



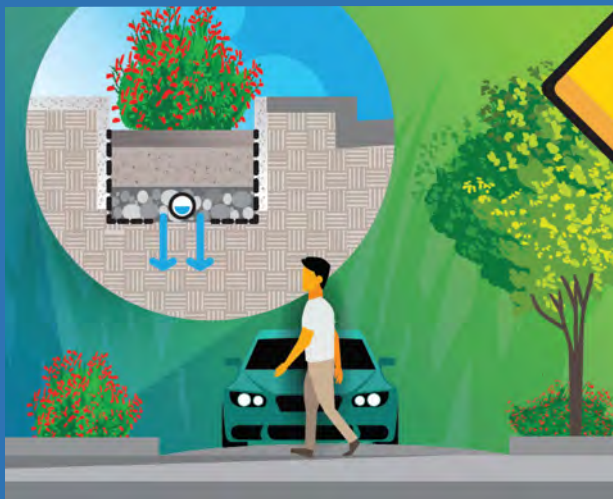
GREEN  
STREETS  
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CLEAN  
WATER



# 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.

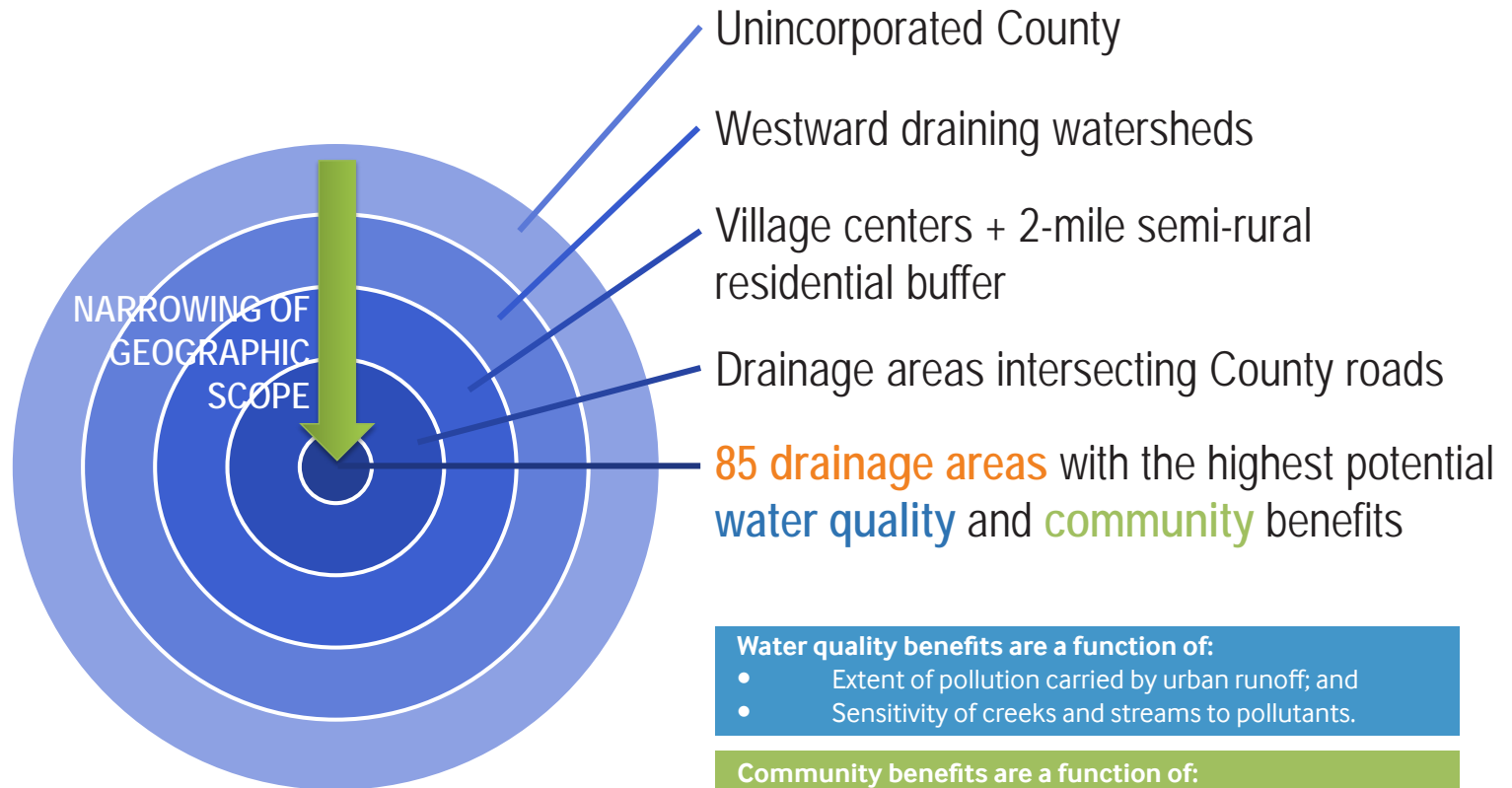




## STEP 1: HIGHEST NEED LOCATIONS

### 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

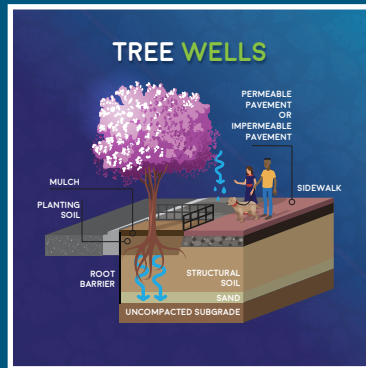
- Permeable median and parking lane
- Tree wells and biofiltration in parkway



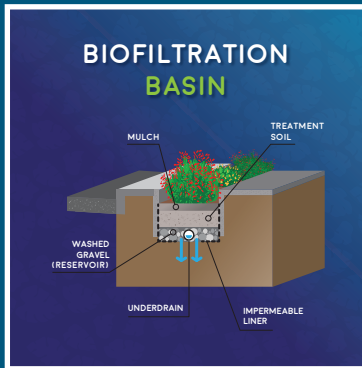
## STEP 2: BEST-SUITED TREATMENT SYSTEMS

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.

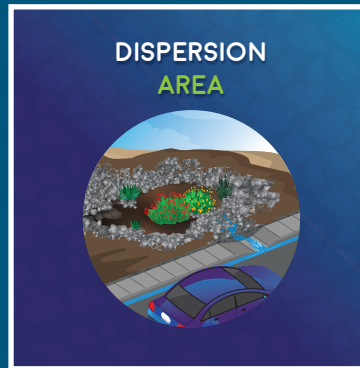
VISIBLE ABOVE GROUND



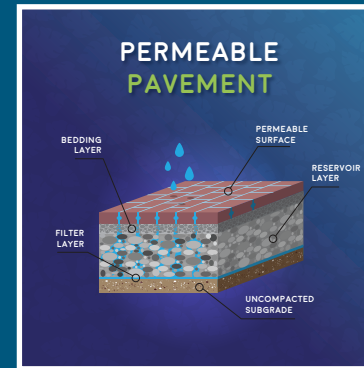
**TREE WELLS:** Trees that filter stormwater runoff through the root system.



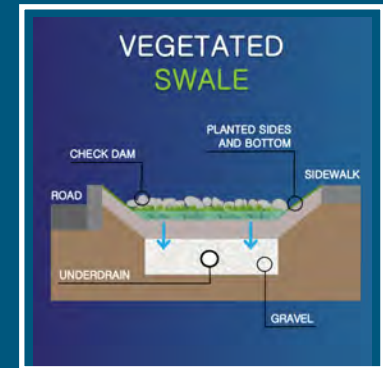
**BIOFILTRATION BASIN:** Landscaped ditches or basins that filter stormwater runoff through soil and plant root systems.



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

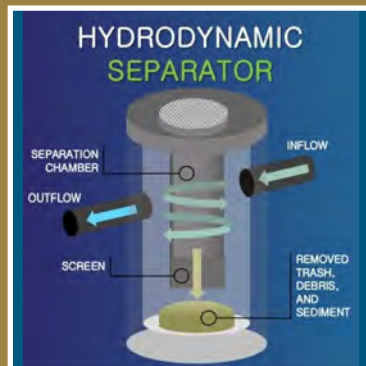


**PERMEABLE PAVEMENT:** Pavement with small gaps allowing the ground to absorb stormwater.

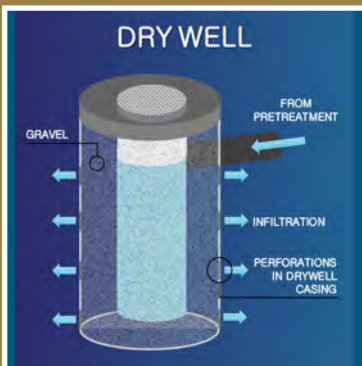


**VEGETATED SWALE:** Open, shallow channel with short vegetation that collects and conveys runoff to a downstream location.

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.





## 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.

### COST-EFFECTIVENESS/RETURN ON INVESTMENT

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



### 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

### OTHER POTENTIAL BENEFITS NOT QUANTIFIED IN PLAN

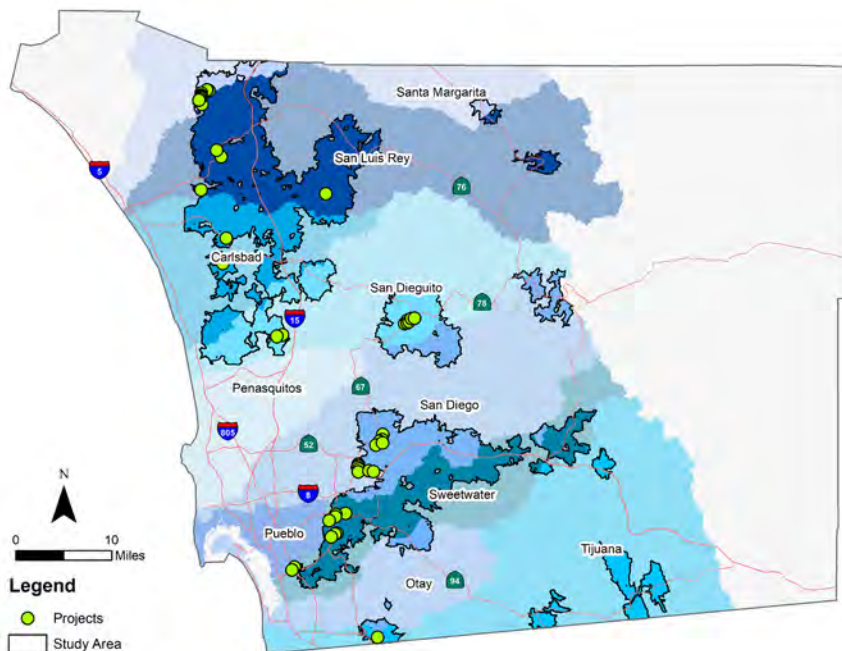
- Improves public health
- Adds/improves bike lanes
- New local jobs
- Increases property values
- Reduces energy costs
- Enhances local tourism

## STEP 3: HIGHEST BENEFIT PROJECTS

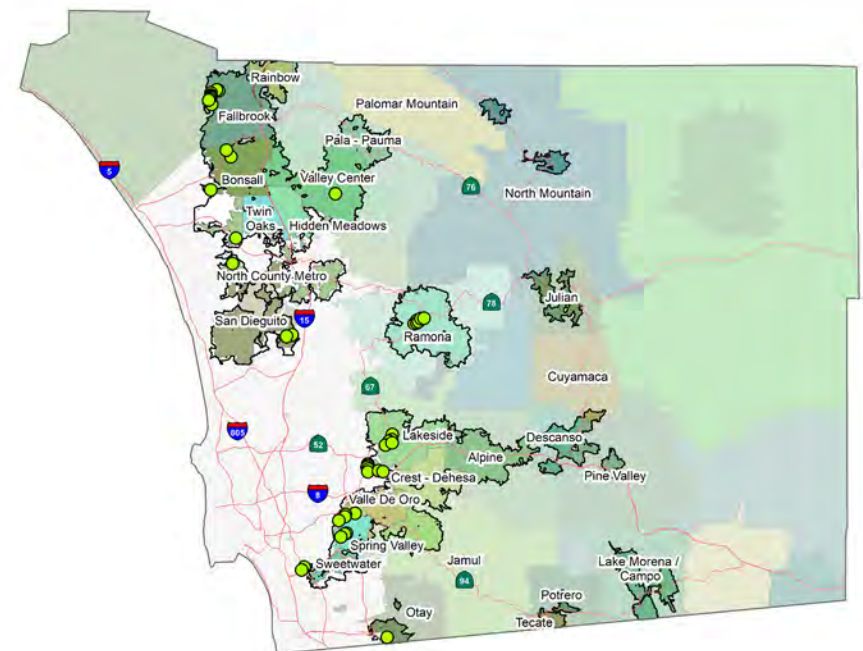
The Green Streets Clean Water prioritization process resulted in individually scored candidate projects based on the total combined environmental benefit, community benefit, and cost-effectiveness (see the primary Green Streets Clean Water Plan for individual project scores). It is important to note, 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



GREEN  
STREETS  
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CLEAN  
WATER

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

Fallbrook

### WATERSHED

San Luis Rey

### PROJECT EXTENT

0.8 miles;  
10,000 sq-ft

### AREA TREATED

Total: 21.7 acres  
Impervious: 12 acres

### PRIORITY POLLUTANTS

Bacteria, nutrients, and  
sediment



EXISTING

### PROJECT COMPONENTS

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



EXISTING



PROPOSED



PROPOSED

South Mission Road at Rocky Crest Rd.

South Mission Road at Almond St.



County of San Diego

Green Streets Clean Water Program ([greenstreetscleanwater.org](http://greenstreetscleanwater.org))



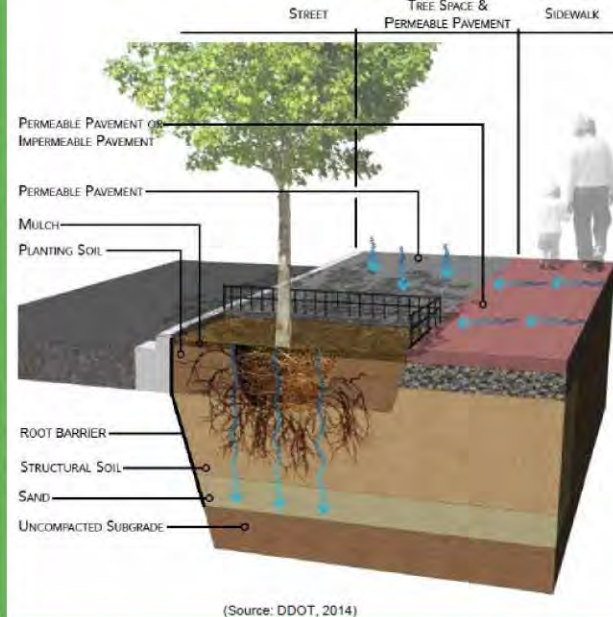


## ENVIRONMENTAL BENEFITS

- Estimated to remove 2,250 lbs. of sediment annually
- Estimated to remove  $1.9 \times 10^{12}$  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<sup>th</sup> percentile
- AB1550 Community
- Supports high ranking pedestrian gap needs
- Potential to support pedestrian safety

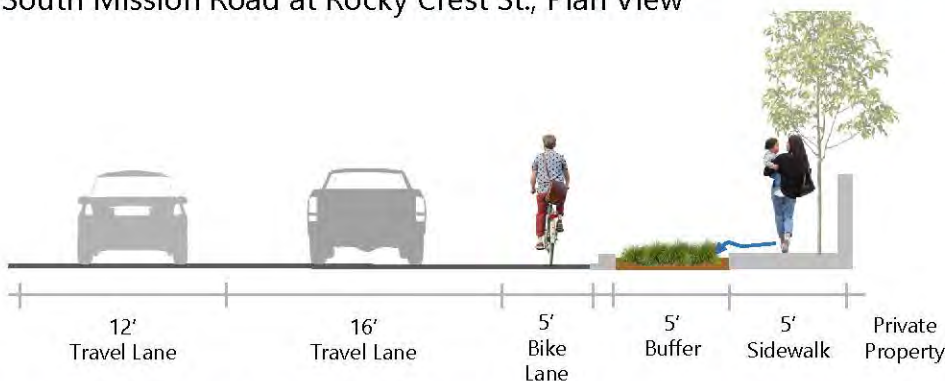


## ECONOMIC BENEFITS

- 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



**County of San Diego**

Green Streets Clean Water Program ([greenstreetscleanwater.org](http://greenstreetscleanwater.org))







# 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

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

### COMMUNITY BENEFITS

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



# PROGRAM HIGHLIGHTS



## COMMUNITY ENGAGEMENT

### INFORMATIONAL OUTREACH:

An informational website ([www.greenstreetscleanwater.org](http://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 GSCW 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.