing costs across projects such as design and mobilization/demobilization costs. As part of the GSCW Plan drainage area prioritization, drainage areas overlying a qualifying CIP project received more points and thereby are more likely to be prioritized for green streets projects.

The Capital Improvement Program Plan identifies improvements to roads and bridges, County-owned airports, drainage structures, wastewater facilities, and watershed water quality projects. The County's 5-year Capital Improvement Program Plan (County of San Diego, 2020a) was screened to identify projects listed as "in current plan" (vs. completed or removed) and scheduled for completion in 2023 or later (to align with the approximate date of completion for any green streets developed under the GSCW Plan and to avoid disruptions to recently improved road surfaces per the Pavement Cut Policy [County of San Diego, 2016b]). Qualifying CIP projects within the GSCW Plan study area are shown in Figure 9.

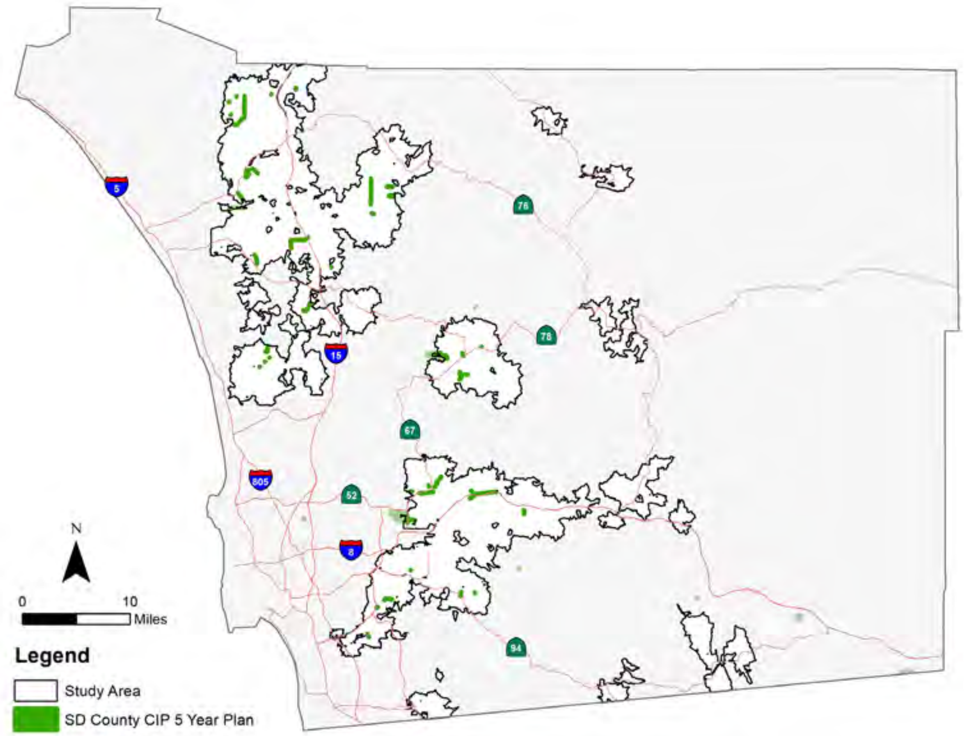


FIGURE 9: SAN DIEGO COUNTY CAPITAL IMPROVEMENT PROJECTS 2020/21 TO 2024/25

3.3 OPPORTUNITY SCREENING RESULTS

Based on the screening factors described in Sections 3.1 and 3.2, the drainage areas within the Study Area received water quality benefit and community benefit scores indicating the relative impact a green street project may have on each drainage area. The highest priority areas for multiple combined benefits or biggest impact were ranked, and the top 85 drainage areas were chosen for further investigation. Attachment D.1 provides the top 85 ranked drainage areas.

The combined benefit score was selected from several options to ultimately reflect an approximate split of 75% for the water quality benefit score and 25% for the community benefit score, with the water quality contributions weighted higher to better align with the primary project drivers. The resulting scores varied by individual drainage area based on site-specific factors. The spatial distribution of water quality benefit, community benefit, and combined benefit scores are shown in Figure 10, Figure 11, and Figure 12.

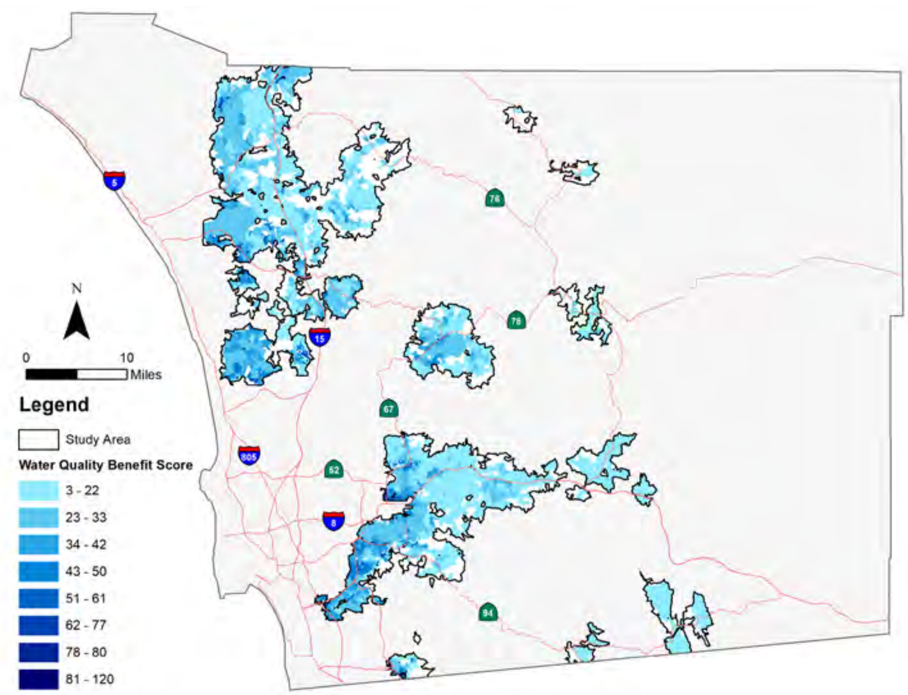


FIGURE 10: WATER QUALITY BENEFIT SCORE

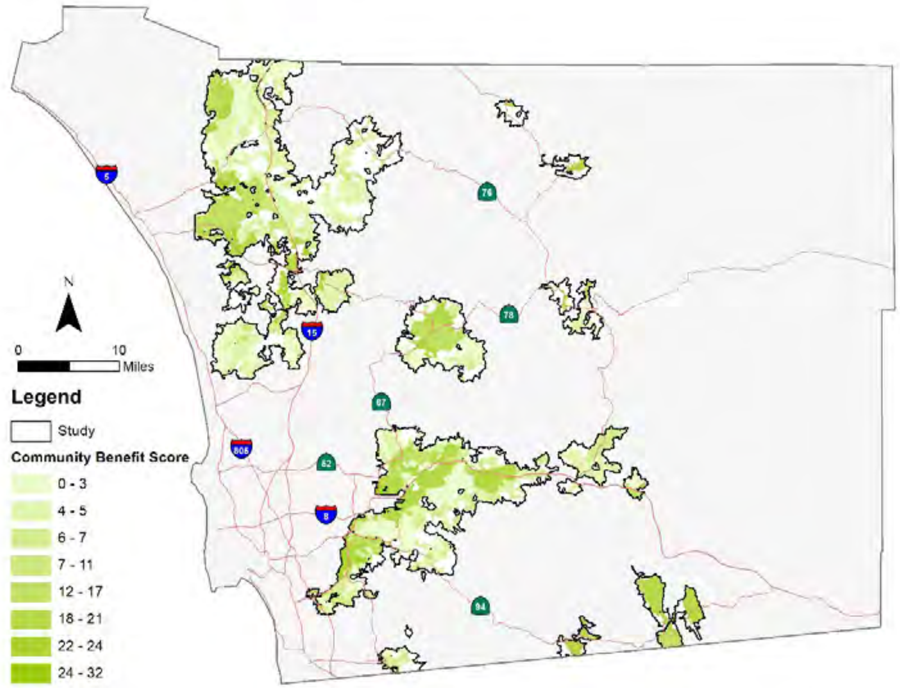


FIGURE 11: COMMUNITY BENEFIT SCORE

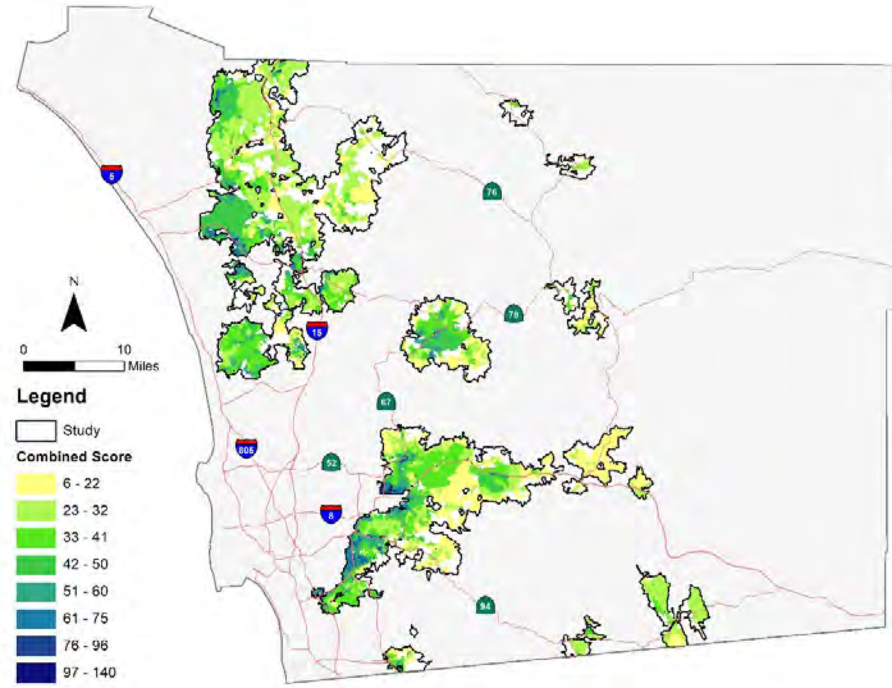


FIGURE 12: TOTAL COMBINED SCORE

To distribute the potential benefits across the study area (and County) the top-scoring catchments within each regional watershed were selected such that the total drainage area of selected catchments was similar to the percentage of each regional watershed within the study area (i.e., regional watersheds that coincided with larger portions of the study area received larger portions of the overall drainage area potentially treated). This catchment prioritization step allowed the plan to focus on strategic opportunities to site green streets treatment systems where they can maximize pollutant load reductions as outlined in the WQIPs. The resulting distribution of drainage areas is summarized in Table 3. Based on the number of community planning areas compared to priority drainage areas (24 to 85, respectively), County staff did not recommend distributing drainage area prioritizations across communities because this would result in a much lower overall water quality and community benefit for the program (i.e., lead to prioritization of drainage areas based purely on location rather than potential benefit).

TABLE 3: DISTRIBUTION OF PRIORITY DRAINAGE AREAS BY WATERSHED

Overlapping Regional Watershed	Selected Priority Drainage Areas (ac)	% of Total Priority Drainage Area
Santa Margarita River	18	5%
San Luis Rey	65	17%
Carlsbad	53	14%
San Dieguito River	27	7%
San Diego River	111	30%
San Diego Bay	80	21%
Tijuana River	24	6%
Total	**378**	**100%**

4

SELECTING GREEN STREETS PROJECT COMPONENTS

4 SELECTING GREEN STREETS PROJECT COMPONENTS

Step 2
Best-Suited Treatment Systems

The GSCW Plan process utilized an array of tools and methodologies to select the most effective treatment system, or Best Management Practice (BMP), for the prioritized drainage areas. This included desktop visual inspections for opportunities and limitations with the County's right-of-way and a geospatial characterization and screening based on known factors using Geographic Information Systems (GIS) software. The initial desktop inspections helped narrow down specific locations where treatment systems could potentially be placed. The geospatial screening evaluated the feasibility of these locations for various treatment system types that would be appropriate for installation.

4.1 INITIAL TREATMENT SYSTEM SITING

Visual screening helped to identify opportunities and constraints not mapped in the GIS analysis, such as utility boxes, fire hydrants, existing trees, bus stops, parking areas, and other obstructions. Visual screening of the priority drainage areas was performed using several tools, including 2019 aerial imagery from SanGIS in ArcGIS, Google Earth, Google Street View, and the SANDAG Online Parcel Viewer. The visual screening was focused on areas within or directly adjacent to the ROW. An example of typical constraints identified through the visual screening process is provided in Figure 13. The visual screening identified a preliminary set of potential treatment system locations in each of the priority drainage areas for further characterization and evaluation.

FIGURE 13: VISUAL SCREENING CONSTRAINT IDENTIFICATION

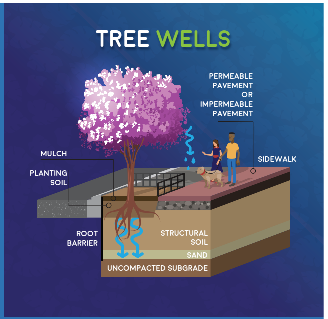
4.2 TREATMENT SYSTEM BMPS

There were seven BMP types considered for the GSCW Plan. Four types are detailed in the County of San Diego's Green Streets Standard Drawings, including tree wells (GS-1), dispersion areas (GS-2), biofilters (GS-3), and permeable pavement (GS-4). Dry wells, hydrodynamic separators, and vegetated swales were also considered to broaden the palette of stormwater treatment options available for priority drainage areas.

4

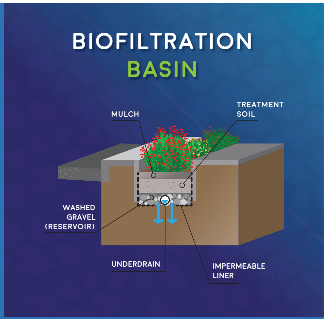
ABOVE GROUND TREATMENT SYSTEMS

TREE WELLS



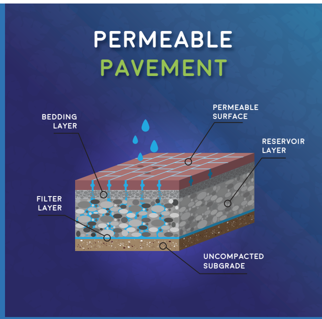
From a water quality improvement perspective, tree wells are treatment systems designed to utilize the roots and soil volume surrounding the roots of a tree to retain and treat stormwater runoff. These are typically located adjacent to roadways in sidewalks or parking lots.

BIOFILTRATION BASIN



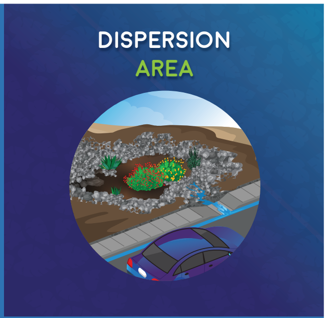
Biofiltration Basin treatment systems, when designed for green streets, are linear, landscaped areas containing soil media intended to filter stormwater runoff and support plant growth while minimizing the leaching of potential pollutants. These basins may or may not be designed to include a perforated underdrain and/ or a liner to support infiltration and can be tailored to the specific site.

PERMEABLE PAVEMENT



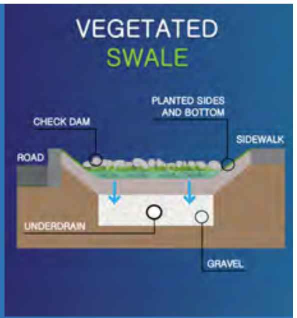
Unlike conventional paved surfaces, permeable pavements contain small voids that allow stormwater runoff to pass through to a layer for storage and treatment. Permeable pavements come in a variety of forms, such as modular concrete pavers, gravel grids, porous concrete, or permeable asphalt.

DISPERSION AREA



Dispersion is the practice of directing stormwater runoff from impervious areas to pervious areas, which slows down the stormwater runoff and promotes infiltration. To improve effectiveness, stormwater runoff should be evenly distributed into a vegetated area with amended soils that improve infiltration and plant health.

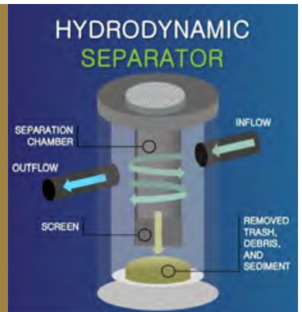
VEGETATED SWALE



A vegetated swale is an open, shallow channel with dense, low-lying vegetation that collects and sends runoff to a downstream discharge location. Swales reduce the velocities of incoming stormwater runoff and provide treatment through filtration and incidental infiltration.

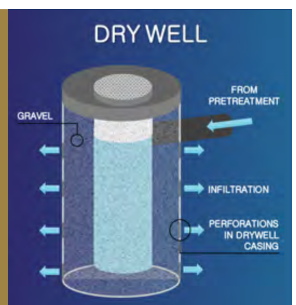
BELOW GROUND TREATMENT SYSTEMS

HYDRODYNAMIC SEPARATOR



Hydrodynamic separators, or HDS units, are units that use gravity to remove gross pollutants (trash, debris, and sediment) using screens, settlement, and/or centrifugal forces. They can be located completely underground, are space-efficient, and easily maintained using a vacuum truck. Engineered media can also be incorporated to remove oils and grease.

DRY WELL



Dry wells collect stormwater runoff and gradually dissipate it into the surrounding soils. These devices have vertically bored holes that promote infiltration and have a small surface footprint. Dry wells are particularly effective at promoting infiltration in areas with low permeability in the surface soils but higher permeability in the subsurface. They can clog easily and therefore require upstream pretreatment.

4.3 RIGHT-OF-WAY CONSTRAINTS & STANDARD DETAILS

The feasibility of proposed treatment system locations was analyzed using available desktop resources within GIS. The first step included a baseline characterization screening for underground utilities and site-specific geotechnical data (e.g., soil types and groundwater basins for infiltration feasibility and potential groundwater recharge). Table 4 presents the background datasets used to screen for constraints, these datasets and sources are detailed in Attachment B.

TABLE 4: BACKGROUND DATASETS

Name	Source
County of San Diego ROW	SanGIS
Storm Drain Infrastructure	County DPW
Sanitary Sewer Infrastructure	County DPW
Hydrologic Soil Group	NRCS
County Maintained Streets	County DPW
Liquefaction Zones	SanGIS
Contaminated Sites	GeoTracker
Groundwater and Monitoring Well Data	GAMA (Groundwater Ambient Monitoring and
Floodplains/Floodways	County DPW
Surface Slopes	Derived from Countywide Elevation Dataset
Collision Prone Areas	County DPW
Priority Land Uses	County DPW

The second step was to screen for constraints based on each treatment system's unique processes and applicable construction requirements. Table 5 summarizes which treatment systems were considered possible based on site and vicinity constraints. Attachment D.2 lists the specific constraints for each type of treatment system considered.

TABLE 5: POSSIBLE TREATMENT SYSTEMS BASED ON ON-SITE AND VICINITY CONSTRAINTS

Site has...	Tree Wells	Biofiltration Basins	Permeable Pavement	Dispersion Areas	Vegetated Swale	Hydro Dynamic Separators	Dry Wells
No constraints	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No storm drain	Yes	Maybe	Yes	Yes	Yes	No	Yes
No water source	Maybe	Maybe	Yes	Maybe	Maybe	Yes	Yes
No free space	Yes	No	Yes	No	No	Yes	Yes
Has poor soils	Yes	Yes	Yes	Yes	Maybe	Yes	No
Safety concerns	Maybe	Maybe	Yes	Yes	Maybe	Yes	Yes

In some cases, priority drainage areas did not have the characteristics that supported feasible treatment system opportunities because either:

1. Visual screening failed to identify available physical footprint within the ROW to support a treatment system, or
2. GIS analysis determined that identified opportunity sites were constrained such that none of the potential treatment system types were likely feasible.

When non-suitable drainage areas were identified, the drainage area with the next highest ranking within the same watershed was evaluated for opportunities and included as a priority drainage area (i.e., non-suitable drainage areas were removed from the priority list). This ensured the plan could maintain a minimum of 85 priority drainage areas with identified treatment system locations even as screening removed certain drainage areas from consideration.

Additional datasets and information were evaluated for each of the priority drainage areas and associated treatment system opportunities. These included the presence of adjacent parking within priority drainage areas, proximity to priority intersections and road segments identified within the Local Road Safety Plan (County of San Diego, 2021b), and Pedestrian Gap Analysis (PGA) (County of San Diego, 2016a) scores and sidewalk condition. Although specific treatment system opportunities were not identified based on this information, it was anticipated these data could indicate opportunities for significant benefits and additional treatment system footprints. Where feasible, geometric changes to existing ROW configurations such as reduced lane or shoulder width, physical separation of sidewalks or bike paths from the traffic lanes, and addition of pedestrian medians, bulb-outs, or roundabouts can create additional physical space for treatment systems. Specific opportunities related to physical changes in the street should be evaluated on a site-specific basis.

4.4 TREATMENT SYSTEM HIERARCHY

In selecting specific treatment systems for each suitable location, a hierarchy was developed to choose between multiple potential systems. This hierarchy is based on the ability of the seven treatment system types to treat stormwater pollutants and reduce volume through infiltration, which is the preferred method to simply and effectively manage runoff. Table 6 shows how each treatment system was categorized in terms of infiltration ability. Some treatment systems can be designed to be more or less infiltrating based on site-specific soil conditions and project requirements, these systems are listed in multiple categories. The design elements that help control infiltration are the inclusion or exclusion of perforated pipe underdrains (see Green Streets Standard Drawings GS-1.05, GS-3.10, and GS-4.03) and impermeable liners.

TABLE 6: POSSIBLE TREATMENT SYSTEMS BASED ON ON-SITE AND VICINITY CONSTRAINTS

Water Quality Treatment Systems
Type 1 (Infiltration) Tree Well without an underdrain Biofilter without underdrain Permeable Pavement without an underdrain
Type 2 (Partial Infiltration) Tree Well with underdrain Biofilter with underdrain Permeable Pavement with underdrain
Type 3 (Low/No Infiltration) Tree Well with underdrain and liner Biofilter with underdrain and liner
Other Hydrodynamic Separator Vegetated Swale

In cases where multiple treatment system types were identified as potentially suitable for a location, the treatment system type expected to produce the greatest number of benefits was prioritized. This hierarchy is based on the following principles and feedback:

1. Full infiltration (Type 1) is prioritized (by the MS4 Permit) when feasible. Pollutant removal is maximized by retention systems. If space is limited, but soil type allows for infiltration, prioritize dry wells.
2. When full infiltration is not feasible, maximizing partial infiltration is preferred (Type 2),
3. When no infiltration is feasible, maximize filtration systems (Type 3),
4. When no space is available and soil type does not allow for infiltration, prioritize HDS units.
5. Additionally, when tree wells and biofilters are compared within each Type, tree wells are preferable based on initial survey results of community members. Tree wells also provide greater environmental and community benefits such as shading, local cooling, and improved air quality.

Dry wells and vegetated swales were considered as treatment systems, but were ultimately not suitable for the project opportunities identified due to infiltration constraints or the presence of shallow groundwater. Tree wells and biofiltration were also preferred over vegetated swales due to the treatment effectiveness.

4.5 PROJECT DEFINITION

Following the initial identification of best-suited treatment systems within the highest-ranked catchments, the treatment systems were grouped into "projects". For this plan, a project was defined as one or more treatment systems within 1,000 feet (along the right of way) of another treatment system, roads and blocks were also used to help group treatment systems into projects. This rationale was used to both increase the cost-effectiveness of a single project, while also minimizing traffic impacts by focusing each project in a limited geographic area. The following section provides the project prioritization approach and results of the top 30 projects.

5
PROJECT PRIORITIZATION APPROACH

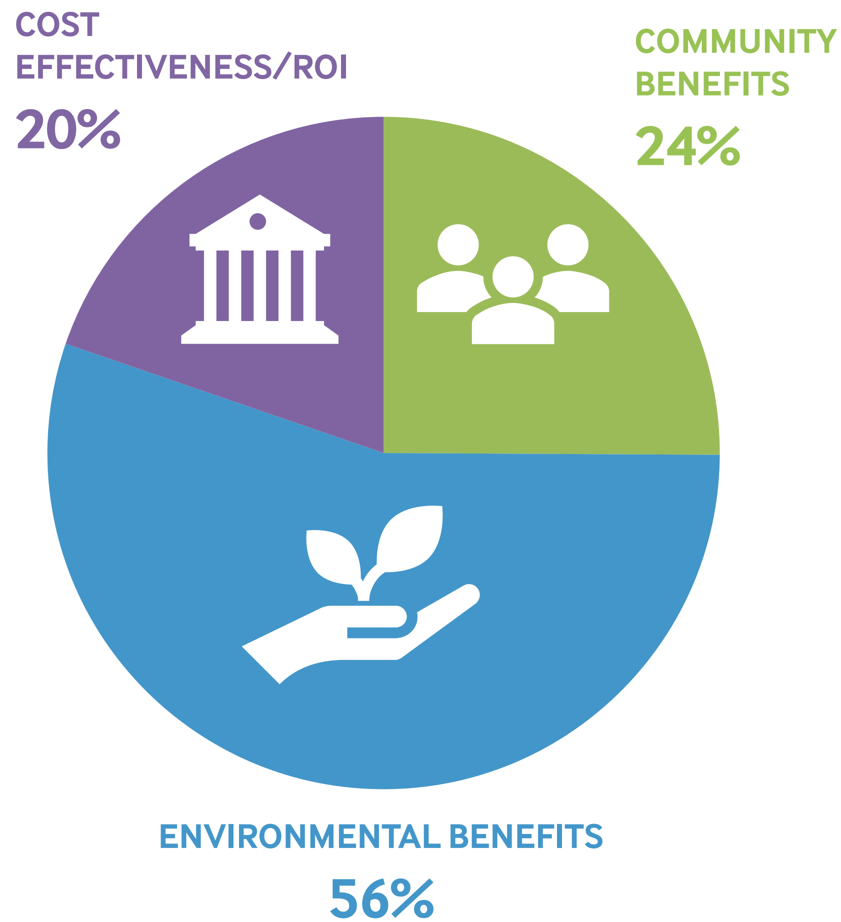
5 PROJECT PRIORITIZATION APPROACH

Step 3
Highest Benefit Projects

The GSCW Plan prioritized the green streets opportunity sites and treatment systems based on their anticipated potential benefits, with the ultimate goal of identifying well-suited designs for the selected sites from the County's Green Streets Standard Drawings.

The project prioritization process assessed the environmental (specifically water quality), community, and cost-effectiveness benefits of each project and applied a scoring framework to identify the most beneficial projects. The GSCW Plan applied the triple bottom line (TBL) concept, which is an assessment method used to prioritize projects, evaluate benefits, and to aid in program and investment decisions (CASQA, 2017). The project ranking framework developed for the GSCW Plan is a numeric quantification method that generally follows the San Diego Stormwater Resource Plan (SWRP) (ESA, 2017) prioritization framework, but is supplemented with Envision™ (ISI, 2018) and Safe Clean Water (SCW) (LACFD, 2019) metrics.

Within the GSCW Plan prioritization, points were assigned to each of the identified projects (refer to Section 4.5) based on whether the individual criteria associated with each metric were satisfied for each of the TBL benefits. Each project was assigned a maximum of 100 points for environmental benefits (56%), a maximum of 43 points for community benefits (24%), and a maximum of 35 points for cost-effectiveness benefits (20%). The total maximum TBL points available for each project was 178. The contribution of each benefit for the GSCW Plan prioritization framework is comparable to the SCW approach. Additionally, the breakdown of points considered here is generally consistent with the drainage area scoring breakdown presented in Section 3.2. The following sections describe each benefit and criteria utilized for prioritization. This framework was applied to all of the identified projects to determine the top 30 projects.



5.1 ENVIRONMENTAL BENEFITS

The GSCW Plan's environmental benefit metric evaluated the project's water quality benefit to reduce pollutant loads. Additionally, other environmental component benefits are evaluated including water supply, flood management (peak flow and runoff reductions), and natural environment benefits to the project.

The water quality and flood management benefits were quantified using a water quality modeling tool adapted from the Orange County Stormwater Tools platform. The land surface characteristics, project locations, and treatment system types were inputs into the water quality modeling tool. The tool then calculated the runoff volume, peak flows, and pollutant concentrations for both wet weather and dry weather conditions draining to each project and determined the long-term volume capture performance and annual load reduction performance provided by each project. The water quality modeling tool quantifies the amount of volume captured and pollutant load reduced based on the dimensions and details from the San Diego County BMP design standards. The inputs required in the model are either calculated based on minimum depths and filtration rates or are site-specific to the project.

Additionally, benefits related to water supply and the natural environment were measured through various metrics and criteria, examples of these criteria include: whether a project infiltrates, has the potential to capture stormwater for direct or indirect uses, increases urban green space, improves water temperatures, or reduces operational energy consumption.

The following environmental benefit criteria were utilized to rank projects:

- **Water Quality Benefit**
  - Projects with the highest pollutant load reductions or treated impervious areas for wet and dry weather.
  - Addresses TMDL and/or Priority Water Quality Conditions in the WQIP informed by the 303(d) listed pollutants. Based on the receiving water TMDLs and pollutant of concerns on the 2014/2016 303(d) List, as found in the 2014/2016 California Integrated Report (US EPA, 2018).
  - Within a priority land use area identified by the California State Water Resource Control Board Trash Implementation Program (Trash Amendments) (California State Water Resources Control Board, 2015).

- **Natural Environment**
  - Projects can be landscaped with native, drought-resistant, pollinator species, or fire-resistant vegetation to reduce pesticide and fertilizer impacts and control invasive species. It is assumed that vegetation species will be selected to match native conditions and have minimal need for fertilizer/pesticide use.
  - Increases urban green space. It is assumed that vegetated treatment systems would provide this benefit.
  - Creates or enhances wetland and/or riparian habitat by treating runoff adjacent to a waterbody.
  - Improves water temperatures by increasing the amount of shaded water through vegetation. It is assumed that vegetated treatment systems would provide this benefit.
  - Reduces Greenhouse Gas (GHG) emissions or increases carbon sinks. It is assumed that vegetated treatment systems would provide this benefit.
  - Reduces operational energy consumption during maintenance. It is assumed that HDS units and dry wells would utilize the most operational energy during maintenance.

- **Flood Management**
  - Projects with the highest peak flow reduction.
  - Projects with the highest total annual runoff reduction.

- **Water Supply**
  - Potential to capture wet and/or dry weather runoff for direct uses:
    - For irrigation on site, at a park, habitat restoration, or natural treatment system; or
    - To wastewater or water treatment facility for potable or recycled use.
  - Potential to capture wet and/or dry weather runoff for direct uses if the project infiltrates to a Sustainable Groundwater Management Act (SGMA) (CA DWR, 2020) priority groundwater aquifer that is a source of local potable water. The SWRP notates that groundwater basin recharge occurs from sources like stormwater runoff infiltration (ESA, 2017).
  - Potential to capture wet and/or dry weather runoff for indirect use (infiltration to groundwater not used as water source).
  - Reduces water usage for irrigation during operation.
  - Project infiltrates and is located within a water supply project area opportunity as identified in the SWRP (ESA, 2017).

Figure 14 visually presents the relative weighting of the metrics and associated points used within the prioritization process for the environmental benefit score. Each of the four benefit categories is colored (darkest to lightest) by the highest to the lowest contribution of points. Within each benefit category, the sub-benefit criteria rectangles are proportional to the size of the point value (noted in parenthesis) they each contribute to the overall benefit. Water quality makes up the majority of the environmental benefit at 55%.

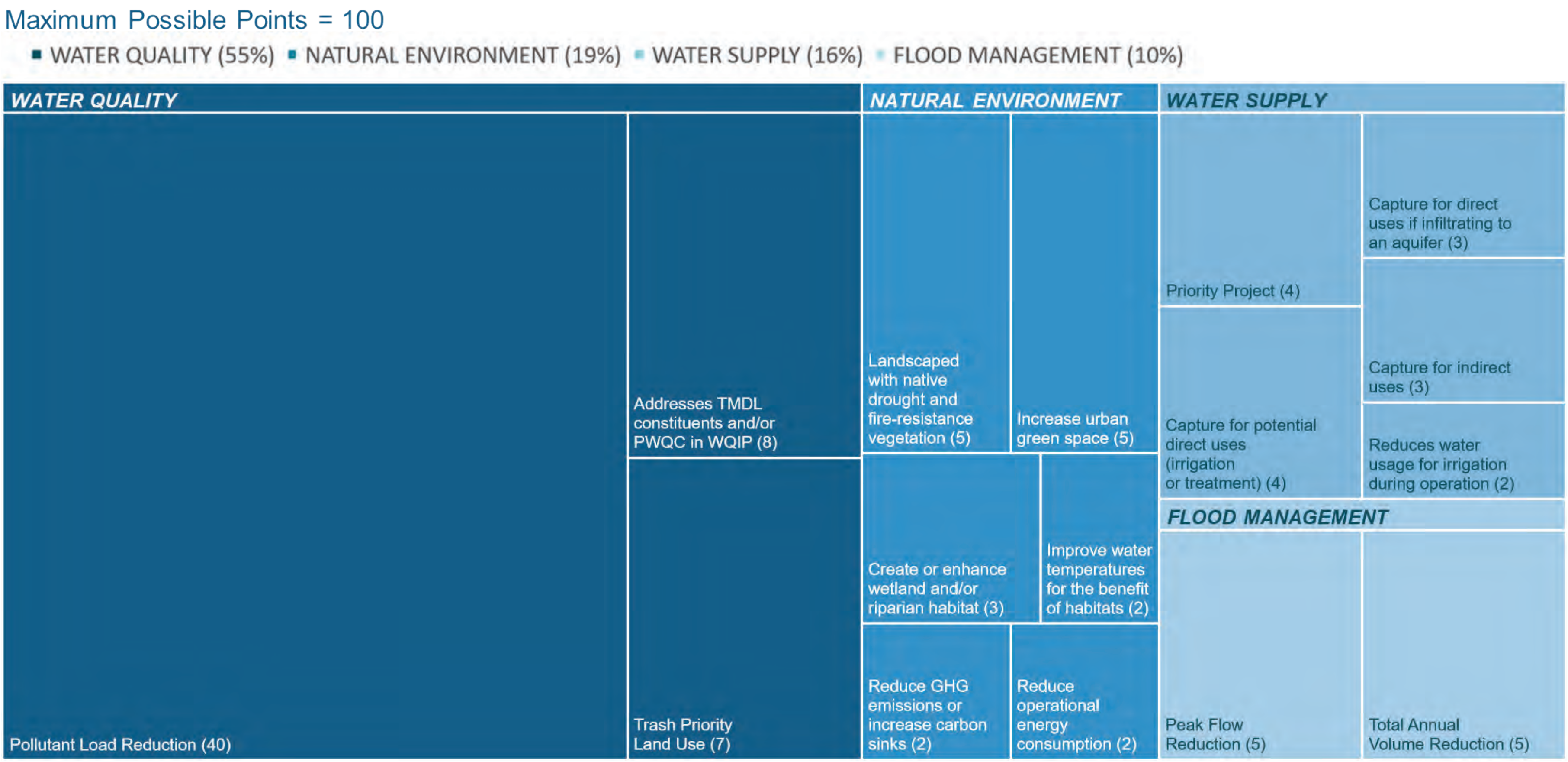


FIGURE 14: ENVIRONMENTAL BENEFIT SCORE DISTRIBUTION

5.2 COMMUNITY BENEFITS

The GSCW Plan community benefit metric measured the social dimensions of the projects and included criteria related to the identification of underserved communities, community involvement, enhancing or creating recreational/public use areas, improving limited pedestrian access, traffic safety improvements, and other potential community benefits, etc. The following potential community benefit criteria were utilized for project ranking:

- **Located in an Underserved Community: Census Tracts which are identified as "Underserved Communities" per criteria provided by LUEG:**
  - Healthy Places Index (HPI) in the 3rd and 4th quartiles
  - CalEnviroScreen (CES) 2.0 percentile scores above 25%
  - San Diego LiveWell Healthiest Cities and Counties Challenge (HC3) communities
  - 17 Census Tracts identified as Environmental Justice Communities (within the communities of north El Cajon, north Lemon Grove, Spring Valley, and Sweetwater)
- **Potential for Community Involvement:** Potential to include community involvement through project design and/or landscaping reflects desired preferences from local non-governmental organizations (NGOs) or community-based organizations. Assumes surface treatment systems will involve the community due to the visible components (landscaping, vegetation, feature design) associated with surface systems.
- **Pedestrian Improvements:** Road segments with the highest points are the highest priority for maintenance and pedestrian access improvement, based upon the ranking factors within the Pedestrian Gap Analysis Report (County of San Diego, 2016a).
- **Aesthetic Improvements:** Enhance and/or create recreational and public use areas through aesthetic improvements or additions. Assumes vegetated or trash treatment systems will enhance areas.
- **Opportunity for Public Education:** Assumes surface treatment systems will provide public education opportunities.
- **Community Mobility and Access Improvements:** Treatment Systems could be applied in or adjacent to transit and would be designed for improved mobility and access.
- **Addition of Green Space:** Vegetated treatment systems not within ¼ mile of parks.
- **Integration with Traffic Safety Improvements:** Projects or treatment systems located on roads and intersections in need of safety improvements as identified in the Local Road Safety Plan (County of San Diego, 2021b).

Figure 15 visually presents the relative weighting of the metrics and associated points used within the prioritization process for the community benefit. Each of the criteria is colored (darkest to lightest) by the highest to the lowest contribution of points and is proportional to the size of the point value (given in parenthesis) they each contribute to the overall benefit. Project location within an Underserved Community makes up 40% of the community benefit.

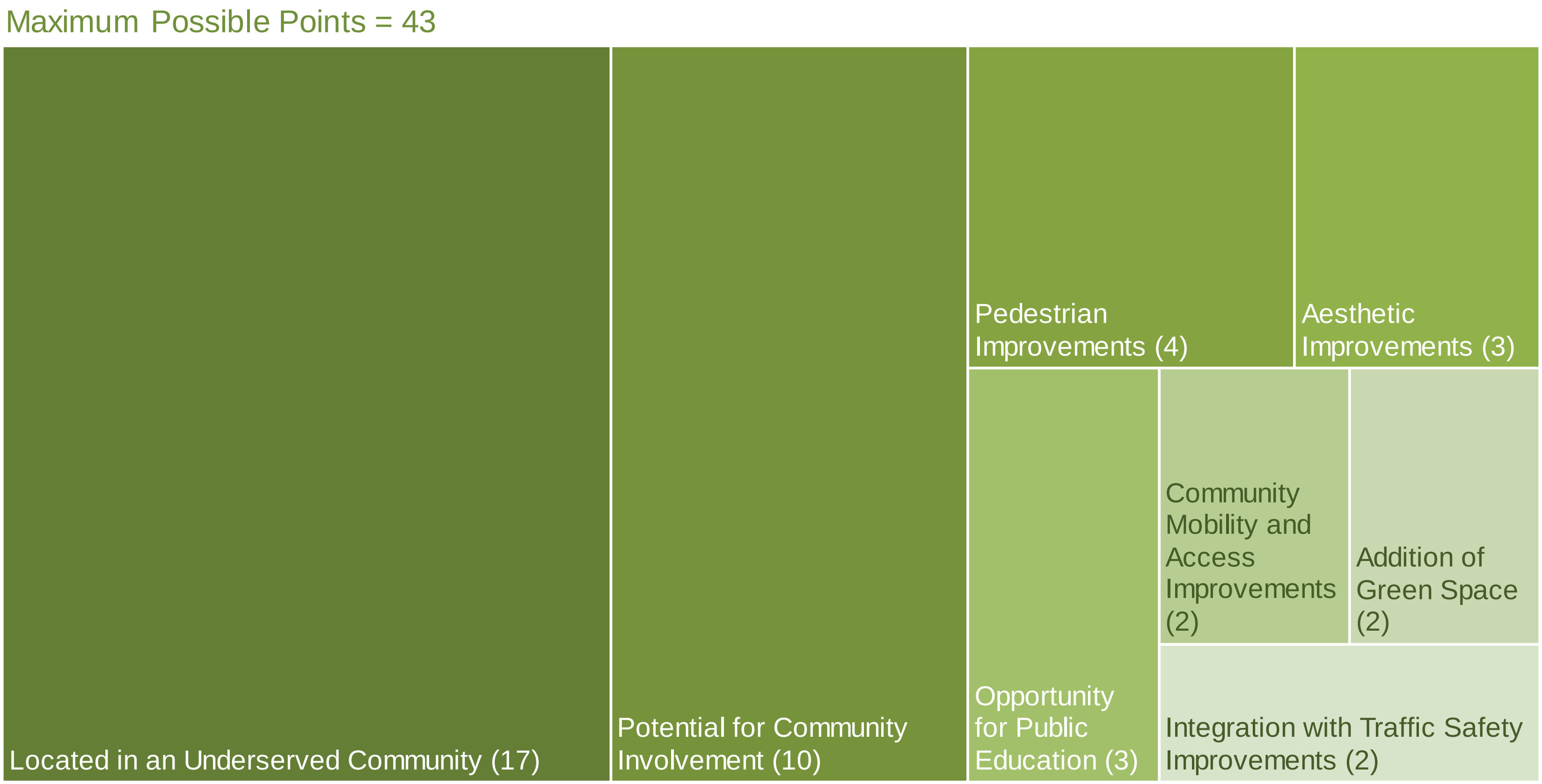


FIGURE 15: COMMUNITY BENEFIT SCORE DISTRIBUTION

5.3 COST-EFFECTIVENESS AND ROI

Project costs were evaluated to estimate the costs and compare the return on investment of different projects. This information was used in the prioritization process using a single cost-effectiveness metric based on the 30-year lifecycle cost per acre of impervious area treated. 30-year lifecycle costs were developed based on a fixed-term present value cost analysis (Net Present Value) that included the following cost components:

- **Capital Cost** – The initial upfront cost for materials and construction, typically developed from unit prices,
- **Construction Contingency** – Cost for other items and construction changes not included in other assumptions, typically a percentage of the capital cost,
- **Project Delivery Costs** – Costs for design, survey, permitting, and utility coordination,
- **Maintenance Cost** – The yearly (or annualized) cost to perform routine maintenance activities, typically a percent of the capital construction cost, or a fixed value based on a unit cost buildup,

The lifecycle cost analysis is also dependent upon the following key parameters:

- **Useful Life** – The design life of an asset after which replacement is needed,
- **End of Life Replacement Cost** – The cost to replace an asset at the end of its useful life (e.g., 90% initial construction cost), and
- **Interest Rate** – The value of money over time (i.e., 2.5%), same for all projects.

Using the opportunity-specific information identified in Section 4, capital costs were quantified using the Unit and Maintenance Cost Tool (County of San Diego, 2021c) and the Unit Price List (County of San Diego, 2021d). Capital costs were focused solely on the water quality elements and directly associated improvements (such as adjacent sidewalk replacement, roadway striping, storm drain extension, and storm drain connection). The costs do not include additional features beyond what is required for the installation of treatment system components, consequently, the costs estimated here represent a low baseline cost. It should also be expected that certain project alternatives evaluated during the project design phase may have significantly higher costs due to the addition of other improvements including drainage system upgrades, traffic calming and other safety measures, etc.

Maintenance costs for the suite of treatment systems considered in these projects can be expected to vary significantly based on several project factors. The County has developed several maintenance cost items and estimates which are documented in the Unit and Maintenance Cost Tool; however, due to the preliminary nature of projects identified in this Plan and the expectation that significant changes may be made during design, for this planning-level analysis, typical maintenance costs as a percent of the treatment system capital cost were assumed based on published values. Similarly, the useful life and cost of replacement at the end of the design life were referenced from the available literature. Utilizing the 30-year lifecycle costs, the cost per acre of impervious area treated for each project is ranked to provide a cost/benefit project ranking. Parameters and sources used in this analysis are summarized in Table 7:

TABLE 7: PARAMETERS AND SOURCES USED IN THE COST-EFFECTIVENESS ANALYSIS

Treatment System Type	Annualized Maintenance Cost (% of Cost)[1]	Useful Life	Runoff Volume Reduction (cu-ft) (% of Cost)[1]
Tree Wells and Biofiltration	3% [2]	25 Years [2]	90% [3]
Hydrodynamic Separators	8% [4]	30 Years [5]	90% [6]

1. *Maintenance and Replacement costs are calculated as a % of the capital cost of just the treatment system elements (e.g., no soft costs, contingency, etc.).*
2. *USEPA, 2005. County Cost Tool Varies by treatment system footprint with a typical value of about 4%.*
3. *Geosyntec, 2011 for USEPA.*
4. *Brown and Caldwell Business Case Evaluation, 2015.*
5. *Proprietary vendor information*
6. *Assumed herein as cost of new minus 10% to account for excavation/other savings.*

5.4 PRIORITIZATION RESULTS

This section presents a scored menu of candidate projects and summarizes key attributes of the projects derived from the previous sections. The prioritization framework was applied to the projects and the TBL benefit scores for environmental, community, and cost-effectiveness were summed and calculated for each project. The projects were ranked based on the combined TBL scores to identify the top 30 projects. This menu of projects is presented in prioritized order (highest scoring projects first); however, it is important to note that in some cases, specific project attributes (e.g., County and community planning area preferences, constraints, opportunities, available funds, etc.) may advance one project faster than another, despite a lower overall ranking. For this reason, the projects presented in this section are considered a "menu of projects" rather than a sequential list with an implied order of implementation.

The Top 30 projects are summarized in Table 8. Additional project information, scoring inputs, and prioritization results are provided in Attachment D.3 with detailed project summary maps provided in Attachment E.

TABLE 8: SUMMARY OF TOP 30 PROJECTS

Rank	Project Name	Score	Total Acres Treated (ac)	Impervious Acres Treated (ac)	Treatment System Type	Total Annual FC Reduction (MPNx10^12)	30-Year Lifecycle Cost
1	Sweetwater Rd	161	48.34	34.66	Tree Well (Type 3)	3.51	$4,059,000
2	Magnolia Ave	152	20.12	16.51	Tree Well (Type 3), HDS	1.78	$2,548,000
3	Campo Rd	149	11.95	9.95	Tree Well (Type 3), HDS	2.21	$1,470,000
4	S Mission Rd (North)	148	21.71	11.92	Tree Well (Type 3), HDS	1.34	$2,414,000
4	Ammunition Rd	148	3.50	2.35	Tree Well (Type 1), HDS	0.03	$513,000
6	Day St	146	6.25	4.04	Tree Well (Type 3), HDS	1.14	$853,000
6	Wintercrest Dr	146	3.74	2.95	Tree Well (Type 3)	0.97	$814,000
8	Osborne St	143	30.42	13.21	Tree Well (Type 3)	3.69	$1,360,000
9	S Mission Rd (W Aviation Rd)	140	5.41	3.32	Tree Well (Type 3)	1.37	$1,031,000
10	Denny Way	137	3.48	3.11	Tree Well (Type 3)	0.86	$1,255,000
11	S Main Ave	136	2.23	1.52	Tree Well (Type 1), HDS	0.14	$295,000
12	Vine St (El Cajon North)	135	4.72	3.75	Tree Well (Type 2)	0.31	$310,000
12	Channel Rd	135	2.52	1.79	Tree Well (Type 2)	0.49	$637,000
14	Vine St (El Cajon South)	126	3.23	2.63	Tree Well (Type 3), HDS	0.34	$266,000
15	S Santa Fe Ave	119	48.47	36.74	HDS	0.00	$87,000
16	Montecito Rd	118	7.08	4.21	HDS	0.00	$87,000
17	W Bradley Ave	117	5.85	5.33	HDS	0.00	$87,000
17	Vernon Way	117	8.71	7.18	HDS	0.00	$87,000
19	S Mission Rd (South)	115	2.22	1.22	Tree Well (Type 3)	0.26	$149,000
20	Troy St	113	0.89	0.55	Tree Well (Type 3)	0.14	$847,000
21	Airway Rd	111	23.56	11.38	Tree Well (Type 3)	1.20	$348,000
22	W Fallbrook St	110	0.72	0.56	Tree Well (Type 3)	0.11	$172,000
23	N Vine St (Fallbrook)	109	1.76	1.18	Tree Well (Type 3), HDS	0.24	$321,000
24	16th St	107	3.08	1.95	HDS	0.00	$119,000
25	Prospect St	104	4.41	3.34	HDS	0.00	$87,000
26	W College St	100	2.59	1.75	Tree Well (Type 3)	0.55	$1,101,000
26	Julian Ave	100	0.44	0.36	Tree Well (Type 3)	0.04	$78,000
28	Birch St	99	1.90	1.50	HDS	0.00	$87,000
29	Bancroft Dr	98	2.27	1.61	HDS	0.00	$199,000
30	8th St	94	1.71	2.47	HDS	0.00	$143,000
	TOTAL		283	193		20.7	$21,824,000

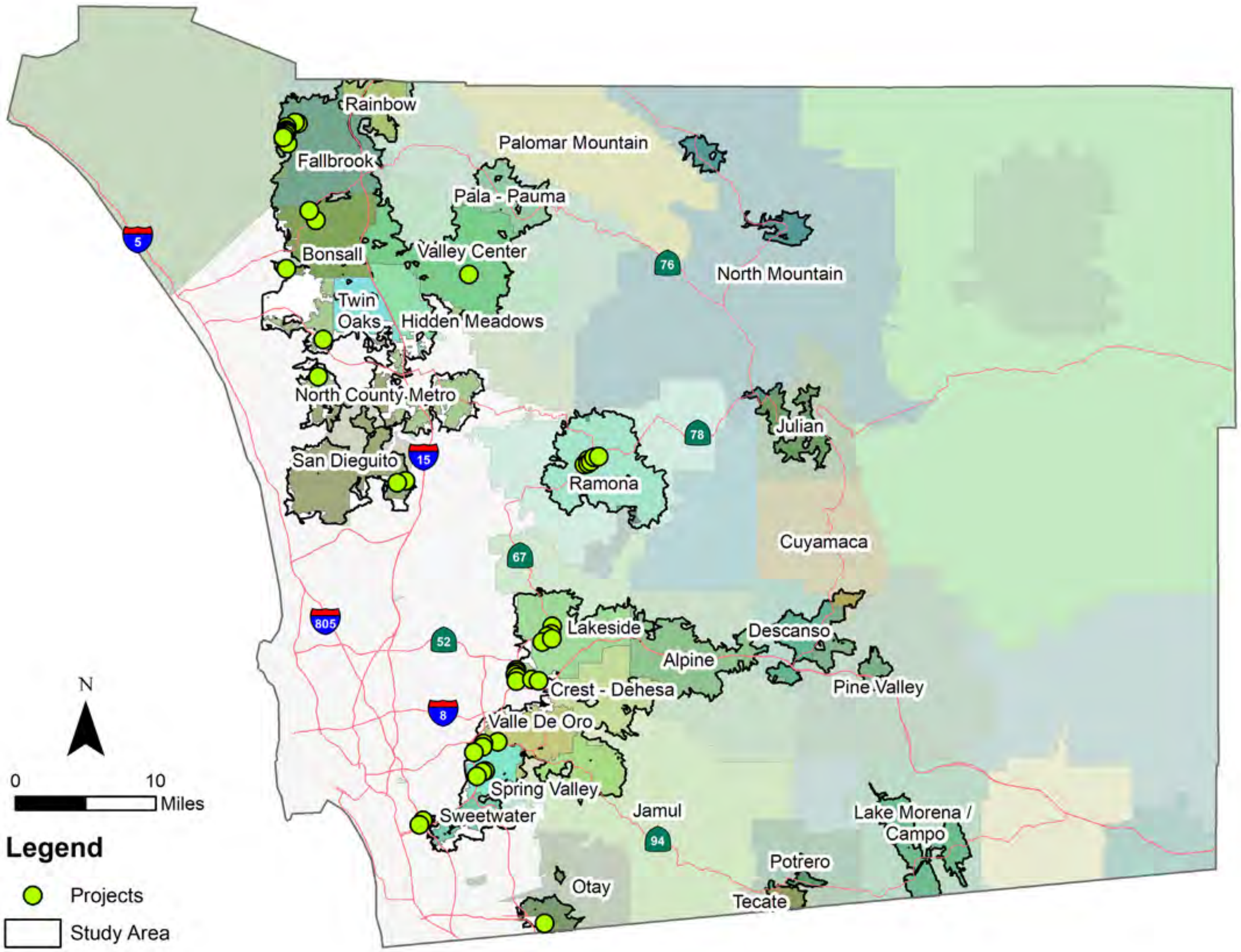


FIGURE 16: TOP 30 PROJECT LOCATIONS

The pollutant load reduction, runoff reduction, and average peak flow results for the top 30 projects are presented in Table 9. Detailed quantitative modeling results are shown in Attachment D.4. Volume-based results include the total, wet, and dry (summer and winter) weather volume treated, retained, captured, and bypassed. Pollutant loading results include total, wet, and dry (summer and winter) weather annual load reductions, including trash. Additionally, the 30-year lifecycle cost for the combined top 30 projects are shown in Table 10.

TABLE 9: ANNUAL BENEFITS FROM THE TOP 30 PROJECTS

	Fecal Coliform Reduction (MPNx10^{12})	Sediment Reduction (lbs)	Runoff Volume Reduction (cu-ft)	Average Long-Term Peak Flow Reduction
Wet Weather	20.7	42,700	87,900	0.77
Dry Weather	–	–	13,800	--
Total	20.7	42,700	101,700	0.77

TABLE 10: GSCW PLAN 30-YEAR LIFECYCLE COST, TOP 30 PROJECTS

Component	Total
Construction Cost	$7.0M
Soft Cost	$7.0M
Contingency	$1.4M
Net Present Value of Maintenance and Replacement	$6.4M
Total Net Present Value (over 30 years)	$21.8M

To illustrate the components and potential benefit of green streets projects included here, an example project titled the South Mission Road Green Streets Biofiltration Project is presented on the next page. This project has been identified through the GSCW planning process described in this plan.

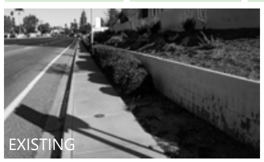
SOUTH MISSION ROAD

Green Streets Biofiltration Project

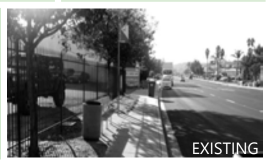
The South Mission Road Project will use green streets elements to capture and treat dry and wet weather runoff from 12 impervious acres of commercial, transportation, and other land uses along South Mission Road in Fallbrook. Green streets features are proposed to include vegetated tree well biofilters (above ground) and hydrodynamic separators (below ground). The project will support the County's progress toward meeting the Twenty Beaches and Creeks Bacteria Total Maximum Daily Load (TMDL) targets, while also treating runoff for sediment, nutrients, metals, and trash, thus protecting downstream waterbodies.

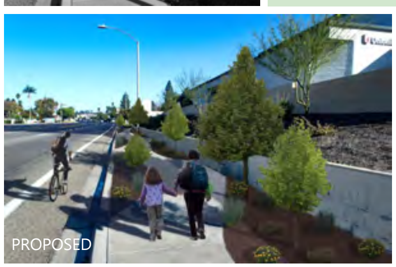
Other complete streets elements being considered include protected walkways, improved sidewalks, and at least one enhanced transit stop. Shaded pedestrian areas will support increased access to recreation and improved public health, enhancing the overall walkability of the corridor. The project will also provide local jobs, both directly via construction and maintenance of the green streets features, as well as indirectly at local businesses with increased foot traffic.

COMMUNITY	WATERSHED	PROJECT EXTENT	AREA TREATED	PRIORITY POLLUTANTS
Fallbrook	San Luis Rey	0.8 miles; 10,000 sq-ft	Total: 21.7 acres Impervious: 12 acres	Bacteria, nutrients, and sediment

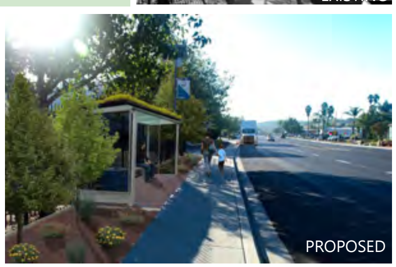


PROJECT COMPONENTS
Tree wells biofilters with underdrains, hydrodynamic separators, and segments of protected walkways.





South Mission Road at Rocky Crest Rd.



South Mission Road at Almond St.

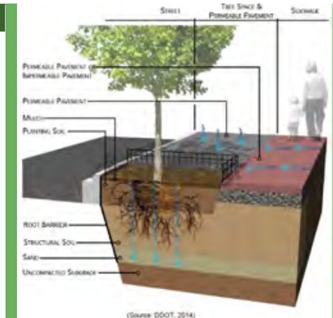
County of San Diego
Green Streets Clean Water Program (greenstreetscleanwater.org)

ENVIRONMENTAL BENEFITS

- Estimated to remove 1,698 lbs. of sediment annually
- Estimated to remove 1.34 x 10^{12} MPN of Fecal Coliform annually, supporting progress toward the Bacteria TMDL target
- Reduces flooding potential by capturing initial runoff
- Supports climate resilience through:
  - Carbon sequestration
  - Addressing vegetative cover in the community

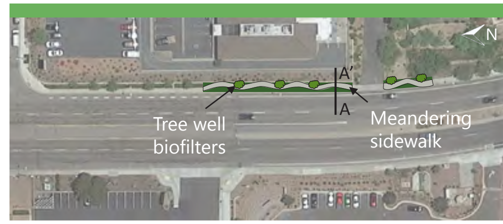
COMMUNITY BENEFITS

- Project benefits an Underserved Community
- Healthy Places Index = 37.7%
- CalEnviroscreen 4.0 = 48th percentile
- AB1550 Community
- Improves local walkability and pedestrian safety
- Improves community mobility and access to transit

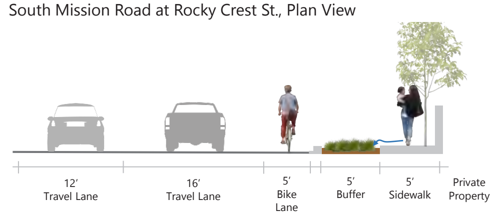


ECONOMIC BENEFITS

- Anticipated cost of water quality green streets elements:
  - Capital cost: $1.6M
  - Operations and maintenance cost:
    - Annual: $52,600; Total 30-year (Net Present Value): $864,000
  - 30-year lifecycle cost: $2.4M
- Provides local jobs during construction and maintenance
- Enhances aesthetics, encouraging increased local foot traffic



South Mission Road at Rocky Crest St., Plan View



South Mission Road at Rocky Crest St., Profile View (A-A')

South Mission Road Project Extent

County of San Diego
Green Streets Clean Water Program (greenstreetscleanwater.org)

GREEN STREETS CLEAN WATER

6
SUMMARY OF PROJECTS AND FUTURE VISION

6 SUMMARY OF PROJECTS AND FUTURE VISION

This Plan lays out a process that can be used to identify candidate locations for multi-benefit green streets projects that optimize water quality benefits while also prioritizing community benefits and cost-effectiveness.

The process presented in this Plan is one way to identify projects, and there may be more green streets projects worth implementing than the ones identified through the Plan. The GSCW Plan is not intended to develop a prescriptive list of candidate projects but to develop a menu of options that can be considered for further evaluation. Additionally, the quantification and ranking methods presented in this plan can be used to evaluate the relative benefits of other green streets projects and compare the relative benefits of green streets with other retrofit projects and programs.

As discussed previously, green streets projects can be implemented through a number of programs and processes, including as elements of larger CIP projects. While some of the potential projects identified here can be considered as standalone projects, others can and should be considered as starting points or supplemental aspects of larger projects. It is expected that through the next phases of the planning and design process, project aspects can and will change based on more detailed information that will be reviewed, collected, and evaluated as part of that process.

6.1 PROJECT BENEFIT SUMMARY

The full menu of projects identified here has the potential to provide significant benefits at both the community and regional watershed scale. The potential aggregated benefits of these projects are summarized below. As noted previously, actual benefits will vary based on individual project designs. It can be expected that benefits would decrease as project footprints are reduced due to presently unforeseen conflicts (e.g., due to underground utilities) and increase as project footprints are augmented due to additional site-specific opportunities (e.g., expansion of treatment system footprints into available parking, changes to roadway width). In fact, it is expected that significant additional benefits can be provided by incorporating these elements into larger transportation network retrofits focused on traffic safety improvements and increased mobility (refer to Section 6.2 for additional discussion).

ENVIRONMENTAL BENEFITS

TREATED AREA 193 IMPERVIOUS ACRES 283 TOTAL ACRES
TOTAL POLLUTANT LOAD REDUCTION 20.7 x 10^{12} MPN FECAL COLIFORM 42,700 LBS. SEDIMENT 796 GALLONS TRASH
TOTAL ANNUAL RUNOFF REDUCTION 101,700 CUBIC FEET OR 760,700 GALLONS
AVERAGE PEAK FLOW REDUCTION 0.8%
GREEN STREETS TREATMENT SYSTEMS 80 BIOFILTRATION TREE WELLS 26 HYDRODYNAMIC SEPARATORS

COMMUNITY BENEFITS

GREEN SPACE **82,300 SQUARE FEET**
TREES 1,000+
PROJECTS IN UNDERSERVED COMMUNITIES 30
SIDEWALK IMPROVEMENTS 3 MILES
OPPORTUNITIES FOR LOCAL ROAD SAFETY IMPROVEMENTS 15

6.2 PLAN LIMITATIONS, FUNDING STRATEGIES, AND POLICY OPTIONS

Green streets treatment systems are one tool in the toolbox to enhance water quality and address regulatory compliance goals while simultaneously providing desirable community benefits such as public health, green jobs, climate resilience, and improved quality of life. As such, green streets are intentionally designed to capitalize on available space within the public right-of-way, complementing other projects and programs with similar goals but different implementation approaches, such as regional treatment systems, retrofits on private property (e.g., County Waterscape Rebate Program), public education, compliance inspections, and other programs.

PLAN

6

The GSCW Plan presents a menu of projects identified to provide significant environmental and community benefits in a cost-effective way compared to other opportunities. These projects and treatment systems were identified based on known opportunities and constraints and were influenced by key decisions made by County staff and members of the multi-departmental Internal Advisory Committee who directed this project. In some cases, the inclusion of specific project attributes (e.g., environmental justice-related benefits) may qualify one project for funding over another, despite a lower overall ranking in this plan. For this reason, the set of projects presented in Section 6.1 is considered a "menu of projects" rather than a sequential list, with an implied order of implementation. In most cases, it was not feasible to maximize all potential benefits simultaneously on the projects identified. For example, shaded and protected sidewalks may be a high priority for communities; however, to maintain proper lines of sight and clear recovery zones for traffic safety, shade trees may not be feasible directly adjacent to travel lanes. To address these competing priorities, a project may include meandering walkways abutted by alternating biofiltration units, including trees that are limited to the sides opposite the roadway. While meeting multiple project objectives often requires a compromise, such a solution still provides some segments of separated walkways (versus a sidewalk still fully abutting the road), allows for trees in the biofilter segments opposite the roadway (versus no trees), and retains the biofiltration function.

The integration of green streets components into new and retrofit projects is also encouraged for private landowners as part of the development process, as described in the County of San Diego Green Streets Guidelines (County of San Diego, 2019a). In some cases, it may be prudent to further partner with specific private landowners to integrate shared goals and adjacent spaces into a mutually beneficial design (e.g., treatment systems on private frontages). Other design considerations may also make the implementation of green streets more accessible and commonplace, such as the development of standard details for traffic calming measures and mobility enhancements that incorporate water quality components.

Projects included in the GSCW Plan may be moved forward as funding becomes available. Beyond typical funding streams for the stormwater program such as the General Fund, alternate funding options will also be considered, including local, state, and federal grants and programs. For example, the American Rescue Plan Act and the Infrastructure Investment and Jobs Act, both approved in 2021, have the potential to provide significant funding for green infrastructure. Partnerships with local agencies, non-profit organizations, and private landowners can also be considered with appropriate agreements in place to govern long-term ownership and operations and maintenance responsibilities.

6

The potential policies and considerations presented below are based on examples from other regions, and may be further explored to encourage and enhance the use of green streets in unincorporated communities:

1. **Maximizing green street opportunities for additional implementation:**
    a. Consider incorporating green streets elements into all County right-of-way projects where feasible, whether they are priority development projects or not, evaluate green street opportunities and constraints as early as possible in the project planning process.
    b. Review the existing "Pavement Cut Policy" (County of San Diego, 2016b) and evaluate the addition of exceptions for green streets projects located within the right-of-way, but out of the travel lanes to reduce potential delays in project implementation.
    c. Oversize green streets, where possible, when used for compliance on County-sponsored CIP projects to support a future water quality credit trading program and to provide potential revenue generation for additional projects.
    d. Expand green streets guidance and resources to facilitate the implementation of complementing green streets elements including traffic calming measures, protected bike lanes, transit stops, and striping elements. This will allow a more network-focused approach as outlined in the Small Town and Rural Multimodal Networks report (FHWA, 2016).

2. **Improve benefit quantification and refinement of cost assumptions to support County of San Diego priorities:**
    a. Quantify the potential benefits (both water quality, to assess progress toward TMDL targets, and community benefits) of green street elements in all ROW projects.
    b. Track design, permitting, construction, and operations and maintenance costs of green streets projects to support development and refinement of County-specific project costs. This will help inform cost-effectiveness and return-on-investment analyses and allow the County to better project the cost of future pollutant load reductions (i.e., WQIP and TMDL compliance).

3. **Explore opportunities for treatment outside of the ROW:**
    a. Investigate opportunities to treat ROW runoff on adjacent private properties while implementing the appropriate agreements with the adjacent property owners.

7 REFERENCES

7 REFERENCES

Brown and Caldwell, 2015. Business Case Evaluation of Structural BMPs Final Report.

California Air Resources Board, 2017. Identification of Low-Income Communities under AB 1550 Methodology and Documentation for Draft Maps. https://ww2.arb.ca.gov/sites/default/files/classic/cc/capandtrade/auctionproceeds/kml/ab1550_maps_documentation.pdf

California Department of Transportation (Caltrans), 2019. Statewide Trash Implementation Plan, CTSW-RT-19-379.09.2. https://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/caltrans/trash_implement_plan_20181130.pdf

California Department of Transportation (Caltrans), 2021. Meeting with Caltrans District 11 NPDES Coordinator, 4 February 2021.

California Regional Water Quality Control Board San Diego Region, 2015. San Diego Region 9 Municipal Separate Storm Sewer System (MS4) Permit, Amended Order No. R9-2013-0001. https://www.waterboards.ca.gov/sandiego/water_issues/programs/stormwater/docs/2015-1118_AmendedOrder_R9-2013-0001_COMPLETE.pdf

California State Water Resources Control Board, 2015. Resolution Number 2015-0019, Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provision of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California. https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2015/rs2015_0019.pdf

California Department of Water Resources, Integrated Regional Water Management (IRWM) Grant Programs (Proposition 1, Proposition 84). https://water.ca.gov/Work-With-Us/Grants-And-Loans/IRWM-Grant-Programs

California Department of Water Resources, 2020. Sustainable Groundwater Management Act 2019 Basin Prioritization. May. https://water.ca.gov/programs/groundwater-management/basin-prioritization

California Stormwater Quality Association (CASQA), 2017. Use of the Triple Bottom Line Analyses to Support Stormwater Management Objectives, June 2017.

County of San Diego, 2014. Low Impact Development Handbook, Appendix F. https://www.sandiegocounty.gov/content/dam/sdc/dpw/WATERSHED_PROTECTION_PROGRAM/susmppdf/lid_appendix_f_geotechnical_considerations.pdf

County of San Diego, 2016a. Active Transportation Plan, Appendix D (Pedestrian Gap Analysis Report), June 2016. https://www.sandiegocounty.gov/content/dam/sdc/pds/advance/activetransportationplan/AppendixD.pdf

County of San Diego, 2016b. Pavement Cut Policy, Policy-RO-7. https://www.sandiegocounty.gov/content/dam/sdc/dpw/COUNTY_ROADS/roadspdf/DPW_POL-RO-7.pdf

County of San Diego, 2019a. Green Streets Guidelines, January 2019. https://www.sandiegocounty.gov/content/dam/sdc/dpw/WATERSHED_PROTECTION_PROGRAM/watershedpdf/Dev_Sup/GS_Guidelines_2019.pdf

County of San Diego, 2019b. Green Streets Standard Drawings, Department of Public Works, Revised March 2021. https://www.sandiegocounty.gov/content/dam/sdc/dpw/WATERSHED_PROTECTION_PROGRAM/watershedpdf/Dev_Sup/CoSD_GS_STD_DWG.pdf

County of San Diego, 2020a. 5 Year Capital Improvement Plan: Fiscal Years 2020/21 to 2024/25. Department of Public Works, Summer 2020. https://www.sandiegocounty.gov/content/dam/sdc/dpw/ENGINEERING_SERVICES/CIP%205%20year%20plan_FY20-21_9-18-20%20tp.pdf

County of San Diego, 2020b. County of San Diego BMP Design Manual, Department of Public Works, 15 September 2020. https://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction/BMP_Design_Manual.html

County of San Diego, 2020c. Park Lands Dedication Ordinance, Parks and Recreation. https://www.sdparks.org/content/dam/sdparks/en/pdf/Development/Park%20Lands%20Dedication%20Ordinance.pdf

County of San Diego, 2021a. General Plan: Chapter 9 Environmental Justice Element, August 2021. https://www.sandiegocounty.gov/content/dam/sdc/pds/gpupdate/09-Environmental-Justice-Aug2021.pdf

County of San Diego, 2021b. Ranking Methodology for Intersections and Segments for the Local Roadway Safety Plan Memorandum, May 2021.

County of San Diego, 2021c. Unit & Maintenance Cost Tool, Version 3.0, Department of Public Works, Land Development Division, August 2021. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.sandiegocounty.gov%2Fcontent%2Fdam%2Fsdc%2Fdpw%2FWATERSHED_PROTECTION_PROGRAM%2Fwatershedpdf%2FDev_Sup%2FUnit_%26_Maintenance_Cost_Tool.xlsx&wdOrigin=BROWSELINK

County of San Diego, 2021d. Unit Price List, Department of Public Works, Land Development Division, July 2021. https://www.sandiegocounty.gov/content/dam/sdc/dpw/LAND_DEVELOPMENT_DIVISION/landpdf/County%20Unit%20Price%20List%20PDS%20DPW%20-%202021%20Clean.pdf

Environmental Science Associates (ESA), 2017. San Diego Region Functionally Equivalent Storm Water Resource Plan (SWRP). June. https://www.sdirwmp.org/pdf/SDRegionSWRP_Final_June2017.pdf

Federal Highway Administration (FHWA), 2016. Small Town and Rural Multimodal Networks, December 2016. https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/

Institute for Sustainable Infrastructure (ISI), 2018. Envision: Sustainable Infrastructure Framework Manual, Version 3. https://sustainableinfrastructure.org/wp-content/uploads/EnvisionV3.9.7.2018.pdf

Los Angeles County Flood Control District (LACFD), 2019. Safe, Clean Water Program Feasibility Study Guidelines. Adopted September 19, 2019. https://safecleanwaterla.org/wp-content/uploads/2019/09/Feasibility-Study-Guidelines-20190917-FINAL-1.pdf

Michael Baker International (MBI), date unknown. Campo Road Corrido Revitalization Specific Plan. Prepared for County of San Diego.
https://www.sandiegocounty.gov/content/dam/sdc/pds/advance/Casa%20de%20Oro/Campo%20Road%20Corridor%20Revitalization%20Specific%20Plan.pdf

Office of Environmental Health Hazard Assessment (OEHHA), 2018. CalEnviroScreen 3.0 June 2018 Update Sitewide Results.
https://oehha.ca.gov/media/downloads/calenviroscreen/document/ces30june2018updatemapsfinal.pdf

San Diego Region MS4 Copermittees, 2018. Water Quality Equivalency Guidance Document, Updated 15 March 2019.
https://projectcleanwater.org/download/2018-wqe/

San Diego Region MS4 Copermittees. Water Quality Improvement Plans. Various Dates.
https://projectcleanwater.org/watersheds/

United States Environmental Protection Agency (US EPA), 2005. National Management Measures to Control Nonpoint Source Pollution from Urban Areas. EPA-841-B-05-004, U.S. EPA, Washington D.C.

United States Environmental Protection Agency (US EPA), 2018. 2014-2016 California Integrated Report, Prepared by the California State Water Resources Control Board, Approved 6 April 2018.
https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/impaired_waters_list/

United States Environmental Protection Agency (US EPA), 2021. Justice40 Climate Initiative – Section 223 of EO 14008. January 27.
https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/

ATTACHMENT A: QUESTIONS AND ANSWERS

Is there a list available of project areas currently under consideration for green streets?

Thus far the priority drainage areas have been identified, and within these areas, project sites are currently being evaluated. Both the priority drainage areas and the projects themselves will be provided in the Green Streets Clean Water Plan.

The Watershed Protection Program sponsored project information can also be found, for projects already moving forward: www.sandiegocounty.gov/stormwater and click on the Green Infrastructure icon.

The Mapleview Green Street Project was described during the Green Streets Clean Water Webinar. Is it one of the 30 projects that will be included in the Green Streets Clean Water Plan?

No, the Mapleview Green Street Project is currently in design and is anticipated to go into construction later this year. Thirty (30) additional projects will be identified in the Green Streets Clean Water Plan.

Are the priority projects available to the public?

Candidate projects have not yet been selected, as they will be developed in consideration of the information we receive from stakeholders during the meeting and from the survey. The candidate project locations will be included in the draft and final Green Streets Clean Water Plan, expected by early 2022.

How can we nominate specific areas for a project?

The survey includes an open response field for additional questions or comments. Please provide suggestions for candidate sites there.

Will all medians be raised and landscaped?

The incorporation of raised medians on County Road projects depends on several factors such as road classification, traffic movement, and traffic safety. In most cases, raised medians are not vegetated. The use of raised medians with vegetation will be considered on green street projects only if there are opportunities to direct runoff to these areas where the most water quality benefits can be achieved. Specific project design will be presented to the community similar to any Capital Improvement Program project.

ATTACHMENT A: QUESTIONS AND ANSWERS

Will trees survive after they receive all those pollutants?

Trees improve water quality by slowing rain as it falls to the Earth, and helping it soak into the soil. By filtering the water with tree roots and soil, pollutants get trapped and diluted which reduces the impact of water pollution.

How will vegetation be irrigated?

Irrigation requirements would depend on the type of vegetation proposed and the availability of water. If irrigation is needed, it will be installed consistent with the County's Water-Efficient Landscape Design Manual. Specific project design will be presented to the community similar to any Capital Improvement Program project.

Will traffic calming mean reduced lanes? What if the community does not like reduced lanes?

Traffic calming can be accomplished through several different measures without resorting to the reduction of traffic lanes. Any of the proposed traffic calming measures will be communicated to the community and presented to the local Community Planning Group.

Are Type IV (protected) bike lanes under consideration for the Mapleview project or any of these other projects?

Type IV bike lanes are not included as part of the Mapleview Project. Fitting Type IV bike lanes into existing roadways can be challenging due to the limited space within the existing built environment and right-of-way. If a green street project is proposed in an area identified for Type IV bike lanes in the County's Active Transportation Plan, the bike lane opportunity will be considered along with other priorities for that specific project.

Will tree wells be designed so that the trees will not buckle pavement as they mature? Great potential for urban forestry here.

The County's Green Streets Standard Drawings, which will be used for this project, include design features and specifications for the tree wells and biofiltration media that direct roots downward rather than horizontally, providing sufficient volume for root establishment and runoff storage. These design features are intended to avoid impacts to sidewalks and roadways while allowing trees to reach their natural heights.

ATTACHMENT A: QUESTIONS AND ANSWERS

Could this program create a vector control problem by allowing standing or ponded water and thus breeding of mosquitos?

Projects will be designed to avoid the ponding of water. The County's Green Streets Standard Drawings, which will be used for this project, intentionally limit the depth of ponded water and require efficient drain times to avoid becoming a breeding environment. Projects with underdrains will provide a backup mechanism for collected runoff to exit the treatment systems to ensure that ponding will not occur.

How are these projects funded?

Most Green Infrastructure (GI) projects in the County roadway have different funding than the regular Capital Improvement Program projects. GI projects are primarily funded through the County general fund and supplemented with water quality grants, whereas typical CIP projects are funded through highway user tax (gas tax), and Federal Highway grants.

What jobs will this program create? Are they long-term or from construction only?

There will be construction jobs during the construction stage, but also long-term jobs can be created by the effect of improving the community with more aesthetically pleasing features, for example, if you have more people visiting your community that will create more jobs, not to mention the jobs in maintaining the vegetation and other features.

Who will maintain the landscaping?

Depending on the nature of landscaping there could be more than one entity involved in conducting the actual maintenance. The County Department of Public Works (DPW) is responsible for ensuring that the landscaping in the right-of-way is maintained either through the use of the County Road Crews or through the use of a landscape contractor.

Where will the funding come from to maintain the landscaping?

County general fund is currently identified as the funding source for green street projects. The goal is to limit the cost of maintaining landscaping through the use of drought-tolerant, native, and non-invasive species. Once the vegetation is established, there is a potential for irrigation and maintenance costs to be reduced. Funding will be from a variety of sources, including general funds.

ATTACHMENT A: QUESTIONS AND ANSWERS

How will water supply concerns be considered for vegetated green streets that will require irrigation?

Vegetated green streets projects will be landscaped using drought-tolerant, non-invasive vegetation, with a preference for native species. Such plants will require some supplemental water when first established to transition away from irrigation over the long term. Additionally, green streets projects are intentionally sited and designed to receive runoff from roads, curbs/gutters, and sidewalks during both dry weather (from sources such as over-irrigation), and wet weather (as stormwater), further offsetting the irrigation demand.

How will green streets projects impact residential street right-of-way frontages that a homeowner may have landscaped themselves?

While the majority of projects will be located outside of residential areas, the County recognizes that residents are invested in the condition of the right-of-way adjacent to their property and understand that some right-of-way areas have been landscaped. If a project is planned in such a location, the County will consider this during the design phase. In cases where prior landscaping necessitates removal, the replacement would be designed to be aesthetically pleasing, pollinator-friendly, etc.

Is proximity to schools being considered in the placement of green streets projects?

Proximity to schools is one of many factors considered in the overall scoring of the projects.

ATTACHMENT B – DATA SOURCES

Attachment B: Data Sources

Data Name	Catchment Opportunity Screening & Prioritization	Project Screening & Prioritization, and BMP Siting	Description	Source	Publication Date	Geometry
85th Percenitle Isohyets	Water Quality Benefits	Environmental Benefits	85th Percentile Storm Depths	SanGIS	13 June 2017	Line
Bike Routes	-	Community Benefits	Existing bike facilities in the San Diego Region.	SanGIS	2020	Vector
California Healthy Places Index (HPI)	-	Environmental Benefits	California Census Tracts with the California HPI scores	Public Health Alliance of Southern California	Varies	Polygon
Caltrans ROW	Community Benefits	BMP Siting / Selection	Caltrans rights-of-way	Caltrans	Varies	Polygon
Catchments	General / Constraints	General	Catchments (Outfall and Inlet Scale)	County of San Diego	2020	Polygon
CIP 5-Year Plan - Projects	Community Benefits	BMP Siting / Selection	CIP project locations/footprints	County DPW	2021	Vector
Collision Prone Areas	-	Community Benefits, BMP Siting / Selection	Top ranked streets and intersections from Local Road Safety Plan	County DPW	13 May 2021	Polygon
Contaminated Sites	-	BMP Siting / Selection	Location of “Active” and “Closed” contaminated sites	GeoTracker	2021	Point
County of San Diego ROW	Water Quality Benefits and General / Constraints	BMP Siting / Selection	County of San Diego rights-of-way	SanGIS	2020	Polygon
Depth to Groundwater and Well Data	-	BMP Siting / Selection	Historic site and well information depth	GAMA (Groundwater Ambient Monitoring and Assessment) and GeoTracker	Varies	Point
Digital Elevation Model (DEM)	-	BMP Siting / Selection	Tiles, county-wide, built from LiDAR-derived contour data	USGS	2015	Raster
Disadvantaged Communities	Community Benefits	Community Benefits	Economically disadvantaged communities (SB535)	CalEnviroScreen	2020	Polygon
Environmental Justice Communities	Community Benefits	Community Benefits	Underserved communities identified by the County of San Diego	CalEnviroScreen and Live Well San Diego	2020	Polygon
Environmentally Sensitive Areas	General / Constraints	General	Environmentally Sensitive Areas (ESA) - includes Multiple Species Conservation Program (MSCP) hardline designations and MSCP preserved land	SanGIS	2019	Polygon
Envision (Version 3)	-	Environmental Benefits, Community Benefits	Framework with 5 categories utlized in a triple bottom line approach. Sourced specificially for community and water supply metrics	Institute of Sustainable Infrastructure (ISI)	2018	Reports, Web
Event Mean Concentrations (EMCs)	Water Quality Benefits	Environmental Benefits	Average EMCs for Pollutants by Landuse in the WQE Guidance Document for Region 9	San Diego Regional Water Quality Control Board	2018	Tabular
Existing/Planned BMPs	General / Constraints	BMP Siting / Selection	Existing and planned distributed/regional BMPs	County DPW	2021	Vector
Flood Maps	-	BMP Siting / Selection	Floodplains, floodways, flood control channels	County DPW	08 January 2021	Polygon
Groundwater Basins	Water Quality Benefits	Environmental Benefits, BMP Siting / Selection	Groundwater Basins w/Beneficial Uses	SanGIS	2020	Polygon
Historical Rainfall	Water Quality Benefits	Environmental Benefits	High resolution rainfall data showing intensity (5 min or bucket tips). Raw data from OneRain	County of San Diego	Varies	Tabular
Hydrologic Subareas (HSAs)	Water Quality Benefits	General	Hydrologic Subareas delineations	California Interagency Watershed Mapping Committee	1999, revised 2004	Polygon
Impervious Areas	Water Quality Benefits	Environmental Benefits	Impervious area classification	NLCD	2016	Raster
Jurisdictional Boundaries	General / Constraints	General	City, County, Unincorporated	SanGIS	2020	Polygon
Land Uses	Water Quality Benefits	Environmental Benefits	County Land Use	County of San Diego	2019	Polygon
Low Income Communities	Community Benefits	Community Benefits	Low Income Communities (AB1550)	County of San Diego	June 2018	Polygon
LUEG 0.2 Underserved Community	-	Community Benefits	Census Tracts that are identified as "Underserved Communities" per criteria provided by LUEG.	County of San Diego	2021	Polygon
Median Income	Community Benefits	Community Benefits	Median income by census tract	US Census	2010	Polygon
Opportunity Zones	Community Benefits	Community Benefits	Disadvantaged communities with tax benefits to investors	CalEnviroScreen	2020	Vector
Parks	Community Benefits	Environental Benefits, Community Benefits	County Parks	SanGIS	2009	Vector
Pedestrian Gap Analysis	-	Community Benefits, BMP Siting / Selection	Identified and ranked road segments from the Active Transportation Plan	County of San Diego	2016	Vector
Priority Land Uses	Water Quality Benefits	Environmental Benefits, BMP Siting / Selection	Priority Land Uses (Trash)	County DPW	2021	Polygon
Publicly-Owned Parcels	General / Constraints	General	All parcels w/ ownership info	SanGIS	2020	Polygon
Rail Stations	-	Community Benefits	Existing rail stations in the California passenger rail system. Pulled from the California State Geoportal. Station information was compiled from Amtrak Operating Timetable 45 and commuter rail websites for Metrolink, ACE, Caltrain, and Coaster	Caltrans	2020	Vector
Receiving Waters	Water Quality Benefits	Environmental Benefits	Linear and polygon features (rivers, streams, lakes, etc) based on NHD Hydrology	SanGIS	2020	Vector
Roads	-	BMP Siting / Selection	County Maintained Roads, Private Roads, Freeways and Highways, Signs, Curbs, Sidewalks, Road Classifications, Roadway Widths, Frontage Zone Widths	County DPW	08 January 2021	Vector
Sanitary Sewer Network	-	Environmental Benefits, BMP Siting / Selection	Sanitation District Boundary, Gravity Mains, Pressurized Mains, Trunk Lines, Lateral Lines, Manholes, Junctions, Easements	County DPW	08 January 2021	Vector
Seismic Hazards	-	BMP Siting / Selection	Geohazards (Faults, Potential Liquefaction Zones)	SanGIS	2017	Vector
Semi-Rural Residential Areas	Community Benefits	General	Regional semi-rural category	SanGIS	Varies	Vector
SGMA Basin Prioritization	-	Environmental Benefits	California’s 515 groundwater basins and subbasins.	California Department of Water Resources	2020	Polygon
Soils w/ Hydrologic Soil Group	Water Quality Benefits	Environmental Benefits, BMP Siting / Selection	Soil Type, Hydrologic Soil Group, and Infiltration Rate	NRCS SSURGO Web Soil Survey	2014	Polygon
Storm Drain Network	General / Constraints	Environmental Benefits, BMP Siting / Selection	County gravity storm sewers, inlets, outlets, etc. (MS4)	County DPW	2021	Vector
Stormwater Resource Plan (SWRP)	-	Environmental Benefits, Community Benefits	Provides scoring and ranking for project prioritization through quantification methods, specifically for water supply project areas	County of San Diego	2017	Reports, Web
Superfund Sites	-	BMP Siting / Selection	Environmental hazard clean-up sites	US EPA	Varies	Vector
Supervisor Districts	Water Quality Benefits and General / Constraints	General	Supervisor district boundaries	SanGIS	2018	Polygon
TMDL and 303(d) Receiving Waters	Water Quality Benefits	Environmental Benefits	TMDLs and Impaired Waterbodies	SanGIS	2019	Vector
Topography	-	BMP Siting / Selection	High Resolution Contours	SanGIS	Varies	Polyline
Transit	-	Community Benefits	Public bus, commuter and light rail, and trolley lines and stops	SanGIS	2021	Vector

Trash Generation Rate	Water Quality Benefits	Environmental Benefits	Average Annual Trash Generation by Land Use	County of San Diego	2018	Tabular
Tree Canopy	Community Benefits	General	Tree Canopy Classification (elevated vegetation ≥15-ft) from SDCounty AOI Classification	SanGIS	2019	Raster
Village and Community Planning Areas	General / Constraints	General	Community villages	SanGIS	2017	Vector
Water Board Region Boundary	General / Constraints	General	Water board region boundaries	California State Water Board	2020	Polygon
Water Districts	-	BMP Siting / Selection	Water District Boundaries	County DPW	08 January 2021	Vector
Watershed Boundaries	General / Constraints	General	Regional Watersheds and Subwatersheds	ProjectCleanWater	Varies	Polygon

ATTACHMENT C – WATER QUALITY BENEFIT QUANTIFICATION

1 INTRODUCTION

This attachment summarizes the water quality benefit quantification approaches used in the scoring of the priority drainage areas (opportunity identification) and selection of priority projects (project prioritization).

2 OPPORTUNITY IDENTIFICATION

This section describes the water quality benefit opportunity screening and scoring approach utilized for the drainage areas evaluated in the GSCW Plan. The intent of this exercise was to prioritize drainage areas that would have the potential to provide the greatest pollutant load reduction if green streets BMPs were to be implemented and facilitate a more focused review of individual project opportunities within the narrower subset of prioritized drainage areas. This approach allows for green streets BMPs to be sited in areas most needing treatment, and likely to provide a significant benefit with regards to pollutant load reduction and TMDL compliance. The water quality score was combined with the community benefit score, as described in Section 3 of the GSCW Plan) to identify the drainage areas with optimized potential for both water quality and community benefits.

2.1 Approach

To form the basis of the relative scoring between drainage areas, pollutant contributions were area-weighted into a representative drainage area concentration with a simplified estimate for local runoff hydrology. This simplified method made use of land surface slivers with similar runoff-affecting characteristics. These slivers are referred to as Hydrologic Response Units (HRUs) and were determined by the geospatial intersection of soil type, land use, mean annual precipitation, and imperviousness. This simplified hydrology is meant to be broadly consistent with the County's guidance for estimating BMP sizing (County of San Diego, 2020a). This simplified hydrology is appropriate for making comparisons of annual runoff volume between BMP siting locations and not to be used to create or inform numerical estimates of whole-watershed hydrology.

The screening utilized the input data identified in the following sections, with a unique drainage area-relative pollutant concentration for each individual pollutant of concern.

2.1.1 Unit of Analysis

The unit of analysis for the water quality opportunity prioritization was the drainage area layer developed for the County through the 2018 Trash Amendment work. These drainage areas were developed using a combination of GIS and PCSWMM to perform typical automated delineation techniques. The resulting drainage areas were then refined based on a manual QA/QC procedure as outlined in the Inlet Mapping, Collection, and Drainage Area Mapping Report (County of San Diego, 2018a). The layer contains a total of 19,347 individual drainage areas, 7,813 of which fall within the study area and establish the analysis units for the water quality prioritization. The average area of the water quality prioritization drainage areas is 47 acres, with a number of significantly larger drainage areas within the lesser developed areas and significantly smaller drainage areas (less than an acre) within the well-defined village areas.

2.1.2 Pollutants of Concern

The water quality prioritization provided a score for each drainage area for each of the following eight pollutants: Total Suspended Solids (TSS), Total Phosphorous (TP), Total Nitrogen (TN), Total Copper (TCu), Total Lead (TPb), Total Zinc (TZn), Fecal coliform (FC), and trash. These pollutants of concern were selected in keeping with typical land use-based pollutant modeling and local practices as described in Appendix B of the Water Quality Equivalency (WQE) Guidance Document Region 9 (County of San Diego, 2018b). Trash was not included in the WQE but has been added to this analysis due to the implementation of the Statewide Trash Amendments and development of land use based annual trash generation rates for priority land uses developed since the publishing of the WQE.

Relative pollutant concentrations were assigned to each of the pollutants of concern (except for trash which was assigned an annual generation rate) based on the contributing land use category in Appendix B of the WQE (County of San Diego, 2018b). Relative pollutant concentrations were used in place of land use event mean concentration (EMC) values to mitigate for the orders of magnitude difference in concentrations between pollutants from different land uses (e.g., rural residential TSS concentration of 2,524 mg/l vs. transportation TSS concentration of 78 mg/l) non-uniform units between categories (i.e., FC and others). This is the same approach and same values that were proposed and used in the WQE (methodology outlined in Section B.12) and allows for a better comparison between pollutants and the development of a single combined score. Table 1 summarizes the relative pollutant concentrations used.

Table 1. Relative Pollutant Concentrations

Land Use Category	TSS	TP	TN	TCu	TPb	TZn	FC
Agriculture	0.45	1.00	1.00	1.00	1.00	0.59	1.00
Commercial	0.13	0.16	0.16	0.56	0.48	1.00	0.87
Education	0.13	0.2	0.11	0.14	0.25	0.39	0.13
Industrial	0.13	0.19	0.15	0.54	0.68	0.89	0.49
Multi-Family Residential	0.10	0.13	0.13	0.14	0.15	0.29	0.27
Orchard	0.18	0.17	0.67	1.00	1.00	0.59	0.11
Rural Residential	1.00	0.51	0.14	0.10	0.71	0.13	0.19
Single Family Residential	0.13	0.2	0.15	0.27	0.43	0.35	0.63
Transportation	0.11	0.26	0.12	0.53	0.31	0.62	0.12
Vacant / Open Space	0.16	0.10	0.10	0.12	0.10	0.10	0.10
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00

The WQE does not provide a relative pollutant concentration for trash, so for this analysis, the values were determined by normalizing the annualized loading rate by the maximum value (6 gallons/acre/year for commercial land uses). Table 2 summarizes the relative pollutant concentrations developed for the Trash used in this analysis.

Table 2. Relative Trash Concentration (Yield)

Land Use Category	Annual Yield (gallons/acre)	Relative Trash Yield Concentration
Commercial	6	1.00
High Density Residential	2.5	0.41
Industrial	2.6	0.43
Public Transportation Station	6	1.00
Alternative Land Use	1	0.16
Undeveloped	0	0.00

2.1.3 Receiving Water TMDLs and Impairments

Receiving water TMDLs and impairments on the 2014/2016 303(d) List (2014/2016 California Integrated Report[1]) were identified for the pollutants of concern and mapped to the corresponding drainage area based on HSA (see the GSCW Section 3, Figure 3). HSAs were used to trace TMDLs and impairments to upstream drainage areas such that all contributing drainage areas could be identified and included in the scoring.

The 2014/2016 California Integrated Report places each assessed waterbody segment into five categories based on the overall beneficial use of the water segment and the need for a TMDL. 303(d) listings for this analysis were filtered for Category 5 (listing requiring the development of a TMDL) and Category 4b (listing is being addressed by an action other than a TMDL). Category 4a 303(d) listings are addressed by USEPA approved TMDLs and are included under the receiving water TMDLs. Table 3 summarizes the TMDLs included in this evaluation (TMDLs with no contributing study areas have not been included).

[1] State Board approved the 2014 303(d) List on October 3, 2017, by Resolution No. 2017-0059, and on April 6, 2018, USEPA approved the List. At the time of this analysis, the State Board had not yet released the 2018 Integrated Report.

Table 3. San Diego Region 9 TMDLs within Study Area

TMDL	Status	Adoption/ Approval Date	Pollutants of Concern	HSAs	
Revised Project I - Twenty Beaches and Creeks in San Diego Region (including Tecolote Creek)	TMDL Adopted	February 10, 2010	Indicator Bacteria (Fecal Coliform)	901.11 901.12 901.13 901.14 901.27 901.30 903.00 904.50	905.00 906.10 906.30 906.50 907.11 907.12 908.22
Rainbow Creek Watershed Nitrogen and Phosphorus TMDLs	TMDL Adopted	February 9, 2005	Total Nitrogen & Total Phosphorous	902.22 902.23	
Loma Alta Slough Phosphorus TMDL	Alternate Approach TMDL Approved	June 26, 2014	Total Phosphorus	904.10	

2.1.4 Other Data and Uses

Additional data and their respective use in the water quality prioritization are identified and summarized below, source information is included in GSCW Plan Attachment B, and graphical inputs are shown in Section 3.1 of the GSCW Plan.

- **Hydrologic Subareas (HSA)** – The HSA is one of the nested levels of watershed delineations developed and cataloged in the California Interagency Watershed Map of 1999 (California Interagency Watershed Mapping Committee, 1999, updated 2004) as the State's working definition of watershed boundaries. TMDLs are mapped to associated HSAs, which are used in this analysis to map downstream impairments to upstream contributing drainage areas.

- **Land Use –** This analysis uses two land use classifications to associate the relative concentrations from Table 1 and Table 2 to each of the drainage areas. The typical land use categories used for the WQE and WQIPs are used for pollutants, while the priority land uses categories from the Trash Amendments are used for Trash. Each drainage area is divided into separate land uses and assigned relative concentrations as shown for Pollutants and Trash.

- **Imperviousness and Hydrologic Soil Group (HSG) –** Impervious area and HSG are used to calculate the area weighed runoff coefficient of each drainage area. Percent Impervious from the CONUS Imperviousness National Land Cover Database (NLCD, 2016), which assigns a value to each 30-meter square grid cell, was resampled within the study area to five times resolution (i.e., each 30-meter grid was divided into 25 identical grid cells) which allowed for spatial averaging across watershed and land-use boundaries. Impervious surfaces were assigned a runoff coefficient of 0.9, consistent with guidance from the County of San Diego Best Management Practice Design Manual (County of San Diego, 2020a). Runoff coefficients of 0.10, 0.14, 0.23, and 0.30 were assigned to previous portions of the drainage areas by HSGs A, B, C, and D, respectively, consistent with guidance from the County of San Diego Best Management Practice Design Manual (County of San Diego, 2020a). Additionally, areas that were as classification of "Rock" or "Water" in the USGS data were assigned runoff coefficients of 0.9 (i.e., assumed impervious).

Table 4 summarizes the breakdown of land use and impervious area across the study area. Impervious area was determined by multiplying the aggregated % impervious value by the total area; these values are provided for general information only and were not used in the scoring analysis.

Table 4. Land Use Summary within Study Area

EMC Land Use	Area (Ac)	Impervious Area (Ac)	Percent Impervious (%)
Agriculture	26,392	1,348	5
Commercial	3,372	1,823	54
Education	6,851	1,763	26
Industrial	3,598	1,728	48
Multi-Family Residential	6,185	2,932	47
Orchard	23,983	326	1
Rural Residential	90,801	5,221	6

EMC Land Use	Area (Ac)	Impervious Area (Ac)	Percent Impervious (%)
Single Family Residential	47,693	14,819	31
Transportation	22,001	7,724	35
Vacant / Open Space	136,678	2,950	2
Water	1,380	50	3.6
Summary (Totals/Weighted)	**367,554**	**40,634**	**11**

- **County Maintained and Private Roads**- The County-maintained and private roads were determined using data from the County of San Diego Department of Public Works and identified based on the jurisdiction attribute. This data set was used to verify that the drainage areas within the study area, to potentially be considered for BMP siting, intersected a portion of County maintained right-of-way (ROW) (public or private). For the screening level intersect analysis, a ROW width of 106 ft. (corresponding to the "Boulevard with median" classification from the Road Registry) was selected. This selection was made to capture a larger number of drainage areas potentially draining to the ROW. A total of 1,485 drainage areas (19%) were identified that did not intersect with the ROW and were subsequently removed from the analysis.

- **Average Annual Precipitation-** At this broad stage of analysis, average annual precipitation was assumed constant across the study area so as not to bias the resulting scoring against portions of the study area with lower annual precipitation. High-resolution rainfall data from a number of gages throughout the County was used for the performance evaluation steps to be conducted for project prioritization (Section 3).

2.1.5 Hydrologic Response Units (HRUs)

The data above were combined to develop unique combinations of land use and land cover or Hydrologic Response Units (HRUs) within each of the study area drainage areas. Each of these HRUs was then evaluated and aggregated to the drainage area level as described in the scoring section below.

2.2 Scoring

Drainage area scores were calculated as the summation of the relative pollutant and trash concentrations for each drainage area using the equations presented below.

First, the area-weighted runoff coefficient is determined for each HRU and drainage area using Equation 1.

$$\mathbf{RC_{i,a\text{-}k}} = \frac{A_{i,imp}RC_{i,imp}+A_{i,perv}RC_{i,perv}}{\sum A_i} \qquad \textbf{(Eq. 1)}$$

Where,

A_i = Area of unique HRU "i" within drainage area (acres)

$RC_{i,imp}$ = Runoff coefficient for impervious land uses within HRU "i" of drainage area = 0.90 (County of San Diego, 2020a)

$RC_{i,perv}$ = Runoff coefficient for pervious land uses within HRU "i" of drainage area (see Table 6, Task 2 Memo) (County of San Diego, 2020a)

Then, the relative pollutant concentration is calculated for each pollutant of concern in each drainage area using Equation 2.

$$\mathbf{P_i} = \frac{\sum P_{1a}A_aRC_a+P_{1b}A_bRC_b+\ldots P_{1k}A_kRC_k}{\sum A_aRC_a+A_bRC_b+\ldots A_kRC_k} \qquad \textbf{(Eq. 2)}$$

Where,

P_i = Relative Pollutant Concentration for Drainage area (calculated for each pollutant),

P_{1a} - P_{1k} = Relative Pollutant Concentration for Land Use Category (See Table 1),

RC_a – RC_k = Runoff Coefficient for HRU (See Equation 1),

A_a – A_k = Area (ac) of Land Use Category

Next, the relative trash yield concentration is calculated for each drainage area using Equation 3. Note that since the trash yield is independent of the runoff coefficient, that term is removed from the equation.

$$\mathbf{P_{Trash}} = \frac{\sum P_{Ta}A_a + P_{Tb}A_b + \ldots P_{Tf}A_f}{\sum A_a + A_b + \ldots A_f} \qquad \textbf{(Eq. 3)}$$

Where,

P_{Trash} = Relative Trash Yield for Drainage area,

P_{Ta} – P_{Tf} = Relative Trash Yield for Land Use Category (See Table 2),

A_a – A_f = Area (ac) of Land Use Category

The Pollutant Score and Trash Score are then calculated using Equations 4 and 5.

$$\textbf{Pollutant Score}_{\textbf{Pollutant}} = \boldsymbol{P_i \times RC_i \times max(F_{TMDL}, F_{303(d)}) \times 20} \qquad \textbf{(Eq. 4)}$$

Where,

RC_i = Area weighted runoff coefficient for drainage area "i" calculated in Equation 1

F_{TMDL} = 3, a weighting factor applied if the drainage area drains to a receiving water with an existing TMDL for the pollutant of concern.

$F_{303(d)}$ = 2, a weighting factor applied if the drainage area drains to a 303(d) listed receiving water for the pollutant of concern.

Equation 4 applies the maximum of either the TMDL factor or 303(d) factor so that drainage areas points are not double-counted.

$$\textbf{Trash Score} = \boldsymbol{P_T \; x \; F_{PLU} \; x \; 20} \qquad \textbf{(Eq. 5)}$$

Where,

F_{PLU} =2, a weighting factor applied if the drainage area contains one of the following Priority Land Uses: Commercial, High-Density Residential, Industrial, and Public Transportation Station.

Finally, the overall Water Quality Benefit Score is determined by summing the individual pollutant and trash scores for each drainage area using Equation 6.

$$\textbf{Water Quality Benefit Score} = \sum \boldsymbol{Pollutant\ Score_{Pollutant} + Trash\ Score} \qquad \textbf{(Eq. 6)}$$

The scoring approach represented above results in eight individual pollutant scores and one overall Water Quality Benefit Score for each drainage area. These results are presented in GSCW Plan Attachment D.1.

3 PROJECT PRIORITIZATION & MODELING ENGINE

This section identifies the water quality benefit quantification approach utilized for project-scale prioritization. Specifically, the section summarizes the modeling inputs and methods used to quantify the water quality benefits of each potential green streets project. Water quality benefits serve as inputs into a broader triple bottom line approach to project prioritization, as described in Section 5 of the GSCW Plan.

3.1 Approach

The water quality performance measures which were quantified for each project include:

- Annual wet and dry weather volume capture;
- Annual wet and dry weather pollutant load reduction;
- Peak flow mitigation (as a percent); and
- Annual trash load reduction.

The quantification leveraged the core water quality calculation engine used in the Orange County (OC) Stormwater Tools platform to support the volume capture and pollutant load reduction benefits. This open-source water quality modeling engine implements general algorithms for computing volume-weighted land surface runoff volume and runoff water quality for both wet weather and dry weather conditions and for determining the long-term volume capture performance and load reduction performance of BMPs. For this project, a San Diego County specific set of input files and reference datasets tailored to San Diego County hydrology, design standards, and the suite of specific BMP configurations assessed for the GSCW Plan effort were developed. Once configured, this calculation framework allowed for the rapid performance assessment of project sites located anywhere within the region for which complete reference data is available.

The following sections document the formation of the input reference data, how the calculation engine used these data to characterize BMP performance for volume and pollutant load reduction, and how other performance measures like trash load reductions and long-term peak flow mitigation were determined.

3.2 Land Surface Hydrology

3.2.1 Rainfall Data

The County provided records for 45 rainfall gauge locations distributed throughout the study area. Each dataset was analyzed to determine suitability for use as a reference gauge to support the long-term volume capture performance of the GSCW Plan BMP scenarios. Gauge suitability for supporting modeling volume-based facilities such as biofilters and infiltration trenches was based on the gauge having over 25 years of hourly measurements. Gauge suitability for flow-based BMP facilities such as HDS devices and swales was based on the gauge having over ten years of records with 5-minute measurements. Twelve gauges were identified as having met both criteria and were used to define rainfall reference zones covering the County's study area. The selected gauges are shown in Figure 1, with summary statistics in Table 5.

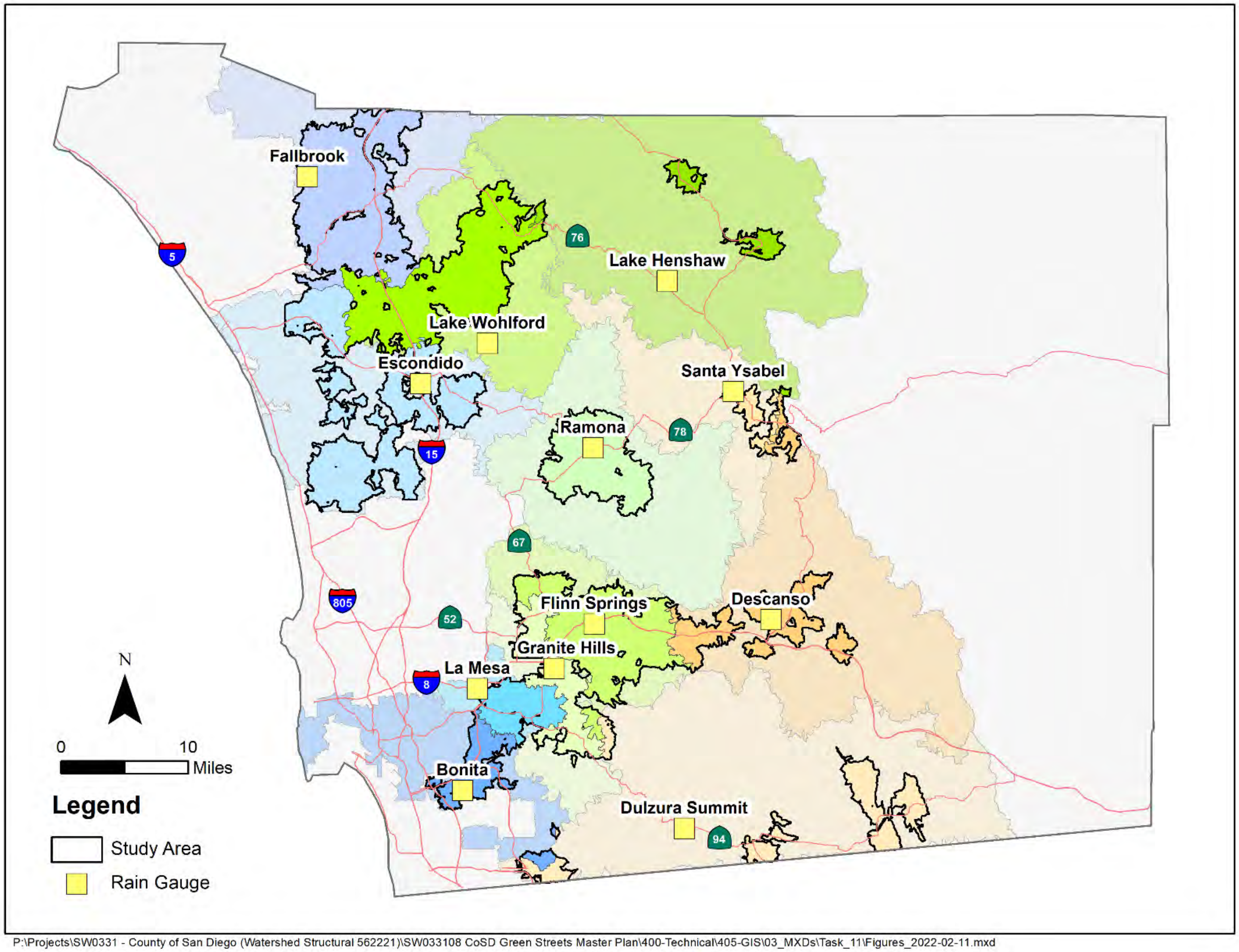


Figure 1. Rainfall Zones

Table 5. Rainfall Summary

Gauge	Mean Annual Rainfall Depth (in)	85th Percentile 24-hr Storm Depth (in) – 2015 Isohyet
BONITA_27017	8.97	0.56
ESCONDIDO_27020	13.3	0.52
FALLBROOK_27019	13.96	0.82
LA MESA_27015	10.55	0.54
FLINN SPRINGS COUNTY PARK_27025	12.74	0.62
GRANITE HILLS_27026	11.37	0.50
LAKE HENSHAW RAIN_27028	22.09	0.78
LAKE WOHLFORD_27021	15.41	0.78
RAMONA CRS_27022	13.19	0.60
DESCANSO_27030	20.72	0.74
DULZURA SUMMIT_48	12.27	0.48
SANTA YSABEL_27029	20.51	0.82

The design storm depth defined by the SD County 85th percentile isohyet layer was used to determine the Design Capture Volume (DCV) for the project and to determine the normalized BMP volume when interrogating the relevant long-term volume capture nomograph for the site. This latter step is described in more detail in Section 3.5.

3.2.2 Stormwater Runoff Quantity

Stormwater runoff quantity was computed using site-specific conditions for every BMP project scenario considered for the GSCW Plan effort. Project site drainage areas were reviewed and adjusted (cut, trimmed, modified, etc.) based on BMP location within the larger prioritized drainage area and a desktop review of local topography and drainage networks where available was readily available. Each project site drainage area intersected a unique combination of on-site soils, land uses, imperviousness surfaces, and used the most representative rainfall record according to its rain zone.

Runoff coefficients were computed using the Hydrologic Response Unit (HRU) approach as described in Section 2.1.5. This approach subdivided a project drainage area into unique local-occurring combinations of rainfall zone, soil, and land use. Impervious surfaces are assigned a runoff coefficient of 0.9, consistent with guidance from the County of San Diego Best Management Practice Design Manual (County of San Diego, 2020a). Runoff coefficients of 0.10, 0.14, 0.23, and 0.30 are assigned to pervious portions of the project drainage area according to the underlying soil Hydrologic Soil Group (HSG) A, B, C, and D, respectively, consistent with guidance from the County of San Diego Best Management Practice Design Manual (County of San Diego, 2020a). Additionally, areas classified as "Rock" or "Water" in the USGS data were assigned runoff coefficients of 0.9 (i.e. assumed impervious).

Each individual HRU on the project thus had a characteristic area-weighted runoff coefficient formed by determining the underlying imperviousness of the HRU according to the imperviousness layer from the CONUS Imperviousness National Land Cover Database (NLCD, 2016). The characteristic runoff coefficient for each HRU was computed using Equation 7:

$$RC_{HRU} = A_{imp} * 0.9 + A_{perv}RC_{perv} \quad \textbf{(Eq. 7)}$$

Where,

A = Area (acres)

RC_{perv} = Runoff coefficient for pervious land use varies by HSG.

The average annual stormwater runoff volume within a GSCW Plan drainage area was then calculated for each HRU using Equation 8:

$$Runoff\ Volume = Area * RC_{HRU} * Rainfall\ Depth \quad \textbf{(Eq. 8)}$$

Where,

Area = Total area of HRU (sqft)

RC_{HRU} = Weighted runoff coefficient for the HRU.

Rainfall Depth = mean annual rainfall depth (ft)

This approach allows for separate runoff volume quantification for each HRU within a proposed green street BMP project drainage area. It thus supports appropriately volume-weighted pollutant loading estimates according to land use EMCs.

3.2.3 Dry Weather Discharge Quantity

Dry weather discharge volume was characterized using a steady-state discharge rate from certain developed land uses. For GSCW Plan project benefit quantification, the dry weather discharge rate was assumed to be 0.0003 cfs/developed acre. This value is the result of extensive regional monitoring in Orange County (2019, 2021) and is also used as the basis for other San Diego County benefit quantification efforts, such as the Rebates and Incentives program.

The land use categories for which unit dry weather discharges were applied are presented in Table 6 below.

Table 6. Land Uses Contributing to Dry Weather Discharges

Land Use Category	Contributes to Dry Weather Flow
Commercial	True
Education	True
Industrial	True
Multi Family Residential	True
Single Family Residential	True
Transportation	True
Rural Residential[1]	False
Agriculture	False
Orchard	False
Vacant / Open Space	False
Water	False

1. Rural residential land uses have been observed to be drained by pervious channels and ditches often leading field teams to observe dry/no flow conditions during dry weather observations.

Rural residential land use is the notable exclusion from the developed land use categories which was modeled as contributing to dry weather discharges. The rural residential land use category is characterized by very low development density, often pervious driveways, and typical drainage infrastructure and conveyances are unlined ditches. Field observations of MS4 outfalls in the San Luis Rey and San Diego River watershed have confirmed that dry weather observations made within 50 ft of the rural residential land use category were consistently observed to be dry for 95 observations out of 102, or 93%, during the 2019 monitoring season. This is much different from the observation locations that are not within 50 ft of rural residential land use, for which 285 of 370 (77%) monitored sites were consistently observed to be dry. For this reason, the Rural Residential land use category is not included in the list of land use categories that generate dry weather discharge volume for the GSCW Plan project benefits quantification effort.

Within each GSCW Plan treated drainage area, the acreages of the land use categories which contribute to dry weather discharges were used to scale the estimated steady-state dry weather discharge volumetric flowrate. The total annual volume of dry weather flow discharged from a given project area and treated by a BMP was calculated by combining the project area's steady-state volumetric flow rate with the number of dry days expected to occur during that year. This scaling is site-specific and varies based upon the rainfall gauge associated with the project.

The San Diego Region 9 MS4 Permit (CARWQCB 2015) provides the following definition for dry weather conditions:

"Weather is considered dry if the preceding 72 hours has been without measurable precipitation (>0.1 inch)."

This definition was used to determine the average long-term number of dry days for each month for each of the modeled rainfall gauges.

Table 7. Water Quality Engine Reference Table: Average Number of Dry Days Per Month

Rain Gauge	Average Number of Dry Days Per Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BONITA	21.2	18.1	21.5	24.3	29.2	29.4	30.5	30.4	29.1	27.7	23.8	22.6
ESCON	19.9	15.9	20.2	23.8	28.0	29.2	30.6	30.3	28.7	27.2	23.6	20.4
FALLBR	20.2	15.9	20.3	23.9	28.2	29.3	30.4	29.9	29.0	27.3	24.4	20.4
LAMESA	21.3	17.3	21.4	24.7	28.1	29.2	30.6	30.7	28.9	27.3	24.5	21.5
FLINN	20.7	17.0	20.9	23.6	27.1	29.1	30.1	30.1	28.6	27.3	23.9	20.6
GRANITE	20.7	17.0	20.9	24.4	28.0	28.7	30.5	30.5	29.2	27.9	23.3	21.0
HENSHAW	19.1	15.2	18.9	23.0	27.8	29.3	28.8	28.8	27.4	26.2	23.3	19.5
WOHLF	19.5	16.3	20.2	23.2	27.6	28.8	30.5	30.3	28.8	27.3	23.0	20.0
RAMONA	20.0	15.7	20.4	23.9	28.1	29.2	30.1	29.8	28.7	27.3	23.1	19.6
DESCANSO	18.4	15.3	19.2	22.7	26.9	29.1	28.5	29.1	27.5	26.8	22.6	18.3
DULZURA	20.7	16.2	21.3	23.7	28.2	29.5	30.4	30.3	29.1	27.6	23.9	21.0
YSABEL	19.2	15.3	18.5	21.4	26.7	28.8	28.9	28.4	27.7	26.4	22.6	18.8

The GSCW Plan modeling approach quantified dry weather discharge calculations occurring as summer season and winter season flows independently. This allows the option to use a different steady-state dry discharge rate for summer and winter flows, if justifiable pending further analysis of available County monitoring data. For this effort, April through September is defined as the summer season and October through March is defined as the winter season.

The overall discharge flow rate from a BMP drainage area composed of multiple types of land surfaces was calculated by multiplying the dry weather discharge rate by the total developed area. The calculation is shown in Equation 9:

$$Q_{season\ \&\ location} = q_{season\ \&\ location} * \ DWF\ Area \qquad \textbf{(Eq. 9)}$$

Where:

Q = dry weather discharge rate for a season and location (cfs)

Q = unit dry weather discharge rate for a certain season and location (cfs/developed acre)

DWF Area=Area contributing to dry weather flow (acres)

The total seasonal dry weather discharge volume from a drainage area was calculated using Equation 10 from the steady-state discharge rate and the long-term average number of dry weather days for the location.

$$V_{season\ \&\ location} = Q_{season\ \&\ location} * \ N_{season\ dry\ days} * 3600\ \frac{seconds}{hour} * 24\,\frac{hours}{day} \qquad \textbf{(Eq. 10)}$$

Where:

V = dry weather discharge volume for a certain season and location (cf)

Q = dry weather discharge rate for a certain season and location (cfs)

N = total number of dry days occurring for a certain season and location

These seasonal dry weather flow rates are compared to the treatment capacity of the BMP receiving the flow as discussed further in Section 3.5.2.

3.3 Land Surface Pollutant Loading

3.3.1 Stormwater Runoff Water Quality

The stormwater quality for each green street BMP project was quantified for each of the same pollutants of concern as described in Section 2. These pollutants of concern were selected for consistency with typical land use-based pollutant modeling and local practices as described in Appendix B of the Water Quality Equivalency (WQE) Guidance Document Region 9 (County of San Diego, 2018b). The specific event mean concentrations are listed in Table 8 below.

Table 8. Event Mean Pollutant Concentrations

Land Use Category	TSS mg/l	TP mg/l	TN mg/l	TCu ug/l	TPb ug/l	TZn ug/l	FC MPN/100ml
Agriculture	999.2	3.34	43.37	100.10	30.20	274.80	60,300
Commercial	127.68	0.32	5.20	54.84	14.40	483.70	51,600
Education	132.11	0.46	2.72	12.02	7.43	174.10	2,148
Industrial	125.18	0.45	4.34	53.54	20.52	428.39	26,703
Multi-Family Residential	39.90	0.23	3.81	12.10	4.50	125.10	11,800
Orchard	252.64	0.36	28.46	100.10	30.20	274.80	1,344
Rural Residential	2,523.76	1.59	4.26	8.36	21.38	39.19	6,684
Single Family Residential	123.41	0.49	4.58	25.96	13.03	153.29	35,557
Transportation	77.80	0.68	2.95	52.20	9.20	292.90	1,680
Vacant / Open Space	216.60	0.12	2.24	10.60	3.00	26.30	484
Water	0	0	0	0	0	0	0

The load of each pollutant was calculated for each individual HRU comprising the project drainage area and accumulated to form the total load for each pollutant for the project. Each project area draining to a GSCW Plan BMP therefor had a characteristic volume-weighted pollutant concentration formed by the unique combinations of land use pollutant EMC and runoff coefficients.

3.3.2 Dry Weather Discharge Water Quality

Dry weather discharge parameters for water quality were used in quantifying dry weather load reductions (similar to EMCs for wet weather water quality). In lieu of County-specific data (which is available in raw format but has not been screened for groundwater influenced or otherwise processed for use in water quality modeling), dry weather discharge water quality parameters derived through analysis of public outfall monitoring data in South Orange County was used in this analysis. The parameters were developed to support the OC Stormwater Tools Modeling Module and are documented in the Dry Weather Average Pollutant Runoff Concentrations for the South Orange County WMA (Orange County, 2022), available via the South Orange County Regional Clearinghouse, OC Stormwater Tools Modeling Documentation.

As documented in the Modeling Module, five years of outfall monitoring data within the South Orange County Watershed Management Area collected between 2015 and 2020 were analyzed based on contributing land uses (dominant categories of mixed residential, business, or transportation). The geometric mean of the relevant data was then determined for constituents of concern as summarized in the table below (Table 2 from OC, 2022).

Table 9. Dry Weather Flow Concentrations by Major Land Use Grouping

Dry Weather Flow Land Use Group	TSS	TP	TN	Total Copper	Total Lead	Total Zinc	Fecal Coliform
	mg/L	mg/L	mg/L	ug/L	ug/L	ug/L	#/100mL
	Presented as Value (Dominant Outfall Land Use Group)						
Business	3.5 (All Developed)	0.21 (Business)	1.57 (Business)	5.2 (All Developed)	0.3 (All Developed)	16.4 (All Developed)	942 (All Developed)
Mixed Residential	3.5 (All Developed)	0.32 (Mixed Residential)	3.57 (Mixed Residential)	5.2 (All Developed)	0.3 (All Developed)	16.4 (All Developed)	942 (All Developed)
Transportation	3.5 (All Developed)	0.3 (Transportation Composite[1])	3.2 (Transportation Composite[1])	5.2 (All Developed)	0.3 (All Developed)	16.4 (All Developed)	942 (All Developed)

1. This transportation composite is formed by area weighting the Mixed Residential concentration with the Business concentration. The weighting ratio is 4.4 to 1 for Mixed Residential and Business groups, respectively.

3.3.3 For the GSCW Plan the Business category was chosen to represent dry weather flow quality for modeling purposes. This decision was based on the exclusion of rural residential land uses described in Section 3.2.3. Trash Loading

The total project trash loading was calculated similarly to the stormwater runoff pollutant loading. Annual trash loading was calculated and accumulated for each of the Priority Land Use categories existing within the project drainage area according to the annual trash yields (County of San Diego, 2020b) presented in Table 10.

Table 10. Trash Yield by Priority Land Use Category

Trash Priority Land Use Category	Annual Yield (gallons/acre)
Commercial	6
High Density Residential	2.5
Industrial	2.6
Public Transportation Station	6

Alternative Land Use	1
Undeveloped	0

3.4 BMP Types

BMP configurations considered for the GSCW Plan considered a variety of different in-situ conditions, and a variety of on-site constraints. For this reason, each of the BMP types detailed in the County of San Diego's Green Streets Standard Drawings had its water quality benefits quantified by the modeling approach. Where applicable, each of the design profiles defined by the Green Streets Standard Drawings document was modeled according to the underlying soil infiltration condition and the BMP underdrain design (see GS-1.05, GS-3.10, and GS-4.03).

The project team also considered three additional BMP types to broaden the number of stormwater treatment options available to high priority GSCW Plan project areas. These included dry wells, hydrodynamic separators, and vegetated swales. The stormwater BMP types considered for the GSCW Plan are presented below in 11.

Table 11. GSCW Plan Stormwater BMPs

Water Quality Treatment BMPs
Type 1 (Infiltration) Tree Well (GS-1) without underdrain Biofilter (GS-3) without underdrain Permeable Pavement (GS-4) without underdrain Dispersion Area (GS-2) Drywell
Type 2 (Partial Infiltration) Tree Well (GS-1) with underdrain Biofilter (GS-3) with underdrain Permeable Pavement (GS-4) with underdrain
Type 3 (Low/No Infiltration) Tree Well (GS-1) with underdrain Biofilter (GS-3) with underdrain and liner
Hydrodynamic Separator
Vegetated Swale

Each of the facility types and infiltration conditions identified for consideration in the GSCW Plan were sized and sited according to the characteristics and requirements of the facility's drainage area. The modeling engine required a minimum set of input parameters for each facility profile to express these physical design characteristics. The required facility design parameters and guidance for calculating and/or estimating them for use with the GSCW Plan modeling approach can be found in Attachment C.1 BMP Modeling Parameters.

In cases where multiple BMP types are identified as being likely suitable for the project, the BMP type that is expected to produce the greatest number of benefits, based on the County of San Diego BMP Design Manual and Green Streets Guidelines, was prioritized in the model (Figure 2). This hierarchy is based on maximizing retention where feasible. Additionally, when biofiltration type (Tree Wells and Biofilters) BMPs were compared, Tree Wells were preferred within each priority. Tree Wells are deeper than Biofilters and therefore more space efficient, resulting in more volume capture per available footprint. Furthermore, Tree Wells are typically preferable based on 1) community preference (survey results), 2) provide greater environmental and community benefit (shading).

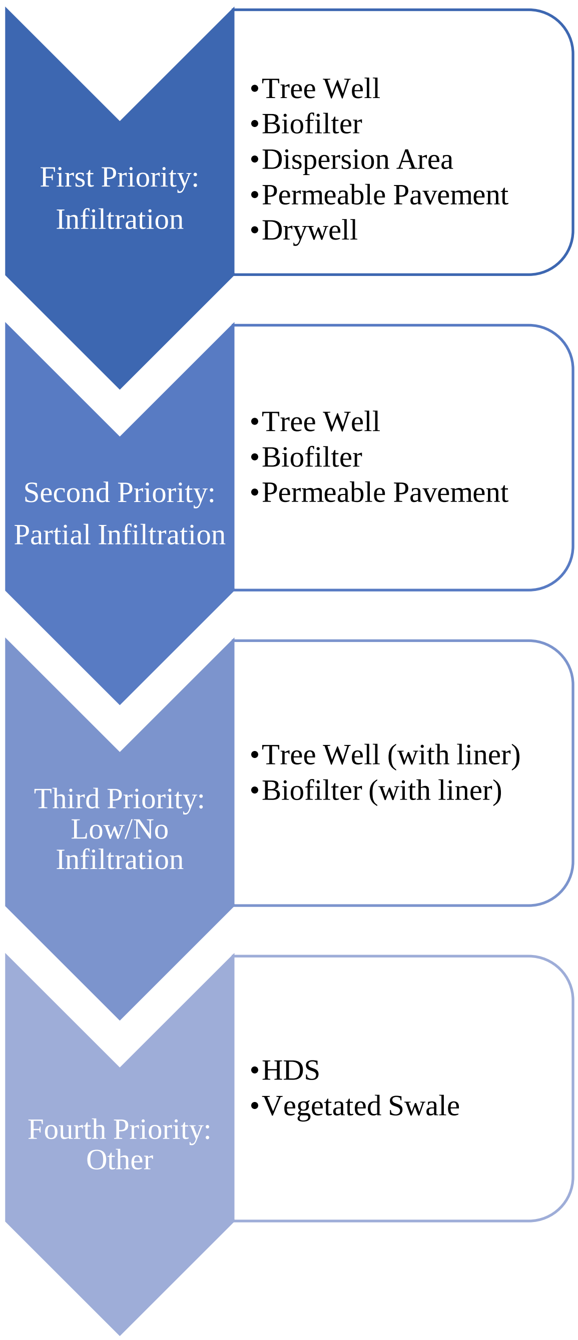


Figure 2. BMP Hierarchy for Modeling

1. Infiltration BMPs (Type 1) do not have impermeable liners or underdrains. Water quality treatment is maximized through retention and infiltration.

2. When full infiltration is not feasible, maximizing partial infiltration is preferred. Partial Infiltration BMPs (Type 2) BMPs do not have impermeable liners but do have underdrains. Water quality treatment is maximized through retention, infiltration, and biofiltration.

3. When partial infiltration is not feasible, Low/No Infiltration (Type 3) BMPs were preferred. These BMPs have impermeable liners and underdrains. Water quality treatment is predominately provided through biofiltration with a small component of retention.

4. When none of the BMPs are feasible, HDS units are selected. HDS units which provide mechanical filtration.

3.5 BMP Performance Quantification

3.5.1 Volume Capture Performance – Wet Weather

Long-term stormwater volume capture performances were modeled with the help of hundreds of long-term continuous modeling simulations performed for each rainfall gauge record. These simulations form nomographs tailored for use within San Diego County and represent the GSCW Plan BMP facilities. A nomograph is a chart that relates key sizing and design parameters of a BMP to the long-term performance of the BMP.

The stormwater BMPs considered for the GSCW Plan were sized according to either 1) the amount of volume capture they provide for purposes of retention and detention (volume-based, e.g., biofilter with an underdrain), or 2) their flow-through capacity for providing treatment (flow-based, e.g., HDS unit). To support the quantification of volume captured by BMPs for both design sizing paradigms, two complete sets of nomographs were prepared for each rainfall record. These nomographs were created by running batches of long-term continuous simulations for BMPs with various storage volumes and drawdown times (for volume-based BMPs) or various flow rates and watershed time of concentration (Tc) values (for flow-based BMPs). Drawdown time is the time required for a storm water BMP to drain and return to dry weather condition. For detention facilities, drawdown time is a function of basin volume and outlet orifice size. For infiltration facilities, drawdown time is a function of basin volume and infiltration rate (County of San Diego, 2020a).

Long-term simulations for volume-based BMPs span a 30-year period from October 1988 to October 2018 and use a 1-hour rainfall timestep. Each volume-based nomograph curve describes the relationship between a BMP's provided treatment capacity, its drawdown time (DDT), and its modeled long-term capture efficiency. Long-term simulations for flow-based BMPs span a 10-year period from October 2008 to October 2018 and use a 5-minute rainfall timestep. Each flow-based nomograph curve describes the relationship between a BMP's design flow rate, the Tc of the watershed, and the BMP's modeled long-term capture efficiency.

Hydraulic result summaries were extracted from each model run to evaluate the long-term BMP capture efficiency. The long-term capture efficiency is defined as the long-term volume treated (i.e., not bypassed) by the BMP divided by the long-term total volume received by the BMP, expressed as a percent. The results for each scenario were then plotted to obtain the nomographs. Example nomographs for the Bonita rainfall gauge are provided in Figure 3.

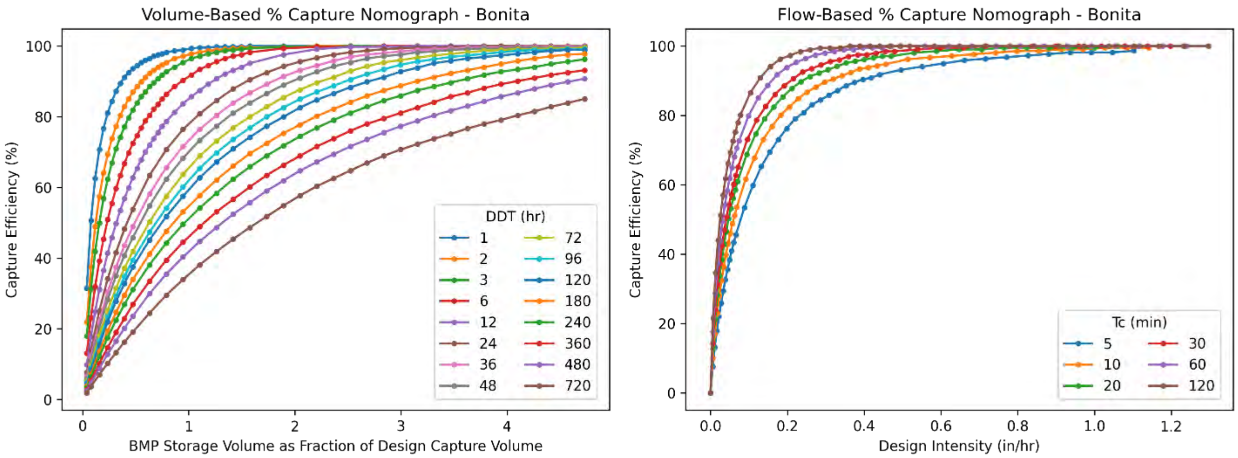


Figure 3. Bonita Gauge Volume Capture Nomographs for Volume-Based BMPs (left) and Flow-Based BMPs (right)

When used within the modeling framework, the volume-based capture nomograph storage volume values are normalized to be expressed as a fraction of the design capture volume. This allows the same nomograph to be used to estimate capture performance for two facilities that need to utilize the same reference rainfall gauge record, but which have different 85th percentile design storm depths according to the SD County 85th percentile isohyet. Equation 11 was used for normalizing the volume provided by the design capture volume.

$$DCV\ (cf) = RO\ Coeff * Drainage\ Area\ (sqft) * Design\ Storm\ Depth\ (inches) * \left(\frac{foot}{12\ inches}\right)$$

(Eq.11)

Similarly, the flow-based capture nomograph treatment rate values are normalized by the effective area of the drainage area to express the treatment rate provided by the facility in terms of design intensity. Equation 12 was used for the design intensity.

$$I_{design}(in/hr) = \frac{Treatment\ Rate\ (cfs)}{RO\ Coeff * Drainage\ Area\ (sqft)}\left(12\frac{inches}{foot}\right) * \left(3600\frac{seconds}{hr}\right) \qquad \textbf{(Eq. 12)}$$

3.5.1.1 Nomograph Solution Approaches

Structural stormwater facility types that utilize nomographs to determine capture performance use the notion of 'compartments' to estimate their long-term volume capture. This allows the modeling engine to consult one nomograph curve for a slow draining storage compartment (e.g., gravel storage layer positioned below an underdrain which infiltrates into in-situ soils) and a different nomograph curve for the faster draining treatment and discharge compartment (e.g., the ponded volume which passes through the filter media before being discharged into the MS4). Each facility may be composed of one or two compartments, and the volume managed by each compartment is either counted as 'treated' and discharged downstream or it is counted as 'retained' and infiltrated. The remaining volume not captured by one of these compartments is considered bypass flow.

This compartment-based approach allows the system to calculate BMP capture for a very wide variety of facility configurations by combining one or two nomograph compartments. The compartments allowed for each of the stormwater BMP types considered for the GSCW Plan are shown in Table 12.

Table 12. Volume Capture Modeling Approaches for Structural Facility Type

Water Quality BMP Types	Volume-based Nomograph Compartments	Flow-based Nomograph Compartments
Type 1 (Infiltration) Tree Well (GS-1) without underdrain Biofilter (GS-3) without underdrain Permeable Pavement (GS-4) without underdrain Dispersion Area (GS-2) Drywell	Retention	--
Type 2 (Partial Infiltration) Tree Well (GS-1) with underdrain Biofilter (GS-3) with underdrain Permeable Pavement (GS-4) with underdrain	Retention Treatment	--
Type 3 (Low/No Infiltration)[1] Tree Well (GS-1) with underdrain Biofilter (GS-3) with underdrain and liner	Treatment	--
Hydrodynamic Separator	--	Treatment
Vegetated Swale	Retention[2]	Treatment

[1]Vegetated BMPs are also capable of performing retention via evapotranspiration. For this analysis, 1% of the long term capture of Type 3 facilities will be considered retained volume to account for retention via evapotranspiration.

[2]Vegetated Swales achieve incidental retention due to their un-lined design. Their volume capture performance benefits are calculated as a hybrid case of flow-based treatment and volume-based retention.

3.5.1.2 Single-Compartment Volume-Based Nomograph Traversal

The single-compartment BMP is the simplest case for facilities whose sizing and performance are most sensitive to the effective volume of the facility, such as with all infiltration facilities, low/no infiltration facilities, and drywells, as shown in Table 8. BMP input parameters are structured so that the total drawdown time can be inferred from commonly known design information like facility depth, total volume, and underlying infiltration rate, so that the correct curve can be chosen from the nomograph. Guidance on the drawdown time calculation is presented in Attachment C.1. For a single compartment BMP, the normalized BMP volume is determined as the ratio of the facility's total effective volume to the facility's drainage area DCV design volume.

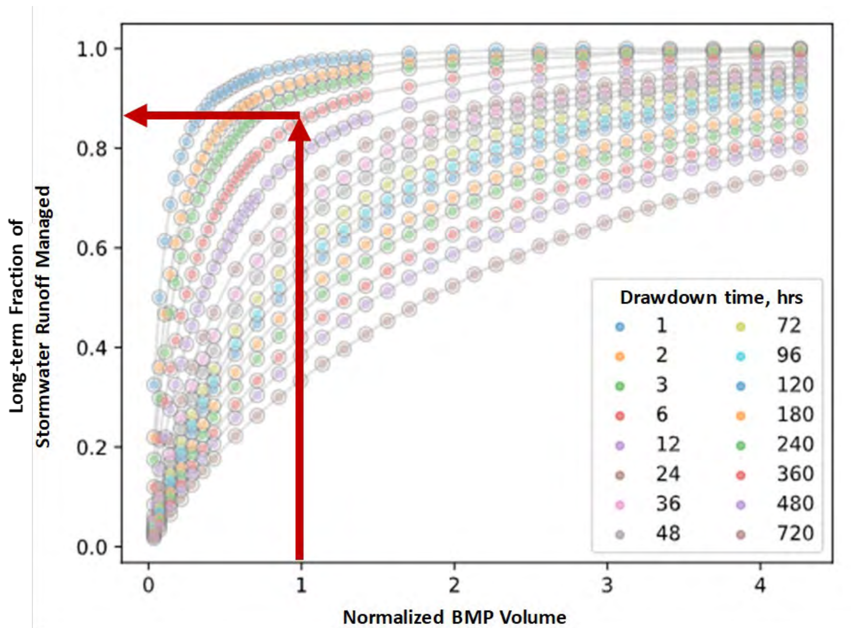


Figure 4. Single Compartment Volume-Based Nomograph Solution Example

Figure 4 above illustrates an example performance solution for an infiltration facility with a 6-hour drawdown time whose total volume is equal to the design volume of the tributary area. In this case, this modeling approach estimated that the facility achieves approximately 85% of long-term runoff volume retention.

3.5.1.3 Two-Compartment Volume-Based Nomograph Traversal

A two-compartment volume-based nomograph traversal is used for volume-based facilities that are capable of both retention and treatment of inflowing stormwater, such as the partial infiltration facilities shown in Table 8. These facility types will perform volume retention via infiltration through their gravel storage layers or soft-bottoms and will discharge treated flow into downstream infrastructure through their underdrains or outlet structures.

The first nomograph traversal is for the retention compartment since these facilities fill from the bottom and retention typically begins to occur before treated discharge. The following figure illustrates the traversal process for a two-compartment facility in which each compartment is sized to be 50% of the design volume. In this case, the drawdown time is 24 hours for the retention compartment and 3 hours for the treatment compartment. The following steps walk through the traversal process, which is illustrated in Figure 5.

1. Determined the retention capture performance by traversing 0.5 units along the x-axis and locate the correct trace for the 24-hour drawdown time of the retention compartment. The value is approximately 48% of long-term capture (shown in brown in the figure below).

2. Translated horizontally to the trace for the next compartment, which draws down in 3 hours (shown in green in the figure below).

3. Followed the green 3-hour drawdown trace up the nomograph for 0.5 units of x-axis distance.

4. In this example, about 83% of long-term capture is achieved by both compartments working in concert.

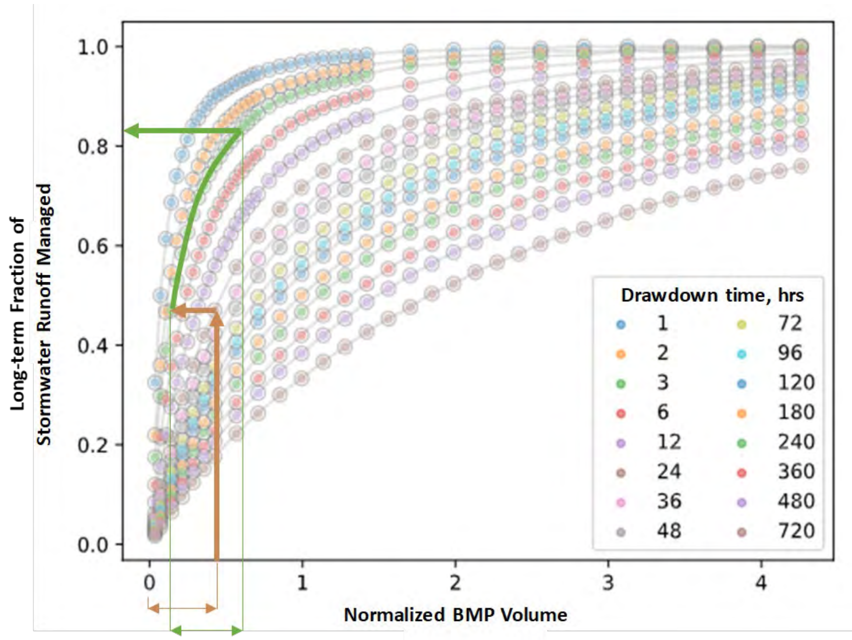


Figure 5: Two Compartment Volume-Based Nomograph Solution Example.

In this case, both compartments have the same volume capture capacity (0.5 design volumes), but they have different drawdown times.

3.5.1.4 Single-Compartment Flow-Based Nomograph Traversal

A single-compartment flow-based nomograph traversal is the simplest case for facilities whose sizing and performance are most sensitive to the design flow rate of the facility and the time of concentration of the treated land area. This nomograph is useful for modeling facilities such as an HDS unit. These facilities do not perform stormwater volume retention, only treatment and discharge.

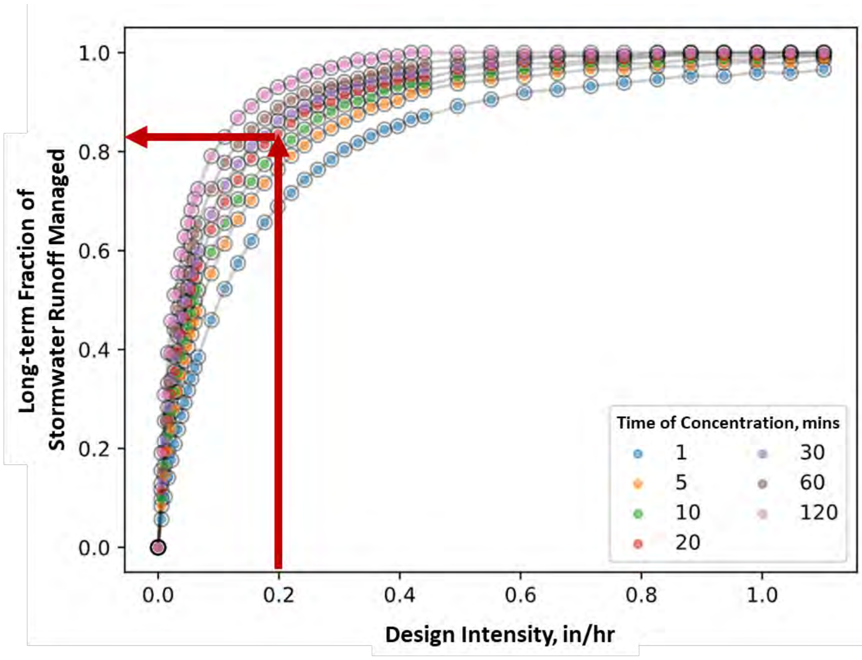


Figure 6. Single-Compartment Flow-Based Nomograph Solution

In the example nomograph shown above in Figure 6, a facility with a design treatment intensity of 0.2 inches/hr treats a drainage area with a 20-minute time of concentration and is expected to manage 83% of long-term runoff.

3.5.1.5 Hybrid Flow-Based Nomograph Traversal

This volume capture solution applies only to unlined flow-based facilities like a vegetated swale. These facilities are typically designed in a flow-based paradigm, but they may achieve incidental volume reduction via infiltration. For these facilities, the modeling module first computes the overall managed volume via the single-compartment flow-based approach, then uses the facility volume, depth, and underlying soil group to estimate the long-term retained volume using the volume-based nomograph. The treated volume discharged by the facility is then back-calculated as the difference between the overall facility captured volume and the retained volume.

3.5.2 Volume Capture Performance – Dry Weather

Dry weather BMP volume capture calculations were performed through steady-state comparison of the cumulative inflowing dry weather discharge rate (see Section 3.2.3 Dry Weather Discharge Quantity) and the rate at which the BMP can retain and/or treat inflows. The following procedure was used to determine what fraction of the dry weather flow is retained, treated, or bypassed for a given inflowing dry weather discharge rate.

1. Determined the retention rate of the BMP. If the facility has no retention compartment, this value is zero.
2. Compared the retention rate to the inflowing dry weather discharge rate. If the retention rate is higher, all dry weather discharge is retained. If the retention rate is lower, the retention rate is retained and subtracted from the inflowing dry weather discharge rate. The remaining inflowing dry weather discharge is released from the facility as either treated or untreated, depending on the treatment rate.
3. Determined the treatment rate of the BMP. If the facility has no treatment compartment, this value is zero.
4. Compared the treatment rate to the remaining inflowing dry weather discharge rate. If the treatment rate is higher, all the remaining inflowing dry weather discharge rate is discharged as treated volume. If the treatment rate is lower, the treatment rate is subtracted from the inflowing dry weather discharge rate, and the full treatment rate is considered treated and discharged. All remaining inflowing dry weather discharge is released from the facility as untreated dry weather flow.

This entire procedure was repeated and summarized by the modeling engine for both summer and winter season dry weather conditions.

3.5.3 BMP Load Reduction Performance Curves

In this modeling framework, BMP pollutant load reduction can be achieved in two ways:

1. Retain and infiltrate polluted inflows, and/or
2. Treat and discharge polluted inflows

Structural BMP facilities, such as partial infiltration and low/no infiltration facilities, HDS units, and vegetated swales are capable of treating and discharging a portion of their inflow volume. This modeling framework leveraged the influent-versus-effluent concentration curves developed based on monitoring studies in the International Stormwater BMP Database (http://bmpdatabase.org/) and prepared for the San Diego WQE (2018). An example plot representing the functional relationship between influent and effluent TSS concentration for several BMP types is shown below in Figure 7.

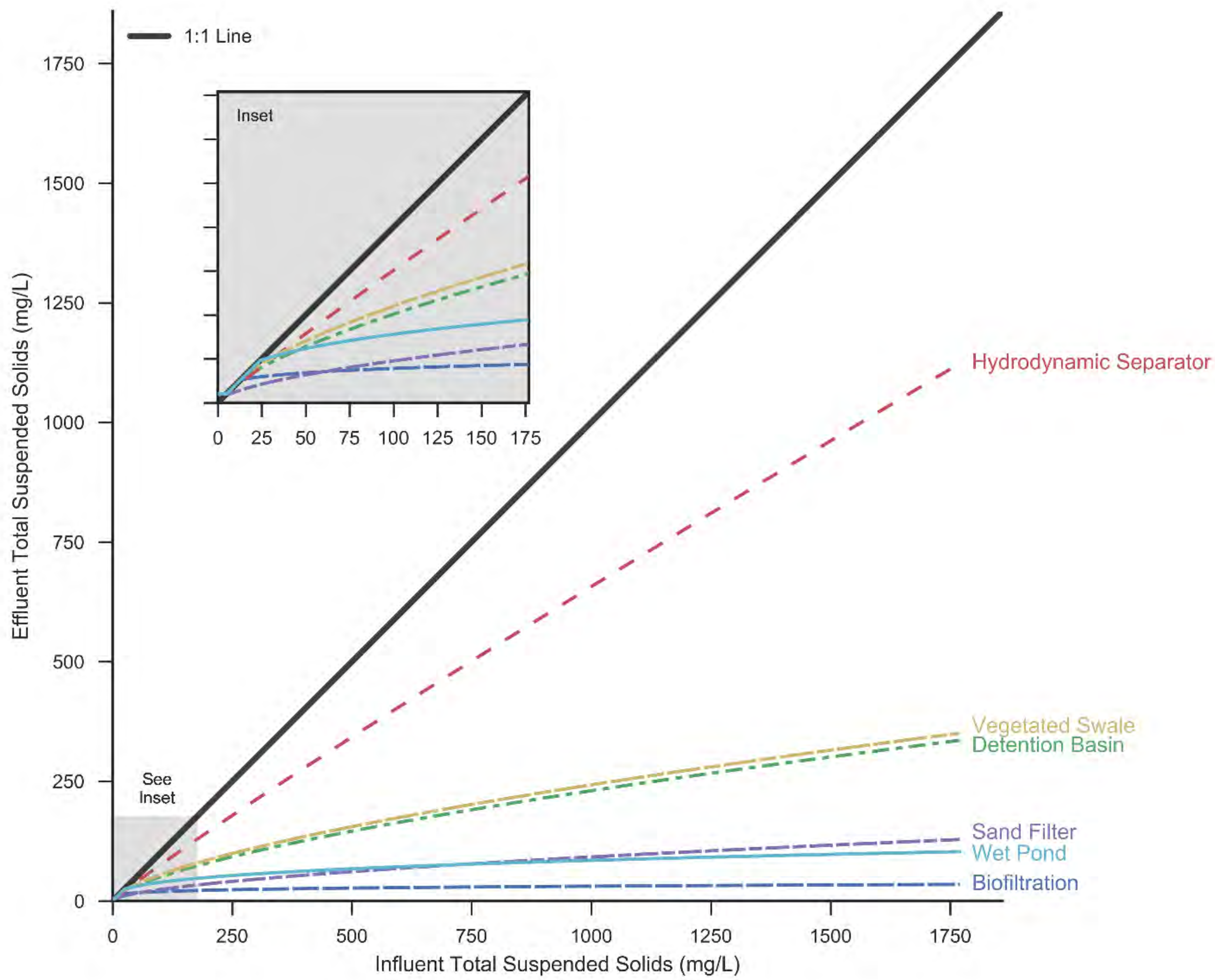


Figure 7. Influent vs Effluent Curve for TSS Removal by BMP Type

A significant amount of effort was invested into developing these characteristic BMP treatment performance curves for the SD WQE and a detailed report about the input data, statistical methods.

The overall load reduction quantification performed by the modeling engine was calculated for each of the three possible pollutant pathways through the BMP: retention, treatment and discharge, and untreated bypass. The total volume for each of these pathways was calculated as described in previous sections. The load present in the retained volume was considered fully treated & removed by the facility since this fraction of the inflow volume is infiltrated into the soil. The load for the treated discharge was calculated by determining the effluent concentration from the functional relationship and combining it with the volume treated and discharged. The facility bypass volume was assumed to be untreated and thus has the same pollutant concentrations as the inflowing runoff volume.

The load reduction processes and assigned treatment performance curve used for each structural stormwater facility type are listed below in Table 13.

Table 13. Load Reduction Mechanisms for GSCW Plan BMPs

Type	Water Quality BMP Types	Eliminates Load (Retained / Infiltrated)	Treatment & Discharge Performance Curve
Type 1 (Infiltration)	Tree Well (GS-1) without underdrain	Retention	--
	Biofilter (GS-3) without underdrain	Retention	--
	Permeable Pavement (GS-4) without underdrain	Retention	--
	Dispersion Area (GS-2)	Retention	--
	Drywell	Retention	--
Type 2 (Partial Infiltration)	Tree Well (GS-1) with underdrain	Retention	Biofiltration / Bioretention
	Biofilter (GS-3) with underdrain	Retention	Biofiltration / Bioretention
	Permeable Pavement (GS-4) with underdrain	Retention	--
Type 3 (Low/No Infiltration)	Tree Well (GS-1) with underdrain (no infiltration)	--	Biofiltration / Bioretention
	Biofilter (GS-3) with underdrain (no infiltration)	--	Biofiltration / Bioretention
--	Hydrodynamic Separator	--	Hydrodynamic Separator
--	Vegetated Swale	Retention	Vegetated Swale

3.5.4 BMP Peak Flow Mitigation Benefit

BMPs designed to retain or detain stormwater runoff volume may achieve the additional benefit of partially mitigating long-term peak runoff flowrates from their drainage areas. This benefit is quantified for volume-based BMPs by using the same long-term continuous SWMM simulations that produced the volume capture nomographs described in Section 4.1. For each of the SWMM simulation results, the long-term peak runoff flowrate and the long-term peak BMP discharge flowrate were compared to determine the percent reduction for each BMP size and drawdown time combination. As an example, the nomograph for peak flow mitigation is shown for the Bonita rainfall gauge in Figure 8.

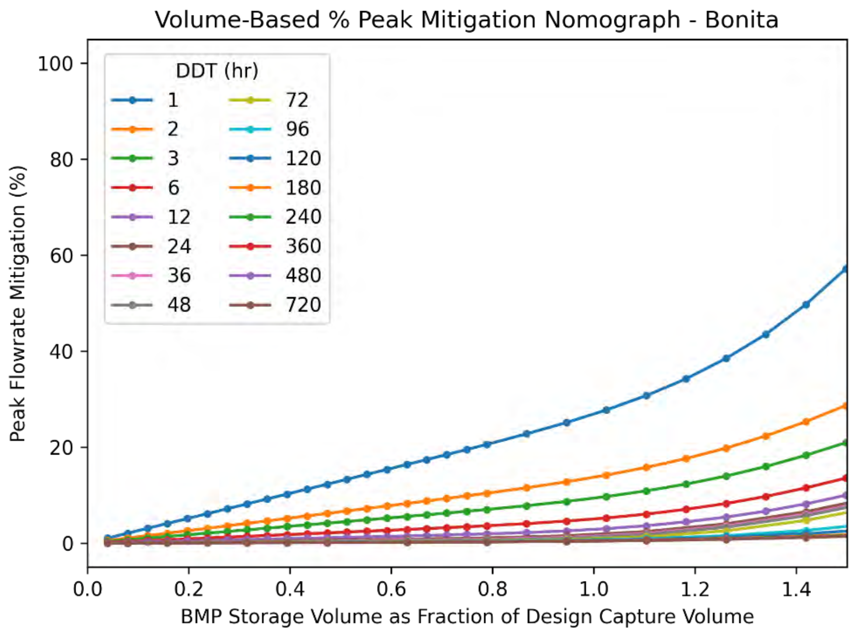


Figure 8. Bonita Rain Gauge Peak Flow Mitigation Nomograph

For peak flow mitigation benefits, larger facilities that provide more capture volume are expected to reduce long-term peak flows more effectively than smaller facilities. In addition, facilities that draw down more quickly, as by high underlying infiltration rates, are expected to reduce long-term peak flows more effectively than slowly draining facilities.

When scoring volume-based BMP facility with two compartments (e.g., partial infiltration BMPs), only the treat and discharge compartment will be considered for peak flow mitigation benefit. These BMPs are characterized by having a low infiltration rate and the contribution to long-term peak flow mitigation of the retention and storage pore volume is thus ignored during benefit quantification since it is de minimis compared to the treat and discharge compartment.

This methodology of ascribing long-term peak flow mitigation benefit was useful for determining the relative performance score for various BMP options across the County at the concept plan level that accounts for the varying rainfall patterns across the GSCW Plan study areas. Though it is useful for GSCW Plan project benefit scoring, this type of analysis cannot take the place of detailed hydraulic and hydrologic simulations that are necessary during future design phases.

3.5.5 BMP Trash Load Reduction Benefit

GSCW Plan stormwater BMP facility types that are approved as full trash capture BMPs will claim the benefits of eliminating all the trash load generated by their project drainage areas. Therefore, the trash benefit calculation for each applicable GSCW Plan BMP assessed for this effort was equal to the land-use area-weighted trash volume (gallons) generated by the project drainage area.

3.5.6 BMP Treatment Benefit Quantification Summary

The following steps summarize the performance metrics benefit quantification workflow that was used for each GSCW Plan proposed project:

1. Evaluated drainage areas for local opportunities and constraints to determine potential locations for Green Street BMPs.
2. Determined treatable drainage areas and delineated them in GIS.
3. Calculated the HRU characteristics for each drainage area that will be routed to a BMP for treatment. An ArcGIS toolbox performed the necessary intersections with reference data layers and produced a land surface characteristics table. This table was used as an input into the water quality modeling engine to determine the wet weather annual runoff volume and the dry weather annual discharge volume as described in Sections 3.2.1 and 3.2.2.
4. Calculated trash loading from the drainage area using the ArcGIS Toolbox.
5. Defined the input parameters for the on-site BMP(s), including facility type, location, and required input parameters defined in Attachment C.1.
6. Loaded the input tables from Steps 3 and 5 into the water quality analysis tool to evaluate the scenario for water quality performance benefits.
7. If the BMP was capable of full trash capture, computed the trash load reduction benefit.

The water quality benefit quantification methodology presented in this attachment has been selected to quantify BMP performance to the extent feasible with the data available at this time and is consistent with San Diego County BMP sizing design guidance (CoSD BMP DM, 2020). The methodology was used to quantify key project benefits, including wet and dry weather volume and pollutant load reduction, as well as peak flow mitigation for each of the BMPs sited within the top 85 drainage areas. These performance values were used to score the environmental portion of the triple bottom line project prioritization.

3.6 Limitations

The water quality benefit quantification and prioritization of the BMP projects were performed based on the available data and tailored to the characteristics of the study area. The methods, datasets, and assumptions used here may not be applicable to other areas or regions. The GSCW Plan study area is unique compared to many similar efforts due to the wide geographic region covered within the unincorporated County. Modeling inputs are presented for the suite of selected BMPs only.

REFERENCES

County of San Diego, 2020a. County of San Diego Best Management Practice Design Manual. Department of Public Works. Updated September 15, 2020.

County of San Diego, 2020b. Trash Generation Rates for Priority Land Uses provided via email on November 19, 2020.

County of San Diego, 2018a. Inlet Mapping, Collection, and Drainage Area Delineations.

County of San Diego, 2018b. Water Quality Equivalency Guidance Document for Region 9. Updated March 15, 2019.

California Regional Water Quality Control Board San Diego Region, 2015. Amended Order No. R9-2013-0001.

California State Water Resources Control Board, 2018. 2014 and 2016 California Integrated Report Clean Water Act Sections 303(d) and 305(b).

California State Water Resources Control Board, 2015. Storm Water Resource Plan Guidelines. Updated November 16 2015.

California Interagency Watershed Mapping Committee, 1999. California Interagency Watershed Map. Updated May 2004.

Orange County, 2019. Water Quality Improvement Plan. Appendix J. https://ocgov.app.box.com/v/SDR-WQIP-Clearinghouse/file/610396462407

Orange County, 2021. Flow Ecology Special Study aka. Evaluation of Baseline and Reference In-stream Flow Conditions. https://ocgov.app.box.com/v/19-20WQIPAppendixH2/file/770089554245

Orange County, 2022. Dry Weather Average Pollutant Runoff Concentrations for the South Orange County WMA. January 2022. http://ocgov.app.box.com/v/SouthOCRegionalClearinghouse/file/926350364412

USGS, 2016. CONUS Imperviousness National Land Cover Database (NLCD)

ATTACHMENT C.1 – BMP MODELING PARAMETERS

BMP Modeling Parameters

This document is intended to provide guidance to define the required modeling parameters necessary for the GSCWP Modeling Engine to correctly represent the structural BMP under analysis. These modeling parameters are required inputs for each facility to produce accurate estimates of water quality benefits using the GSCWP Modeling Engine.

These supported BMP types and their input parameters have been customized to support the County of San Diego's Green Streets Clean Water effort. The following sections and tables provide guidance on how to specify the modeling input parameters for each of the GSCWP BMP facility types.

1 COMMON PARAMETERS FOR ALL BMPS

The following common parameters are required for most structural BMPs.

BMP Types	Parameter Name	Units	Field Description	Purpose in Modeling Engine
All BMPs	Delineation(s) or Upstream BMP	--	Assign a delineation to the BMP through the normal delineation options. **OR** Indicate that the BMP receives flow from an upstream BMP.	Determines what drains to the BMP, or if it receives flow that has already been treated by another BMP.
	Lat, Long	Degrees (WGS 1984)	Locate the BMP on the landscape	Assigns the 85th percentile storm depth according to the nearest isohyet (CoSD Hydrology Manual 2015). Assigns the relevant rainfall zone for selecting an appropriate nomograph.

2 PARAMETERS FOR INFILTRATION BMPS

The following parameters are required to model infiltration BMPs.

BMP Types	Parameter Name	Units	Description	Guidance and Defaults
Tree Well (GS-1) with no underdrain Biofiltration (GS-3) with no underdrain Permeable Pavement (GS-4) with no underdrain Dispersion Area (GS-2)	Total Effective BMP Volume	cu-ft	The volume of the BMP available for water quality purposes. This includes ponding volume and the volume available in subsurface layers. It does not include flow control volumes or other volume that is not designed for water quality purposes.	Total effective volume = ponded volume + pore volume Simple methods: - Ponded volume = WQ ponding depth * wetted area when ponded at half of WQ depth - Pore volume = media and gravel volume * respective porosity o Default media porosity = 0.25 o Default gravel porosity = 0.4
	Infiltration Surface Area	sq-ft	Surface area through which infiltration can occur in the system. If infiltration will occur into the sidewalls of a BMP, it is appropriate to include half of the sidewall area as part of the infiltration surface area.	Estimate the area of the BMP floor and sidewalls that are wetted when the BMP at half of its total effective volume. Sidewalls are typically negligible for permeable pavement and underground infiltration galleries.
	Underlying Infiltration Rate	in/hr	The underlying infiltration rate below the BMP. This refers to the underlying soil, not engineered media.	A design infiltration rate should be calculated when infiltration is the only means of treatment
	Drawdown time	hrs	The time required for a BMP to drain and return to the dry-weather condition. For infiltration facilities, drawdown time is a function of basin volume and infiltration rate.	The drawdown time can be estimated by dividing the effective retention depth within all layers of the BMP by the design infiltration rate of the underlying soil.

BMP Types	Parameter Name	Units	Description	Guidance and Defaults
Drywell	Total Effective BMP Volume	cu-ft	The volume of the BMP available for water quality purposes. This includes the volume in any pre-treatment chamber as well as the volume in the well itself.	Add the volume of the pre-treatment system and the drywell, including free water volume and pore volume.
	Infiltration Discharge Rate	cfs	Design or tested infiltration flowrate of the drywell. This is specified in cu-ft per second, rather than inches per hour.	This value varies based on boring depth, width, and site soil conditions.
	Drawdown time	hrs	The time required for a BMP to drain and return to the dry-weather condition. For infiltration facilities, drawdown time is a function of basin volume and infiltration rate.	Dry are typically designed to infiltrate within 96 hours. However they are sized and treated as flow-based systems in this engine and therefore drawdown time is not used in sizing.

3 PARAMETERS FOR BMPS WITH ELEVATED UNDERDRAINS

This BMP type discharges treated water and provides stormwater retention via infiltration. There are two distinct compartments: the retention compartment below the underdrain elevation and the biofiltration compartment above the underdrains (media + ponding). The following parameters are required to model this BMP type.

BMP Types	Parameter Name	OCST Units	Description	Guidance and Defaults
Biofiltration (GS-3) with underdrain Tree Well (GS-1) with underdrain Permeable Pavement (GS-4) with underdrain	Total Effective BMP Volume	cu-ft	The volume of the BMP available for water quality purposes. This includes ponding volume and the available pore volume in media layers and/or in gravel storage layers. It does not include flow control volumes or other volume that is not designed for water quality purposes.	Total effective volume = ponded volume + pore volume Simple methods: - Ponded volume = WQ ponding depth * wetted area when ponded at half of WQ depth - Pore volume = media and gravel volume * respective porosity o Default media porosity = 0.25 o Default gravel porosity = 0.4
	Storage Volume Below Lowest Outlet Elevation	cu-ft	The volume of water stored below the lowest outlet (e.g., underdrain, orifice) of the system.	Calculate the volume contained in gravel or soil pores that is below the lowest outlet from the system. See calculations and defaults above.
	Media Bed Footprint	sq-ft	Surface area of the media bed of the BMP.	This can be estimated based on the ponded volume divided by the ponding depth.
	Design Media Filtration Rate	in/hr	Design filtration rate through the media bed. This may be controlled by the media permeability or by an outlet control on the underdrain system.	If not known, a reasonable default is 2.5 in/hr.
	Underlying Hydrologic Soil Group (HSG)	[A, B, C, D]	Choose the soil group that best represents the soils underlying the BMP. This is used to estimate a default infiltration rate.	Default to D
	Drawdown time	hrs	The time required for a BMP to drain and return to the dry-weather condition. For facilities with elevated underdrains, drawdown time is a function of basin volume, outlet sizing, and infiltration rate.	For two compartment BMP types the drawdown time for the ponded volume is a function of the outlet and the underlying infiltration rate. The Drawdown time of the retention volume is a function of the infiltration rate.

4 PARAMETERS FOR BIOFILTRATION AND FILTRATION BMPS WITH LINER

The following parameters are needed to model biofiltration and filtration BMPs with a liner. This group of BMPs is "volume-based" which means they have a design capture volume and drawdown time.

BMP Types	Parameter Name	Units	Description	Guidance and Defaults
Biofiltration (GS-3) with underdrain and liner Tree Well (GS-1) with underdrain	Total Effective BMP Volume	cu-ft	The volume of the BMP available for water quality purposes. This includes ponding volume and the available pore volume in media layers. It does not include flow control volumes or other volume that is not designed for water quality purposes.	Total effective volume = ponded volume + pore volume Simple methods: - Ponded volume = WQ ponding depth * wetted area when ponded at half of WQ depth - Pore volume = media and gravel volume * respective porosity o Default media porosity = 0.25 o Default gravel porosity = 0.4
	Media Bed Footprint	sq-ft	Surface area of the media bed or sand bed of the BMP.	This can be estimated based on the ponded volume divided by the ponding depth.
	Design Media Filtration Rate	in/hr	Design filtration rate through the media/sand bed. This may be controlled by the media/sand permeability or by an outlet control on the underdrain system.	If not known, a reasonable default is 2.5 in/hr.

	Drawdown Time	hr	The time required for a BMP to drain and return to the dry-weather condition. For infiltration facilities, drawdown time is a function of basin volume and infiltration rate	Surface Ponding: The drawdown time can be estimated by dividing the WQ ponding depth by the design media filtration rate.

5 PARAMETERS FOR PROPRIETARY FLOW-BASED BMPS

The following parameters are needed to model BMPs the following flow-based treatment BMPs. These BMPs do not retain or detain significant volume. They treat water as it flows through them up to a certain design flowrate.

BMP Types	Parameter Name	Units	Description	Guidance and Defaults
Hydrodynamic Separator	Treatment Rate	cfs	The flowrate at which the BMP can provide treatment of runoff.	Obtain from manufacturer specifications.
	Time of Concentration	mins [5,10, 15,20, 30,45, 60]	The time required for the entire drainage to begin contributing runoff to the BMP. This value must be less than 60 minutes.	Default 10 mins is reasonable for most developed catchments with size of at least 0.2 acres. For smaller catchments, assume 5 minutes.

6 PARAMETERS FOR VEGETATED FLOW-BASED BMPS WITH INCIDENTAL INFILTRATION

This group of BMPs are typically sized with flow-based methods, but also typically have soft bottoms and may therefore provide incidental volume reduction via infiltration.

BMP Types	Parameter Name	Units	Description	Guidance and Defaults
Vegetated Swale	Treatment Rate	cfs	The flowrate at which the BMP can provide treatment of runoff.	Enter the design flowrate of the facility.
	Time of Concentration	mins [5,10, 15,20, 30,45, 60]	The time required for the entire drainage to begin contributing runoff to the BMP. This value must be less than 60 minutes. See TGD guidance.	A default of 10 mins is reasonable for most developed catchments with size of at least 0.2 acres. For smaller catchments, assume 5 minutes.
	Wetted Footprint	sq-ft	Wetted footprint when BMP is half full.	
	Effective Retention Depth	feet	Depth of water stored in shallow surface depression or media/rock sump for infiltration to occur. Must account for gravel porosity.	If there is an infiltration sump in the swale, then use this value. Most of this time this will be zero.
	Underlying Hydrologic Soil Group (HSG)	[A, B, C, D, Lined]	Choose the soil group that best represents the soils underlying the BMP. This is used to estimate a default infiltration rate.	If not known assume D soils as a conservative default.

This page intentionally left blank

ATTACHMENT D – TABLES/RESULTS

ATTACHMENT D.1 – DRAINAGE AREA RANKING

Attachment D.1. Drainage Area Ranking

Rank	Drainage Area ID	Supervisor District	Watershed	Community Name	Area (acres)	Impervious Area (acres)	Runoff Coefficient	% Impervious	Water Quality Benefit Scores									Community Benefit Score								Drainage Area Prioritization Score
									TSS	TP	TN	TCu	TPb	TZn	FC	Trash	WQ Benefit Points	Underserved Communities	Environmental Justice Communities	Low-Income Communities	Caltrans	CIP	Park Access	Tree Canopy Cover	Community Benefit Points	
1	01_6794	5th Supervisorial Dist	Santa Margarita River	Fallbrook	1.4	1.1	0.7	73.1	1.8	6.7	6.7	15.6	6.7	13.9	24.2	40.0	116	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	136
2	05_5921	2nd Supervisorial Dist	San Diego River	Lakeside	3.7	3.2	0.8	87.3	4.2	2.8	5.2	9.2	7.7	16.0	40.1	18.5	104	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	133
3	04_22960	2nd Supervisorial Dist	San Dieguito River	Ramona	1.9	1.2	0.7	61.7	3.5	2.1	4.3	7.5	6.4	13.4	34.9	39.9	112	0.0	0.0	13.6	0.0	0.0	0.0	3.4	17	129
4	06_8607	2nd Supervisorial Dist	San Diego Bay	Spring Valley	5.0	4.0	0.8	81.0	4.1	2.6	5.0	17.6	7.5	15.6	26.7	19.5	99	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	124
5	06_8603	2nd Supervisorial Dist	San Diego Bay	Spring Valley	7.5	5.9	0.8	78.9	3.8	2.4	4.7	13.8	6.0	12.5	21.7	33.1	98	0.0	5.1	13.6	0.0	0.0	0.0	3.4	22	120
6	05_5883	2nd Supervisorial Dist	San Diego River	Lakeside	4.3	3.6	0.8	83.0	3.9	3.2	4.6	8.7	7.5	13.4	24.3	21.8	87	3.4	5.1	13.6	0.0	3.4	3.4	3.4	32	120
7	05_14046	2nd Supervisorial Dist	San Diego River	Lakeside	4.0	3.5	0.8	88.4	4.1	3.4	4.7	9.0	8.4	13.8	23.5	19.8	87	3.4	5.1	13.6	0.0	3.4	3.4	3.4	32	119
8	06_8144	2nd Supervisorial Dist	San Diego Bay	Valle De Oro	3.0	2.5	0.8	85.4	4.2	2.6	5.2	18.2	7.8	16.2	28.3	15.6	98	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	119
9	01_17250	5th Supervisorial Dist	Santa Margarita River	Fallbrook	0.3	0.2	0.7	76.4	1.9	6.9	6.9	16.2	6.9	14.4	25.1	20.0	98	0.0	0.0	13.6	0.0	0.0	3.4	2.0	19	117
10	06_8475	2nd Supervisorial Dist	San Diego Bay	Spring Valley	6.1	4.2	0.7	68.8	3.7	2.3	4.5	15.8	6.8	14.1	24.4	19.7	91	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	117
11	04_23398	2nd Supervisorial Dist	San Dieguito River	Ramona	0.2	0.1	0.7	67.7	3.7	2.3	4.5	7.9	6.8	14.1	36.8	20.0	96	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	116
12	02_6629	5th Supervisorial Dist	San Luis Rey	Fallbrook	2.7	1.8	0.7	68.7	3.6	2.2	4.5	7.8	6.7	13.9	36.4	20.0	95	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	115
13	05_5867	2nd Supervisorial Dist	San Diego River	Lakeside	2.6	2.1	0.8	79.6	3.8	3.2	4.4	8.4	7.4	12.8	22.0	20.5	83	3.4	5.1	13.6	0.0	3.4	3.4	3.4	32	115
14	02_17261	5th Supervisorial Dist	San Luis Rey	Fallbrook	1.0	0.7	0.7	71.1	3.5	2.2	4.3	7.6	6.5	13.5	35.0	19.7	92	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	113
15	05_5625	2nd Supervisorial Dist	San Diego River	Lakeside	2.8	2.3	0.8	81.8	4.0	2.9	4.8	8.7	6.9	14.4	32.8	15.9	90	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	111
16	04_22758	2nd Supervisorial Dist	San Dieguito River	Ramona	3.1	1.8	0.7	59.3	3.3	2.3	4.0	7.0	5.7	11.9	28.5	32.2	95	0.0	0.0	13.6	0.0	0.0	0.0	2.0	16	111
17	06_18458	2nd Supervisorial Dist	San Diego Bay	Spring Valley	1.3	1.1	0.8	79.4	4.0	3.0	4.6	16.8	10.4	13.7	15.0	17.1	85	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	110
18	01_6770	5th Supervisorial Dist	Santa Margarita River	Fallbrook	3.5	2.3	0.6	66.2	1.6	7.4	5.7	14.2	5.5	11.3	16.1	27.8	89	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	110
19	05_5564	2nd Supervisorial Dist	San Diego River	Lakeside	6.2	4.6	0.7	73.7	3.5	2.7	4.2	7.6	5.9	12.1	25.6	27.4	89	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	109
20	01_6908	5th Supervisorial Dist	Santa Margarita River	Fallbrook	2.6	1.8	0.7	68.7	1.6	8.0	5.8	14.7	5.7	11.5	15.4	25.7	88	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	109
21	05_5950	2nd Supervisorial Dist	San Diego River	Lakeside	0.4	0.3	0.8	87.7	4.0	3.0	4.8	8.8	7.0	14.3	31.8	14.6	88	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	109
22	05_5894	2nd Supervisorial Dist	San Diego River	Lakeside	1.6	1.3	0.8	83.8	4.0	3.3	4.6	8.6	9.6	13.4	20.5	15.6	80	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	109
23	06_8133	2nd Supervisorial Dist	San Diego Bay	Valle De Oro	10.0	8.3	0.8	83.0	4.0	2.9	4.9	17.6	7.1	14.7	23.2	16.7	91	0.0	0.0	13.6	0.0	0.0	0.0	3.4	17	108
24	05_5860	2nd Supervisorial Dist	San Diego River	Lakeside	8.7	7.4	0.8	84.8	4.1	3.3	4.7	8.7	9.8	13.5	20.1	15.1	79	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	108
25	04_21700	3rd Supervisorial Dist	San Dieguito River	San Dieguito	2.8	1.9	0.7	67.0	3.6	2.5	4.3	7.8	6.3	13.1	31.0	33.6	102	0.0	0.0	0.0	0.0	0.0	3.4	2.0	5	108
26	06_8610	2nd Supervisorial Dist	San Diego Bay	Spring Valley	1.1	0.8	0.8	75.8	3.7	2.9	4.4	16.6	6.4	13.3	19.1	14.3	81	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	106
27	06_8440	2nd Supervisorial Dist	San Diego Bay	Spring Valley	1.9	1.5	0.8	77.9	3.9	3.0	4.5	16.5	9.7	13.2	14.1	15.6	81	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	106
28	01_6859	5th Supervisorial Dist	Santa Margarita River	Fallbrook	0.5	0.4	0.7	67.7	1.8	7.3	6.6	15.7	6.5	13.4	21.8	12.5	86	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	106
29	06_8267	2nd Supervisorial Dist	San Diego Bay	Spring Valley	0.6	0.5	0.7	76.5	3.8	2.9	4.4	16.0	9.8	12.9	13.9	16.7	80	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	106
30	SDTO_4_S233_a	2nd Supervisorial Dist	San Dieguito River	Ramona	1.3	0.8	0.6	60.6	3.2	2.0	3.9	6.8	5.8	12.2	31.7	19.8	85	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	106
31	06_8836	1st Supervisorial Dist	San Diego Bay	County Islands	0.7	0.4	0.6	54.4	7.9	8.7	16.4	19.3	9.3	7.0	18.3	1.3	88	0.0	0.0	13.6	0.0	0.0	0.0	3.4	17	105
32	05_5565	2nd Supervisorial Dist	San Diego River	Lakeside	3.0	2.2	0.7	72.8	3.3	2.5	4.0	6.8	5.4	11.1	24.8	27.6	86	0.0	0.0	13.6	0.0	0.0	3.4	2.0	19	105
33	04_22705	2nd Supervisorial Dist	San Dieguito River	Ramona	0.9	0.6	0.7	70.8	3.7	2.6	4.4	8.0	6.5	13.4	32.2	16.7	87	0.0	0.0	13.6	0.0	0.0	0.0	3.4	17	104
34	06_12840	2nd Supervisorial Dist	San Diego Bay	Spring Valley	4.9	2.5	0.6	51.3	7.3	8.1	14.9	18.3	8.6	6.9	16.6	1.4	82	0.0	5.1	13.6	0.0	0.0	0.0	3.4	22	104
35	04_22752	2nd Supervisorial Dist	San Dieguito River	Ramona	7.5	4.4	0.7	59.4	3.2	2.1	3.9	6.0	5.1	10.4	26.1	31.4	88	0.0	0.0	13.6	0.0	0.0	0.0	2.0	16	104
36	06_8821	1st Supervisorial Dist	San Diego Bay	County Islands	8.7	6.7	0.7	77.0	3.6	2.6	4.4	16.1	6.4	13.3	20.4	16.3	83	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	104
37	05_5924	2nd Supervisorial Dist	San Diego River	Lakeside	0.7	0.6	0.8	87.6	4.1	3.5	4.6	8.9	9.1	13.1	17.9	13.4	75	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	104
38	04_23375	2nd Supervisorial Dist	San Dieguito River	Ramona	0.7	0.4	0.7	60.0	3.4	2.1	4.2	7.4	6.3	13.2	34.2	12.2	83	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	103
39	05_5630	2nd Supervisorial Dist	San Diego River	Lakeside	0.4	0.3	0.7	73.4	3.5	2.5	4.2	7.7	6.2	12.8	29.5	16.0	82	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	103
40	06_8266	2nd Supervisorial Dist	San Diego Bay	Spring Valley	0.9	0.6	0.7	73.1	3.6	2.8	4.2	15.4	9.1	12.3	12.8	16.1	76	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	102
41	01_15255	5th Supervisorial Dist	Santa Margarita River	Fallbrook	0.3	0.2	0.7	64.0	1.8	7.8	6.2	14.8	9.3	12.2	13.4	17.3	83	0.0	0.0	13.6	0.0	0.0	3.4	2.0	19	102
42	06_8242	2nd Supervisorial Dist	San Diego Bay	Spring Valley	0.3	0.3	0.8	78.2	3.7	3.1	4.4	16.8	6.2	12.8	16.5	12.6	76	0.0	5.1	13.6	0.0	0.0	3.4	3.4	26	102
43	05_5858	2nd Supervisorial Dist	San Diego River	Lakeside	1.3	1.1	0.8	83.2	3.9	3.4	4.5	8.6	8.8	12.7	17.1	13.4	72	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	101
44	06_8271	2nd Supervisorial Dist	San Diego Bay	Spring Valley	0.8	0.6	0.7	73.6	3.8	2.8	4.3	15.7	9.8	12.9	14.1	17.3	81	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	101
45	04_22704	2nd Supervisorial Dist	San Dieguito River	Ramona	0.8	0.5	0.7	65.5	3.5	2.5	4.2	7.6	6.2	12.7	30.4	16.7	84	0.0	0.0	13.6	0.0	0.0	0.0	3.4	17	101
46	05_5854	2nd Supervisorial Dist	San Diego River	Lakeside	1.4	1.2	0.8	86.4	4.1	3.4	4.7	8.8	9.7	13.5	19.8	7.3	71	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	100
47	01_6854	5th Supervisorial Dist	Santa Margarita River	Fallbrook	0.7	0.5	0.7	69.2	1.7	8.5	6.1	15.5	5.8	12.0	16.1	13.2	79	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	99
48	04_22828	2nd Supervisorial Dist	San Dieguito River	Ramona	5.3	3.2	0.7	59.5	3.3	2.3	4.0	7.2	5.8	12.0	28.2	16.0	79	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	99
49	01_6933	5th Supervisorial Dist	Santa Margarita River	Fallbrook	1.6	0.9	0.6	56.2	1.5	8.1	5.3	13.8	5.4	10.2	11.5	20.8	77	0.0	0.0	13.6	0.0	3.4	3.4	2.0	22	99
50	01_6762	5th Supervisorial Dist	Santa Margarita River	Fallbrook	5.1	3.1	0.6	60.9	1.5	6.5	5.5	13.4	5.4	11.2	17.6	17.1	78	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	99
51	05_5549	2nd Supervisorial Dist	San Diego River	Lakeside	2.5	1.8	0.7	71.6	3.4	2.6	4.0	7.4	5.7	11.8	25.5	14.0	75	0.0	0.0	13.6	0.0	3.4	3.4	3.4	24	98
52	03_4505	5th Supervisorial Dist	Carlsbad	North County Metro	4.9	3.1	0.7	64.4	1.7	2.3	3.9	10.5	5.0	9.9	23.3	36.0	93	0.0	0.0	0.0	0.0	0.0	3.4	2.0	5	98
53	04_22782	2nd Supervisorial Dist	San Dieguito River	Ramona	2.3	1.4	0.7	60.9	3.4	2.3	4.1	7.3	6.0	12.5	30.3	16.5	82	0.0	0.0	13.6	0.0	0.0	0.0	2.0	16	98
54	02_6649	5th Supervisorial Dist	San Luis Rey	Fallbrook	0.8	0.5	0.7	65.7	3.3	2.5	4.0	7.4	5.9	12.2	27.7	15.9	79	0.0	0.0	13.6	0.0	0.0	3.4	2.0	19	98
55	01_6893	5th Supervisorial Dist	Santa Margarita River	Fallbrook	0.5	0.3	0.6	60.3	1.7	6.8	5.8	13.7	5.5	11.3	17.7	14.9	77	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	98
56	05_5650	2nd Supervisorial Dist	San Diego River	Lakeside	0.5	0.4	0.8	79.0	3.7	3.0	4.3	8.3	6.2	12.8	25.6	13.0	77	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	97
57	04_21520	3rd Supervisorial Dist	San Dieguito River	San Dieguito	0.3	0.2	0.7	61.4	3.5	2.1	4.3	7.5	6.4	13.3	34.8	19.9	92	0.0	0.0	0.0	0.0	0.0	3.4	2.0	5	97
58	05_5929	2nd Supervisorial Dist	San Diego River	Lakeside	0.3	0.2	0.7	75.9	3.5	2.8	4.2	7.7	6.1	12.2	26.6	13.8	77	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	97
59	04_23369	2nd Supervisorial Dist	San Dieguito River	Ramona	0.3	0.2	0.6	47.7	3.0	2.0	3.6	6.5	5.4	11.1	27.4	17.8	77	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	97
60	01_6742	5th Supervisorial Dist	Santa Margarita River	Fallbrook	0.7	0.5	0.7	73.4	1.7	8.6	6.0	15.4	5.7	11.7	15.0	12.6	77	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	97
61	01_6728	5th Supervisorial Dist	Santa Margarita River	Fallbrook	0.9	0.6	0.6	64.6	1.6	7.0	5.7	13.9	5.5	11.4	17.1	15.7	78	0.0	0.0	13.6	0.0	0.0	3.4	2.0	19	97
62	06_8077	2nd Supervisorial Dist	San Diego Bay	Valle De Oro	1.1	0.9	0.8	84.6	4.1	2.8	4.9	16.8	7.1	14.6	23.3	16.4	90	0.0	0.0	0.0	0.0	0.0	3.4	3.4	7	97
63	02_6627	5th Supervisorial Dist	San Luis Rey	Fallbrook	2.2	1.3	0.7	62.1	3.3	2.5	3.9	7.2	5.6	11.6	25.2	14.7	74	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	94
64	03_4469	5th Supervisorial Dist	Carlsbad	North County Metro	48.5	36.3	0.7	75.0	3.9	2.9	4.4	7.9	9.5	12.7	13.5	15.8	71	0.0	0.0	13.6	0.0	3.4	3.4	3.4	24	94
65	02_6665	5th Supervisorial Dist	San Luis Rey	Fallbrook	3.8	2.2	0.6	59.2	3.2	2.2	3.6	6.3	5.0	10.3	23.6	14.3	68	0.0	0.0	13.6	0.0	0.0	3.4	3.4	20	89
66	02_6645	5th Supervisorial Dist	San Luis Rey	Fallbrook	0.3	0.2	0.6	56.4	3.2	2.4	3.8	6.8	5.5	11.1	25.4	14.8	73	0.0	0.0	13.6	0.0	0.0	0.0	2.0	16	89
67	05_5905	2nd Supervisorial Dist	San Diego River	Lakeside	45.7	33.0	0.7	72.3	3.4	3.2	3.9	6.9	5.4	9.5	13.2	6.6	52	3.4	5.1	13.6	0.0	3.4	3.4	3.4	32	84
68	06_8612	2nd Supervisorial Dist	San Diego Bay	Spring Valley	1.0	0.7	0.7	71.7	3.4	3.4	3.8	15.7	5.2	10.6	9.9	7.9	60	0.0	5.1	13.6	0.0	0.0	0.0	3.4	22	82
69	05_5910	2nd Supervisorial Dist	San Diego River	Lakeside	17.0	12.8	0.7	75.2	3.3	3.5	3.7	7.7	5.8	9.9	9.2	9.1	52	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	81
70	05_5908	2nd Supervisorial Dist	San Diego River	Lakeside	0.5	0.5	0.8	86.4	3.7	4.2	4.0	8.7	5.6	10.5	7.3	7.5	51	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	80
71	09_19728	1st Supervisorial Dist	Tijuana River	Otay	2.8	1.4	0.6	50.8	5.3	11.7	11.7	11.9	11.8	7.2	11.7	0.2	71	0.0	0.0	0.0	0.0	0.0	3.4	3.4	7	78
72	02_6647	5th Supervisorial Dist	San Luis Rey	Fallbrook	2.7	1.3	0.6	49.4	2.8	2.0	3.3	5.3	4.8	8.6	22.8	12.3	62	0.0	0.0	13.6	0.0	0.0	0.0	2.0	16	78
73	09_19727	1st Supervisorial Dist	Tijuana River	Otay	21.0	10.0	0.6	47.6	5.3	11.7	11.7	11.7	11.7	6.9	11.7	0.0	71	0.0	0.0	0.0	0.0	0.0	3.4	3.4	7	78
74	05_5909	2nd Supervisorial Dist	San Diego River	Lakeside	2.5	1.6	0.6	65.9	3.2	2.7	3.3	6.2	5.4	8.4	9.9	9.2	48	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	77
75	02_6646	5th Supervisorial Dist	San Luis Rey	Fallbrook	1.6	0.7	0.5	44.2	2.5	1.7	3.0	4.6	4.5	7.7	23.0	13.3	60	0.0	0.0	13.6	0.0	0.0	0.0	2.0	16	76
76	05_5911	2nd Supervisorial Dist	San Diego River	Lakeside	0.5	0.4	0.8	81.8	3.4	3.9	3.7	8.1	4.9	9.5	5.9	6.9	46	3.4	5.1	13.6	0.0	0.0	3.4	3.4	29	75
77	02_27456	5th Supervisorial Dist	San Luis Rey	Bonsall	35.6	14.3	0.5	40.1	8.5	6.2	10.8	5.9	7.2	4.3	20.7	1.9	65	0.0	0.0	0.0	0.0	3.4	0.0	2.0	5	71
78	06_8611	2nd Supervisorial Dist	San Diego Bay	Spring Valley	23.8	16.1	0.7	67.7	3.5	3.1	4.0	9.8	5.5	6.0	13.3	3.4	48	0.0	5.1	13.6	0.0	0.0	0.0	3.4	22	71
79	06_8593	2nd Supervisorial Dist	San Diego Bay	Spring Valley	1.5	1.1	0.7	71.3	3.3	3.6	3.6	14.2	4.8	8.4	6.0	3.3	47	0.0	5.1	13.6	0.0	0.0	0.0	3.4	22	69
80	02_6650	5th Supervisorial Dist	San Luis Rey	Fallbrook	2.7	1.3	0.5	47.3	2.7	1.8	3.0	4.5	4.2	7.1	19.7	9.3	52	0.0	0.0	13.6	0.0	0.0	0.0	2.0	16	68
81	02_6210	5th Supervisorial Dist	San Luis Rey	Bonsall	2.3	1.0	0.5	42.8	2.5	1.8	3.0	5.5	4.3	9.0	20.3	15.9	62	0.0	0.0	0.0	0.0	0.0	3.4	2.0	5	68
82	02_6637	5th Supervisorial Dist	San Luis Rey	Fallbrook	4.7	1.8	0.5	38.6	2.4	1.8	2.9	4.4	3.7	6.1	13.1	8.3	43	0.0	0.0	13.6	0.0	3.4	3.4	2.0	22	65
83	02_6458	5th Supervisorial Dist	San Luis Rey	Valley Center	1.0	0.5	0.6	49.1	1.5	2.3	1.7	6.3	4.8	9.7	19.8	11.9	58	0.0	0.0	0.0	0.0	0.0	3.4	3.4	7	65
84	02_6195	5th Supervisorial Dist	San Luis Rey	Bonsall	1.1	0.5	0.5	47.5	2.6	2.0	3.2	5.8	4.5	9.2	19.8	12.2	59	0.0	0.0	0.0	0.0	0.0	3.4	2.0	5	65
85	02_6630	5th Supervisorial Dist	San Luis Rey	Fallbrook	2.7	1.6	0.6	59.0	2.8	2.2	3.3	4.5	4.0	6.6	16.0	7.4	47	0.0	0.0	13.6	0.0	0.0	0.0	3.4	17	64

ATTACHMENT D.2 – BMP CONSTRAINTS

Table D.2 BMP Constraints

Constraint	Type 1 – Infiltration					Type 2 – Partial Infiltration			Type 3 – Low/No Infiltration		Other	
	Tree Well (GS-1)	Biofilter (GS-3)	Permeable Pavement (GS-4)	Dispersion Area (GS-2)	Drywell	Tree Well (GS-1)	Biofilter (GS-3)	Permeable Pavement (GS-4)	Tree Well (GS-1)	Biofilter with liner (GS-3)	HDS	Vegetated Swale
Maximum distance to public storm drain (ft)[a]	--	--	--	--	--	100	100	100	100	100	100	100
Soil Type[c]	A/B	A/B	A/B	A/B	A/B[b]	C	C	C	D	D	--	--
Overhead power lines[a]	--	--	--	--	Yes	--	--	--	--	--	--	--
Parking present[a]	--	--	Yes	--	--	--	--	Yes	--	--	--	--
Minimum depth to groundwater (ft bgs)	13[c]	14[d]	13[d]	14[c]	25[a]	13[c]	14[d]	13[d]	3[c]	4[d]	--	11.5[d]
Minimum width (ft)	4[c]	4[c]	8[a]	4[c]	7[a]	4[c]	4[c]	8[a]	4[c]	4[c]	--	2[d]
Minimum length (ft)	6[c]	6[c]	8[a]	4.5[c]	16[a]	6[c]	6[c]	8[a]	6[c]	6[c]	--	N/A
Slope Max (%)	20[e]	20[d]	5[c]	5[c]	20[e]	2[d]	2[d]	5[c]	2[d]	2[d]	--	6[d]
Slope Min (%)	--	--	--	--	--	--	--	--	--	--	--	1.5[d]
Minimum distance from GeoTracker Contaminated Sites (ft) [d]	100	100	100	100	100	100	100	100	0	0	0	100
Minimum distance from water supply well (ft) [d]	100	100	100	100	100	100	100	100	0	0	--	--
Minimum building setback (ft) [d]	10	10	10	10	25[a]	0	0	0	0	0	0	10
High priority land use (trash generating) [a]	--	--	--	--	--	--	--	--	--	--	Yes	--

<u>Notes</u>

(a) Best professional judgment by the GSCW Plan team
(b) A/B soils screened as "likely suitable"; C/D soils screened as "potentially suitable"
(c) County of San Diego Green Streets Standard Drawings (2021)
(d) County of San Diego BMP Design Manual (2020)
(e) County of San Diego Low Impact Development Handbook (2014), Appendix F

ATTACHMENT D.3 – TOP 30 PROJECT SCORING INPUTS

Attachment D.3 Top 30 Project Scoring Inputs

Rank	Project Name	Watershed	Number of BMPs	BMP Type(s)	BMP Footprint (sqft)	Drainage Area (ac)	Impervious Acre Treated (ac)	Annual FC Reduction (MPNx10^12)	Social Benefit Score (max 43 points)	Environmental Benefit Score (max 100 points)	Cost Effectiveness Benefit Score (max 35 points)	Total Score (max 178 points)
1	Sweetwater Rd	Sweetwater	14	Tree Well (Type 3)	19645	48.3	34.66	3.51	43	84	34	161
2	Magnolia Ave	San Diego River	11	Tree Well (Type 3), HDS	10925	20.1	16.5	1.78	40	78	34	152
3	Campo Rd	Sweetwater	11	Tree Well (Type 3), HDS	5107	11.9	9.95	2.21	43	73	33	149
4	S Mission Rd (North)	San Luis Rey	17	Tree Well (Type 3), HDS	10047	21.7	11.92	1.34	41	74	33	148
4	Ammunition Rd	Santa Margarita River	4	Tree Well (Type 1), HDS	1317	3.5	2.35	0.03	39	76	33	148
6	Day St	San Dieguito River	4	Tree Well (Type 3), HDS	3174	6.2	4.04	1.14	41	72	33	146
6	Wintercrest Dr	San Diego River	3	Tree Well (Type 3)	2954	3.7	2.95	0.97	43	71	32	146
8	Osborne St	San Luis Rey	1	Tree Well (Type 3)	5710	30.4	13.21	3.69	34	75	34	143
9	S Mission Rd (W Aviation Rd)	Santa Margarita River	2	Tree Well (Type 3)	4128	5.4	3.32	1.37	39	69	32	140
10	Denny Way	San Diego River	6	Tree Well (Type 3)	4848	3.5	3.11	0.86	37	68	32	137
11	S Main Ave	Santa Margarita River	3	Tree Well (Type 1), HDS	647	2.2	1.52	0.14	40	63	33	136
12	Vine St (El Cajon North)	San Diego River	1	Tree Well (Type 2)	632	4.7	3.75	0.31	37	63	35	135
12	Channel Rd	San Diego River	2	Tree Well (Type 2)	2391	2.5	1.79	0.49	43	60	32	135
14	Vine St (El Cajon South)	San Diego River	3	Tree Well (Type 3), HDS	579	3.2	2.63	0.34	41	51	34	126
15	S Santa Fe Ave	Carlsbad	1	HDS	29	48.5	36.74	0.00	24	60	35	119
16	Montecito Rd	San Dieguito River	1	HDS	8	7.1	4.21	0.00	26	57	35	118
17	W Bradley Ave	San Diego River	1	HDS	20	5.9	5.33	0.00	25	57	35	117
17	Vernon Way	San Diego River	1	HDS	75	8.7	7.18	0.00	22	60	35	117
19	S Mission Rd (South)	San Luis Rey	1	Tree Well (Type 3)	383	2.2	1.22	0.26	38	43	34	115
20	Troy St	Sweetwater	1	Tree Well (Type 3)	3409	0.9	0.55	0.14	39	42	32	113
21	Airway Rd	Tijuana River	2	Tree Well (Type 3)	921	23.6	11.38	1.20	35	41	35	111
22	W Fallbrook St	Santa Margarita River	2	Tree Well (Type 3)	369	0.7	0.56	0.11	40	38	32	110
23	N Vine St (Fallbrook)	Santa Margarita River	4	Tree Well (Type 3), HDS	689	1.8	1.18	0.24	39	38	32	109
24	16th St	San Dieguito River	1	HDS	156	3.1	1.95	0.00	26	47	34	107
25	Prospect St	Sweetwater	1	HDS	2	4.4	3.34	0.00	26	43	35	104
26	W College St	Santa Margarita River	1	Tree Well (Type 3)	4600	2.6	1.75	0.55	41	59	0	100
26	Julian Ave	San Diego River	1	Tree Well (Type 3)	67	0.4	0.36	0.04	39	28	33	100
28	Birch St	Sweetwater	1	HDS	6	1.9	1.50	0.00	24	41	34	99
29	Bancroft Dr	Sweetwater	3	HDS	80	2.3	1.61	0.00	24	41	33	98
30	8th St	San Dieguito River	2	HDS	8	1.7	2.47	0.00	26	34	34	94

Attachment D.3 Top 30 Project Scoring Inputs

Social Benefit			LUEG 0.2 Version "Underserved Communities" *(Points given based on the maximum of the collective BMP points within the Project)*		Include community involvement (assumes vegetated BMPs will involve community) *(Points given based on the maximum of the collective BMP points within the Project)*		Limited pedestrian access (Ped Gap Score) *(Points given based on the average Ped Gap Scores of the collective BMPs within the Project)*		Enhance/create recreational and public use areas (Assumes Vegetated or Trash BMPs will receive maximum points) *(Points given based on the maximum of the collective BMP points within the Project)*		Provide public education opportunities (assumes surface BMPs will provide public education opportunities) *(Points given based on the maximum of the collective BMP points within the Project)*		Improve community mobility & access (LID BMPs within 200 ft of transit) *(Points given based on the maximum of the collective BMP points within the Project)*		Limited park access (Vegetated BMPs >1/4 mile from parks) *(Points given based on the maximum of the collective BMP points within the Project)*		Identified traffic safety improvements *(Points given based on the maximum of the collective BMP points within the Project)*		Sum
Criteria and Available Points			Yes	17	Yes	10	≥ 1589 1342 – 1573 959 – 1308	4 3 2	Vegetated or Trash BMPs	3	Yes	3	Yes	2	Yes	2	Yes	2	43
			No	0	None	0	571 – 947 No Score - 571	1 0	Others	1	No	0	No	0	No	0	No	0	
Rank	**Project Name**	**Watershed**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Sum**
1	Sweetwater Rd	Sweetwater	Yes	17	Yes	10	1872.85	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	Yes	2	43
2	Magnolia Ave	San Diego River	Yes	17	Yes	10	713.83	1	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	Yes	2	40
3	Campo Rd	Sweetwater	Yes	17	Yes	10	1643.73	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	Yes	2	43
4	S Mission Rd (North)	San Luis Rey	Yes	17	Yes	10	1694.67	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	No	0	41
4	Ammunition Rd	Santa Margarita River	Yes	17	Yes	10	2339.54	4	Vegetated or Trash BMP	3	Yes	3	No	0	No	0	Yes	2	39
6	Day St	San Dieguito River	Yes	17	Yes	10	1860.04	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	No	0	41
6	Wintercrest Dr	San Diego River	Yes	17	Yes	10	1784.45	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	Yes	2	43
8	Osborne St	San Luis Rey	Yes	17	Yes	10	713.19	1	Vegetated or Trash BMP	3	Yes	3	No	0	No	0	No	0	34
9	S Mission Rd (W Aviation Rd)	Santa Margarita River	Yes	17	Yes	10	1765.09	4	Vegetated or Trash BMP	3	Yes	3	No	0	No	0	Yes	2	39
10	Denny Way	San Diego River	Yes	17	Yes	10	262.11	0	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	No	0	37
11	S Main Ave	Santa Margarita River	Yes	17	Yes	10	1544.68	3	Vegetated or Trash BMP	3	Yes	3	Yes	2	No	0	Yes	2	40
12	Vine St (El Cajon North)	San Diego River	Yes	17	Yes	10	1115.36	2	Vegetated or Trash BMP	3	Yes	3	Yes	2	No	0	No	0	37
12	Channel Rd	San Diego River	Yes	17	Yes	10	2057.10	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	Yes	2	43
14	Vine St (El Cajon South)	San Diego River	Yes	17	Yes	10	1659.06	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	No	0	Yes	2	41
15	S Santa Fe Ave	Carlsbad	Yes	17	No	0	0.00	0	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	Yes	2	24
16	Montecito Rd	San Dieguito River	Yes	17	No	0	2353.00	4	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	No	0	26
17	W Bradley Ave	San Diego River	Yes	17	No	0	572.20	1	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	Yes	2	25
17	Vernon Way	San Diego River	Yes	17	No	0	0.00	0	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	No	0	22
19	S Mission Rd (South)	San Luis Rey	Yes	17	Yes	10	1383.09	3	Vegetated or Trash BMP	3	Yes	3	No	0	No	0	Yes	2	38
20	Troy St	Sweetwater	Yes	17	Yes	10	0.00	0	Vegetated or Trash BMP	3	Yes	3	Yes	2	Yes	2	Yes	2	39
21	Airway Rd	Tijuana River	Yes	17	Yes	10	0.00	0	Vegetated or Trash BMP	3	Yes	3	No	0	Yes	2	No	0	35
22	W Fallbrook St	Santa Margarita River	Yes	17	Yes	10	1546.56	3	Vegetated or Trash BMP	3	Yes	3	No	0	Yes	2	Yes	2	40
23	N Vine St (Fallbrook)	Santa Margarita River	Yes	17	Yes	10	1774.58	4	Vegetated or Trash BMP	3	Yes	3	No	0	Yes	2	No	0	39
24	16th St	San Dieguito River	Yes	17	No	0	1793.18	4	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	No	0	26
25	Prospect St	Sweetwater	Yes	17	No	0	2251.95	4	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	No	0	26
26	W College St	Santa Margarita River	Yes	17	Yes	10	1622.35	4	Vegetated or Trash BMP	3	Yes	3	No	0	Yes	2	Yes	2	41
26	Julian Ave	San Diego River	Yes	17	Yes	10	1808.04	4	Vegetated or Trash BMP	3	Yes	3	Yes	2	No	0	No	0	39
28	Birch St	Sweetwater	Yes	17	No	0	1646.63	4	Vegetated or Trash BMP	3	No	0	No	0	No	0	No	0	24
29	Bancroft Dr	Sweetwater	Yes	17	No	0	1198.73	2	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	No	0	24
30	8th St	San Dieguito River	Yes	17	No	0	1715.26	4	Vegetated or Trash BMP	3	No	0	Yes	2	No	0	No	0	26

Attachment D.3 Top 30 Project Scoring Inputs

Environmental Benefit - Water Quality			Addresses TMDL constituents and/or PWQC (303d pollutant) in WQIP *(Points given based on the maximum of the collective BMP points within the Project)*		Trash Priority Land Use *(Points given based on the maximum of the collective BMP points within the Project)*		Pollutant Load Reduction *(Points given based on the sum of the effective impervious area treated within the Project)*		Sum
Criteria and Available Points			Yes	8	Yes	7	≥ 80th percentile	40	55
							60-79th percentile	30	
							40-59th percentile	20	
			No	0	No	0	20-39th percentile	10	
							<20th percentile or no reduction	0	
Rank	**Project Name**	**Watershed**	**Input**	**Points**	**Input**	**Points**	**Effective Impervious Area Treated (ac)**	**Points**	**Sum**
1	Sweetwater Rd	Sweetwater	Yes	8	Yes	7	14.35	40	55
2	Magnolia Ave	San Diego River	Yes	8	Yes	7	13.35	40	55
3	Campo Rd	Sweetwater	Yes	8	No	0	8.03	40	48
4	S Mission Rd (North)	San Luis Rey	Yes	8	No	0	10.99	40	48
4	Ammunition Rd	Santa Margarita River	Yes	8	Yes	7	2.62	30	45
6	Day St	San Dieguito River	Yes	8	Yes	7	3.07	30	45
6	Wintercrest Dr	San Diego River	Yes	8	Yes	7	2.93	30	45
8	Osborne St	San Luis Rey	Yes	8	No	0	7.91	40	48
9	S Mission Rd (W Aviation Rd)	Santa Margarita River	Yes	8	No	0	3.27	30	38
10	Denny Way	San Diego River	Yes	8	Yes	7	3.14	30	45
11	S Main Ave	Santa Margarita River	Yes	8	Yes	7	1.57	20	35
12	Vine St (El Cajon North)	San Diego River	Yes	8	Yes	7	1.46	20	35
12	Channel Rd	San Diego River	Yes	8	No	0	1.82	20	28
14	Vine St (El Cajon South)	San Diego River	Yes	8	No	0	1.49	20	28
15	S Santa Fe Ave	Carlsbad	Yes	8	Yes	7	42.40	40	55
16	Montecito Rd	San Dieguito River	Yes	8	Yes	7	4.77	40	55
17	W Bradley Ave	San Diego River	Yes	8	Yes	7	6.25	40	55
17	Vernon Way	San Diego River	Yes	8	Yes	7	8.43	40	55
19	S Mission Rd (South)	San Luis Rey	Yes	8	No	0	0.62	10	18
20	Troy St	Sweetwater	Yes	8	No	0	0.54	10	18
21	Airway Rd	Tijuana River	No	0	No	0	1.83	20	20
22	W Fallbrook St	Santa Margarita River	Yes	8	No	0	0.42	10	18
23	N Vine St (Fallbrook)	Santa Margarita River	Yes	8	No	0	0.98	10	18
24	16th St	San Dieguito River	Yes	8	Yes	7	2.21	30	45
25	Prospect St	Sweetwater	Yes	8	No	0	3.70	30	38
26	W College St	Santa Margarita River	Yes	8	Yes	7	1.79	20	35
26	Julian Ave	San Diego River	Yes	8	No	0	0.14	0	8
28	Birch St	Sweetwater	Yes	8	Yes	7	1.67	20	35
29	Bancroft Dr	Sweetwater	Yes	8	Yes	7	1.83	20	35
30	8th St	San Dieguito River	Yes	8	No	0	1.40	20	28

Attachment D.3 Top 30 Project Scoring Inputs

Environmental Benefit - Water Supply			Priority Project (Infiltrates and identified as water supply area in SWRP Section 5.2) *(Points given based on the maximum of the collective BMP points within the Project)*		Reduces Irrigation usage *(Points given based on the minimum of the collective BMP points within the Project)*		Capture for direct uses (Irrigation - Vegetated BMPs within ¼ mile of parks) (Treatment - BMP within 100 ft of Sewer Line) *(Points given based on the maximum of the collective BMP points within the Project)*		Capture for direct uses (BMP infiltrates to a SGMA priority groundwater aquifer) *(Points given based on the maximum of the collective BMP points within the Project)*		Capture for indirect uses (Infiltrating BMP) *(Points given based on the maximum of the collective BMP points within the Project)*		Sum
Criteria and Available Points			Yes	4	Vegetated BMPs	0	Potential irrigation on site	4	Medium	3	Yes	3	16
									Low	2			
							Potential Treatment facility	3	Very Low	1			
			No	0	Others	2	None	0	None	0	No	0	
Rank	**Project Name**	**Watershed**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Sum**
1	Sweetwater Rd	Sweetwater	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
2	Magnolia Ave	San Diego River	No	0	No-Vegetated BMP	0	None	0	None	0	No	0	0
3	Campo Rd	Sweetwater	No	0	No-Vegetated BMP	0	Potential Treatment facility	3	None	0	No	0	3
4	S Mission Rd (North)	San Luis Rey	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
4	Ammunition Rd	Santa Margarita River	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	Yes	3	7
6	Day St	San Dieguito River	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
6	Wintercrest Dr	San Diego River	No	0	No-Vegetated BMP	0	Potential Treatment facility	3	None	0	No	0	3
8	Osborne St	San Luis Rey	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
9	S Mission Rd (W Aviation Rd)	Santa Margarita River	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
10	Denny Way	San Diego River	No	0	No-Vegetated BMP	0	None	0	None	0	No	0	0
11	S Main Ave	Santa Margarita River	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	Yes	3	7
12	Vine St (El Cajon North)	San Diego River	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	Very Low	1	Yes	3	8
12	Channel Rd	San Diego River	No	0	No-Vegetated BMP	0	Potential Treatment facility	3	Very Low	1	Yes	3	7
14	Vine St (El Cajon South)	San Diego River	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
15	S Santa Fe Ave	Carlsbad	No	0	Others	2	None	0	None	0	No	0	2
16	Montecito Rd	San Dieguito River	No	0	Others	2	None	0	None	0	No	0	2
17	W Bradley Ave	San Diego River	No	0	Others	2	None	0	None	0	No	0	2
17	Vernon Way	San Diego River	No	0	Others	2	None	0	None	0	No	0	2
19	S Mission Rd (South)	San Luis Rey	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
20	Troy St	Sweetwater	No	0	No-Vegetated BMP	0	Potential Treatment facility	3	None	0	No	0	3
21	Airway Rd	Tijuana River	No	0	No-Vegetated BMP	0	None	0	None	0	No	0	0
22	W Fallbrook St	Santa Margarita River	No	0	No-Vegetated BMP	0	None	0	None	0	No	0	0
23	N Vine St (Fallbrook)	Santa Margarita River	No	0	No-Vegetated BMP	0	None	0	None	0	No	0	0
24	16th St	San Dieguito River	No	0	Others	2	None	0	None	0	No	0	2
25	Prospect St	Sweetwater	No	0	Others	2	Potential Treatment facility	3	None	0	No	0	5
26	W College St	Santa Margarita River	No	0	No-Vegetated BMP	0	None	0	None	0	No	0	0
26	Julian Ave	San Diego River	No	0	No-Vegetated BMP	0	Potential irrigation on site	4	None	0	No	0	4
28	Birch St	Sweetwater	No	0	Others	2	Potential irrigation on site	4	None	0	No	0	6
29	Bancroft Dr	Sweetwater	No	0	Others	2	Potential irrigation on site	4	None	0	No	0	6
30	8th St	San Dieguito River	No	0	Others	2	Potential irrigation on site	4	None	0	No	0	6

Attachment D.3 Top 30 Project Scoring Inputs

Environmental Benefit - Flood Management			Long Term Peak Flow Reduction *(Points given based on the weighted effective impervious area % reduction of the collective BMP % reductions with the Project)*		Volume Reduction *(Points given based on the sum of the collective BMP volume reduction with the Project)*		Sum
Criteria and Available Points			≥ 80th percentile	5	≥ 80th percentile	5	10
			60-79th percentile	4	60-79th percentile	4	
			40-59th percentile	3	40-59th percentile	3	
			20-39th percentile	2	20-39th percentile	2	
			<20th percentile or no reduction	0	<20th percentile or no reduction	0	
Rank	**Project Name**	**Watershed**	**Peak Flow Reduction (%)**	**Points**	**Total Annual Volume Reduction (cuft)**	**Points**	Sum
1	Sweetwater Rd	Sweetwater	1.42	4	11493	5	9
2	Magnolia Ave	San Diego River	1.08	3	5626	4	7
3	Campo Rd	Sweetwater	0.93	2	3316	4	6
4	S Mission Rd (North)	San Luis Rey	0.60	2	2723	4	6
4	Ammunition Rd	Santa Margarita River	0.94	3	28123	5	8
6	Day St	San Dieguito River	1.37	3	1666	4	7
6	Wintercrest Dr	San Diego River	1.88	4	1140	3	7
8	Osborne St	San Luis Rey	0.56	2	8216	5	7
9	S Mission Rd (W Aviation Rd)	Santa Margarita River	1.97	4	1663	4	8
10	Denny Way	San Diego River	2.01	4	1201	3	7
11	S Main Ave	Santa Margarita River	0.15	0	18098	5	5
12	Vine St (El Cajon North)	San Diego River	0.41	0	2705	4	4
12	Channel Rd	San Diego River	2.17	5	6034	4	9
14	Vine St (El Cajon South)	San Diego River	0.35	0	916	3	3
15	S Santa Fe Ave	Carlsbad	0.00	0	0	0	0
16	Montecito Rd	San Dieguito River	0.00	0	0	0	0
17	W Bradley Ave	San Diego River	0.00	0	0	0	0
17	Vernon Way	San Diego River	0.00	0	0	0	0
19	S Mission Rd (South)	San Luis Rey	0.45	2	657	3	5
20	Troy St	Sweetwater	2.16	5	193	0	5
21	Airway Rd	Tijuana River	0.11	0	6196	5	5
22	W Fallbrook St	Santa Margarita River	0.87	2	267	2	4
23	N Vine St (Fallbrook)	Santa Margarita River	0.89	2	441	2	4
24	16th St	San Dieguito River	0.00	0	0	0	0
25	Prospect St	Sweetwater	0.00	0	0	0	0
26	W College St	Santa Margarita River	2.39	5	871	3	8
26	Julian Ave	San Diego River	0.35	0	141	0	0
28	Birch St	Sweetwater	0.00	0	0	0	0
29	Bancroft Dr	Sweetwater	0.00	0	0	0	0
30	8th St	San Dieguito River	0.00	0	0	0	0

Attachment D.3 Top 30 Project Scoring Inputs

Environmental Benefit - Natural Environment			Landscaped with native vegetation for drought and fire-resistance (Vegetated BMPs) *(Points given based on the maximum of the collective BMP points within the Project)*		Increase urban green space (Vegetated BMPs increase green space) *(Points given based on the maximum of the collective BMP points within the Project)*		Create or enhance wetland and/or riparian habitat (BMP within 100 ft of a waterbody) *(Points given based on the maximum of the collective BMP points within the Project)*		Improve water temperatures for the benefit of habitats (Vegetated BMPs increase shaded water) *(Points given based on the maximum of the collective BMP points within the Project)*		Reduce GHG emissions or increase carbon sinks (Vegetated BMPs) *(Points given based on the maximum of the collective BMP points within the Project)*		Reduce operational energy consumption *(Points given based on the maximum of the collective BMP points within the Project)*		Sum
Criteria and Available Points			Yes	5	Yes	5	Yes	3	Yes	2	Yes	2	Tree Wells	2	19
													Others (Except HDS and CDS)	1	
			No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	
Rank	**Project Name**	**Watershed**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	**Input**	**Points**	Sum
1	Sweetwater Rd	Sweetwater	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
2	Magnolia Ave	San Diego River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
3	Campo Rd	Sweetwater	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
4	S Mission Rd (North)	San Luis Rey	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
4	Ammunition Rd	Santa Margarita River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
6	Day St	San Dieguito River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
6	Wintercrest Dr	San Diego River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
8	Osborne St	San Luis Rey	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
9	S Mission Rd (W Aviation Rd)	Santa Margarita River	Yes	5	Yes	5	Yes	3	Yes	2	Yes	2	Tree Wells	2	19
10	Denny Way	San Diego River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
11	S Main Ave	Santa Margarita River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
12	Vine St (El Cajon North)	San Diego River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
12	Channel Rd	San Diego River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
14	Vine St (El Cajon South)	San Diego River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
15	S Santa Fe Ave	Carlsbad	No	0	No	0	Yes	3	No	0	No	0	HDS and CDS Units	0	3
16	Montecito Rd	San Dieguito River	No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	0
17	W Bradley Ave	San Diego River	No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	0
17	Vernon Way	San Diego River	No	0	No	0	Yes	3	No	0	No	0	HDS and CDS Units	0	3
19	S Mission Rd (South)	San Luis Rey	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
20	Troy St	Sweetwater	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
21	Airway Rd	Tijuana River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
22	W Fallbrook St	Santa Margarita River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
23	N Vine St (Fallbrook)	Santa Margarita River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
24	16th St	San Dieguito River	No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	0
25	Prospect St	Sweetwater	No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	0
26	W College St	Santa Margarita River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
26	Julian Ave	San Diego River	Yes	5	Yes	5	No	0	Yes	2	Yes	2	Tree Wells	2	16
28	Birch St	Sweetwater	No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	0
29	Bancroft Dr	Sweetwater	No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	0
30	8th St	San Dieguito River	No	0	No	0	No	0	No	0	No	0	HDS and CDS Units	0	0

Attachment D.3 Top 30 Project Scoring Inputs

Cost Effectivness Benefit			Lowest capital cost per impervious acre treated *(Capital costs and total impervious area were summed on project level to get a new $/ac value)*	
Criteria and Available Points			≥ 80th percentile (Highest $/ac)	0
			60-79th percentile	32
			40-59th percentile	33
			20-39th percentile	34
			<20th percentile (Lowest $/ac)	35
Rank	**Project Name**	**Watershed**	**$/ac**	**Points**
1	Sweetwater Rd	Sweetwater	$ 62,707	34
2	Magnolia Ave	San Diego River	$ 120,711	34
3	Campo Rd	Sweetwater	$ 147,760	33
4	S Mission Rd (North)	San Luis Rey	$ 123,126	33
4	Ammunition Rd	Santa Margarita River	$ 218,190	33
6	Day St	San Dieguito River	$ 161,903	33
6	Wintercrest Dr	San Diego River	$ 259,389	32
8	Osborne St	San Luis Rey	$ 102,971	34
9	S Mission Rd (W Aviation Rd)	Santa Margarita River	$ 310,285	32
10	Denny Way	San Diego River	$ 254,744	32
11	S Main Ave	Santa Margarita River	$ 193,812	33
12	Vine St (El Cajon North)	San Diego River	$ 55,367	35
12	Channel Rd	San Diego River	$ 306,693	32
14	Vine St (El Cajon South)	San Diego River	$ 100,985	34
15	S Santa Fe Ave	Carlsbad	$ 2,374	35
16	Montecito Rd	San Dieguito River	$ 20,734	35
17	W Bradley Ave	San Diego River	$ 16,372	35
17	Vernon Way	San Diego River	$ 12,144	35
19	S Mission Rd (South)	San Luis Rey	$ 122,582	34
20	Troy St	Sweetwater	$ 347,675	32
21	Airway Rd	Tijuana River	$ 30,600	35
22	W Fallbrook St	Santa Margarita River	$ 309,079	32
23	N Vine St (Fallbrook)	Santa Margarita River	$ 264,405	32
24	16th St	San Dieguito River	$ 60,891	34
25	Prospect St	Sweetwater	$ 26,138	35
26	W College St	Santa Margarita River	$ 358,572	0
26	Julian Ave	San Diego River	$ 215,515	33
28	Birch St	Sweetwater	$ 57,987	34
29	Bancroft Dr	Sweetwater	$ 123,056	33
30	8th St	San Dieguito River	$ 57,820	34

ATTACHMENT D.4 – TOP 30 PROJECT WATER QUALITY BENEFIT RESULTS

Table D.4.1 Total Annual Volume Captured and Peak Flow Reductions

Project Name	BMP Type	Total Volume Inflow (cf)	Total Volume Treated (cf)	Total Volume Retained (cf)	Total Volume Captured (cf)	Total Volume Bypassed (cf)	Long-Term Peak Flow Reduction (%)
Sweetwater Rd	Tree Well (Type 3)	1,533,368	747,027	11,493	758,521	774,847	1.42
Magnolia Ave	Tree Well (Type 3)	806,932	572,048	5,626	577,674	229,258	1.08
Campo Rd	Tree Well (Type 3), HDS	460,449	327,661	3,316	330,977	129,472	0.93
S Mission Rd (North)	Tree Well (Type 3), HDS	796,050	628,918	2,723	631,641	164,409	0.60
Ammunition Rd	Tree Well (Type 1), HDS	142,418	101,775	28,123	129,898	12,520	0.94
Day St	Tree Well (Type 3), HDS	250,122	169,864	1,666	171,530	78,592	1.37
Wintercrest Dr	Tree Well (Type 3)	143,218	118,680	1,140	119,819	23,399	1.88
Osborne St	Tree Well (Type 3)	960,560	524,146	8,216	532,363	428,197	0.56
S Mission Rd (W Aviation Rd)	Tree Well (Type 3)	208,262	171,080	1,663	172,743	35,519	1.97
Denny Way	Tree Well (Type 3)	147,331	123,211	1,201	124,412	22,918	2.01
S Main Ave	Tree Well (Type 1), HDS	91,807	60,187	18,098	78,285	13,522	0.15
Vine St (El Cajon North)	Tree Well (Type 2)	197,062	84,075	2,705	86,780	110,282	0.41
Channel Rd	Tree Well (Type 2)	89,273	69,957	6,034	75,991	13,282	2.17
Vine St (El Cajon South)	Tree Well (Type 3), HDS	129,757	71,515	916	72,430	57,327	0.35
S Santa Fe Ave	HDS	2,121,960	1,986,756	-	1,986,756	135,204	-
Montecito Rd	HDS	276,734	256,137	-	256,137	20,597	-
W Bradley Ave	HDS	250,158	237,734	-	237,734	12,424	-
Vernon Way	HDS	353,726	336,350	-	336,350	17,375	-
S Mission Rd (South)	Tree Well (Type 3)	82,915	43,498	657	44,156	38,759	0.45
Troy St	Tree Well (Type 3)	21,861	17,765	193	17,958	3,903	2.16
Airway Rd	Tree Well (Type 3)	620,502	74,274	6,196	80,470	540,032	0.11
W Fallbrook St	Tree Well (Type 3)	32,291	21,526	267	21,793	10,499	0.87
N Vine St (Fallbrook)	Tree Well (Type 3), HDS	75,447	54,063	441	54,503	20,943	0.89
16th St	HDS	123,958	114,669	-	114,669	9,289	-
Prospect St	HDS	137,861	126,189	-	126,189	11,672	-
W College St	Tree Well (Type 3)	107,204	90,449	871	91,320	15,885	2.39
Julian Ave	Tree Well (Type 3)	17,558	7,744	141	7,885	9,672	0.35
Birch St	HDS	63,050	57,593	-	57,593	5,457	-
Bancroft Dr	HDS	79,081	73,355	-	73,355	5,726	-
8th St	HDS	73,183	67,623	-	67,623	5,560	-

Table D.4.2: Annual Wet Weather Volume and Peak Flow Reductions

Project Name	BMP Type	Volume Inflow (cf)	Volume Treated (cf)	Volume Retained (cf)	Volume Captured (cf)	Volume Bypassed (cf)	Long-Term Peak Flow Reduction (%)
Sweetwater Rd	Tree Well (Type 3)	1,149,345	363,005	11,493	374,498	774,847	1.42
Magnolia Ave	Tree Well (Type 3)	651,947	417,063	5,626	422,690	229,258	1.08
Campo Rd	Tree Well (Type 3), HDS	365,897	233,108	3,316	236,425	129,472	0.93
S Mission Rd (North)	Tree Well (Type 3), HDS	639,445	472,313	2,723	475,036	164,409	0.60
Ammunition Rd	Tree Well (Type 1), HDS	115,277	82,345	20,413	102,758	12,520	0.94
Day St	Tree Well (Type 3), HDS	202,219	121,962	1,666	123,628	78,592	1.37
Wintercrest Dr	Tree Well (Type 3)	113,987	89,449	1,140	90,589	23,399	1.88
Osborne St	Tree Well (Type 3)	821,636	385,222	8,216	393,439	428,197	0.56
S Mission Rd (W Aviation Rd)	Tree Well (Type 3)	166,340	129,157	1,663	130,820	35,519	1.97
Denny Way	Tree Well (Type 3)	120,104	95,984	1,201	97,185	22,918	2.01
S Main Ave	Tree Well (Type 1), HDS	74,500	48,997	11,981	60,978	13,522	0.15
Vine St (El Cajon North)	Tree Well (Type 2)	160,452	47,465	2,704	50,169	110,282	0.41
Channel Rd	Tree Well (Type 2)	70,691	51,376	6,033	57,409	13,282	2.17
Vine St (El Cajon South)	Tree Well (Type 3), HDS	104,494	46,252	916	47,167	57,327	0.35
S Santa Fe Ave	HDS	1,761,907	1,626,703	-	1,626,703	135,204	-
Montecito Rd	HDS	222,484	201,887	-	201,887	20,597	-
W Bradley Ave	HDS	204,393	191,969	-	191,969	12,424	-
Vernon Way	HDS	285,656	268,280	-	268,280	17,375	-
S Mission Rd (South)	Tree Well (Type 3)	65,737	26,321	657	26,978	38,759	0.45
Troy St	Tree Well (Type 3)	19,310	15,214	193	15,407	3,903	2.16
Airway Rd	Tree Well (Type 3)	619,585	73,357	6,196	79,553	540,032	0.11
W Fallbrook St	Tree Well (Type 3)	26,719	15,953	267	16,220	10,499	0.87
N Vine St (Fallbrook)	Tree Well (Type 3), HDS	62,101	40,717	441	41,157	20,943	0.89
16th St	HDS	100,322	91,034	-	91,034	9,289	-
Prospect St	HDS	102,680	91,008	-	91,008	11,672	-
W College St	Tree Well (Type 3)	87,086	70,331	871	71,202	15,885	2.39
Julian Ave	Tree Well (Type 3)	14,117	4,303	141	4,444	9,672	0.35
Birch St	HDS	47,949	42,492	-	42,492	5,457	-
Bancroft Dr	HDS	61,127	55,401	-	55,401	5,726	-
8th St	HDS	60,059	54,499	-	54,499	5,560	-

Table D.4.3: Annual Dry Weather Volume Reductions

Project Name	BMP Type	Volume Inflow (cf)	Volume Treated (cf)	Volume Retained (cf)	Volume Captured (cf)	Volume Bypassed (cf)
Sweetwater Rd	Tree Well (Type 3)	384,022	384,022	-	384,022	-
Magnolia Ave	Tree Well (Type 3), HDS	154,984	154,984	-	154,984	-
Campo Rd	Tree Well (Type 3), HDS	94,552	94,552	-	94,552	-
S Mission Rd (North)	Tree Well (Type 3), HDS	156,605	156,605	-	156,605	-
Ammunition Rd	Tree Well (Type 1), HDS	19,430	19,430	7,711	27,140	-
Day St	Tree Well (Type 3), HDS	47,903	47,903	-	47,903	-
Wintercrest Dr	Tree Well (Type 3)	29,231	29,231	-	29,231	-
Osborne St	Tree Well (Type 3)	138,924	138,924	-	138,924	-
S Mission Rd (W Aviation Rd)	Tree Well (Type 3)	41,923	41,923	-	41,923	-
Denny Way	Tree Well (Type 3)	27,227	27,227	-	27,227	-
S Main Ave	Tree Well (Type 1), HDS	11,190	11,190	6,118	17,308	-
Vine St (El Cajon North)	Tree Well (Type 2)	36,610	36,610	-	36,610	-
Channel Rd	Tree Well (Type 2)	18,581	18,581	1	18,582	-
Vine St (El Cajon South)	Tree Well (Type 3), HDS	25,263	25,263	-	25,263	-
S Santa Fe Ave	HDS	360,053	360,053	-	360,053	-
Montecito Rd	HDS	54,250	54,250	-	54,250	-
W Bradley Ave	HDS	45,764	45,764	-	45,764	-
Vernon Way	HDS	68,070	68,070	-	68,070	-
S Mission Rd (South)	Tree Well (Type 3)	17,178	17,178	-	17,178	-
Troy St	Tree Well (Type 3)	2,551	2,551	-	2,551	-
Airway Rd	Tree Well (Type 3)	917	917	-	917	-
W Fallbrook St	Tree Well (Type 3)	5,573	5,573	-	5,573	-
N Vine St (Fallbrook)	Tree Well (Type 3), HDS	13,346	13,346	-	13,346	-
16th St	HDS	23,635	23,635	-	23,635	-
Prospect St	HDS	35,181	35,181	-	35,181	-
W College St	Tree Well (Type 3)	20,118	20,118	-	20,118	-
Julian Ave	Tree Well (Type 3)	3,441	3,441	-	3,441	-
Birch St	HDS	15,101	15,101	-	15,101	-
Bancroft Dr	HDS	17,954	17,954	-	17,954	-
8th St	HDS	13,124	13,124	-	13,124	-

Table D.4.4 Total Annual Load Benefit Quantification

Project Name	BMP Type	Total Annual Load Reductions							
		TSS (lb)	TP (lb)	TN (lb)	TCu (lb)	TPb (lb)	TZn (lb)	FC (MPNx10^{12})	Trash (gal)
Sweetwater Rd	Tree Well (Type 3)	2,238	1.331	36.281	0.902	0.162	8.753	3.51	137.86
Magnolia Ave	Tree Well (Type 3), HDS	2,117	1.461	28.525	0.925	0.192	7.527	1.78	53.41
Campo Rd	Tree Well (Type 3), HDS	1,343	0.086	25.443	0.556	0.094	5.365	2.21	61.51
S Mission Rd (North)	Tree Well (Type 3), HDS	1,698	0.243	51.783	0.691	0.067	3.724	1.34	87.38
Ammunition Rd	Tree Well (Type 1), HDS	264	0.939	14.641	0.164	0.012	0.426	0.03	14.61
Day St	Tree Well (Type 3), HDS	673	0.034	15.437	0.273	0.045	2.542	1.14	36.77
Wintercrest Dr	Tree Well (Type 3)	554	0.026	9.595	0.224	0.040	2.319	0.97	19.47
Osborne St	Tree Well (Type 3)	20,101	32.077	410.421	1.030	0.330	3.877	3.69	20.36
S Mission Rd (W Aviation Rd)	Tree Well (Type 3)	809	0.040	13.506	0.335	0.059	3.390	1.37	27.91
Denny Way	Tree Well (Type 3)	597	0.176	8.909	0.247	0.052	2.433	0.86	14.84
S Main Ave	Tree Well (Type 1), HDS	189	0.381	10.520	0.099	0.010	0.352	0.14	12.46
Vine St (El Cajon North)	Tree Well (Type 2)	328	0.169	4.277	0.128	0.041	1.227	0.31	11.94
Channel Rd	Tree Well (Type 2)	350	0.174	5.857	0.146	0.025	1.367	0.49	10.59
Vine St (El Cajon South)	Tree Well (Type 3), HDS	232	0.023	4.766	0.104	0.015	0.887	0.34	15.42
S Santa Fe Ave	HDS	3,215	0.000	151.091	1.759	0.000	0.694	0.00	115.23
Montecito Rd	HDS	319	0.000	23.049	0.169	0.000	0.092	0.00	34.77
W Bradley Ave	HDS	349	0.000	18.127	0.215	0.000	0.081	0.00	17.15
Vernon Way	HDS	487	0.000	23.728	0.299	0.000	0.117	0.00	19.66
S Mission Rd (South)	Tree Well (Type 3)	161	0.017	2.615	0.069	0.012	0.677	0.26	10.69
Troy St	Tree Well (Type 3)	597	1.687	22.611	0.064	0.014	0.240	0.14	0.32
Airway Rd	Tree Well (Type 3)	4,802	13.706	192.161	0.422	0.109	1.218	1.20	0.12
W Fallbrook St	Tree Well (Type 3)	87	0.059	1.171	0.041	0.006	0.369	0.11	2.71
N Vine St (Fallbrook)	Tree Well (Type 3), HDS	178	0.022	4.279	0.079	0.010	0.611	0.24	7.34
16th St	HDS	165	0.000	10.433	0.099	0.000	0.036	0.00	14.91
Prospect St	HDS	152	0.000	8.850	0.103	0.000	0.040	0.00	17.63
W College St	Tree Well (Type 3)	398	0.172	5.591	0.180	0.029	1.673	0.55	10.01
Julian Ave	Tree Well (Type 3)	25	0.010	0.384	0.011	0.002	0.106	0.04	1.89
Birch St	HDS	81	0.000	4.017	0.047	0.000	0.018	0.00	4.45
Bancroft Dr	HDS	108	0.000	5.313	0.062	0.000	0.023	0.00	5.68
8th St	HDS	102	0.000	6.304	0.061	0.000	0.021	0.00	8.59

Table D.4.5: Annual Wet Weather Load Benefit Quantification

Collective BMP ID	BMP Type	Wet Weather Load Reductions							
		TSS (lb)	TP (lb)	TN (lb)	TCu (lb)	TPb (lb)	TZn (lb)	FC (MPNx10^12)	Trash (gal)
Sweetwater Rd	Tree Well (Type 3)	2,238	1.331	36.281	0.902	0.162	8.753	3.50	137.86
Magnolia Ave	Tree Well (Type 3), HDS	2,117	1.461	28.525	0.925	0.192	7.525	1.78	53.41
Campo Rd	Tree Well (Type 3), HDS	1,343	0.086	25.443	0.556	0.094	5.364	2.21	61.51
S Mission Rd (North)	Tree Well (Type 3), HDS	1,698	0.243	51.783	0.691	0.067	3.713	1.34	87.38
Ammunition Rd	Tree Well (Type 1), HDS	262	0.838	13.885	0.161	0.012	0.416	0.03	14.61
Day St	Tree Well (Type 3), HDS	673	0.034	15.437	0.273	0.045	2.541	1.14	36.77
Wintercrest Dr	Tree Well (Type 3)	554	0.026	9.595	0.224	0.040	2.319	0.97	19.47
Osborne St	Tree Well (Type 3)	20,101	32.077	410.421	1.030	0.330	3.877	3.69	20.36
S Mission Rd (W Aviation Rd)	Tree Well (Type 3)	809	0.040	13.506	0.335	0.059	3.390	1.37	27.91
Denny Way	Tree Well (Type 3)	597	0.176	8.909	0.247	0.052	2.433	0.86	14.84
S Main Ave	Tree Well (Type 1), HDS	187	0.301	9.920	0.097	0.010	0.344	0.14	12.46
Vine St (El Cajon North)	Tree Well (Type 2)	328	0.169	4.277	0.128	0.041	1.227	0.31	11.94
Channel Rd	Tree Well (Type 2)	350	0.174	5.857	0.146	0.025	1.367	0.49	10.59
Vine St (El Cajon South)	Tree Well (Type 3), HDS	232	0.023	4.766	0.104	0.015	0.886	0.34	15.42
S Santa Fe Ave	HDS	3,215	0.000	151.091	1.759	0.000	0.652	0.00	115.23
Montecito Rd	HDS	319	0.000	23.049	0.169	0.000	0.086	0.00	34.77
W Bradley Ave	HDS	349	0.000	18.127	0.215	0.000	0.076	0.00	17.15
Vernon Way	HDS	487	0.000	23.728	0.299	0.000	0.109	0.00	19.66
S Mission Rd (South)	Tree Well (Type 3)	161	0.017	2.615	0.069	0.012	0.677	0.26	10.69
Troy St	Tree Well (Type 3)	597	1.687	22.611	0.064	0.014	0.240	0.14	0.32
Airway Rd	Tree Well (Type 3)	4,802	13.706	192.161	0.422	0.109	1.218	1.20	0.12
W Fallbrook St	Tree Well (Type 3)	87	0.059	1.171	0.041	0.006	0.369	0.11	2.71
N Vine St (Fallbrook)	Tree Well (Type 3), HDS	178	0.022	4.279	0.079	0.010	0.611	0.24	7.34
16th St	HDS	165	0.000	10.433	0.099	0.000	0.034	0.00	14.91
Prospect St	HDS	152	0.000	8.850	0.103	0.000	0.036	0.00	17.63
W College St	Tree Well (Type 3)	398	0.172	5.591	0.180	0.029	1.673	0.55	10.01
Julian Ave	Tree Well (Type 3)	25	0.010	0.384	0.011	0.002	0.106	0.04	1.89
Birch St	HDS	81	0.000	4.017	0.047	0.000	0.017	0.00	4.45
Bancroft Dr	HDS	108	0.000	5.313	0.062	0.000	0.021	0.00	5.68
8th St	HDS	102	0.000	6.304	0.061	0.000	0.020	0.00	8.59

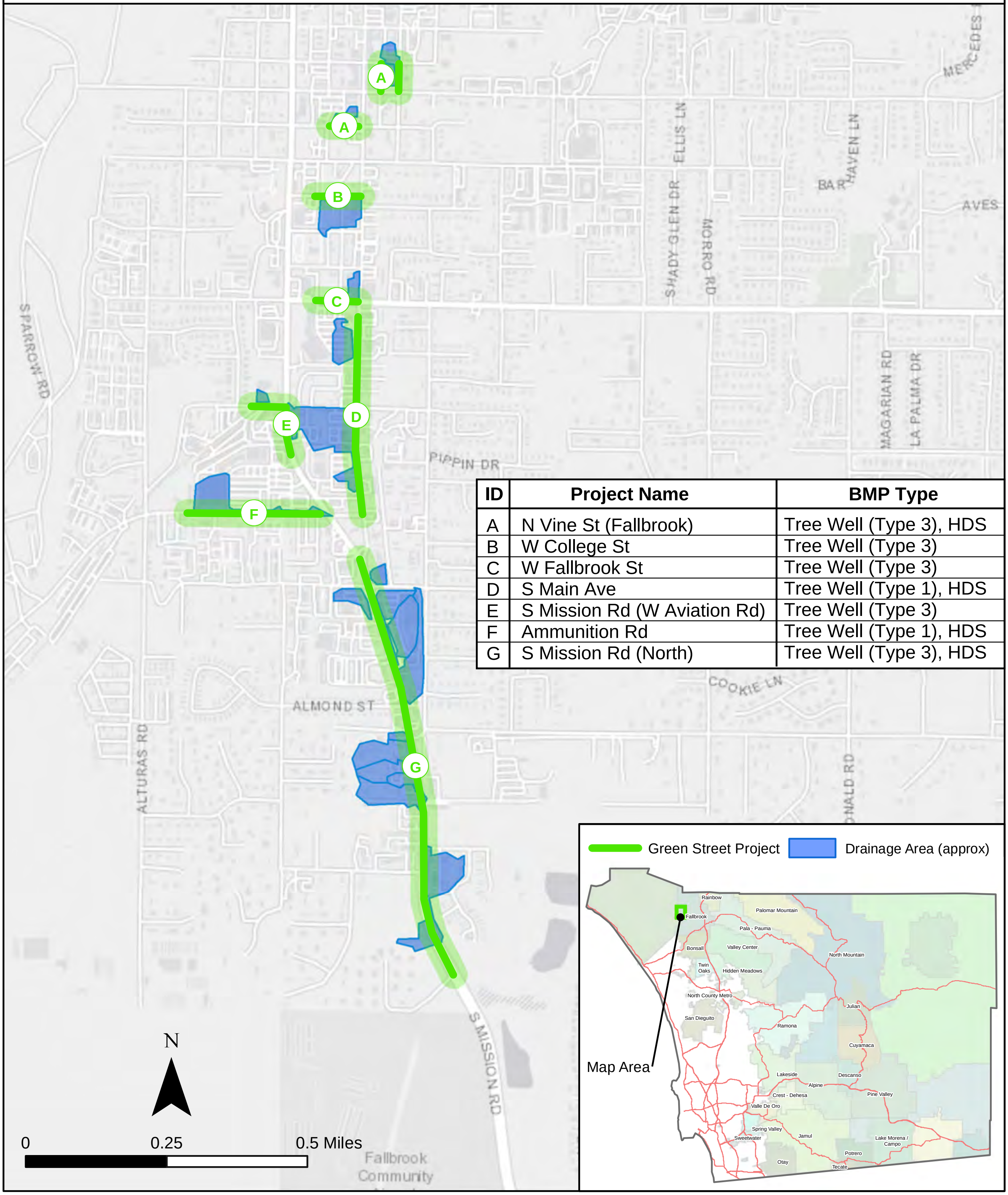
Table D.4.6: Annual Dry Weather Load Benefit Quantification

Collective BMP ID	BMP Type	Dry Weather Annual Load Reductions						
		TSS (lb)	TP (lb)	TN (lb)	TCu (lb)	TPb (lb)	TZn (lb)	FC (MPNx10^12)
Sweetwater Rd	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.02
Magnolia Ave	Tree Well (Type 3), HDS	0.00	0.000	0.000	0.000	0.000	0.002	0.01
Campo Rd	Tree Well (Type 3), HDS	0.00	0.000	0.000	0.000	0.000	0.001	0.00
S Mission Rd (North)	Tree Well (Type 3), HDS	0.00	0.000	0.000	0.000	0.000	0.011	0.00
Ammunition Rd	Tree Well (Type 1), HDS	1.68	0.101	0.756	0.003	0.000	0.010	0.00
Day St	Tree Well (Type 3), HDS	0.00	0.000	0.000	0.000	0.000	0.001	0.00
Wintercrest Dr	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Osborne St	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.01
S Mission Rd (W Aviation Rd)	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Denny Way	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
S Main Ave	Tree Well (Type 1), HDS	1.34	0.080	0.600	0.002	0.000	0.008	0.00
Vine St (El Cajon North)	Tree Well (Type 2)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Channel Rd	Tree Well (Type 2)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Vine St (El Cajon South)	Tree Well (Type 3), HDS	0.00	0.000	0.000	0.000	0.000	0.000	0.00
S Santa Fe Ave	HDS	0.00	0.000	0.000	0.000	0.000	0.042	0.00
Montecito Rd	HDS	0.00	0.000	0.000	0.000	0.000	0.006	0.00
W Bradley Ave	HDS	0.00	0.000	0.000	0.000	0.000	0.005	0.00
Vernon Way	HDS	0.00	0.000	0.000	0.000	0.000	0.008	0.00
S Mission Rd (South)	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Troy St	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Airway Rd	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
W Fallbrook St	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
N Vine St (Fallbrook)	Tree Well (Type 3), HDS	0.00	0.000	0.000	0.000	0.000	0.000	0.00
16th St	HDS	0.00	0.000	0.000	0.000	0.000	0.003	0.00
Prospect St	HDS	0.00	0.000	0.000	0.000	0.000	0.004	0.00
W College St	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Julian Ave	Tree Well (Type 3)	0.00	0.000	0.000	0.000	0.000	0.000	0.00
Birch St	HDS	0.00	0.000	0.000	0.000	0.000	0.002	0.00
Bancroft Dr	HDS	0.00	0.000	0.000	0.000	0.000	0.002	0.00
8th St	HDS	0.00	0.000	0.000	0.000	0.000	0.002	0.00

ATTACHMENT E – PROJECT SUMMARY MAPS

Top Ranked Green Streets Projects

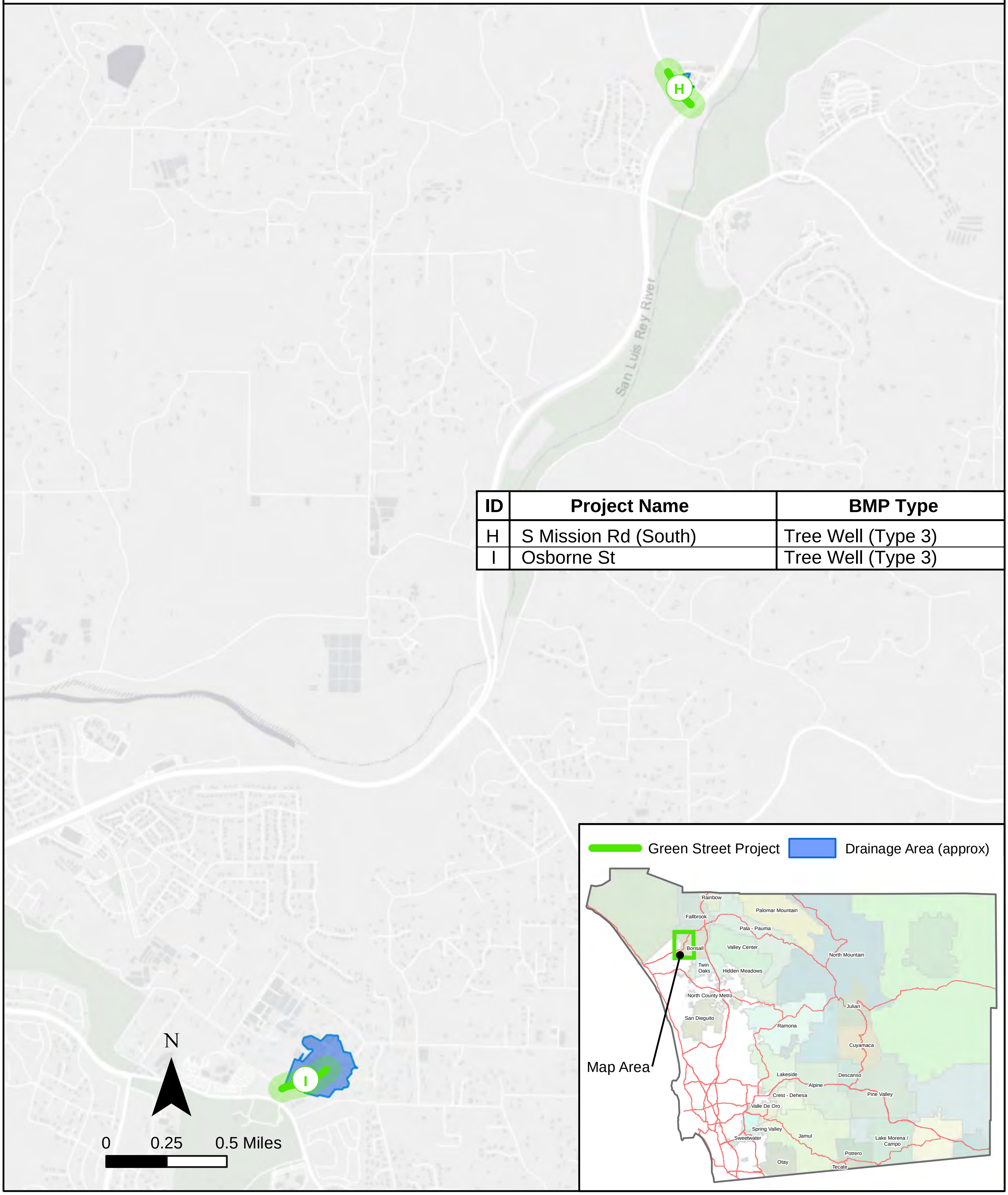
Fallbrook



ID	Project Name	BMP Type
A	N Vine St (Fallbrook)	Tree Well (Type 3), HDS
B	W College St	Tree Well (Type 3)
C	W Fallbrook St	Tree Well (Type 3)
D	S Main Ave	Tree Well (Type 1), HDS
E	S Mission Rd (W Aviation Rd)	Tree Well (Type 3)
F	Ammunition Rd	Tree Well (Type 1), HDS
G	S Mission Rd (North)	Tree Well (Type 3), HDS

Top Ranked Green Streets Projects

Bonsall

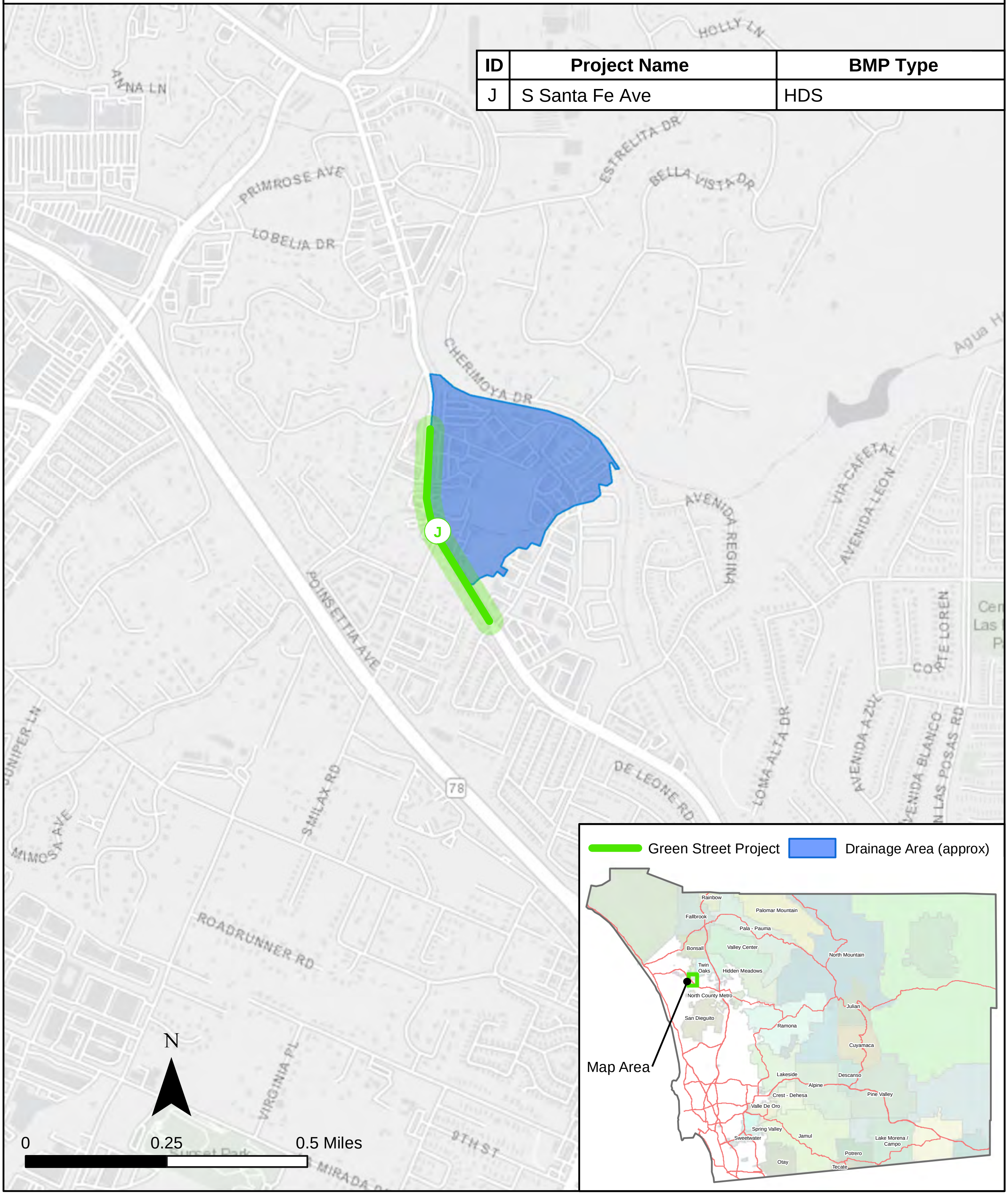


ID	Project Name	BMP Type
H	S Mission Rd (South)	Tree Well (Type 3)
I	Osborne St	Tree Well (Type 3)

Top Ranked Green Streets Projects

North County Metro

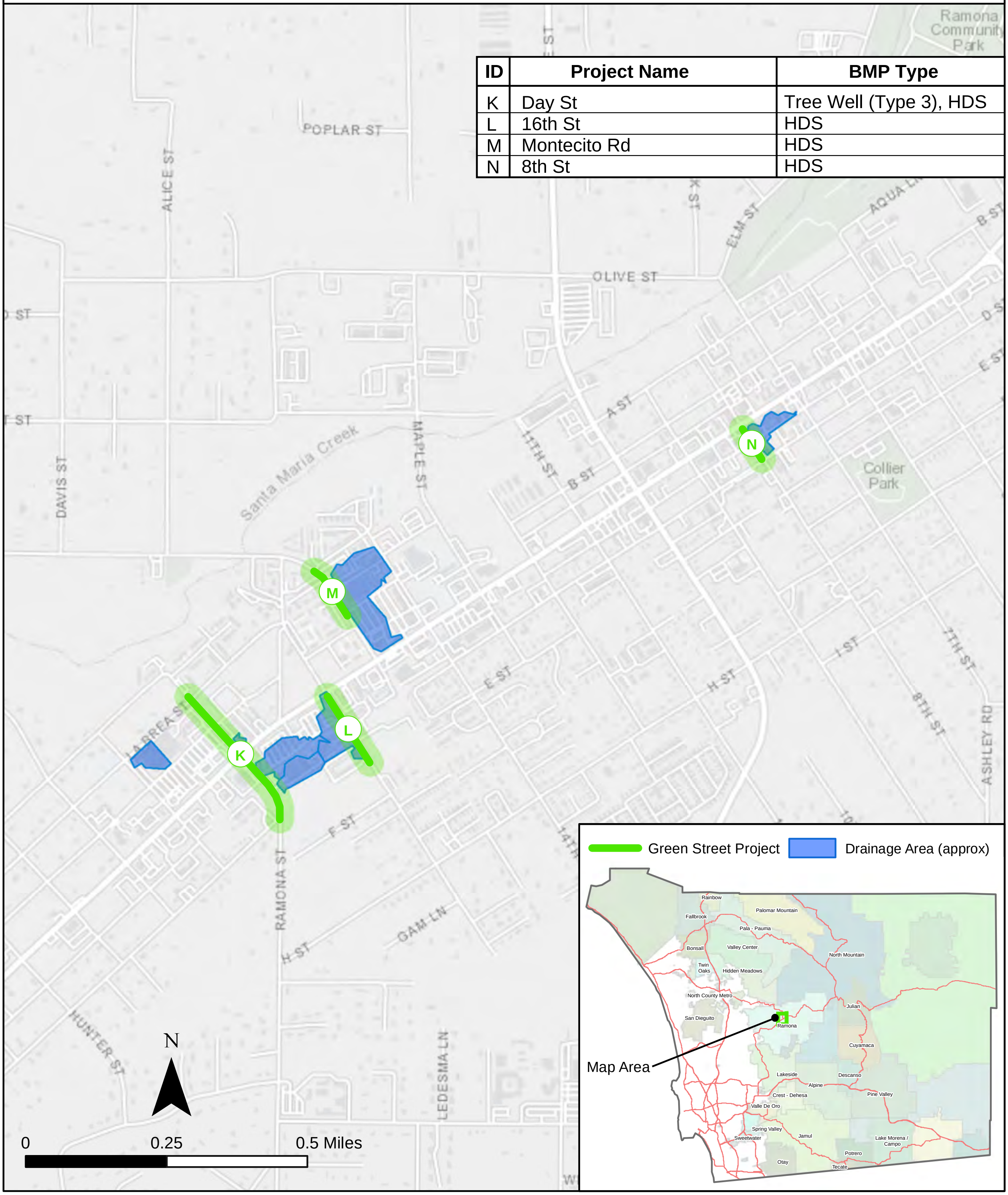
ID	Project Name	BMP Type
J	S Santa Fe Ave	HDS



Top Ranked Green Streets Projects

Ramona

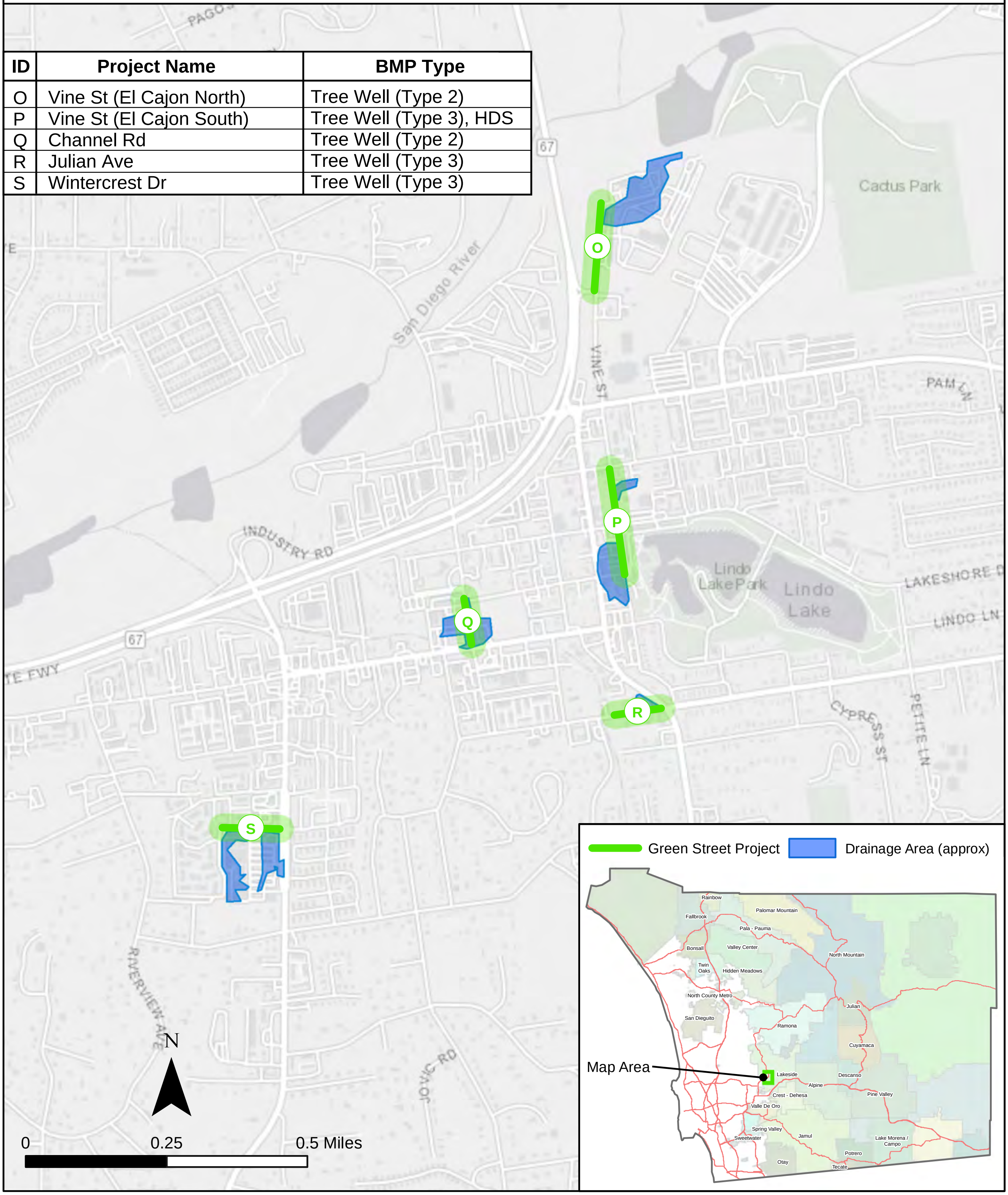
ID	Project Name	BMP Type
K	Day St	Tree Well (Type 3), HDS
L	16th St	HDS
M	Montecito Rd	HDS
N	8th St	HDS



Top Ranked Green Streets Projects

Lakeside (North)

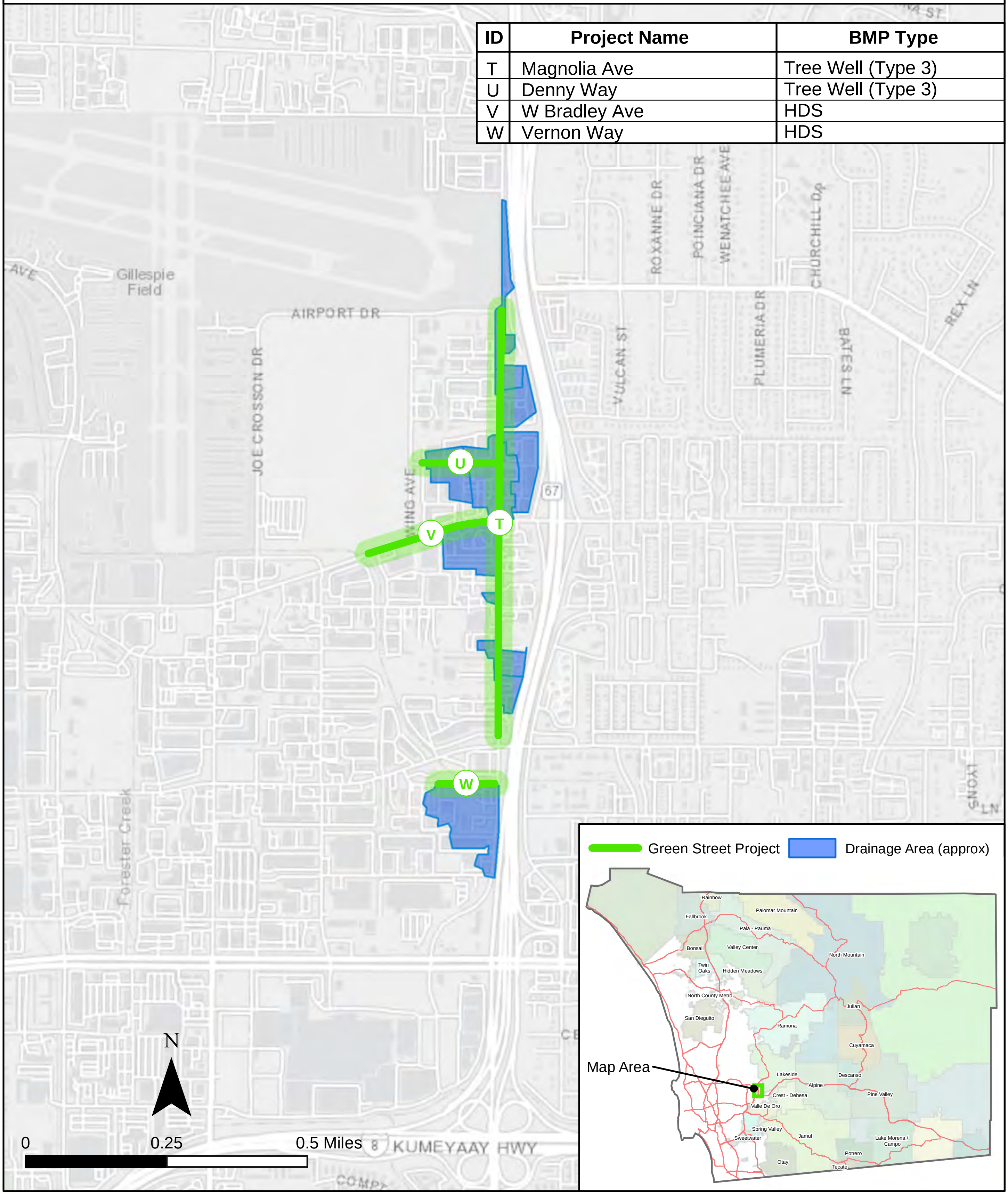
ID	Project Name	BMP Type
O	Vine St (El Cajon North)	Tree Well (Type 2)
P	Vine St (El Cajon South)	Tree Well (Type 3), HDS
Q	Channel Rd	Tree Well (Type 2)
R	Julian Ave	Tree Well (Type 3)
S	Wintercrest Dr	Tree Well (Type 3)



Top Ranked Green Streets Projects

Lakeside (South)

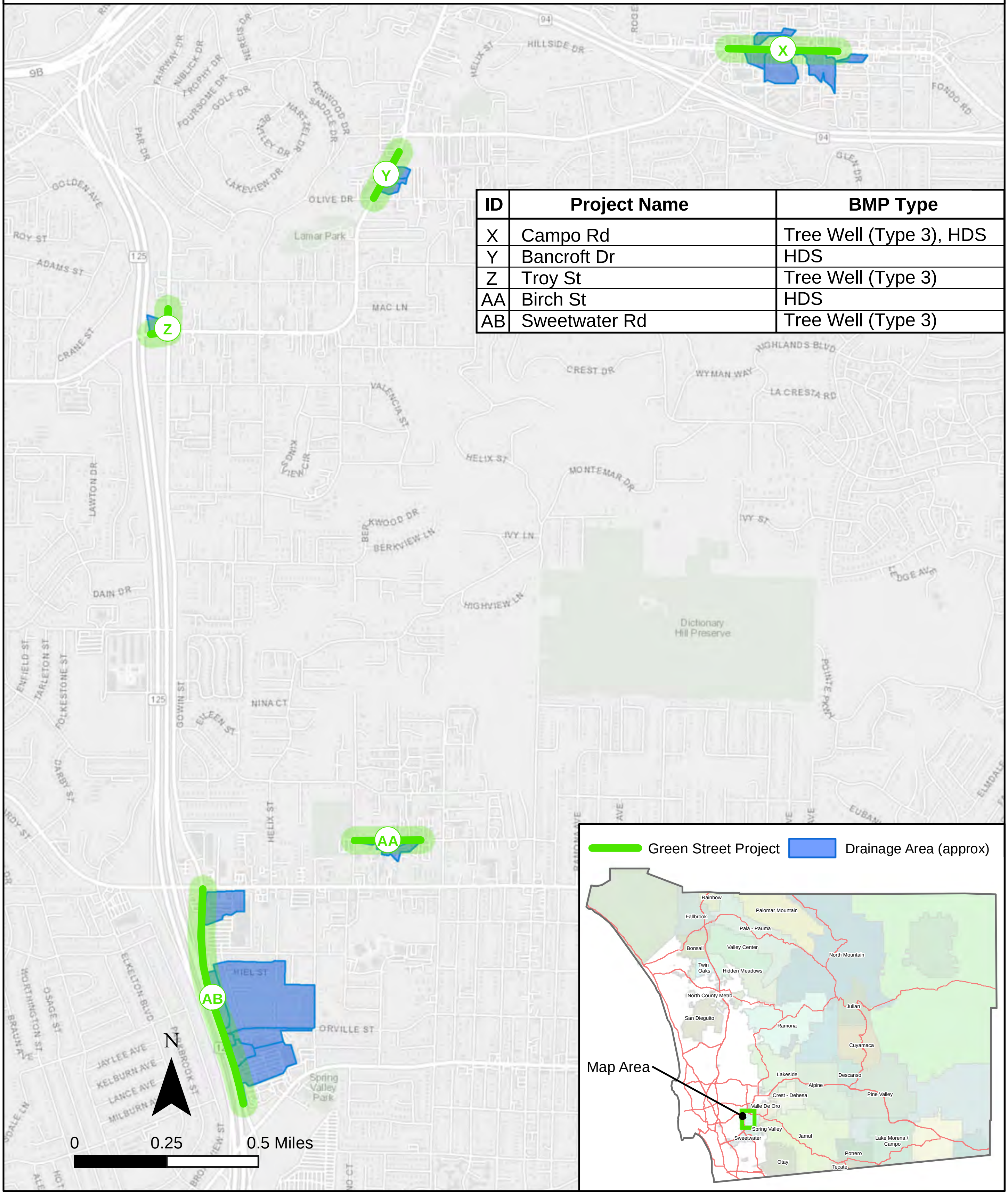
ID	Project Name	BMP Type
T	Magnolia Ave	Tree Well (Type 3)
U	Denny Way	Tree Well (Type 3)
V	W Bradley Ave	HDS
W	Vernon Way	HDS



Top Ranked Green Streets Projects

Spring Valley / Valle de Oro

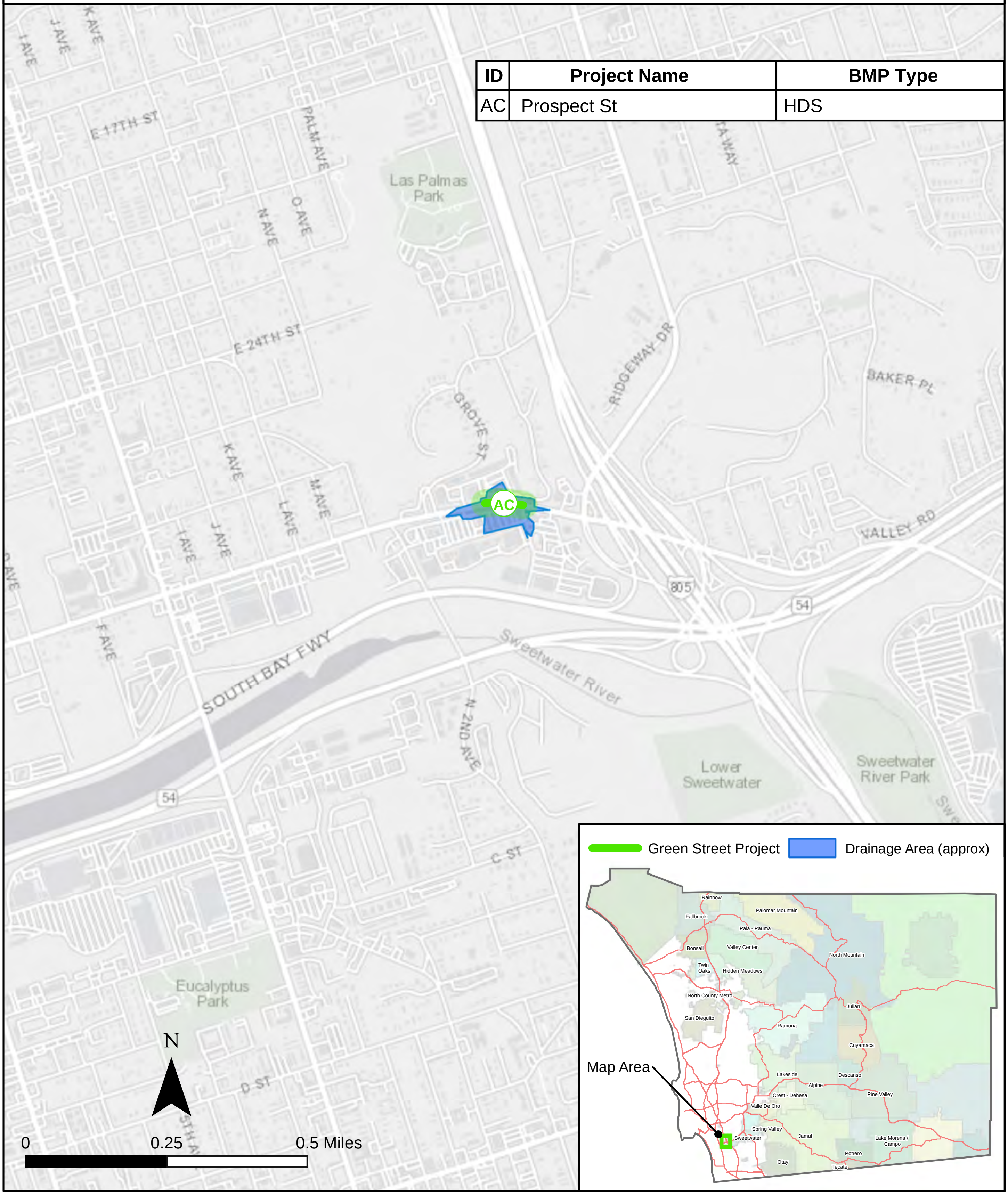
ID	Project Name	BMP Type
X	Campo Rd	Tree Well (Type 3), HDS
Y	Bancroft Dr	HDS
Z	Troy St	Tree Well (Type 3)
AA	Birch St	HDS
AB	Sweetwater Rd	Tree Well (Type 3)



Top Ranked Green Streets Projects

County Islands

ID	Project Name	BMP Type
AC	Prospect St	HDS



Top Ranked Green Streets Projects

Otay

ID	Project Name	BMP Type
AD	Airway Rd	Tree Well (Type 3)