Richmond Green Infrastructure Master Plan

March 2025

RVA H2O

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Acronyms and Abbreviations

Alliance	Alliance for the Chesapeake Bay
Arcadis	Arcadis U.S., Inc.
BMP	best management practice
CIP	Capital Improvement Project
City	City of Richmond
CSO	combined sewer overflow
CSS	combined sewer system
DCIA	directly connected impervious area
DEM	digital elevation model
DPU	Department of Public Utilities
DPW	Department of Public Works
FTP	File Transfer Protocol
GI	green infrastructure
GI Ranking Tool	RVAH2O Green Infrastructure Ranking Tool
GIS	geographic information system
IEN	Institute for Engagement & Negotiation
Integrated Permit	Integrated Virginia Pollutant Discharge Elimination System Permit #VA0063177
KPI	Key Performance Indicator
LiDAR	light detection and ranging
MEP	maximum extent practicable
MS4	municipal separate storm sewer system
NRCS	Natural Resources Conservation Service
Plan	RVAH2O Green Infrastructure Master Plan
RC	runoff catchment
RVAH2O	Richmond, Virginia Clean Water Program
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VCU	Virginia Commonwealth University
VPDES	Virginia Pollutant Discharge Elimination System
WWTP	wastewater treatment plant

Forward and Acknowledgements

The purpose of the RVAH2O Green Infrastructure Master Plan (the Plan) is to identify public parcels within the City of Richmond's three priority watersheds that have the greatest potential for implementing green infrastructure (GI) using a tool for ranking and prioritizing projects based on specific objectives and outcomes. Specifically, the Plan promotes better communication, cooperation, and consideration of GI proactively across City of Richmond (City) departments on projects that convert impervious surfaces to pervious surfaces, plant trees and native plants, and install bioretention, permeable pavement systems, and various other innovative green stormwater practices that reduce stormwater volume and minimize the amount of nitrogen, phosphorus, and sediment delivered to the James River and its tributaries.

This report provides a tool that can be used to:

- Inform future planning
- Promote workflow discussion between City departments
- Prioritize the use of GI on a parcel and project level
- Increase green space and enhance tree canopy
- Improve stormwater management strategies
- Promote the City of Richmond as a sustainability model for other municipalities

This Plan was prepared in cooperation with several City departments. The leadership team involved in the development of this Plan included the following:

Executive Summary

The Alliance for the Chesapeake Bay (the Alliance) received a grant from the National Fish and Wildlife Foundation to partner with the City of Richmond (the City) Department of Public Utilities (DPU) and the consulting firm, Arcadis U.S., Inc. (Arcadis), to develop a green infrastructure (GI) master plan to expand and accelerate the goals and mission of RVAH2O (Richmond, Virginia Clean Water Program) and the Alliance's mission to improve the lands and waters of the Chesapeake Bay Watershed. The Institute for Engagement & Negotiation (IEN) at the University of Virginia was also engaged as a partner in this project to facilitate stakeholder engagement activities during the development of the RVAH2O Green Infrastructure Master Plan (the Plan). The engagement strategy fosters ongoing collaboration at the department level across the City to design and implement additional GI in the future.

The City has the first Virginia Pollutant Discharge Elimination System (VPDES or Integrated Permit) permit in the Commonwealth of Virginia that integrates wastewater, stormwater, and a combined sewer system into one watershed management program for a more efficient and holistic approach to water systems management. The City's Integrated Permit has requirements to achieve the reduction of pollutants to the maximum extent practicable (MEP) in compliance with the Chesapeake Bay Total Maximum Daily Load (TMDL). In 2014, to address stormwater quantity and discharge quality issues, DPU initiated RVAH2O (https://rvah2o.org/), which is a citywide effort to implement solutions, disseminate outreach information, and facilitate ongoing communication and partnership projects with stakeholders. As part of RVAH2O and their RVA Clean Water Plan, DPU has actively promoted the use of GI.

The City has many public parcels that are highly impervious and generate a significant amount of runoff during wet weather events. Reuse or conversion of portions of these properties from impervious to pervious surfaces through the use of GI offers a strategic opportunity to address stormwater runoff and integrate community resilience, sustainability, and ecological restoration.

RVAH2O Green Infrastructure Master Plan Goal and Objectives. The goal of the Plan is to identify opportunities to incorporate GI in public parcels and in the right-of-way to reduce stormwater quantity and improve water quality. The Plan has the following objectives:

- Reduce stormwater volume
- Reduce impervious area and increase green space
- Reduce the amount of nitrogen, phosphorus, and sediment delivered to the James River
- Address existing drainage and flooding concerns, where possible
- Implement easily maintainable GI, where possible, to minimize future maintenance

Master Plan Approach. A tool for ranking and prioritizing public parcels with the greatest potential for implementing GI was developed for the City's three most heavily polluted watersheds: Cannon's Branch/Shockoe Creek, Gillies Creek, and Manchester Canal/Goose Creek (see Figure ES-1). These three priority watersheds identified in the RVA Clean Water Plan contain 537 public parcels and are prone to flooding due to the age of their collection systems and proximity to the James River. With an increased threat of more severe and frequent storm events in the future, implementing GI to help address the objectives above will be very important.

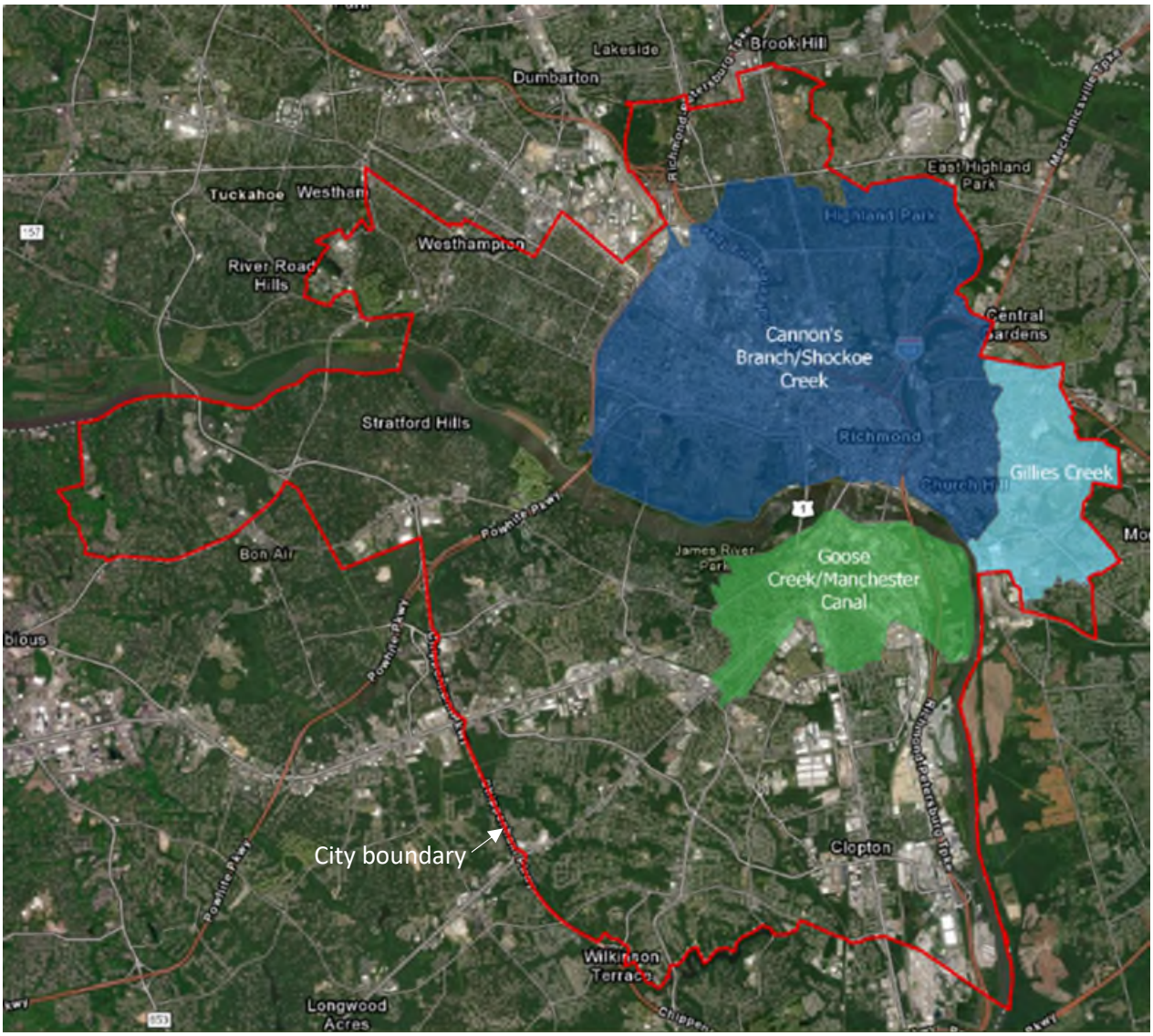


Figure ES-1. Map of the Three Priority Watersheds

The RVAH2O Green Infrastructure Ranking Tool (GI Ranking Tool) and the Plan promote better communication, cooperation, and consideration of GI proactively across City departments on projects that convert impervious surfaces to pervious surfaces; plant trees and native plants; and install bioretention, permeable pavement systems, and various other innovative green stormwater practices to reduce stormwater volume and minimize the amount of nitrogen, phosphorus, and sediment delivered to the James River and its tributaries.

The City has developed several documents that include elements of municipal stormwater management, such as use of GI, as well as other important topics, including social vulnerability and sustainability. These documents, including the RVA Clean Water Plan (2017), Green Infrastructure Initiative Plan (2019), Richmond 300 (2020), and the RVAgreen 2050 Climate Equity Index (2020), were reviewed and synchronized, where possible, with the current RVAH2O Green Infrastructure Master Plan.

GI Types Used in the Plan. GI can be used to complement gray infrastructure and add capacity to collection systems, reduce the peak discharge rates of runoff during storm events, and improve water quality – all while creating additional green space benefits for the City. The two primary GI types preferred by City staff and considered in the Plan are permeable pavement systems and bioretention. Permeable pavement systems, which include permeable asphalt, concrete, and pavers, were selected because DPU has sufficient equipment and staff for maintenance. Bioretention was selected as it provides desirable vegetation and water quality treatment benefits. Additional GI practices favored by DPU include reforestation and tree plantings, which can help meet RVA Clean Water Plan and other City goals for increasing tree canopy and reducing the urban heat island effect, and rainfall harvesting devices, such as cisterns and rain barrels, which have small footprints and can be added adjacent to structures even in highly urban areas.

Figure ES-2. Permeable Paver Parking Lot at DPU's Stormwater Utility Facility

RVAH2O Green Infrastructure Ranking Tool. Though designing and implementing GI has become more mainstream, retrofitting GI in developed areas still poses challenges due to existing utilities and infrastructure, lack of suitable soils and slopes, and a number of other potential surface and subsurface issues. To identify and evaluate favorable potential GI locations, the Plan used a five-step geographic information system (GIS) site screening approach that used subsurface and surface infrastructure data from the City.

The GI Ranking Tool evaluation and analysis process included the following five phases:

Phase 1: Flow Availability – Screened parcels and runoff catchments based on tributary volume

Phase 2: Site Availability – Determined availability of adequate space for various GI types

Phase 3: Site Suitability – Screened out unsuitable locations based on exiting conflicts with surface functions and subsurface structures, such as trees and exiting utilities

Phase 4: Score GI Performance – Identified sites based on estimated benefits

Phase 5: Select Target GI – Selected target sites for GI conceptual design development

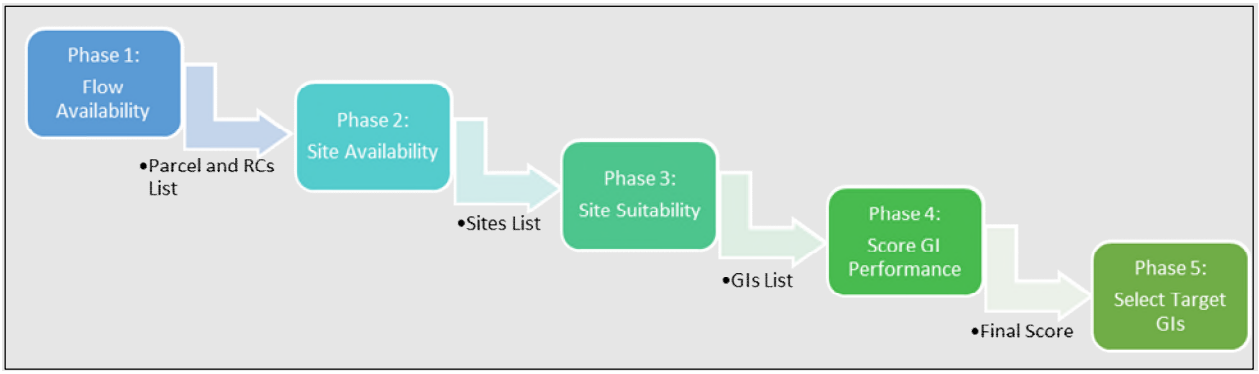


Figure ES-3. The Creation Process for the RVAH2O Green Infrastructure Ranking Tool

Stepping through each phase sequentially enabled the large number of sites to be reduced to a viable number of sites for the GI Ranking Tool with the highest benefits to the community. The evaluation process also enabled the GI Ranking Tool to provide results at a faster rate as the project progressed. Finally, the process helped to simplify reviews for each phase and prevented re-examination of sites that were already excluded if/when the performance criteria were modified.

Performance Criteria. Eleven different metrics for GI performance scoring were used to select sites for the GI Ranking Tool. Each was assigned to one of four tiers based on importance to the project team and feedback from other City departments. The GI Ranking Tool performance criteria weighting and maximum and minimum scoring are shown in Table ES-1.

Table ES-1. GI Ranking Tool Performance Criteria Scoring

Metric	Tier	Max Score	Min Score	Scoring
Reduce Runoff/Flow	1	10	1	Proportional to runoff volume
	1	10	1	Based on combined sewer system overflow threshold
Reduce Impervious Area	1	10	1	Impervious area removed using GI
Reduce Maintenance	1	10	5	Based on GI type
Provide Socioeconomic Benefits	1	10	0	Within 0.10 mile of open space
	1	10	1	Based on City Social Vulnerability Analysis data
Minimize Existing Flooding	2	5	0	-
Improve Urban Tree Canopy	2	5	0	Based on the area to be used to plant trees
Improve Water Quality	3	3.3	0	Proportional to the area to be used
Slope Suitability	4	2.5	-2.5	Open area scored based on % slope
Soil Infiltration	4	2.5	-2.5	Infiltration based on soil type A through D

Following the scoring of GI sites in public parcels and the right-of-way using the performance criteria, projects in qualified sites were ranked for each GI type evaluated, as shown in Table ES-2.

Table ES-2. Performance Analysis of Qualified Sites by GI Type

GI Type	Qualified Sites	Number of Sites in the Top 40%
Permeable pavement* parking lots	113	58
Bioretention in parking lots	81	41
Bioretention in open areas	1,803	970
Bioretention in sidewalks	2,224	355
Permeable parking lanes* in local and collector roads	959	474
Permeable parking lanes* in major roadways	182	91
Permeable pavement* in local roads	313	91
Green alleys	18	11

** Permeable pavement/parking lanes include permeable asphalt/concrete and pavers*

Results. Bioretention in open areas of public parcels and the space between the curb and sidewalks in the right-of-way had the highest number of qualified sites for incorporating GI. Bioretention in parking lots and green alleys had significantly smaller numbers of qualified sites. The GI Ranking Tool was used to produce maps for each GI type evaluated to show the ranking of sites.

The optimal parcels and areas identified for the different GI types are available for evaluation by City departments using the following two options:

1. ARCGIS maps that have been created for each of the GI types to allow for the evaluation of individual sites
2. A PowerBI interface that has been created to allow for City users to conduct evaluations and comparisons across multiple sites and GI types

Stakeholders outside of the City can work together with DPU or other City departments to gather and evaluate GI ranking information. The ARCGIS maps allow users to navigate using Google Earth to zoom in on individual parcels and observe site features and potential site constraints and view the scoring of any site. It also allows individual layers, such as utility conflicts, to be turned on and off for clarity or to look at specific criteria.

The PowerBI interface provides a more robust companion piece to the ARCGIS maps and makes the Plan a living and interactive tool. Criteria scoring and weighting information for parcels and GI types can be accessed and modified by the user using the PowerBI interface. A screenshot of the PowerBI interface is shown in Figure ES-4. These two tools make it easy for City staff to evaluate optimal locations for GI.

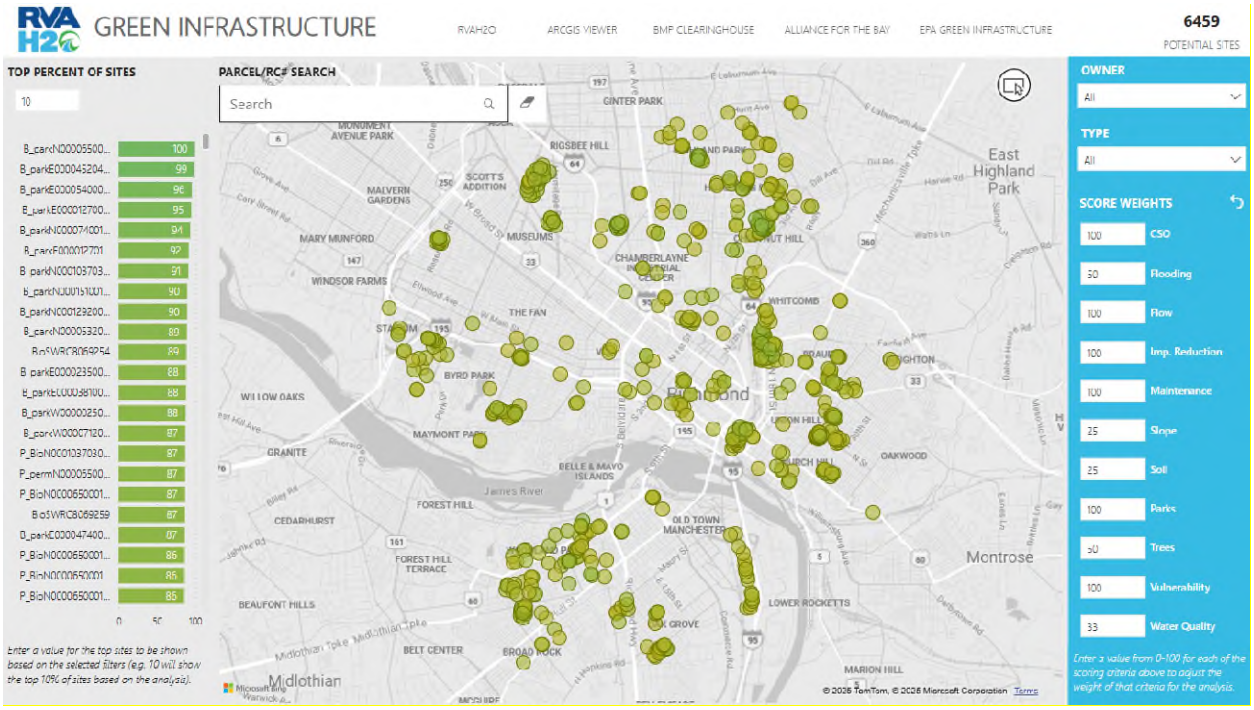


Figure ES-4. Screenshot of the Interactive PowerBI Interface

As part of the Plan, two conceptual designs were prepared to illustrate the process of moving projects from the planning stage to the conceptual design stage (see Figure ES-5). As part of their continuing partnership, the Alliance and DPU will implement a pilot project to showcase the practicality of the GI Ranking Tool and to further promote GI in the City.

Figure ES-5. Example GI Conceptual Design for Annie Giles Community Resource Center

Measuring and assessing the progress of GI installation in Richmond will take place along two tracks:

1. DPU will continually monitor progress toward achieving the goals set out in the RVA Clean Water Plan
2. The Alliance will continually monitor progress to determine the effectiveness of achieving the goals set out in their National Fish and Wildlife Foundation grant proposal

An additional key measure of success over time will be working through RVAH2O to influence policy and management changes so that GI becomes a core function of how all City departments plan, prioritize funding, and implement Capital Improvement Projects (CIPs).

1 Introduction

1.1 Background

The City of Richmond (the City), like most urbanized communities, has many public parcels that are highly impervious and generate a significant amount of runoff during wet weather events. Runoff from these and other properties contains pollutants that discharge to local streams and the James River, degrading water quality. Reuse or conversion of portions of these properties from impervious to pervious surfaces through the use of green infrastructure (GI) offers a strategic opportunity for the City to integrate community resilience, sustainability, and ecological restoration.

The City's Department of Public Utilities (DPU) serves more than 500,000 residential and commercial customers in Richmond and the surrounding metropolitan region. The City operates sanitary sewer, combined sewer, and stormwater systems (see Figure 1-1) and has an integrated Virginia Pollutant Discharge Elimination System (VPDES) permit (Permit Number VA0063177; the Integrated Permit). The Integrated Permit allows for total annual nutrient and suspended solid load limits for all discharges and integrated municipal separate storm sewer system (MS4) and combined sewer system (CSS) annual reporting, among other provisions. The City's Integrated Permit has requirements to achieve the reduction of pollutants to the maximum extent practicable (MEP) and in compliance with the Chesapeake Bay Total Maximum Daily Load (TMDL).

In 2014, to address stormwater quantity and discharge quality issues, DPU initiated RVAH2O (https://rvah2o.org) which represents a citywide effort to implement solutions, disseminate outreach information, and facilitate ongoing communication and partnership projects with stakeholders. As part of RVAH2O and their RVA Clean Water Plan, DPU has actively promoted the use of GI. DPU's dedication is exemplified by the installation of permeable pavers and pavement and bioswales at their own facility, located at 1801 Commerce Road in Richmond. DPU has partnered with the Alliance for the Chesapeake Bay (the Alliance) on numerous occasions over the past decade to collectively promote and implement GI and improve water quality in Richmond.

For more than 50 years, the Alliance has been dedicated to restoring the Chesapeake Bay's rivers and streams through partnerships, collaboration, and both individual and community stewardship. The Alliance is a non-profit organization that works within the six states and the District of Columbia that make up the Chesapeake Bay Watershed. They work with the United States Environmental Protection Agency (USEPA) Chesapeake Bay Program; other federal, state, and local agencies; municipalities; and other non-profits to advocate for funding with a focus on restoration, water quality, tree plantings, education, and GI. They have partnered with many local and state governments on GI projects, including the City of Richmond.

In 2019, the Alliance initiated another partner project with DPU and the consulting firm Arcadis U.S., Inc. (Arcadis) to expand and accelerate the progress of the RVAH2O initiative by developing the RVAH2O Green Infrastructure Master Plan (the Plan). The Plan is funded through a grant from the National Fish and Wildlife Foundation (Project Number 62603). The grant includes the development of the Plan as well as the implementation of at least one recommended GI project.

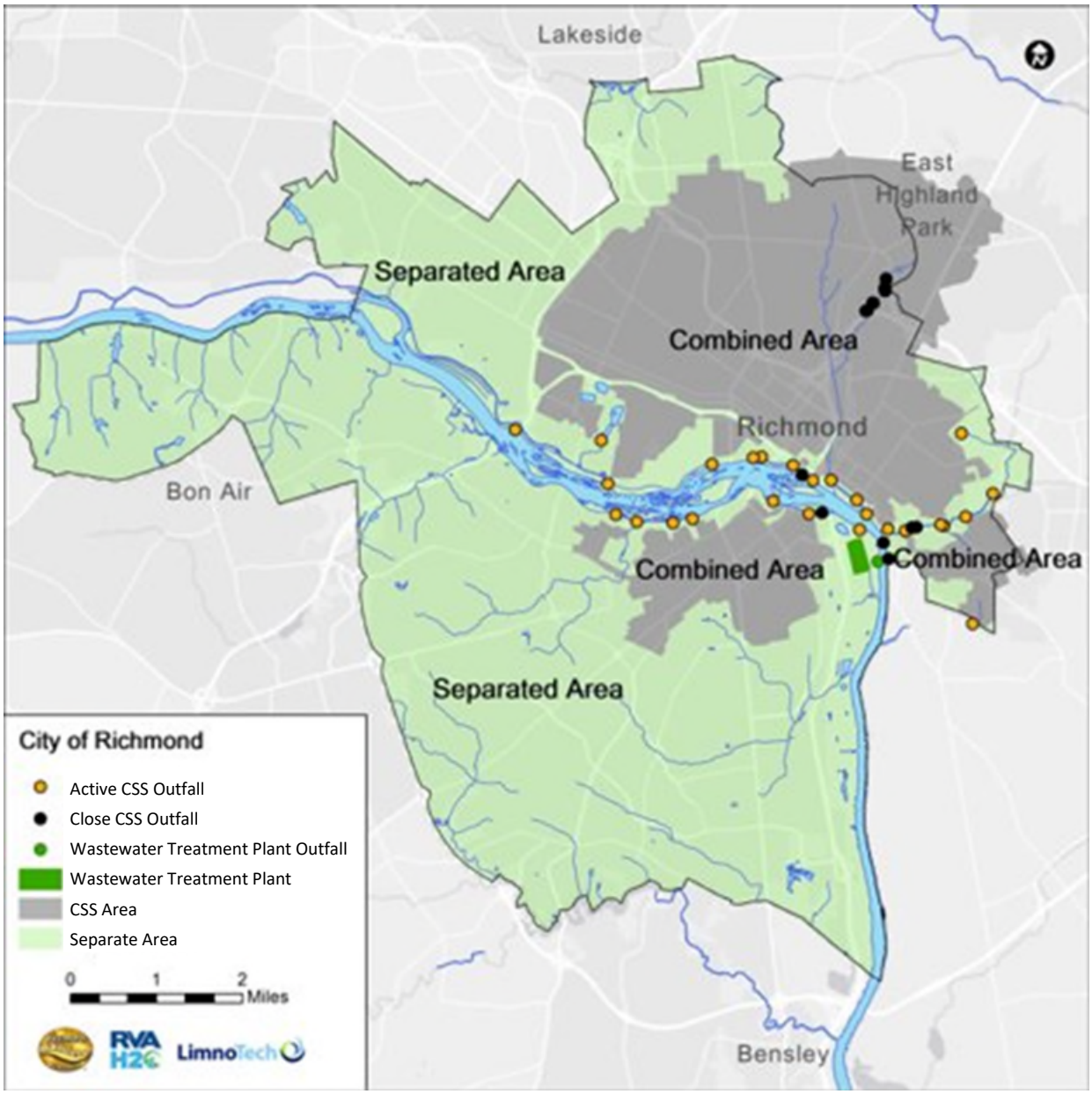


Figure 1-1. MS4 and CSS Areas in the City of Richmond

1.2 RVA Clean Water Plan Implementation

DPU manages five utilities, three of which address local water resources: the Water Utility, Wastewater Utility, and Stormwater Utility divisions. Historically, these utilities were managed independently and, thus, were unable to holistically consider interrelated impacts.

Beginning with an initial meeting in November of 2014, DPU has worked to integrate these utilities more effectively through its RVAH2O initiative, especially in relation to addressing the management of water quality in local waterways and the James River. Technical meetings for RVAH2O were originally held quarterly and continue to be held biannually at the stakeholders' request. The formation of RVAH2O laid a foundation for better cooperation between agencies working to improve water quality in the City and the James River.

Current DPU initiatives include the following:

1. **Wastewater Treatment Plant (WWTP) Expansion to Treat 140 Million Gallons per Day:** These additional capacity improvements have been completed.
2. **Real-Time Decision Support System:** This program measures CSS flows inside pipes and overflow volume during wet weather to understand and, ultimately, control and store flow within the system until the WWTP has the capacity to treat it.
3. **Green Infrastructure:** DPU has actively been promoting and implementing GI projects to reduce the amount of stormwater entering both the CSS and the MS4.

This Plan complements these efforts and ties directly to the third initiative above – promoting the use of GI and developing tools and procedures across the City for its installation.

1.3 Master Planning Process

The Plan has been developed to identify opportunities to implement GI practices that capture and treat stormwater runoff on public land in the three most heavily polluted priority watersheds identified in the RVA Clean Water Plan: Cannon's Branch/Shockoe Creek, Gillies Creek, and Manchester Canal/Goose Creek (see Figure 1-2). These three priority watersheds are the most impervious in the City and suffer from historic disinvestment. Specifically, the Plan promotes cooperation and consideration of GI practices that convert impervious surfaces to pervious surfaces, plant trees and native plants, and install bioretention, permeable pavement systems, and various other innovative GI practices that reduce stormwater volume and minimize the amount of nitrogen, phosphorus, and sediment delivered to the James River and its tributaries.

Tasks in the Plan's development included gathering and reviewing existing information to identify and inventory publicly owned land and parcels within the three priority watersheds, identifying and prioritizing GI opportunities for implementation at the project site-level, and compiling the ranking and results of the prioritization process into the comprehensive Plan. Information was shared among the project team during the plan's development using a SharePoint site (see Appendix A). Report references are provided in Appendix B.

1.4 Stakeholder Involvement

The Institute for Engagement & Negotiation (IEN) at the University of Virginia provided guidance and facilitation for stakeholder engagement during the development of the Plan. A primary goal of the engagement strategy was to foster ongoing collaboration at the department level across the City to design and implement more GI in the future. To increase the consideration of GI in future Capital Improvement Projects (CIPs) on public land, workshops were held with a diverse and applicable group of City departments to educate, promote, and gain buy-in for GI's use. City departments involved included the following:

- Department of Public Works (DPW)
- Parks, Recreation, and Community Facilities
- Office of Sustainability
- Planning and Development Review
- Richmond Public Schools
- Richmond Public Libraries

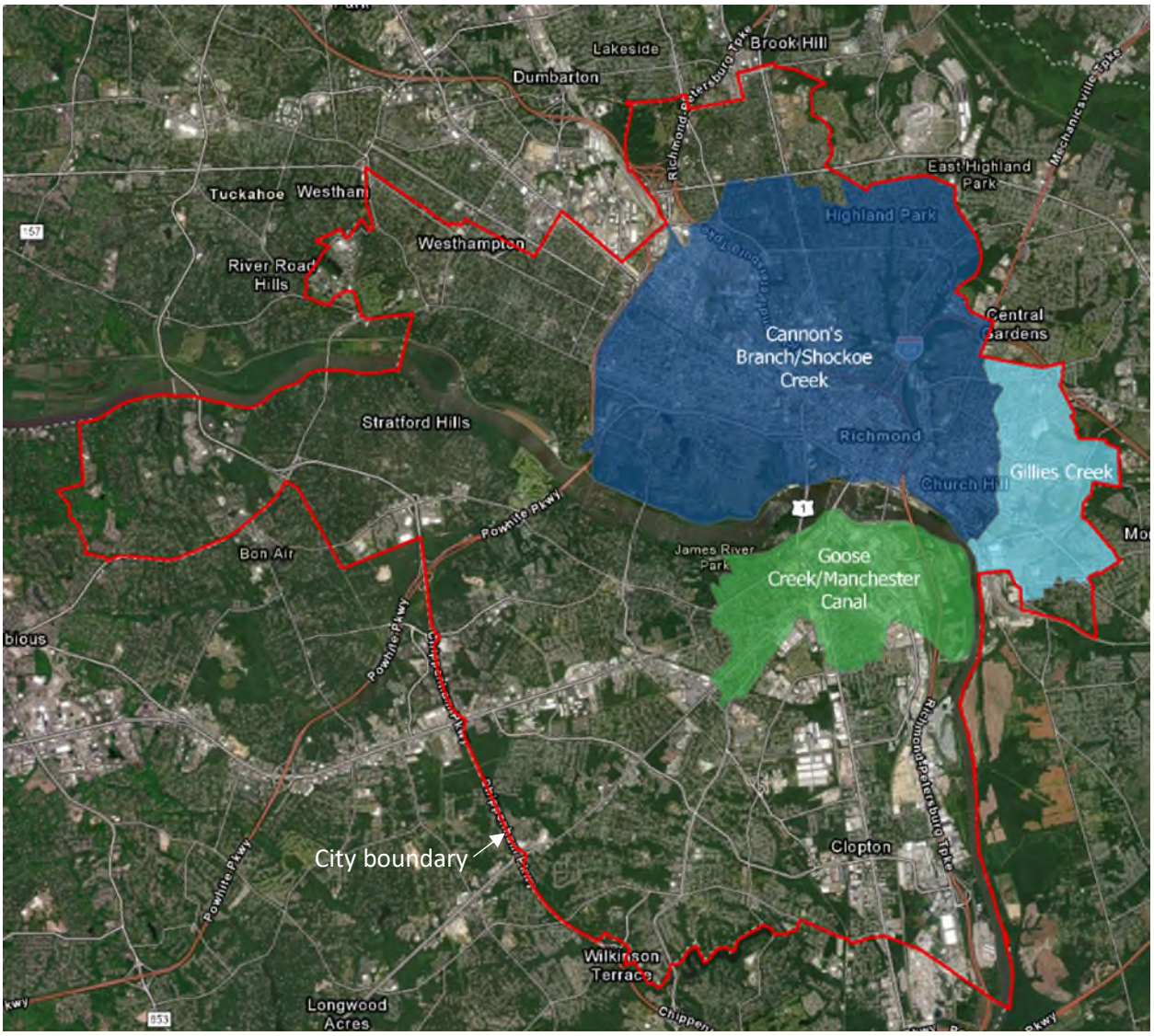


Figure 1-2. Map of the Three Priority Watersheds

- The Mayor's Office
- DPU

The series of stakeholder engagements facilitated during this planning process is briefly described below with full workshop summaries provided in Appendix C.

- **Kick-Off Meeting (August 5, 2020)**: The goals of this 60-minute meeting included the following:
  - Describe the grant project as a whole
  - Discuss the value of GI and create buy-in for its use
  - Generate enthusiasm for ongoing participation in the project
- **Workshop (October 19, 2020)**: The goals of this 90-minute workshop included the following:
  - Learn about the issues and opportunities City staff see for GI planning, implementation, and collaboration using real City case studies for context

  - Garner feedback on the scoring criteria being considered for the RVAH2O Green Infrastructure Ranking Tool (GI Ranking Tool)
- **Site Selection Workshop (January 28, 2021):** The goals of this 90-minute workshop included the following:
  - Provide an update on the development of the GI Ranking Tool and share how prior stakeholder input had been incorporated into the design
  - Present sites that the project team considered for conceptual design development and garner input to identify preferred sites for further consideration
  - Identify strategies for strengthening collaboration around GI among City departments
- **GI Ranking Tool Demonstration Workshop (May 18, 2021):** The goals of this 60-minute workshop included the following:
  - Discuss potential workflow mechanisms that encourage the consideration of GI in future projects
  - Present updates on the two sites recommended for conceptual design
  - Present the GI Ranking Tool interface, gauge stakeholder interest for future use, and seek input on ways to improve its format and usability

More than 20 different representatives from the City departments and offices (listed above) attended these virtual gatherings. Staff from the Alliance and Arcadis presented updates on the project at two separate RVAH2O meetings during the project period. All engagements were held remotely in light of the COVID-19 pandemic.

Funding and maintenance of GI were the two biggest challenges mentioned by department representatives. More interdepartmental cooperation during the planning process and aligning the Plan with planned CIPs and budgets between departments were cited as ways to promote implementation. It was suggested that this could be accomplished by holding regular meetings to share updates on forthcoming projects and have interdepartmental workgroups to help prioritize projects.

Most participants responded that they would be interested in using the GI Ranking Tool, learning more details about it, and/or receiving training for its use. While the GI Ranking Tool is meant to be used in the planning stage of a project to help identify or screen sites that are optimal for GI, many participants were also interested in using it to help tie projects to the co-benefits of GI, such as economic and health benefits as well as water quality improvements.

2 Existing Conditions & Review of Existing Information

2.1 Location & Characteristics of the Three Priority Watersheds

The western and northernmost portions of the City have experienced the least amount of hydrologic modification, possess the lowest intensity of developed land use, have the most forested land cover, and have high soil infiltrative capacity. On the other hand, the eastern portion of the City, where the three priority watersheds are located (shown in Figure 2-1), corresponds with a higher intensity of developed and industrial land use, as well as the City's urban core. Consequently, this area has soils that are considered urban and tend to have less infiltration capacity. It also possesses a topography that includes some considerably steep slopes that make it more challenging to site GI.

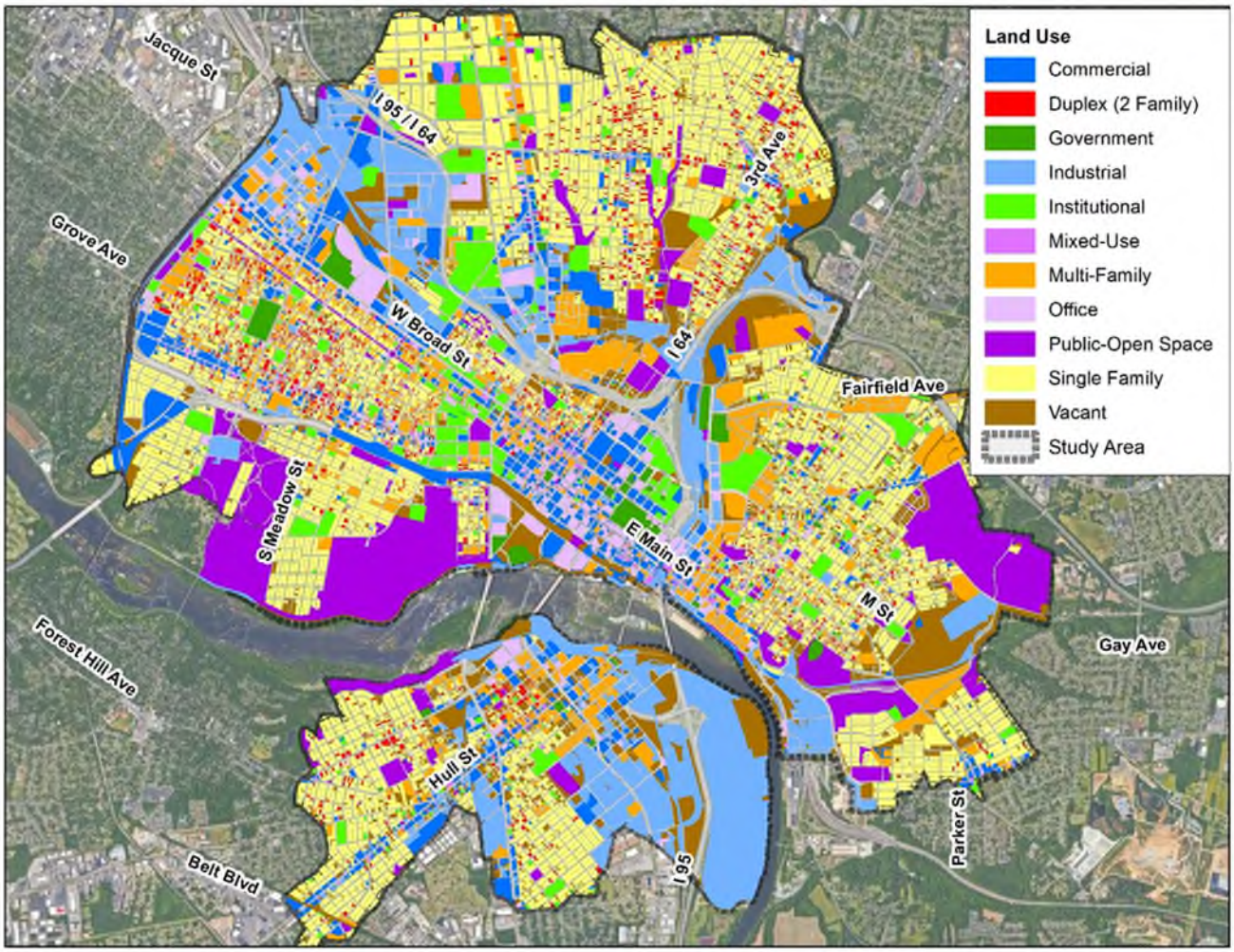


Figure 2-1. Map of Land Use within the Three Priority Watersheds

The City is served by both a CSS and an MS4. The CSS serves 12,000 acres, the MS4 serves 24,500 acres, and 1,500 acres within City limits have direct drainage to the James River. The three priority watersheds addressed in the Plan are primarily in the CSS area.

2.2 Inventory of Existing Public Land/Parcels

The City has 1,042 public parcels within the three priority watersheds; however, many are located in areas where GI is not feasible or recommended. A total of 537 public parcels were considered suitable for preliminary consideration for siting GI. These 537 parcels constitute 1,186 acres of 13,000 total acres within the watersheds (see Figure 2-2).

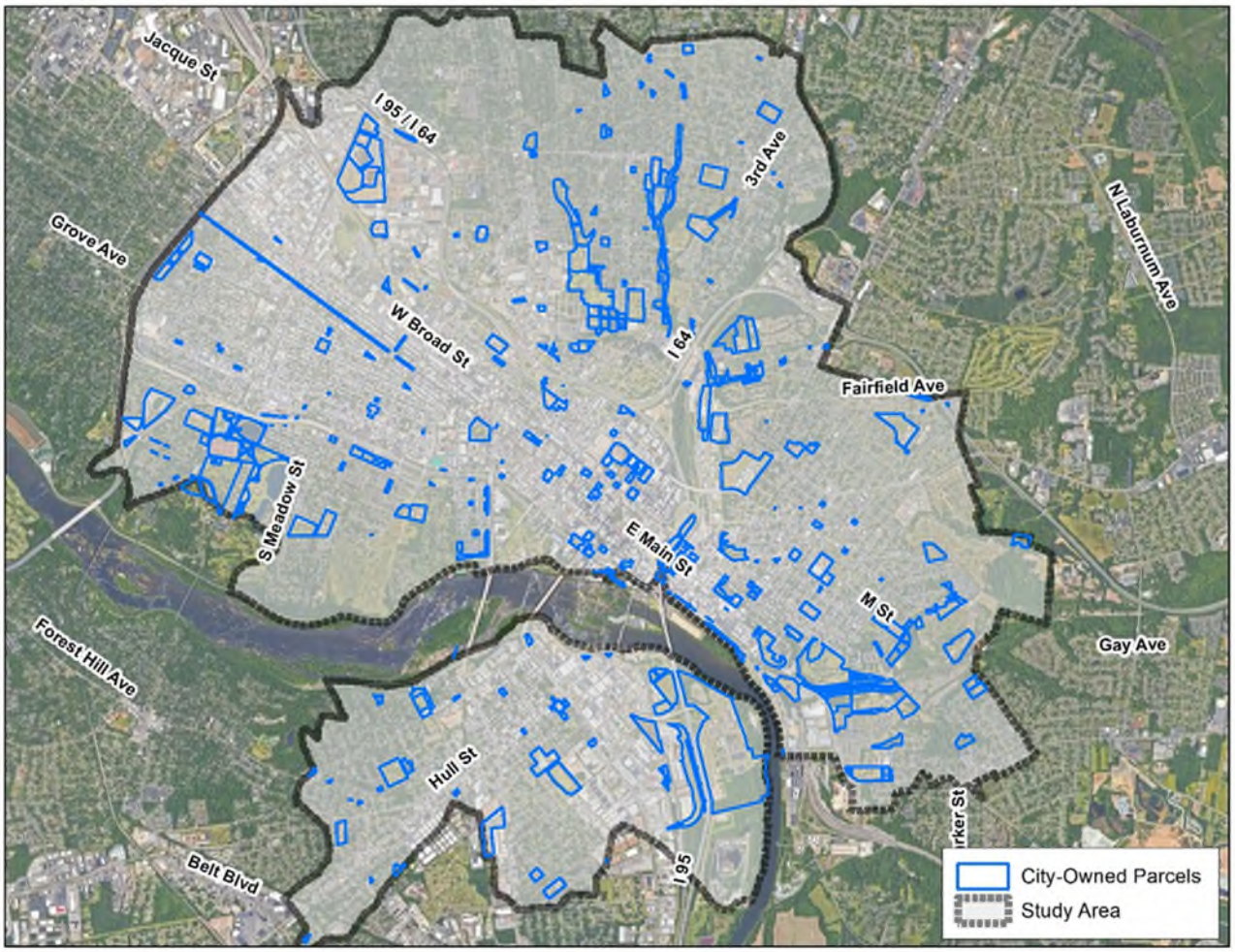


Figure 2-2. Map of Public Parcels in the Three Priority Watersheds

Land use types for these parcels include the following:

- 58 commercial (e.g., paved surface parking, theaters)
- 26 government (e.g., fire and police stations, libraries, museums)
- 25 industrial (e.g., railroads, storage warehouses, miscellaneous)
- 29 institutional (e.g., educational)
- 6 offices
- 197 public-open space (e.g., parks and community centers)
- 196 vacant (e.g., single-family residential, multi-family, commercial, industrial)

The initial number of parcels grouped by City department owner is shown in Table 2-1.

Table 2-1. Initial List of City-Owned Parcels in the Three Priority Watersheds

Owner Name	No. of Parcels	Owner Name	No. of Parcels
City of Richmond	21	City of Richmond Public Utilities	5
City of Richmond, c/o Chief Administrative Officer	1	City of Richmond School Board	31
City of Richmond Finance	6	Economic Development Authority of The City of Richmond	7
City of Richmond, c/o City Attorney	2	City of Richmond Recreation & Parks	216
City of Richmond, c/o Main Street Station	5	Greater Richmond Convention Center Authority	12
City of Richmond, c/o Real Estate Services	12	Richmond Behavioral Health Authority	8
City of Richmond Community Facilities	1	Richmond Metropolitan Authority	38
City of Richmond Department of Public Works (DPW)	203	Richmond Redevelopment and Housing Authority	446
City of Richmond ROW - Public Works	27	City of Richmond Nursing Health	1
		Total	**1,042**

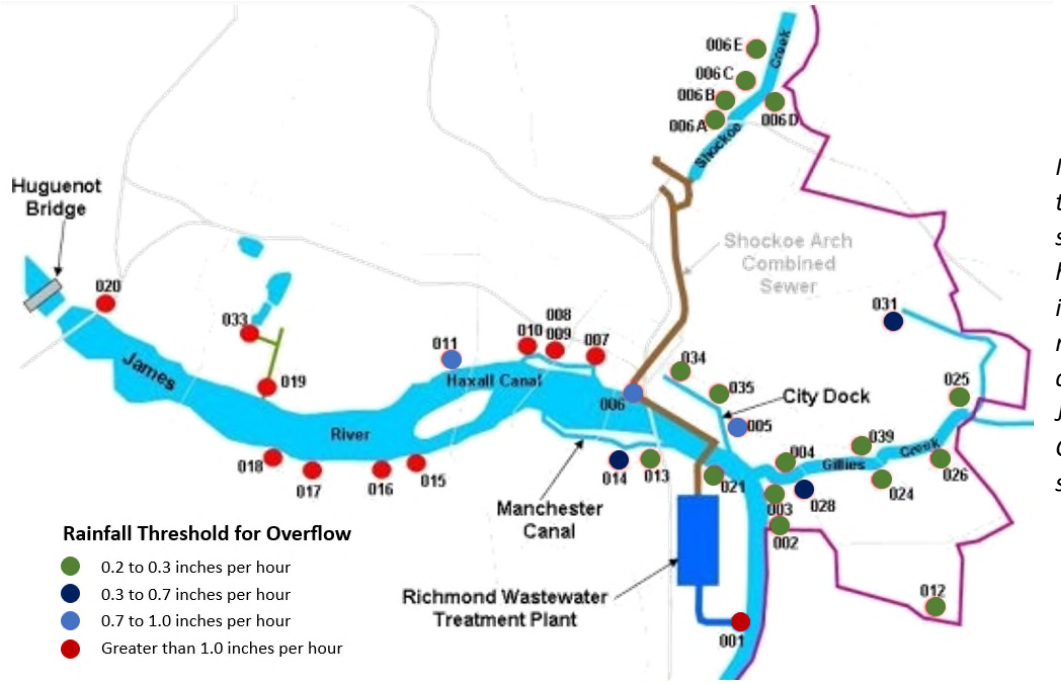
Parcels within the floodplain adjacent to the James River were removed as they are generally pervious and provide some level of water quality treatment. The list of parcels was further refined based on direction from the project team to exclude parcels with railroads, cemeteries, and other land use-related hindrances. There are several parcels that were listed as owned by City departments but were actually owned by another entity. Those parcels were also removed from consideration, yielding a final number of 537 parcels. There were also some discrepancies between the City department shown in geographic information system (GIS) and the actual department that manages the parcel. These were discussed with DPU staff and assigned to the correct department within the GIS Ranking Tool.

2.3 Inventory of Existing Utilities and Watershed Data

To identify practical publicly owned land and parcels and gather other relevant data for siting GI, the City compiled an inventory of existing utilities, parcels, and topography datasets in GIS. This inventory included, but was not limited to, the following:

- MS4 and CSS drainage systems
- Buried utility features
- Aboveground utility features
- Real estate data
- Topography and hydrology
- Land cover
- Additional datasets, such as bus stops

Combined sewer overflow (CSO) threshold levels are shown in Figure 2-3. Existing utilities data are included in Table 2-2.



Note: Several of the overflow points shown in this figure have been closed, including those near the confluence of the James River and Gillies Creek (as seen in Figure 1-1).

Figure 2-3. Combined Sewer Overflow Threshold Levels

Table 2-2. Existing GIS Utilities Data

#	Layer	Source	Requested From Utility?	Utility Requested From	Date Requested	Date Received
1	Streetlighting	Richmond FTP	-	-	-	-
2	Bus stop	Richmond Open Data Portal	-	-	-	-
3	Combined sewer BMP network	Richmond FTP	Yes	DPU	-	2/18/2020
4	Combined sewer BMP drop inlet	Richmond FTP	Yes	DPU	-	2/18/2020
5	Combined sewer manhole	Richmond FTP	Yes	DPU	-	2/18/2020
6	Combined sewer outfall	Richmond FTP	Yes	DPU	-	2/18/2020
7	Combined sewer pipe network	Richmond FTP	Yes	DPU	-	2/18/2020
8	Comcast communication line	Comcast Contact	Yes	Comcast	3/30/2020	6/4/2020
9	Electrical conduit	Richmond FTP	Yes	DPU	-	2/18/2020
10	Fire hydrant	Richmond FTP	Yes	DPU	-	2/18/2020
11	Gas pipeline	Richmond FTP	Yes	DPU	-	2/18/2020
12	Gas service line	Richmond FTP	Yes	DPU	-	2/18/2020
13	Parks/open space	Richmond 300	-	-	-	-
14	Primary electrical service	Richmond FTP	Yes	DPU	-	2/18/2020
15	Road basemap	Richmond GeoHub	-	-	-	-
16	Secondary electrical service	Richmond FTP	Yes	DPU	-	2/18/2020
17	Segra underground fiber	Segra	Yes	Segra	2/24/2020	9/15/2020
18	Sewer laterals	Richmond FTP	Yes	DPU	-	2/18/2020
19	Soil	Web Soil Survey	-	-	-	-
20	Trees	Richmond FTP	Yes	DPW	2/10/2020	2/19/2020
21	Water pipeline	Richmond FTP	Yes	DPU	-	2/18/2020
22	Water service line	Richmond FTP	Yes	DPU	-	2/18/2020
23	Watershed boundary	Richmond FTP	-	-	-	-
24	Watershed with buffer	Richmond FTP	Yes	DPU	-	-

Notes:
BMP: best management practice
FTP: File Transfer Protocol

2.4 Drainage Issues/Historic Flooding Problems

The three priority watersheds are prone to flooding due to the ages of their collection systems, high amounts of impervious area, and proximity to the James River. This includes the City's south and north James River Park System areas and public recreational waters that receive a large number of visitors each year. CSOs within the three priority watersheds are being actively reduced but still pose water quality issues. Additionally, DPU maintains complaint records for localized parcel flooding that were obtained for this Plan. A map of general stormwater complaints within the three priority watersheds is shown in Figure 2-4.

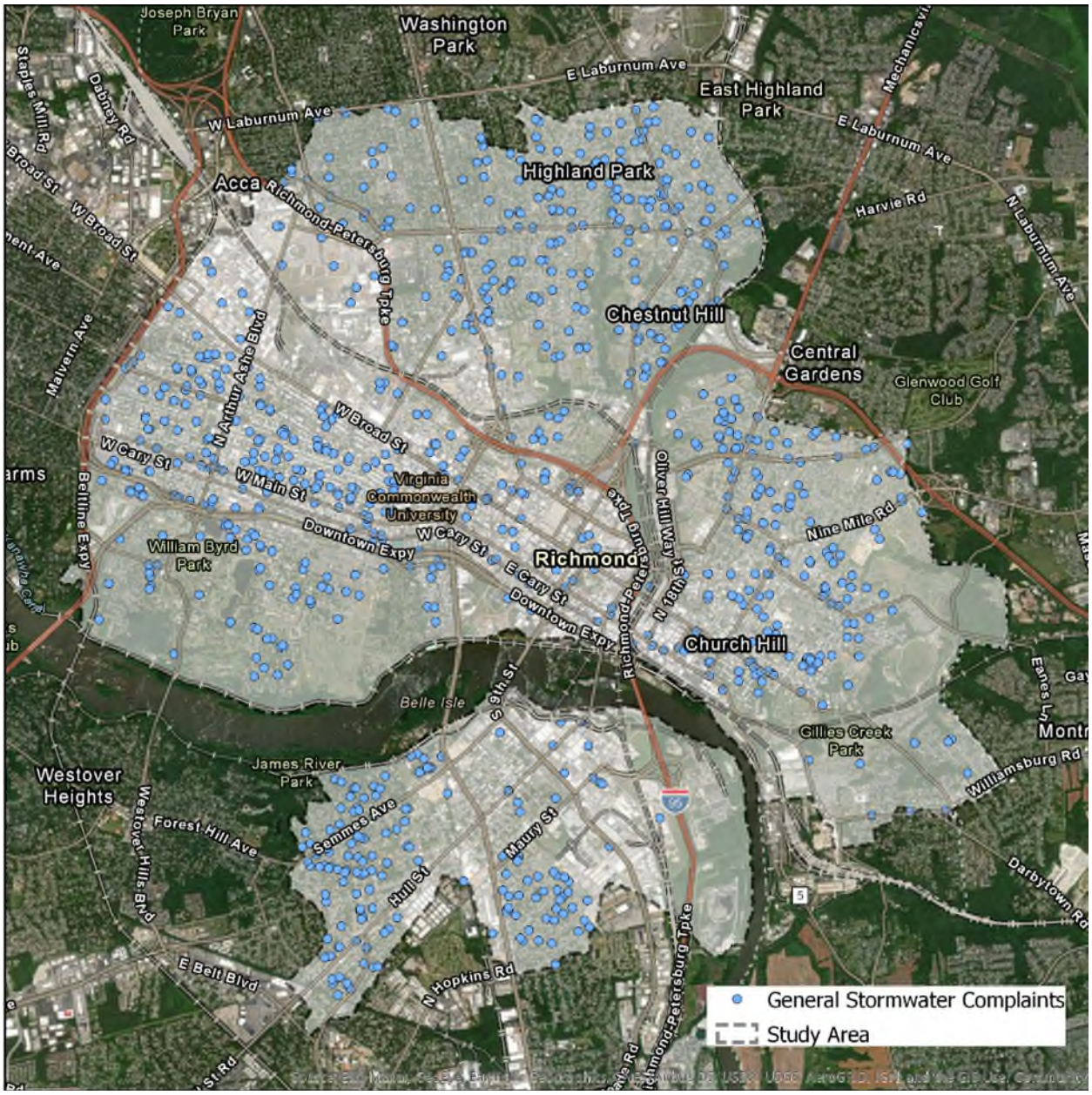


Figure 2-4. Map of General Stormwater Complaints in the Three Priority Watersheds

2.5 Previous/Current Studies

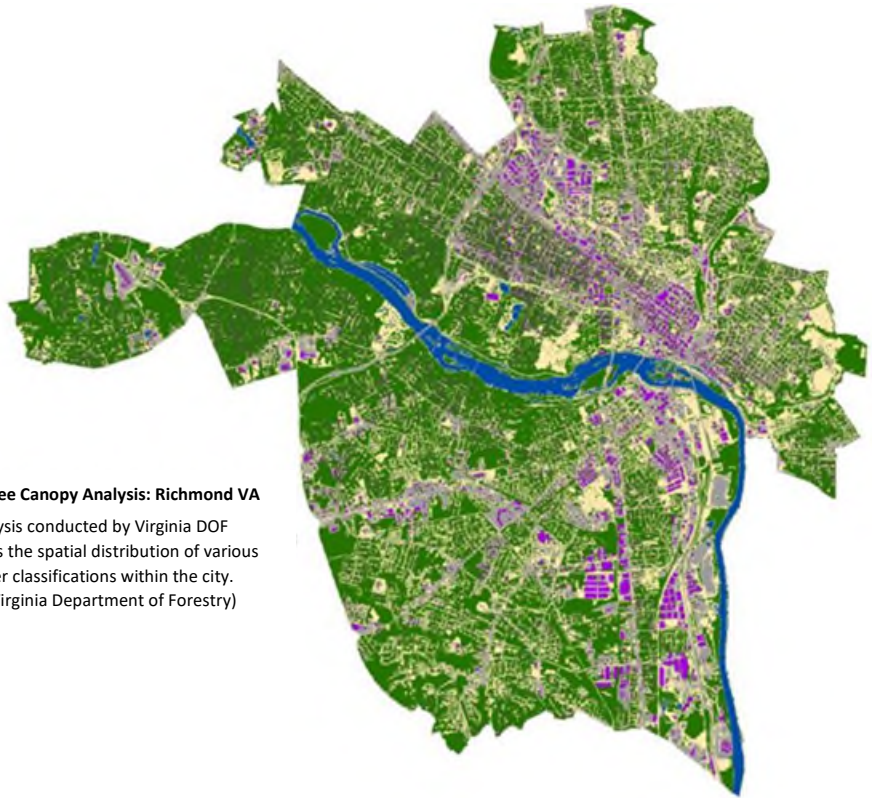
The City has developed several documents within the last few decades that have included stormwater management as well as other important topics, such as social vulnerability and sustainability, that are synchronized with and supported by the Plan. Summaries of and salient components from these documents include the following:

- **STRATUM Sample Survey of Richmond Street Trees (2009)**: This report provides a condition assessment of street trees in Richmond with recommendations for preserving existing trees and supporting DPW's Urban Forestry budget. Fifty percent of the existing street trees in Richmond are 12 inches in diameter or less, and 70% are 18 inches in diameter or less. However, individual tree

conditions at each location were not available for analysis and, thus, a 10-foot diameter tree buffer area was assumed for the current Plan.

- ***Richmond Green Infrastructure Assessment (2010)***: This report identifies vacant parcels that could add significant value to the City's open space portfolio in the form of a GI network. It also presents strategies that can be applied at the neighborhood-level to improve habitat, recreational access, and water quality. Key goals in this assessment include the following:
  - Transform obsolete structures for productive use
  - Fill critical gaps in park inventory
  - Acquire underutilized property to provide additional public access to the James River
  - Ensure high-quality water resources
  - Protect environmentally sensitive land
  - Increase citizens' appreciation for and access to the natural environment
  - Protect critical natural resources
  - Protect pedestrian and bicycle movement
  - Increase collaboration between Richmond Public Schools and the Department of Parks, Recreation, and Community Facilities
  - Increase the role of the Department of Parks, Recreation, and Community Facilities in economic development and neighborhood revitalization
  - Ensure quality of life for all residents

The report states that existing tree canopy covers approximately 40% of the total land area in Richmond (see Figure 2-5). Urban tree canopy analyses can be helpful in identifying heavily impervious areas to target for future greening and tree planting efforts.



Urban Tree Canopy Analysis: Richmond VA

This analysis conducted by Virginia DOF illustrates the spatial distribution of various land cover classifications within the city. (image: Virginia Department of Forestry)

Figure 2-5. Existing Tree Canopy in Richmond

RVA Clean Water Plan (2017): The focus of this stakeholder-driven integrated plan is to restore and protect the waterways in the portion of the James River watershed within the municipal boundary of the City. GI projects can help reduce the number and volume of CSOs, the outfalls for which are shown in Figure 2-6.

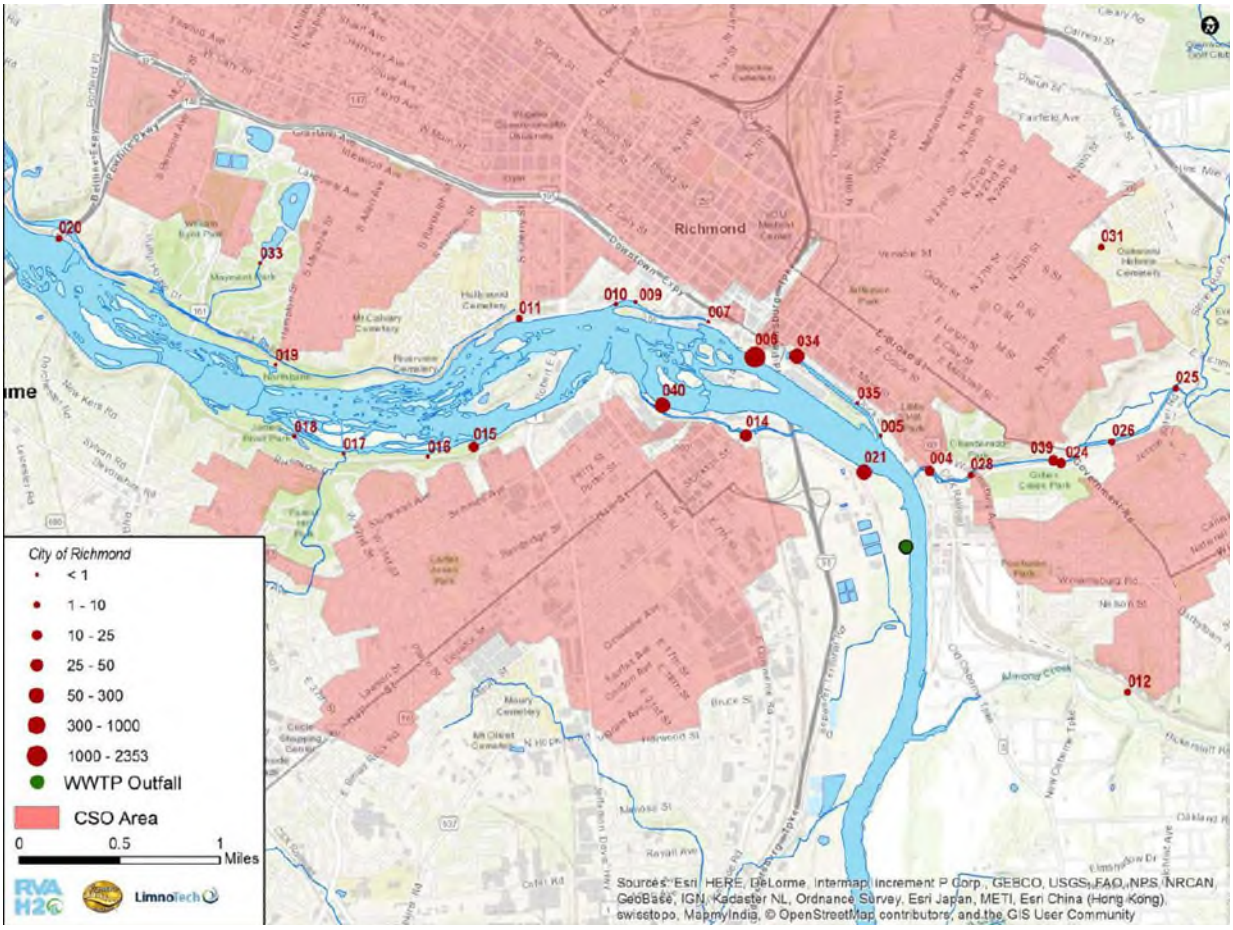


Figure 2-6. CSO Volume by Outfall (Millions of Gallons per Year)

Green Infrastructure Initiative Plan (2019): This effort shares DPU's strategies to incentivize GI on privately owned land within Richmond's three priority watersheds. As the current Plan is focused on public land, this plan is relevant only for those GI opportunities on public parcels where it makes sense to consider expanding efforts to nearby private land.

Proposed Capital Improvements Plan for Fiscal Years 2020-2024 (2020): This 5-year plan identifies funding budgets needed for projects that address health and safety concerns, such as roadways, neighborhood parks, schools, and other economic development activities. It also includes a long-range strategy and 20-year CIP plan that recognizes the importance of proper maintenance. Proposed CIPs were noted for future reference against high-scoring GI sites identified in the Plan.

Richmond 300 (2020): This plan promotes a vision of an equitable, sustainable, and beautiful Richmond to ensure a high quality of life for all existing and future residents. It outlines 17 goals, 73 objectives, and 415 strategies that will shape the growth of the land, neighborhoods, and the City. This plan includes a map (see Figure 2-7) with projected future land use that should be considered as future GI projects are identified and implemented.

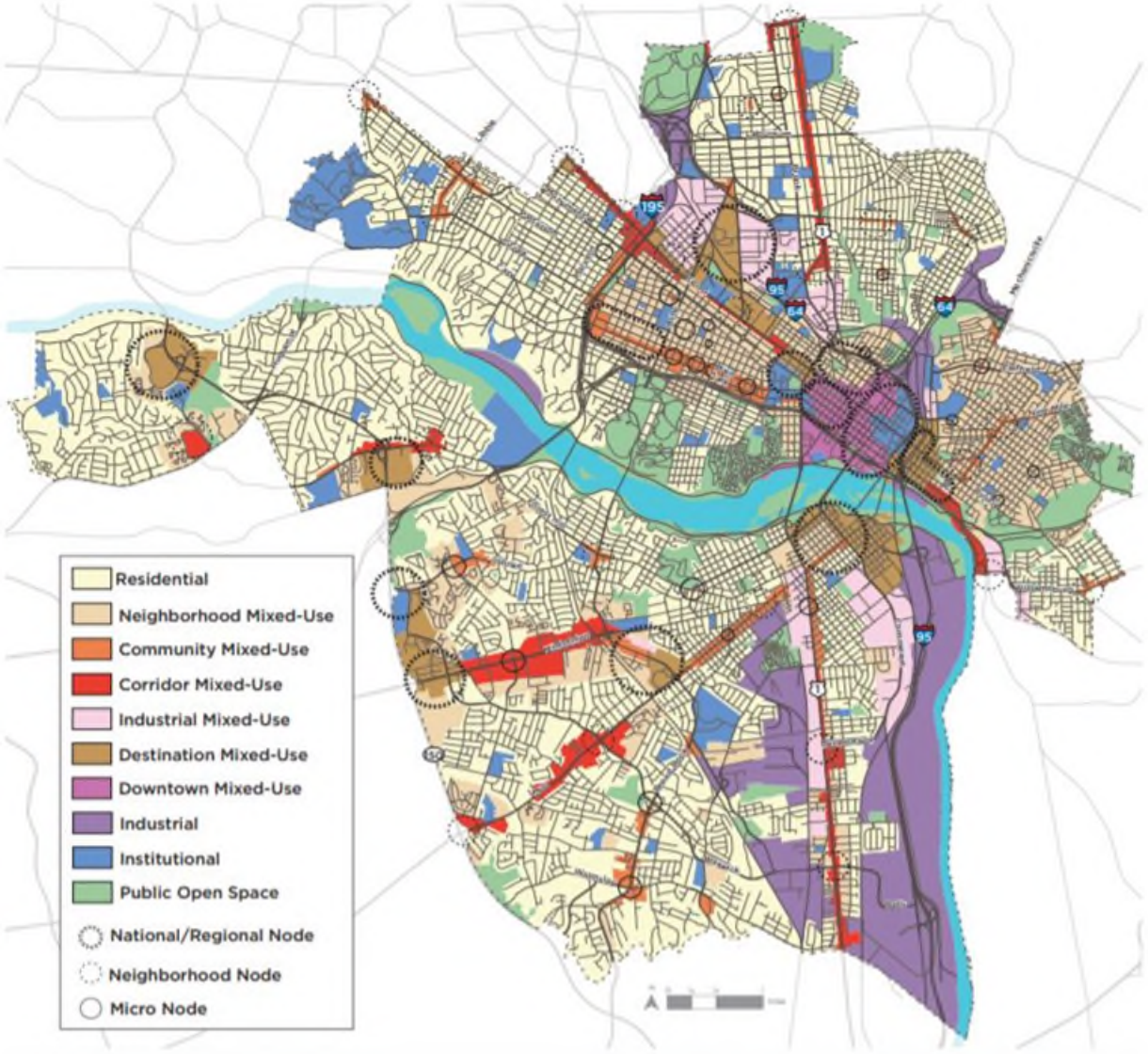


Figure 2-7. Map of Envisioned Future Land Use in Richmond

RVAgreen 2050 Climate Equity Index (2020): This index, developed by the City's Office of Sustainability, includes sensitivity, climate equity, and adaptive capacity factors. This index was incorporated as part of the scoring criteria for siting GI within the Plan.

Green Team (2020): This effort gathered key local stakeholders, along with City departments, to identify existing City-owned parcels for conversion to parks, similar to the Plan's intention to site GI on public lands. Green Team goals include increasing the number of parks in the City by five parks in 1 year. Final recommendations from the Green Team included:

- Evaluation of the top 12 parcels (see Figure 2-8) to determine the best candidates for new park spaces. All sites were outside of the three priority watersheds' areas.
- Work with Richmond Public Schools to allow access to green spaces, as appropriate.
- Explore options for increasing park and green space and connectivity, including private and tax delinquent property acquisition.

Final Objective Ranking

Objective Rank	Name	Council District
1	Broad Rock Creek	8
2	Hioaks Water Tower	9
3	Rear Earnest Road	8
4	Reedy Creek Wetland	9
5	South James Riverfront	8
6	Rosemont Road	8
7	Stockton Street	8
8	Grindall Creek	8
9	Glenway Dr. Open Space	9
10	Halsey Lane	4
11	Tuckahoe Avenue	1
12	South Hopkins Road	8

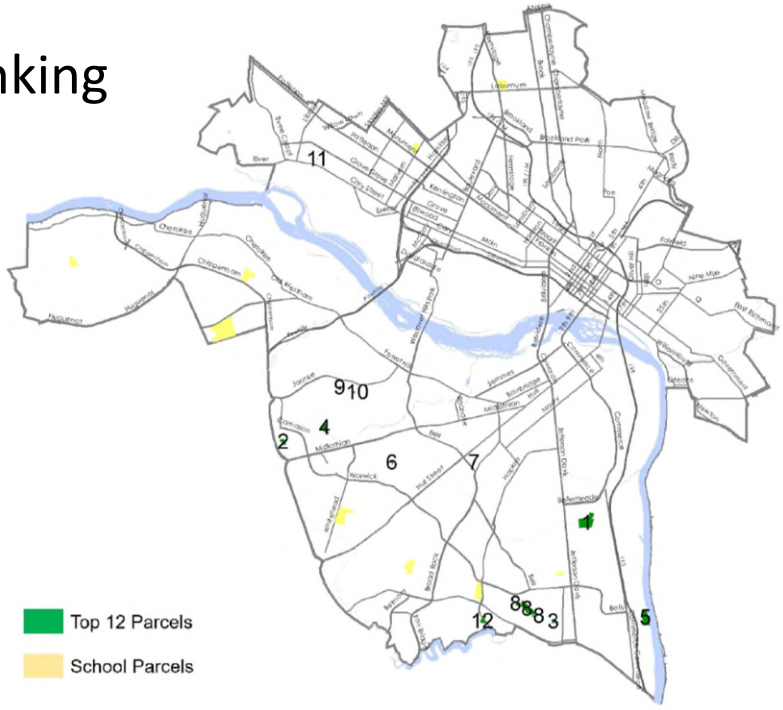


Figure 2-8. Green Team Final Objective Ranking Site Map

3 Objectives and Identification of GI Opportunities

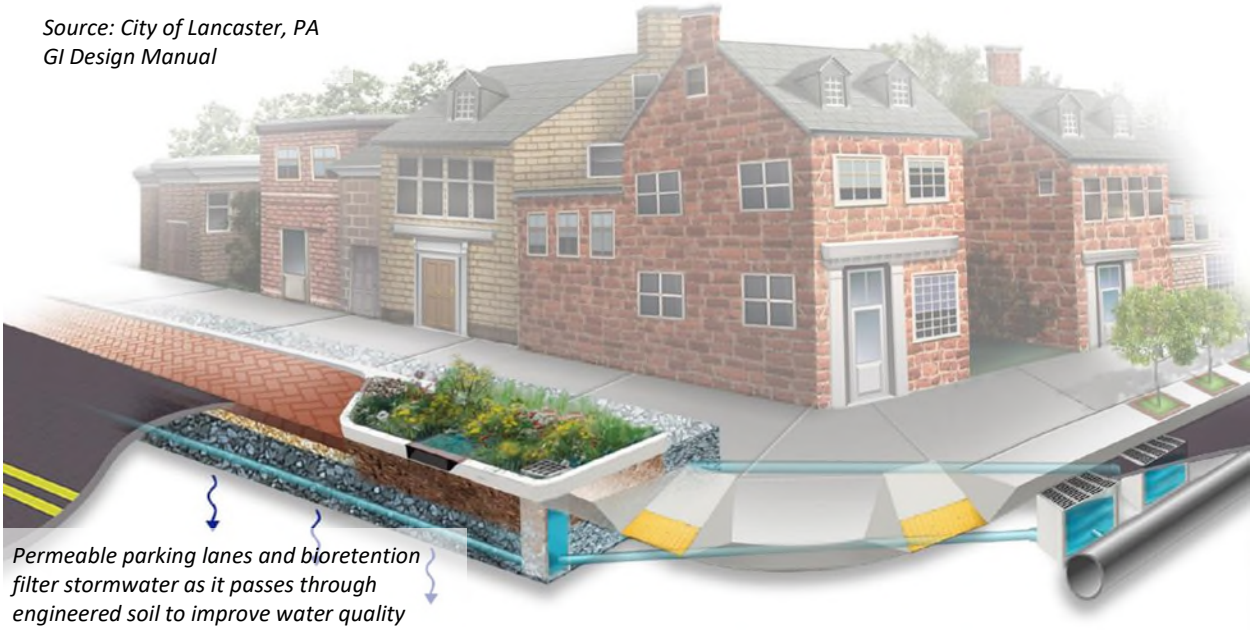
3.1 Master Plan Objectives

The goal of the Plan is to identify opportunities to incorporate GI in public parcels and the right-of-way to reduce stormwater quantity and improve water quality. The Plan has several key objectives that are critical to the project's success. They include the following:

- Reduce stormwater volume
- Reduce impervious area and increase green space
- Reduce the amount of nitrogen, phosphorus, and sediment delivered to James River
- Address existing drainage and flooding concerns, where possible
- Implement easily maintainable GI, where possible, to minimize future maintenance (as maintenance in perpetuity is necessary)
- Other objectives as identified by DPU and the Alliance

These objectives can be achieved through careful planning and the application of GI practices. GI is used to add capacity to drainage systems, reduce runoff during storm events, and improve water quality while creating additional green space benefits. Stormwater runoff collected by GI is returned to the water cycle through natural processes, such as infiltration and evapotranspiration. Figure 3-1 illustrates two of the primary GI types preferred by DPU staff, bioretention and permeable pavement, and how they function within a street right-of-way to filter and capture stormwater. On the following pages, different GI opportunities are described, preferred GI types are discussed, and the process and criteria for screening GI is explored.

Source: City of Lancaster, PA GI Design Manual



Permeable parking lanes and bioretention filter stormwater as it passes through engineered soil to improve water quality and recharge the groundwater table

Figure 3-1. Project Example of GI in the Right-of-Way

3.2 Selection of Preferred GI Types

GI types can include downspout disconnection, vegetated roofs, bioswales, permeable pavement, and planter boxes. Several preferred types of GI, summarized below, were identified at the start of the Plan's development, with an emphasis placed on GI types established in the City. The two primary types of GI targeted for consideration in the Plan include permeable pavement and bioretention. Permeable pavement was selected because DPU has sufficient equipment and staff for maintenance. Bioretention was selected because it provides desirable vegetation and water quality treatment benefits. Additional GI practices that were considered include reforestation and tree plantings, which can help meet RVA Clean Water Plan and other City goals for increasing tree canopy and reducing the urban heat island effect. Rainfall harvesting devices, such as cisterns and rain barrels, were also considered, because they have small footprints and can be added adjacent to structures even in highly urban and developed areas.

Permeable Pavement and Pavers: A paved surface that allows for the infiltration of stormwater into subsurface storage (generally consisting of rock, gravel, or sand). This GI can be accomplished either through pavement that is manufactured to be permeable or through gaps between paver blocks with permeable infill or vegetation. Permeable paving materials include porous aggregate, porous turf, open-jointed block, porous concrete, and porous asphalt. Permeable pavement, while not natural, improves water quality and provides increased storage capacity over most other types of GI.

Bioretention: Bioretention areas, colloquially called rain gardens, are depressed, landscaped areas with permeable soil that are designed to retain and filter stormwater before it is removed through infiltration or evapotranspiration. They are often applied at small sites, including residential areas, in parking lots, along highways, in urban settings, and adjacent to industrial or commercial facilities. They rank near the top of the list in terms of aesthetic appeal but tend to have limited storage capacity.

Reforestation and Tree Plantings: Reforestation, including tree plantings, provides a mechanism to increase green space, reduces the urban heat island effect, better manages stormwater, and provides an amenity to the public. In urban areas, trees can increase the capacity of stormwater management systems if they are planted alongside roadways or in parking lots or other paved areas that are purposefully engineered to retain stormwater. While they lack the storage capacity of other GI installations, trees provide many co-benefits, including habitat, shade, and beautification.

Rain Barrels or Cisterns: Rain barrels and cisterns are rainwater harvesting vessels used to collect rainwater. They are often connected to a downspout to capture stormwater from a roof and collected water is typically reused on site. This process conserves potable water in addition to reducing stormwater runoff. Due to limited capacity and storage-only functionality, these vessels provide limited volume control and no direct water quality benefits.

3.3 Site Screening Process

While designing and implementing GI has become more mainstream, retrofitting GI into developed areas still poses challenges due to existing utilities and infrastructure, lack of suitable soils or slopes, and a number of other potential surface and subsurface issues. To provide a high-level evaluation of favorable potential GI locations, Arcadis developed a GIS site screening approach using readily available infrastructure data from the City. Much of this work would have previously been done by sending field staff out to inspect and gather data. The goal of this approach is to provide a tool for the planner/ designer that represents a continuum of GI suitability across the project area from which individual locations can be evaluated and ranked. This approach reduces time in the field by prioritizing which areas may be better suited for GI implementation and, as such, can provide a defensible baseline for CIP project selection and design.

Existing GIS data for subsurface and surface factors obtained from the City were reviewed to determine how best to be utilized for the site screening process. It was determined that the data needed to be augmented with additional information pertinent to the project goals, including past flooding issues, CSO activations, and various social equity data. Each data set brought its own set of complications on how best to evaluate and use it in the context of the GI Ranking Tool and the Plan. For example, the project team evaluated volume management via runoff/flow reduction based on CSO drainage area and the potential for reduced overflow activation. It was determined that the best way to evaluate this item was on a parcel level, not a subwatershed-level. This required individual GIS data on inlets and sewer lines to be obtained and evaluated to determine the exact drainage area tributary to each CSO and the parcels contained within each drainage area.

3.4 Project Ranking Methodology

The methodology for the project ranking process evolved over the course of the project and was based on past similar ranking tool models developed by Arcadis with input from DPU and the Alliance. Even before a methodology was finalized for the individual components of the model, a discussion ensued on the type of public land that should be considered during the GI ranking process that included the following questions:

- Should certain types of City properties be prioritized?
- Should certain areas in the three priority watersheds be prioritized?
- Should all public parcel owners be included in the GI Master Planning process?
- How should non-City-owned public parcels be addressed at all?
- Should all right-of-way areas be considered or only those areas adjacent to planned sidewalk replacement projects?

These questions were collectively addressed by DPU, the Alliance, and Arcadis before moving on to the methodology for ranking GI sites. No priority was given to one City property type over another; however, certain areas within the three priority watersheds were prioritized based on location, equity issues, and other criteria. The process attempted to be as inclusive as possible by inviting all affected public parcel owners to workshops, but some were unavailable to participate. Non-City-owned public parcels were not addressed in general. Right-of-way along roadways was considered in the analysis, but concrete medians in the middle of roadways/boulevards were not considered, because they are part of the public roadway and would have had to be addressed/measured individually.

The GI site ranking methodology started out simplistically looking at the following elements:

- ***Site screening approach*** **–** Develop a scoring system to screen out unsuitable sites:
  - Buffer zone
  - Site suitability
  - Exclude due to disruption to public activities
- ***Site prioritization*** **–** Develop a scoring system to prioritize sites based on estimated benefit:
  - Flow capture
  - Size of the site
  - CSO activations
  - Flooding complaints
  - Future redevelopment and CIP projects
  - Social and sustainability benefits
  - Water quality
  - Reduction of impervious area

The ranking process eventually evolved into the five-phase process detailed in Section 4. Public parcel scores were evaluated during each phase and each scenario within each phase. In addition, modifications were made to the methodology to provide consistent, reasonable results that did not skew or double count criteria. Once the first three (screening) phases were complete and the fourth (scoring) phase was initiated, the ranking methodology was updated to include tiers, maximum and minimum values, and weighting of individual criteria. Initial values were used for each metric based on past project experience with the GI Ranking Tool, and values were modified to provide consistent, reasonable results.

4 Evaluation of the Three Priority Watersheds

4.1 GI Ranking Tool Overview

To provide a high-level evaluation of favorable potential GI locations in advance of modeling, a screening approach was developed in GIS using readily available infrastructure data. Much of this work would have previously been done by sending field staff out to identify areas. The goal of this approach is to provide a tool for the planner and design engineer that represents a continuum of GI suitability across the project area from which individual locations can be evaluated. This approach reduces time in the field by prioritizing optimal areas for GI implementation and, thereby, providing a defensible baseline for design.

The GI Ranking Tool is intended to be a cost-effective way to identify potential locations for GI solutions across the watersheds. It was also customized to focus on specific types of parcels. In addition, for this Plan, the focus is on public parcels owned by the City in the three priority watersheds as well as potential sites within the right-of-way, but the GI Ranking Tool can be expanded to other watersheds and private parcels as desired in the future. It is based on GIS and is scalable across subwatershed, watershed, and citywide levels.

The GI Ranking Tool evaluation and analysis process was divided into five phases, as depicted in Figure 4-1 and described in the following text:

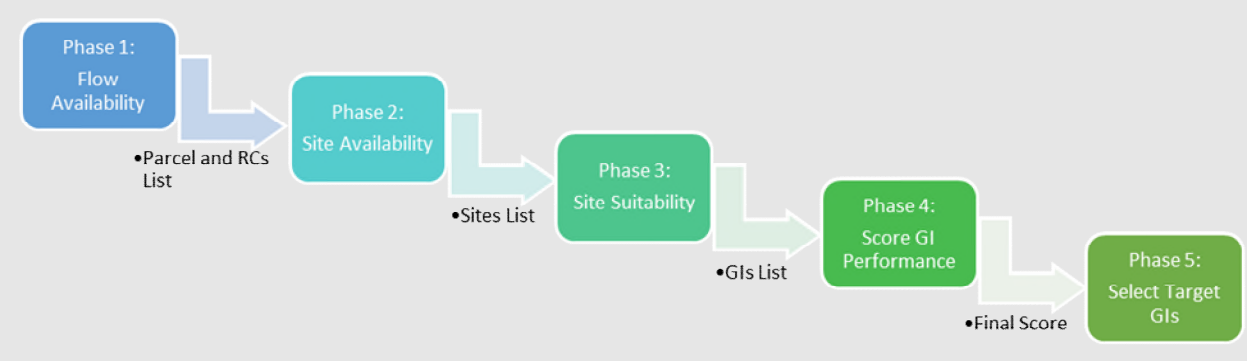


Figure 4-1. The Creation Process for the RVAH2O Green Infrastructure Ranking Tool

Phase 1: Flow Availability – Screen parcels and runoff catchments based on tributary volume

Phase 2: Site Availability – Determine availability of adequate space for various GI types

Phase 3: Site Suitability – Screen out unsuitable locations based on exiting conflicts with surface functions and subsurface structures, such as trees and exiting utilities

Phase 4: Score GI Performance – Identify sites based on estimated benefits

Phase 5: Select Target GI – Select target sites for conceptual design GI development

Stepping through each phase sequentially reduced the large number of sites in the three priority watersheds to a viable number of GI sites with the highest benefit to the community. The reduced number of sites and criteria enabled the GI Ranking Tool to provide evaluation results at a faster rate as the project progressed. Finally, the process helped to simplify reviews for each phase and will not require the team to re-examine sites that were already excluded if criteria are modified in the future.

Issues identified during the initial development of the GI Ranking Tool included the following:

- Missing impervious area shapefile – A GIS layer with impervious area by parcel was not available so layers for buildings, roadways, sidewalks/parking lots, etc. were requested separately from the City.
- Soils information received as a description, not a shapefile – Soils information was only available as a map with written description so a shapefile for hydrologic soil groups within the three priority watersheds was downloaded from the web Natural Resources Conservation Service (NRCS) soil survey for use in GIS.
- Missing curb data – The street shapefile did not include data on roadside curbs, which impacts how surface runoff is routed inside each runoff catchment.

Once all data were successfully obtained or developed, each phase of the GI Ranking Tool was initiated. A description of each phase including its function, development, and refinement, are provided in the following sections.

4.2 Phase 1: Flow Availability Analysis

Phase 1 of the GI Ranking Tool evaluation and analysis process involved determining flow availability and included the following elements:

- Flow capture (potential tributary drainage area)
- Impervious area
- Location of the GI unit

The flow availability process involved locating runoff catchments and City-owned parcels with adequate surface runoff. The process included estimating runoff catchment for each storm inlet, identifying flow routing mechanisms, and calculating directly connected impervious areas (DCIAs) within both City-owned parcels and runoff catchments. GIS layers used in the flow availability process analysis are shown in Table 4-1.

Table 4-1. GIS Data Used in the Flow Availability Analysis

Evaluation Phase	GIS Layer(s)
Flow Availability	Parcel and right-of-way boundaries
	Impervious layers (e.g., roads, buildings, parking lots, sidewalks, driveways)
	Contours/LiDAR/DEM
	Storm inlets
	Street centerlines

Notes:
LiDAR = light detection and ranging
DEM = digital elevation model

After runoff catchment areas were delineated by digital elevation model (DEM), other GIS layers, such as City-owned parcels, roads, roofs, impervious areas, and storm inlets, were used to determine how much flow can be captured by the GI during a 1-inch storm event. The size of the subwatershed, total direct impervious area within the subwatershed, and City-owned parcel determined how much runoff volume can be managed. The output of this phase is a list of parcels that meet the minimum volume criteria of 10,000 gallons and a list of runoff catchments that meet the minimum volume criteria of 50,000 gallons. Flow availability requirements and the number of parcels and runoff catchments meeting those requirements are provided in Table 4-2. A map of public parcels and runoff catchments that meet the flow availability requirements is provided as Figure 4-2.

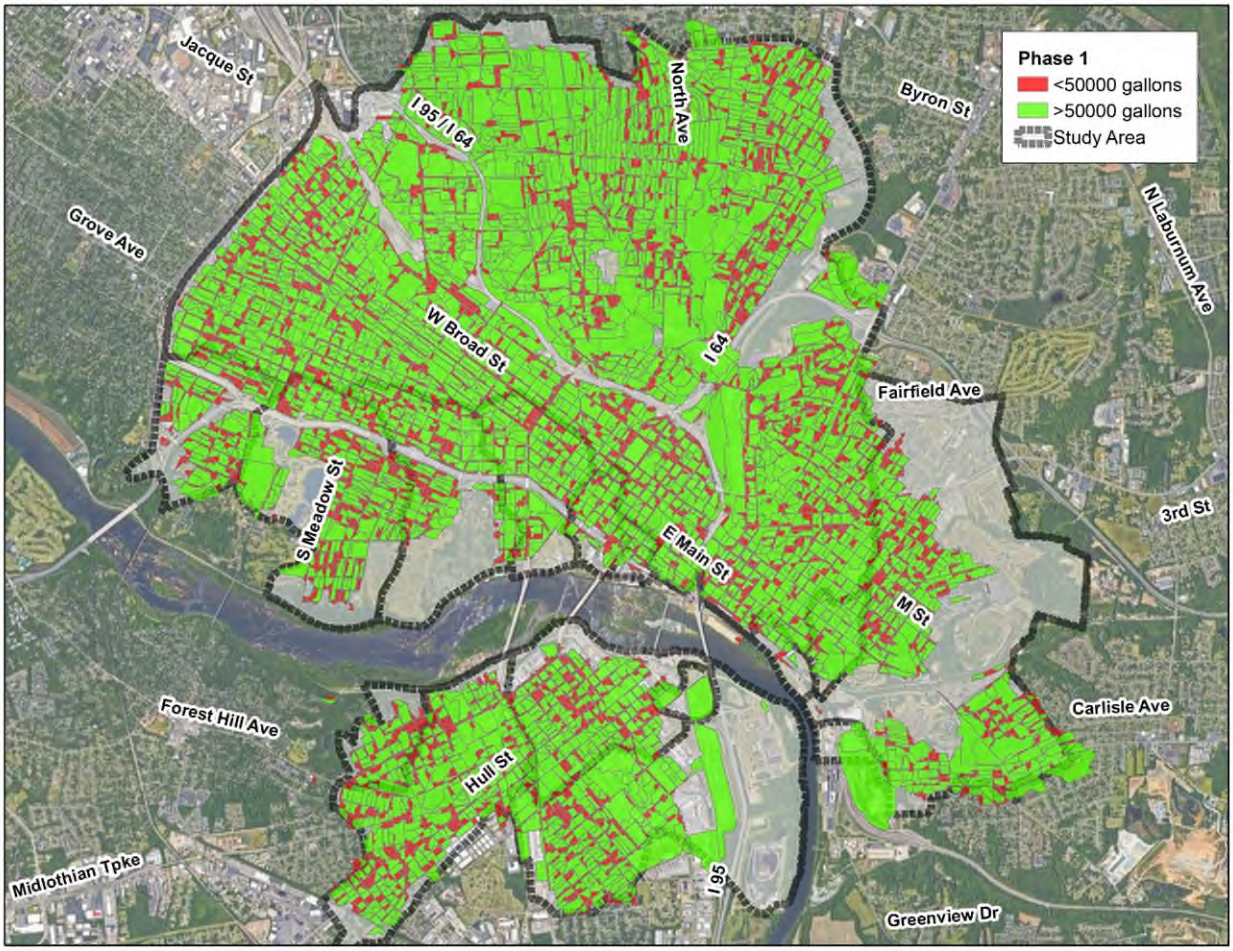


Figure 4-2. Phase 1 Flow Availability Results for City-Owned Parcels

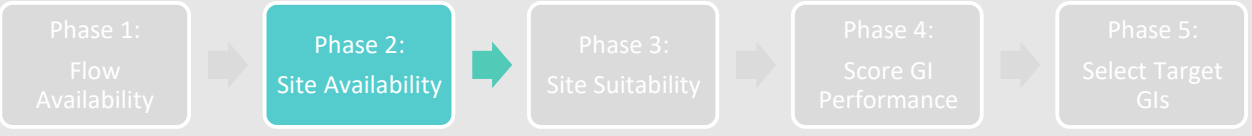
Table 4-2. Phase 1 Flow Availability Results

Results	City-Owned Parcels	Right-of-Way
Input for Phase 1	537 parcels	8,845 runoff catchments
Number of qualified parcels/runoff catchment to Phase2	180 parcels	3,292 runoff catchments
Estimated total DCIA (acres)	169.8 acres	9,938.2 acres
Estimated DCIA in qualified parcels/runoff catchments (acres)	169.1 acres	7,862.4 acres

The total City-owned parcels identified during the flow availability process was 537. There were 180 parcels with a runoff volume of more than 10,000 gallons, resulting in approximately 67% of properties being eliminated from further consideration.

Runoff catchments with adequate runoff volume were identified. A runoff volume of more than 50,000 gallons was selected for the public corridors. Overall, there were 3,292 runoff catchments with a runoff volume of more than 50,000 gallons, which covered more than 7,862 acres.

4.3 Site Availability Analysis



Phase 2 in developing the GI Ranking Tool involved locating sites that are adequate for the targeted GI types and included the following elements:

- Impervious area
- Location of the GI unit

Specific GIS layers used in the site availability process analysis are shown in Table 4-3 below. Table 4-4 shows the number of City-owned parcels that meet the used site availability criteria for GI systems in parcels. The analysis targets for both bioretention and permeable pavement in City-owned parcels were contiguous areas that meet the criteria in Table 4-4. Since there are usually several open (unpaved) locations within the parcel that can be converted to bioretention, several bioretention sites could be selected in each parcel.

Table 4-3. GIS Data Used in Site Suitability Analysis

Evaluation Phase	GIS Layer(s)
Site Availability	Qualified parcels and runoff catchments from Phase 1
	Impervious layers (e.g., roads, buildings, parking lots, sidewalks, driveways)
	Road intersection
	Street centerlines

Table 4-4. Site Availability Analysis Criteria and Public Parcels Meeting Those Requirements

Potential GI Types	Site Availability Criteria	Sites/ (No. Parcels)
Bioretention cells in open spaces	Minimum pervious area of 60 feet^2, minimum length of 60 feet, and minimum width of 4 feet	1,003 / (164)
Bioretention cells in parking area	1% of parking area is > 60 feet^2	84 / (84)
Pervious pavement	50% of parking area > 1,000 feet^2	118 / (118)

In public corridors within the right-of-way, permeable pavement was assumed for low traffic areas, including local roads; parking lanes of local, collector and major roads; and alleys with curbs. Bioretention sites were evaluated along sidewalks away from intersections and driveways. The criteria used to ensure sites have adequate contiguous area for each GI type in the public corridor is summarized in Table 4-5, along with the number of the qualified sites. The possible locations for all eight GI types, shown in Tables 4-4 and 4-5, that meet site availability requirements are provided graphically in Figures 4-3 through 4-10.

Concrete median areas within the right-of-way were initially considered as possible sites for GI, especially for bioswales, so that they could be converted from gray to green and help capture and infiltrate roadway runoff. However, the medians were part of the road right-of-way and would have required being individually sized/removed from the GIS, which would have taken a substantial amount of time to complete for potentially limited benefit. While bioretention, tree planters, and other GI should be considered in the future for these areas, they were not included in the GI Ranking Tool.

Table 4-5. Site Availability Analysis Criteria and Public Corridor Sites Meeting Those Requirements

Potential GI Types	Site Availability Requirements	Sites
Bioretention (sidewalk)	Minimum sidewalk width of 10 feet, minimum available area for the GI unit of 60 feet^2, and minimum length of 15 feet	4,419
Green alleys	Alley with curb, minimum alley width of 8 feet, and minimum length of 40 feet	51
Permeable pavement (parking lanes) in local and collector roads	Local and collector roads with minimum width of 28 feet, minimum lane width of 10 feet, and minimum length of 40 feet	7,226
Permeable pavement (parking lanes) in major roadways	Major roads with minimum width of 28 feet, minimum lane width of 10 feet, and minimum length of 40 feet	1,168
Permeable pavement (local roads)	Minimum road width of 22 feet and minimum length of 40 feet	4,582

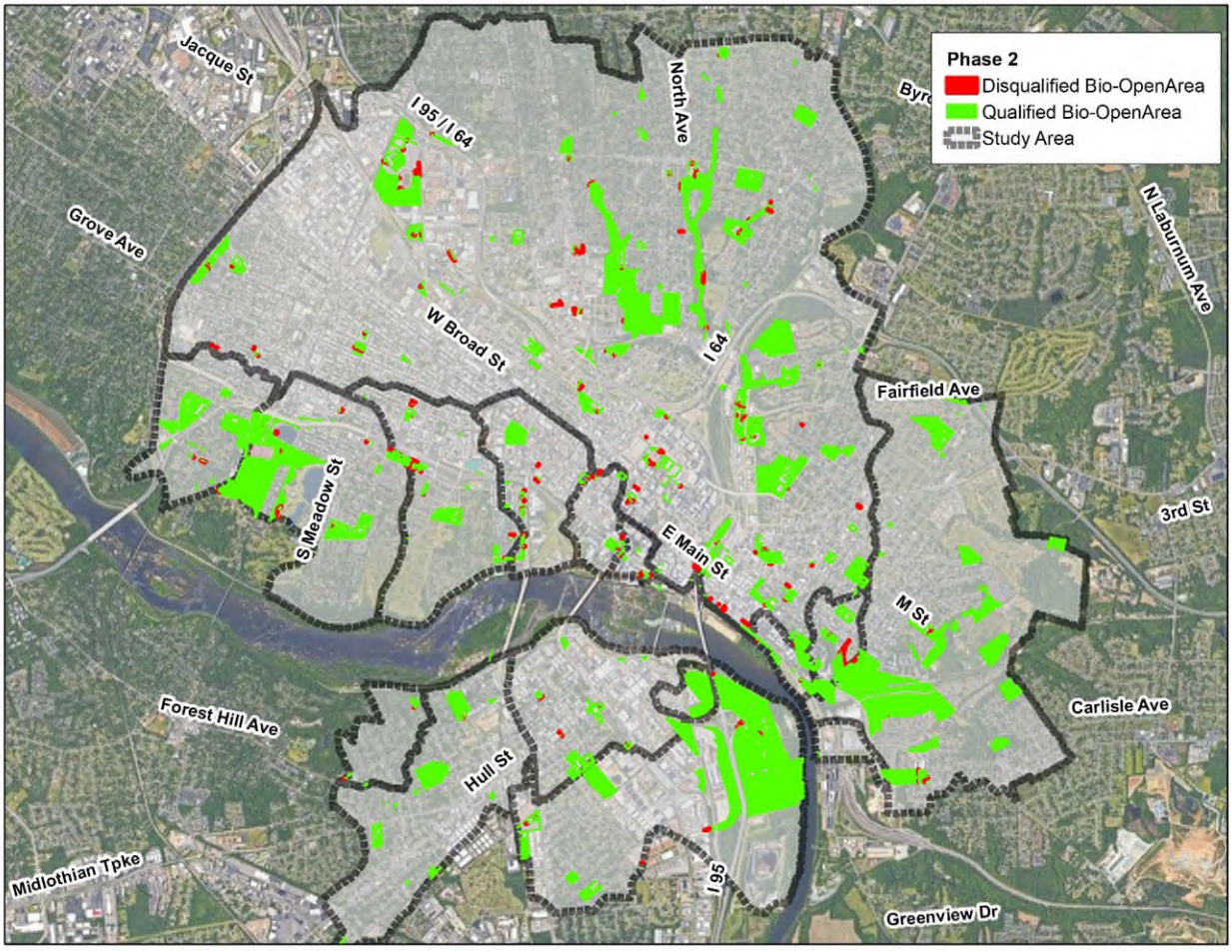


Figure 4-3. Map of Possible Locations for Bioretention in Open Areas

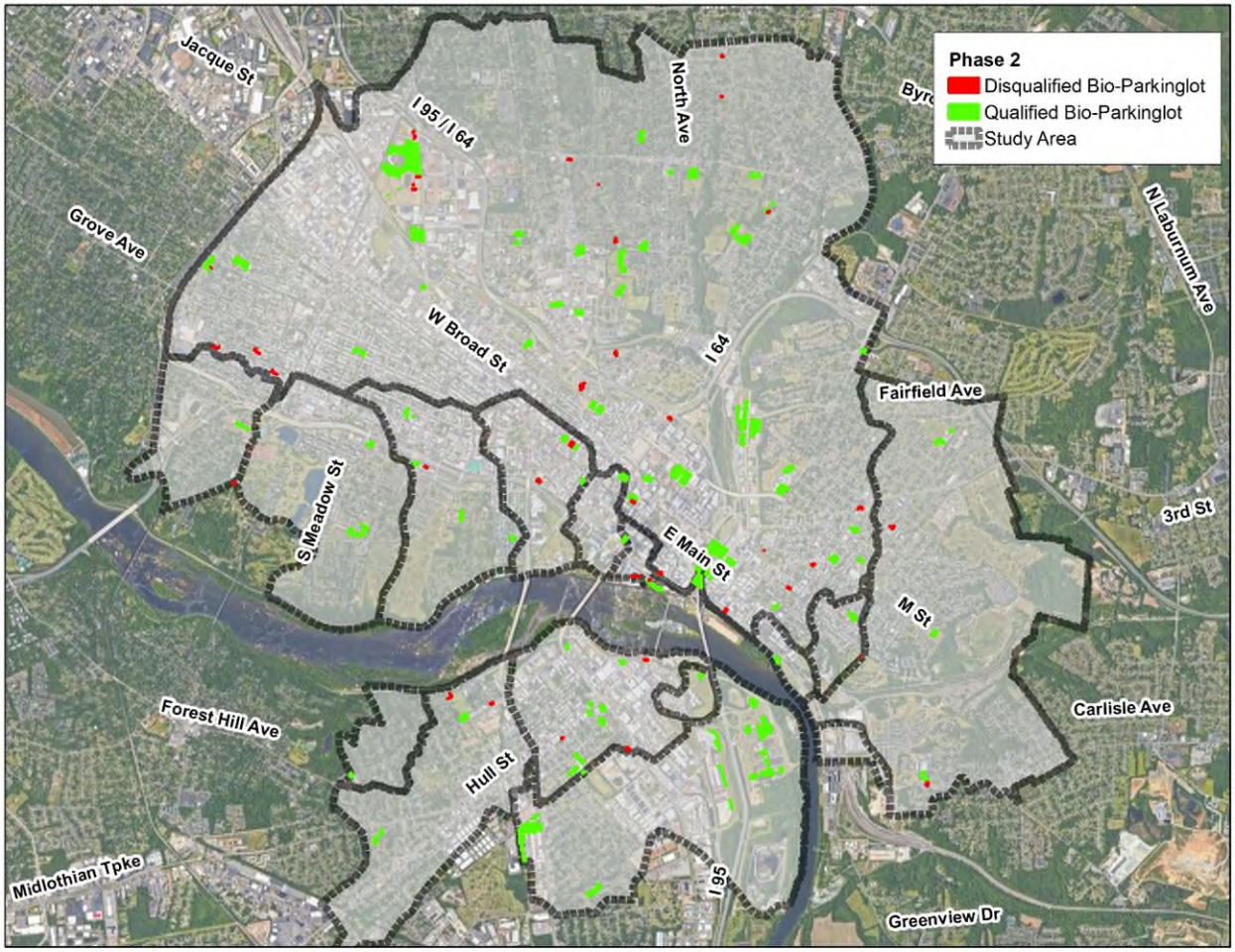


Figure 4-4. Map of Possible Locations for Bioretention in Parking Lots

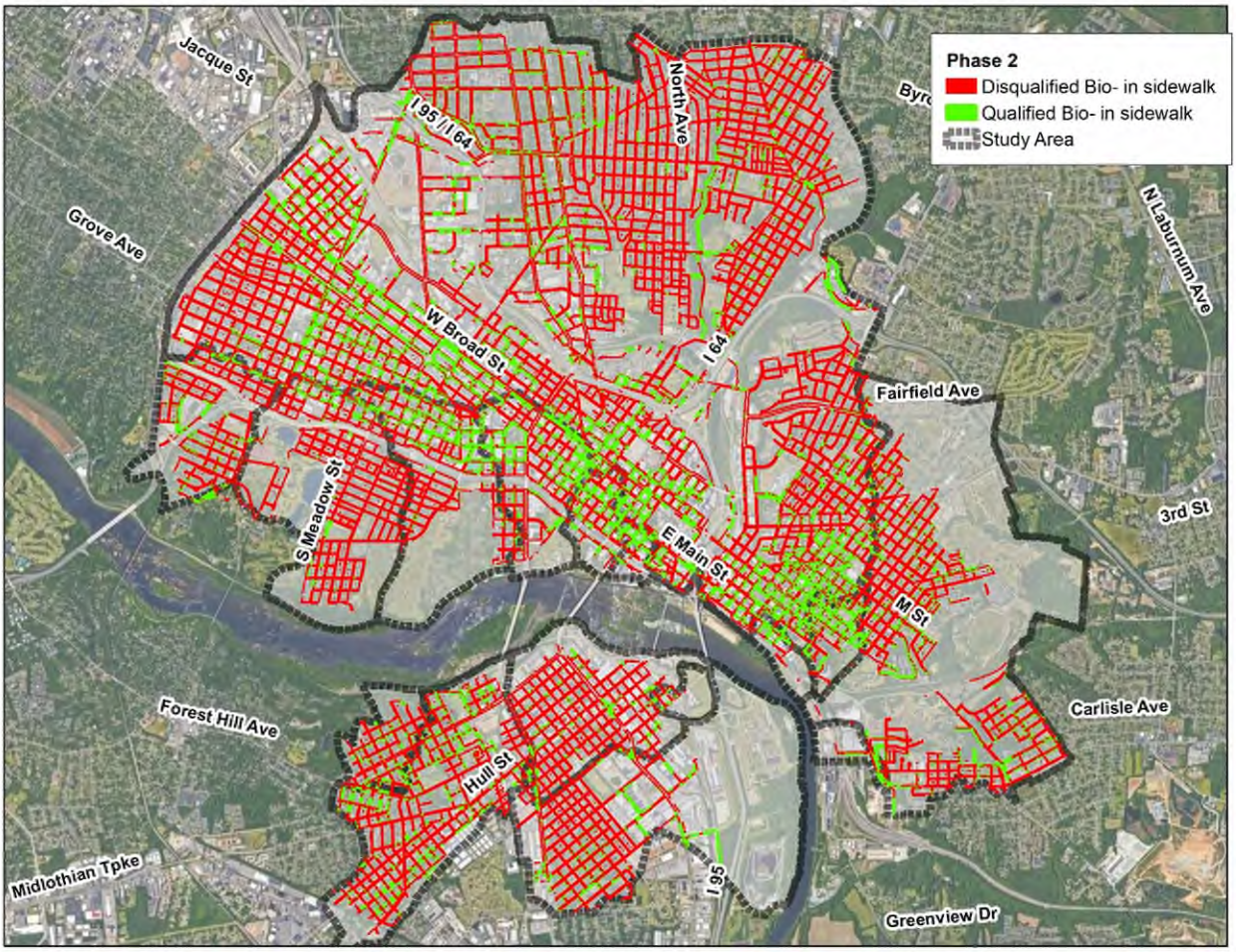


Figure 4-5. Map of Possible Locations for Bio-Sidewalks

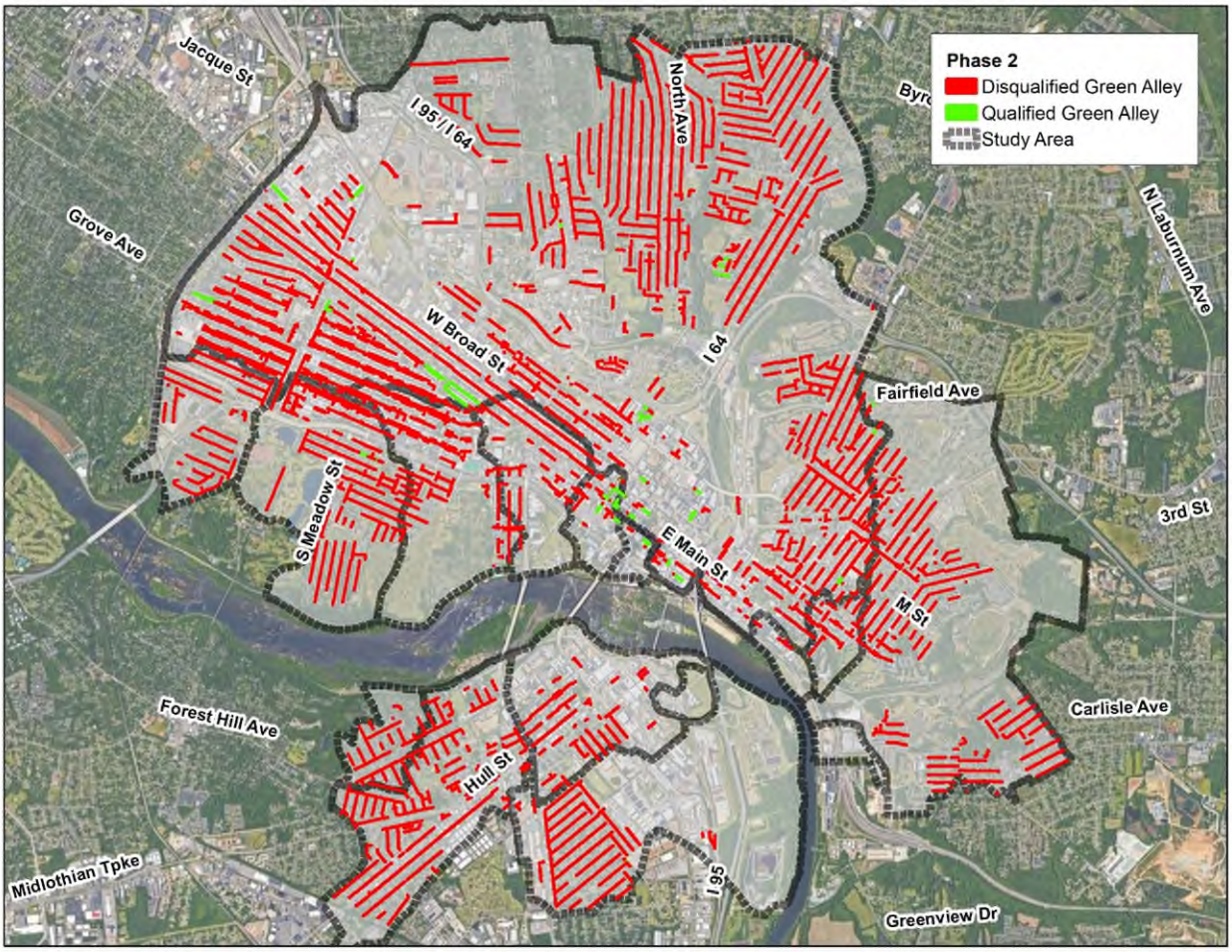


Figure 4-6. Map of Possible Locations for Green Alleys

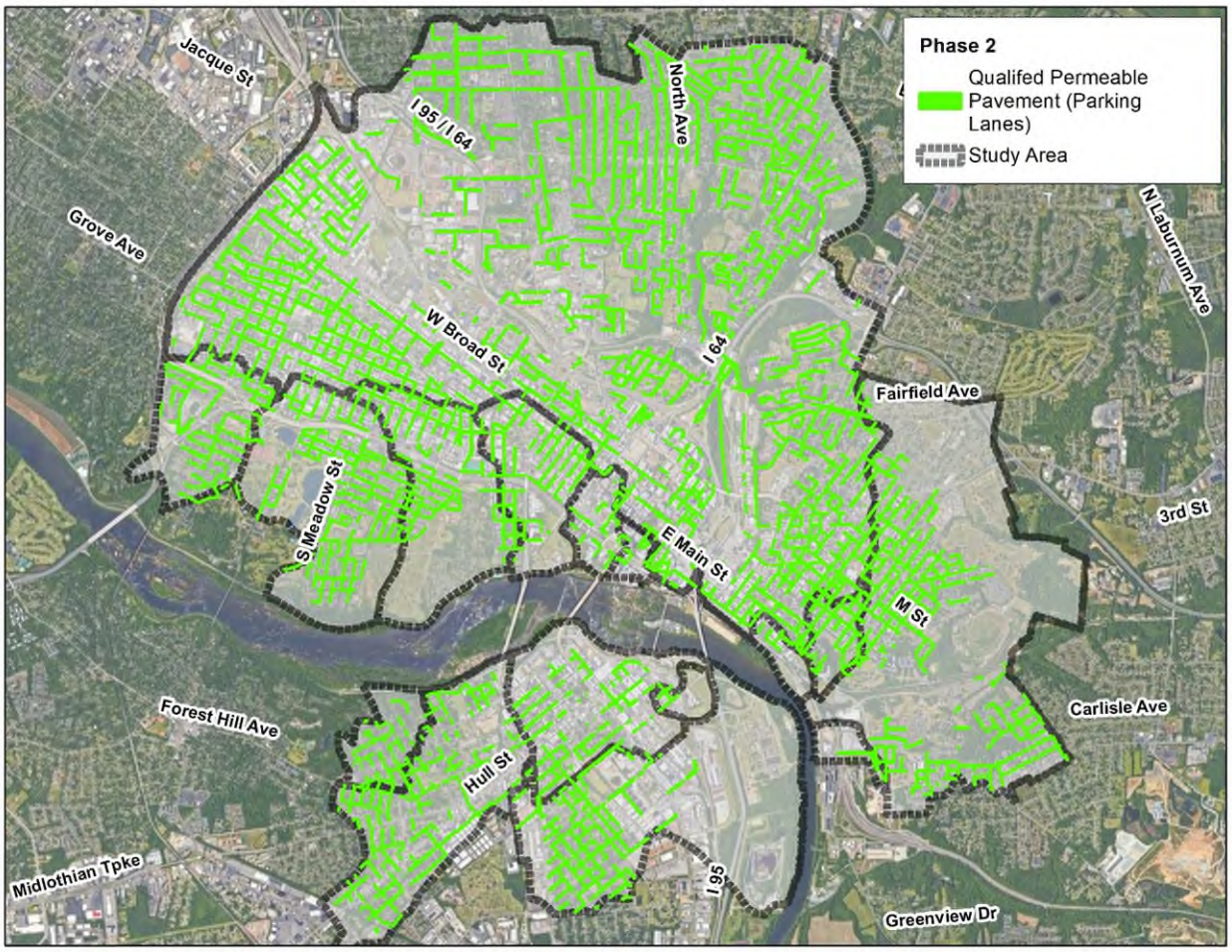


Figure 4-7. Map of Possible Locations for Permeable Parking Lanes in Local and Collector Roads

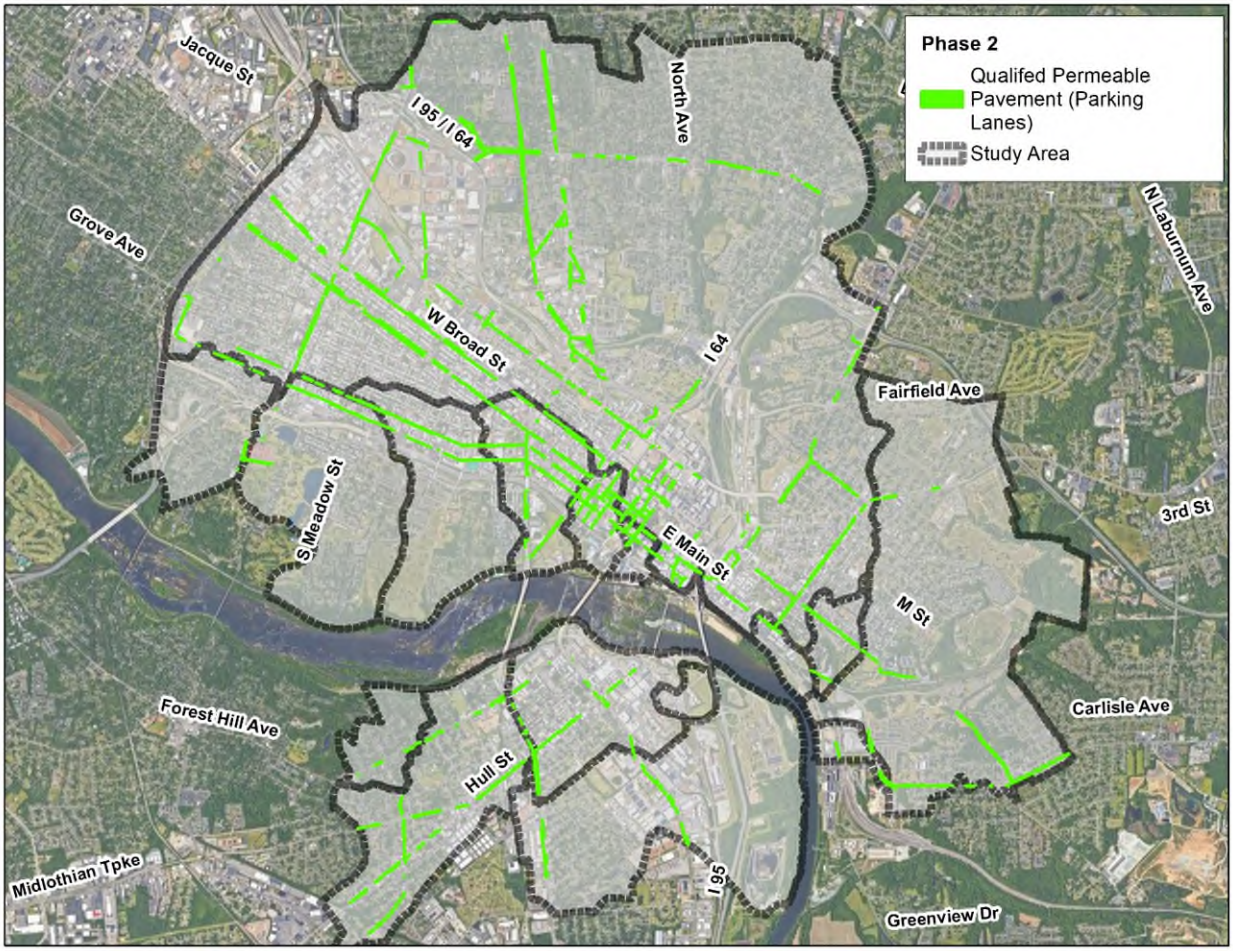


Figure 4-8. Map of Possible Locations for Permeable Parking Lanes in Major Roadways

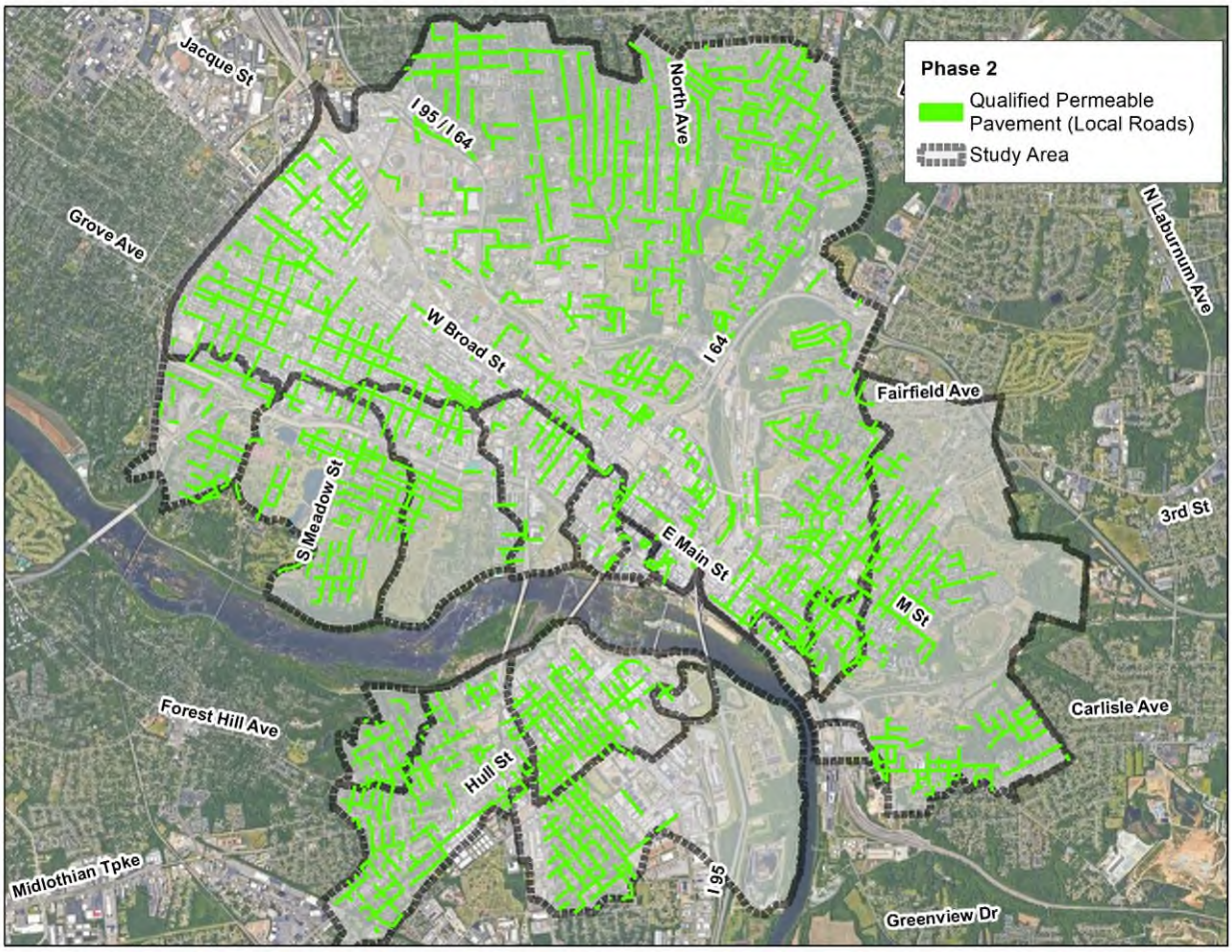


Figure 4-9. Map of Possible Locations for Permeable Pavement in Local Roads

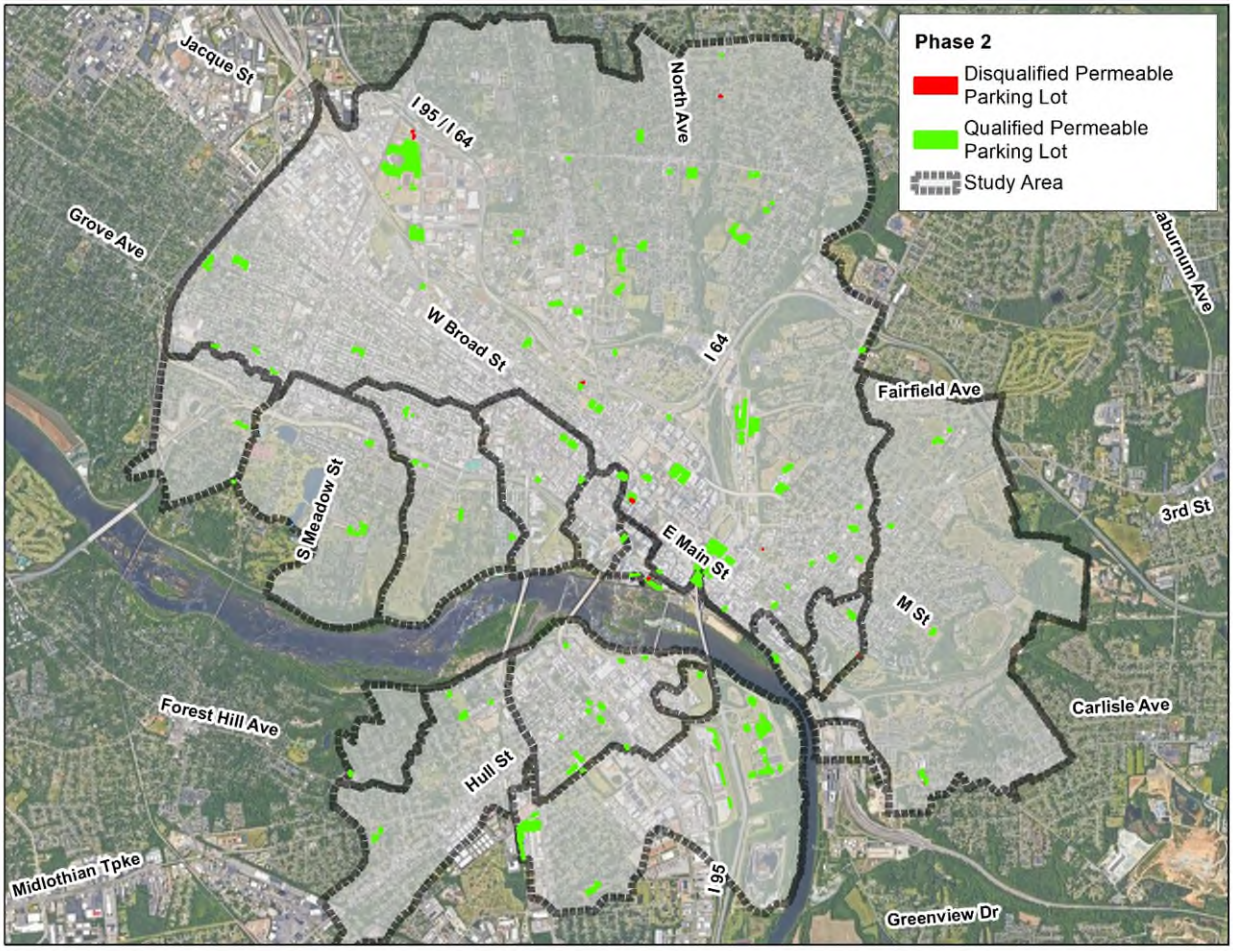
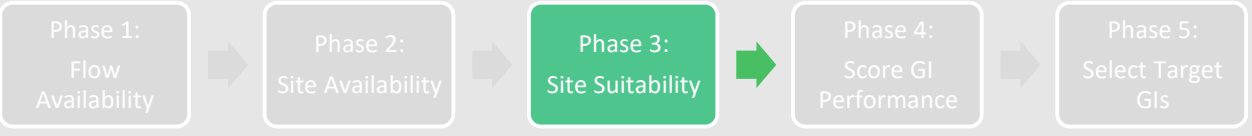


Figure 4-10. Map of Possible Locations for Permeable Parking Lots

4.4 Site Suitability Analysis



Phase 3 in developing the GI Ranking Tool involved determining site suitability and included the following elements:

- Surface and subsurface utilities
- Public activity disruption (e.g., bus stops, trees, recent CIPs)

The site suitability process involved defining the footprints suitable for each GI type by excluding conflicts with surface functions and subsurface structures/utilities in public parcels and within the public corridor. The GIS layers used in the site suitability process and the methodology used to define the conflict area around each layer are explained below.

Conflicts to potential GI installations included both surface and subsurface structures. Surface conflicts included light poles, electric poles, electrical surface structures, and fire hydrants. Subsurface conflicts included sanitary sewers, water pipes, gas lines, electrical network, and telecommunication cables. Public functionality items, such as mature, healthy trees and bus stops, were also considered in the analysis. For each GIS layer, a buffer area was defined that included two zones – Avoid Space Zone and Less Favorable Space Zone.

Subsurface structures were divided into these two zone types based on their ease to relocate. Sanitary sewers, water pipes, and gas lines are critical subsurface conflicts that are hard to relocate and should be avoided – they fall in the Avoid Space Zone. Electrical network and telecommunication cables are movable subsurface conflicts that can be considered for relocation as needed – they fall in the Less Favorable Space Zone.

Mature, healthy trees should be avoided and would fall in the Avoid Space Zone. Small and unhealthy trees are considered replaceable and fall in the Less Favorable Space Zone. The size of the tree for the Avoid Space Zone can be estimated based on the tree's condition and the diameter at breast height of the tree. These data were not available for the current analysis; therefore, a 10-feet diameter for tree buffer area was used. At each bus stop, a setback of 40 feet along the road before and after the bus stop location was assumed. Figures 4-11 through 4-14 illustrate the properties for both the Avoid Space and Less Favorable Space Zones.

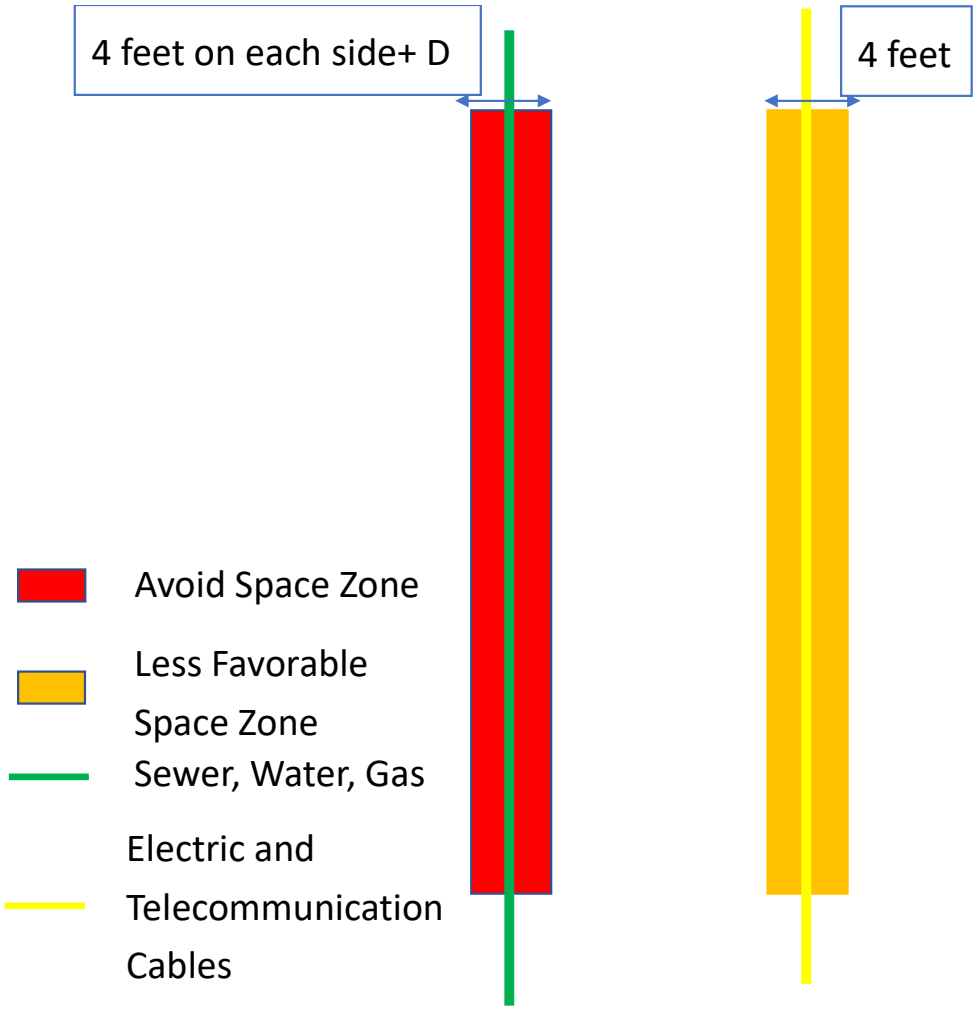


Figure 4-11. Subsurface Structures Avoid Space Zone and Less Favorable Space Zone

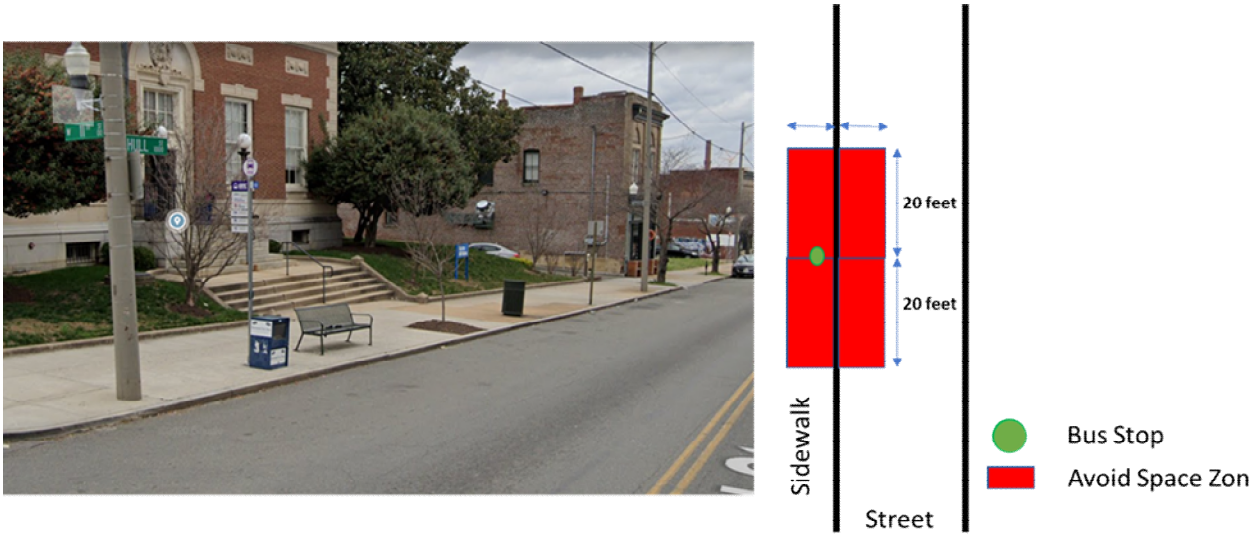


Figure 4-12. Bus Stop Avoid Space Zone

Figure 4-13. Mature Trees Avoid Space Zone

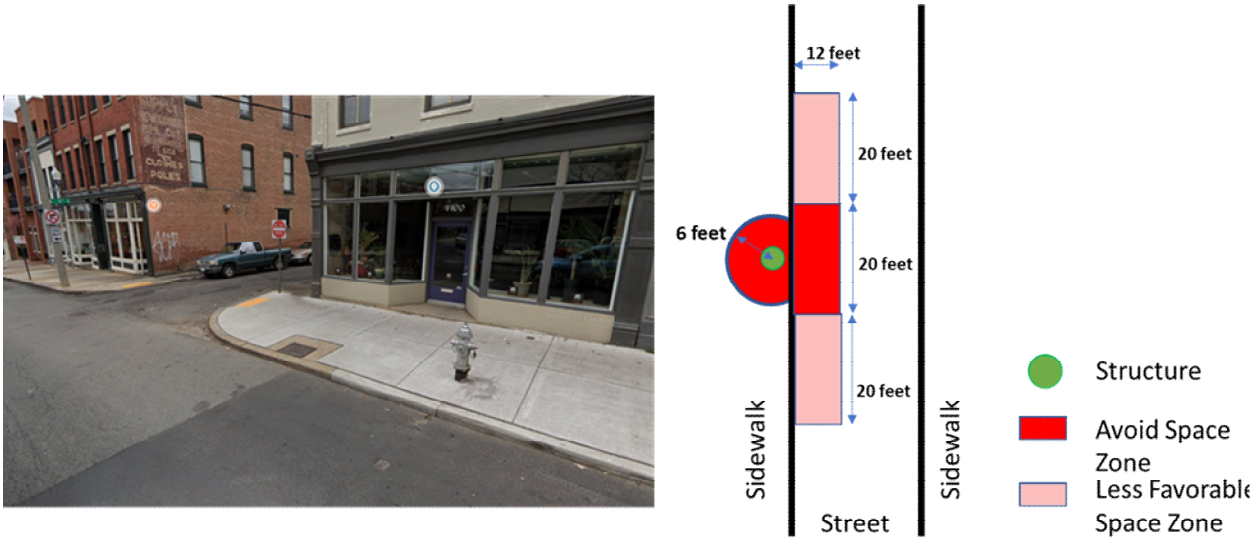


Figure 4-14. Fire Hydrant Avoid Space Zone and Less Favorable Space Zone

Figure 4-15 shows an example of the produced layer, illustrating the Avoid Space and Less Favorable Space Zones. All the overlaps between Phase 2 outputs, described in the previous section, and the Avoid Space and Less Favorable Space Zones were removed. The remaining contiguous areas were rechecked against Phase 2 requirements to select the sites that still meet the site availability requirements. The number of sites within the City-owned parcels and within the public corridor that meet those requirements are provided in Tables 4-6 and 4-7, respectively. Figures 4-16 through 4-23 show the qualified sites for Phase 3.

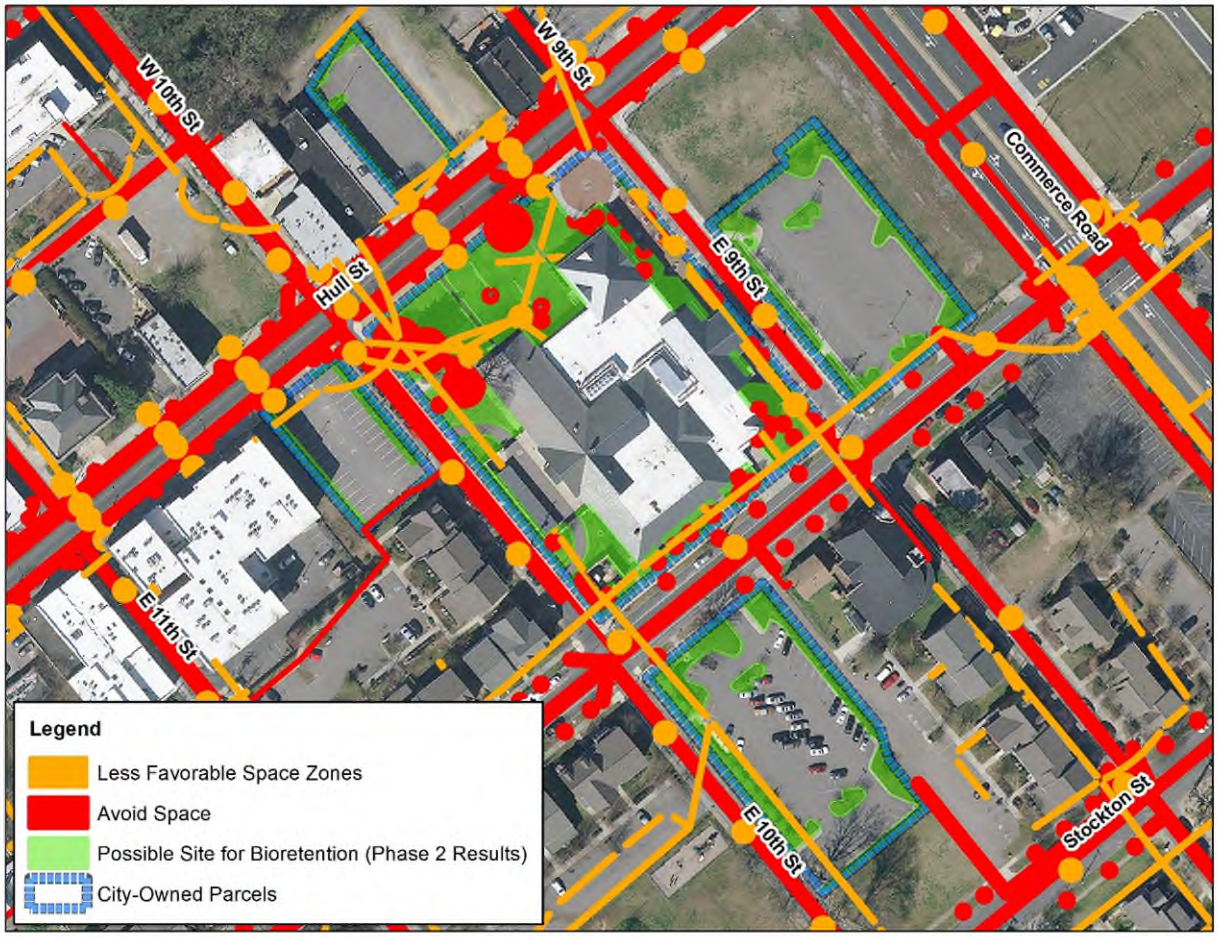


Figure 4-15. Example of GI Ranking Tool Display of Avoid Space and Less Favorable Space Zones

Table 4-6. Public Parcels Meeting Site Suitability Requirements (Phase 3)

Potential GI Types	Phase 2 Selected Sites (No. of Parcels)	Phase 3 Selected Sites (No. of Parcels)
Bioretention in open spaces	1,003 / (164)	1,803 / 156
Bioretention in parking lots	84 / (84)	81 / (81)
Permeable pavement in parking lots	118 / (118)	113 / (113)

Table 4-7. Sites within Public Corridor Meeting Site Suitability Requirements (Phase 3)

Potential GI Types	Phase 2 Selected Sites	Phase 3 Selected Sites
Bioretention (sidewalk)	4,419	2,225
Green alleys	51	18
Permeable pavement (Parking lanes) in local and collector roads	7,226	984
Permeable pavement (parking lanes) in major roadways	1,168	182
Permeable pavement (local roads)	4,582	313

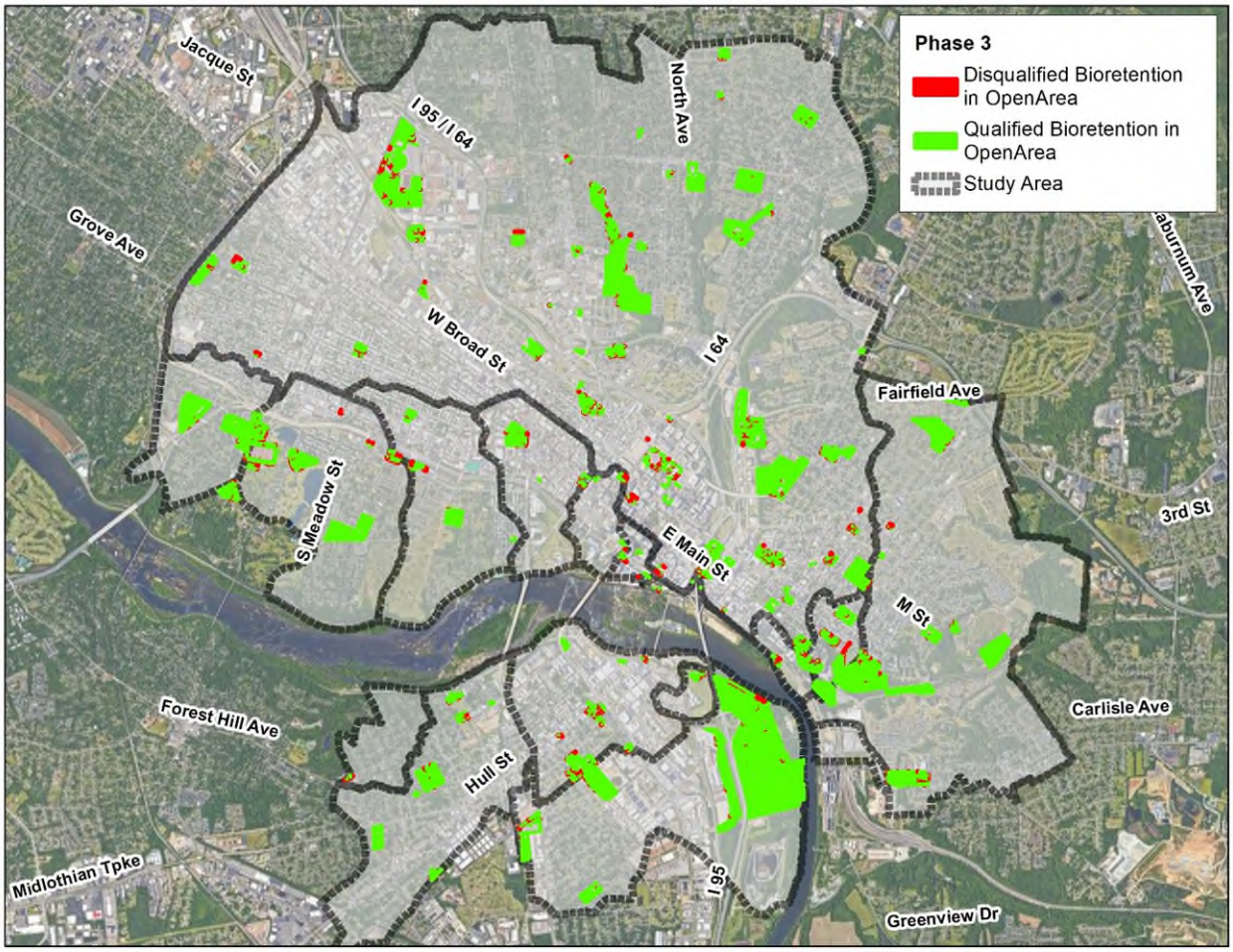


Figure 4-16. Map of Bioretention in Open Area in Phase 3

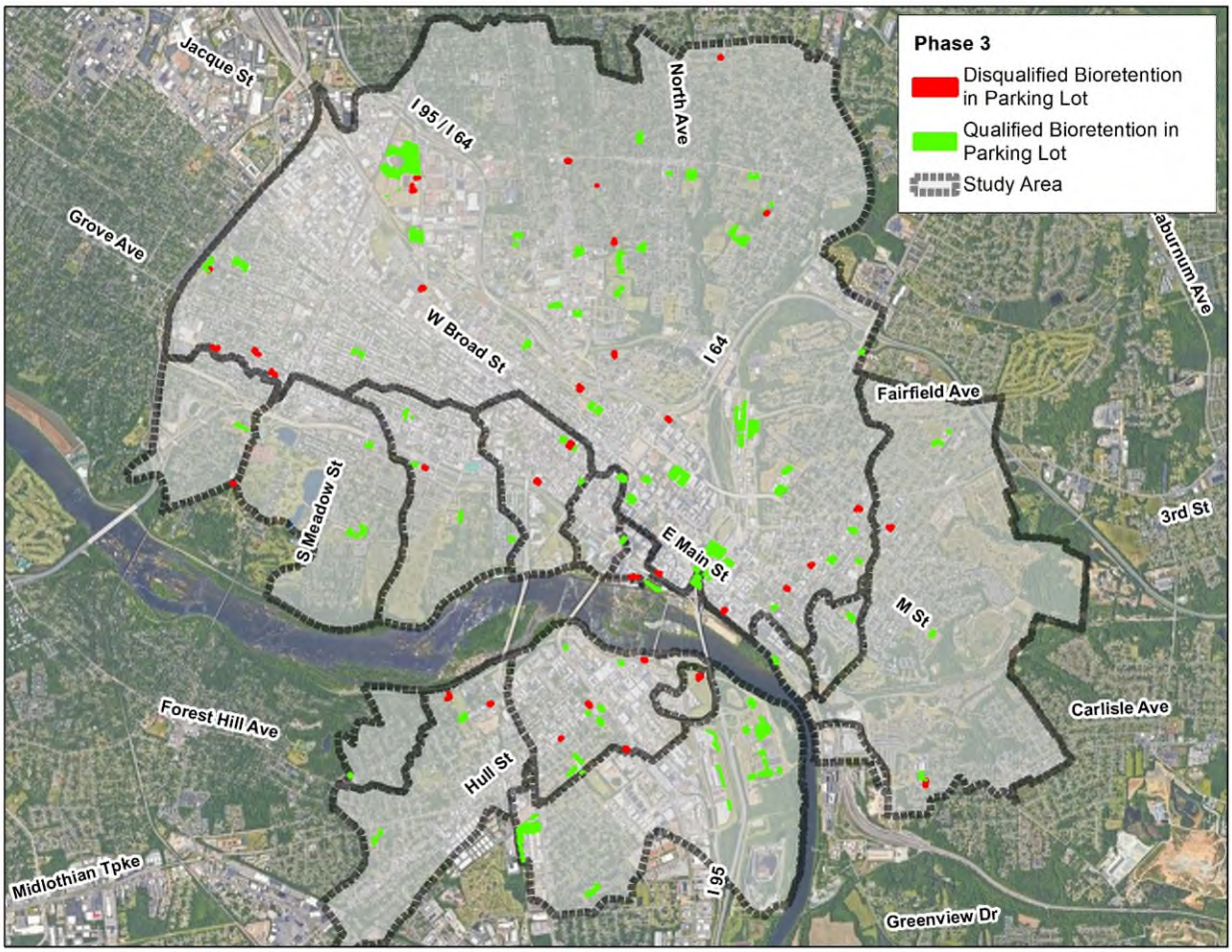


Figure 4-17. Map of Bioretention in Parking Lot in Phase 3

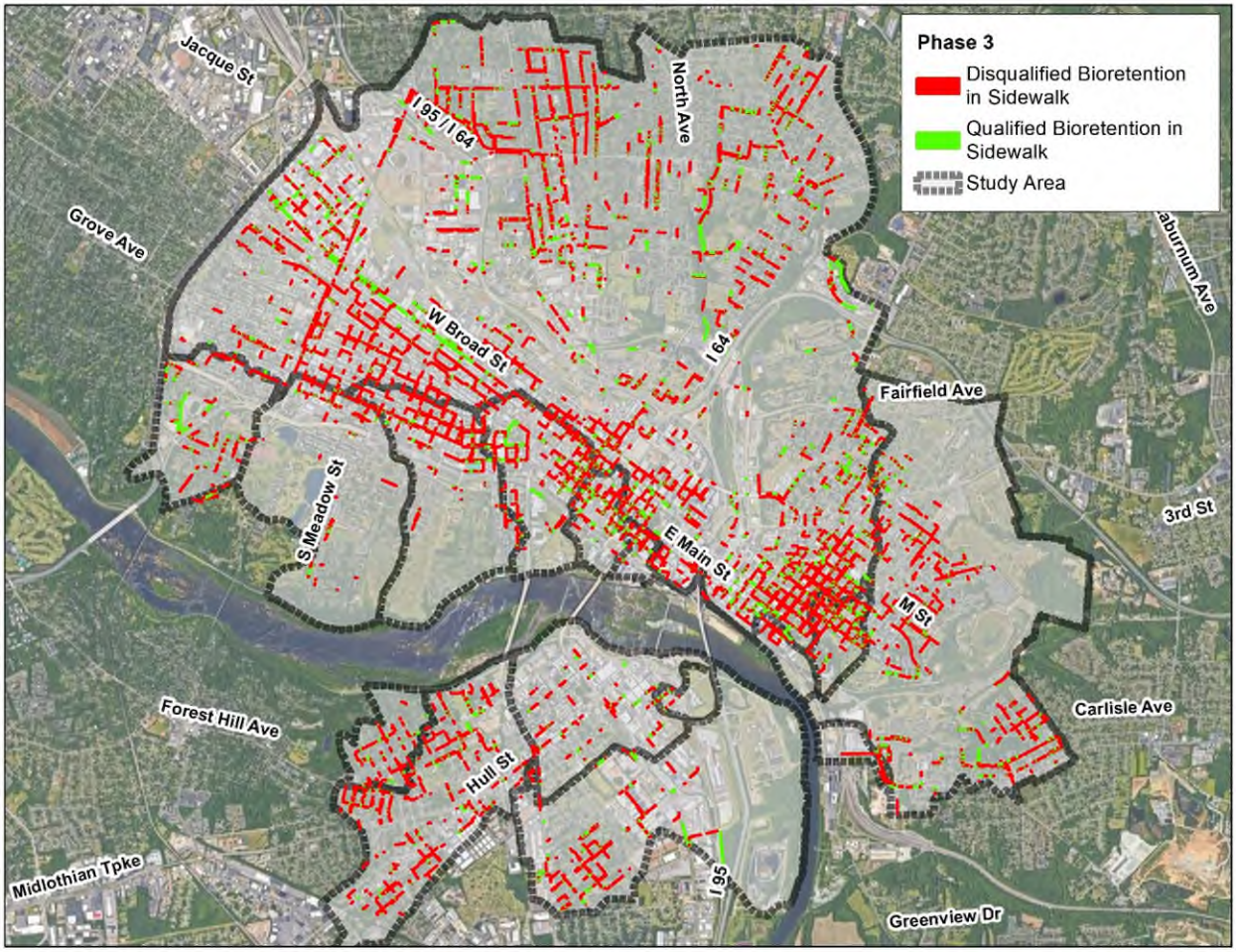


Figure 4-18. Map of Bioretention in Sidewalk in Phase 3

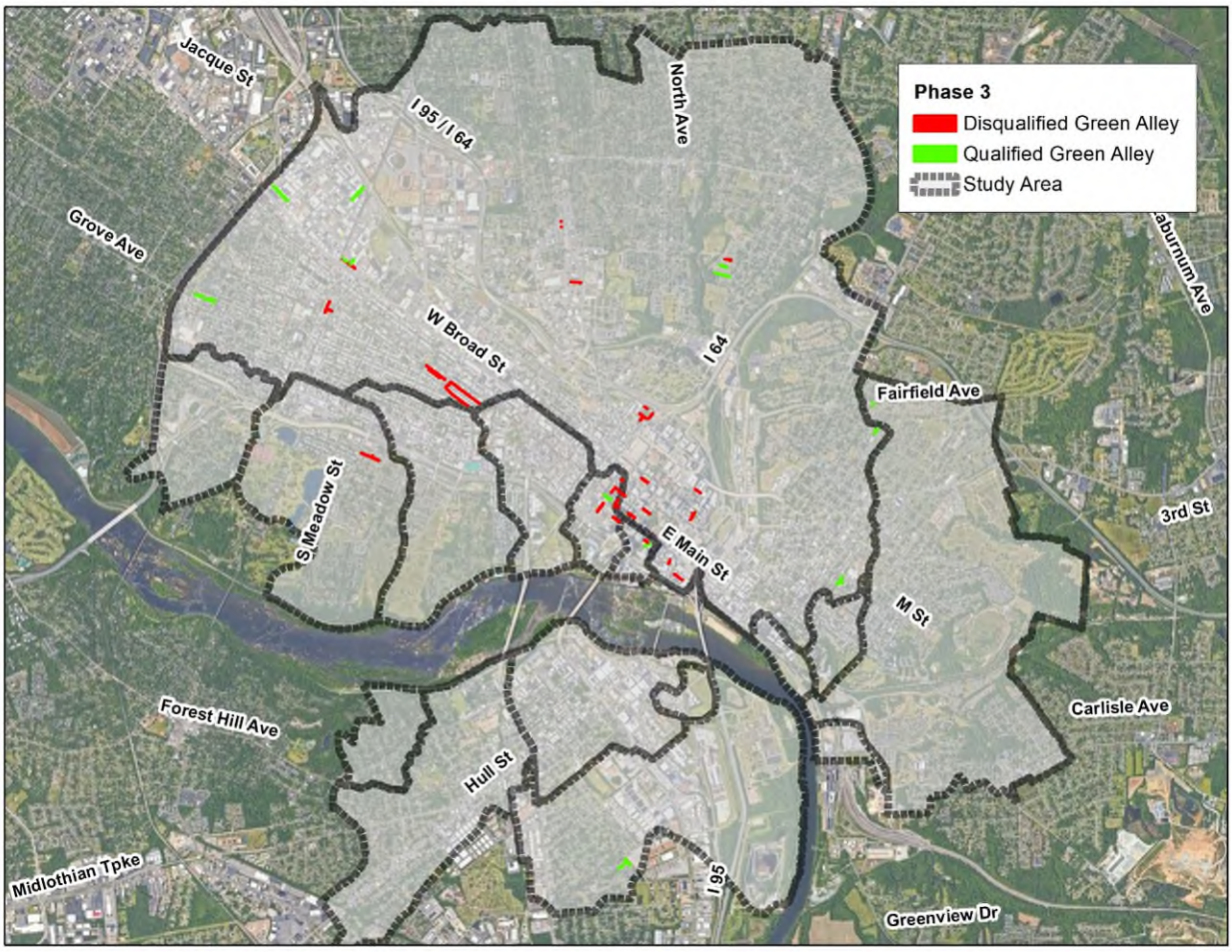


Figure 4-19. Map of Green Alleys in Phase 3

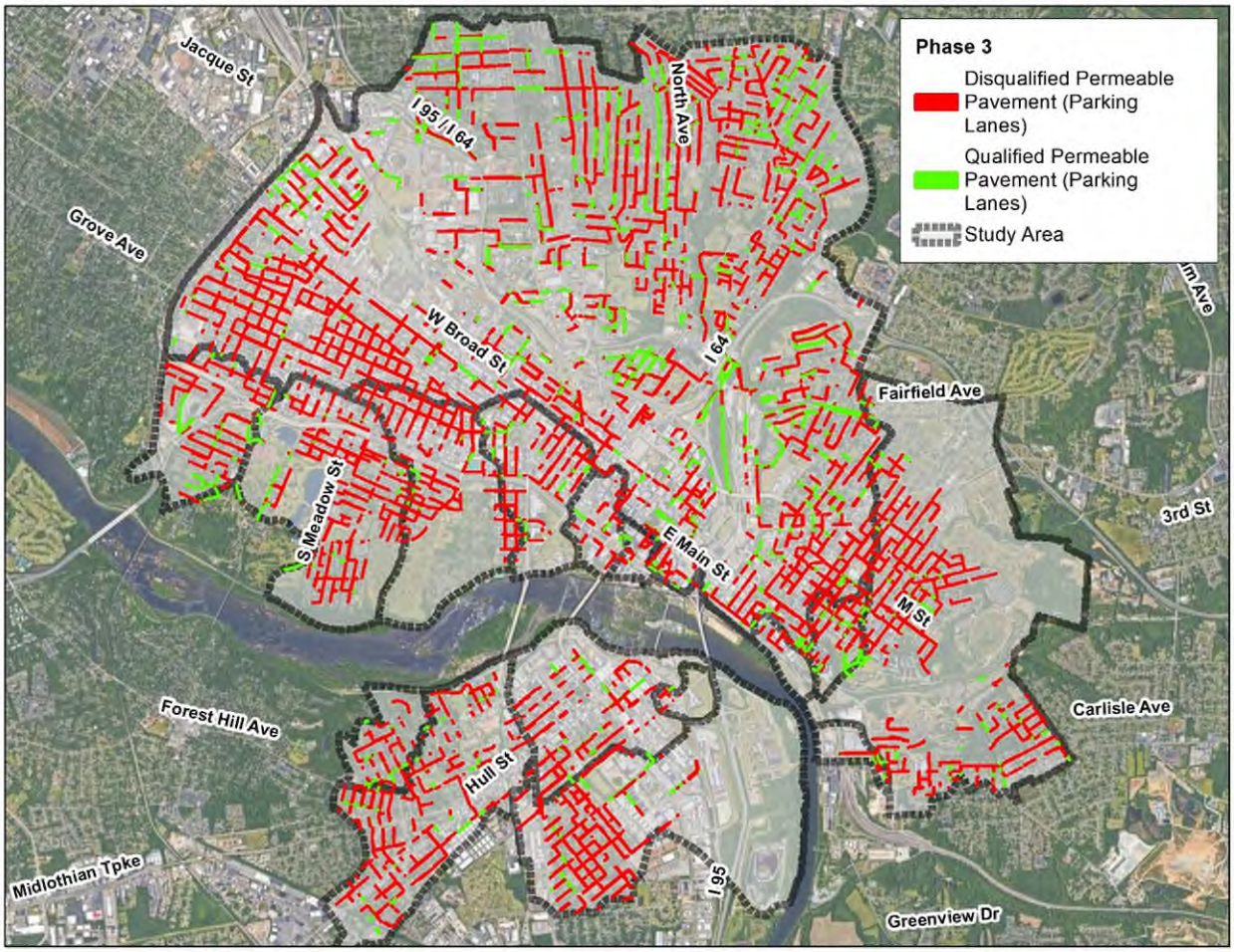


Figure 4-20. Map of Permeable Parking Lanes in Local and Collector Roads in Phase 3

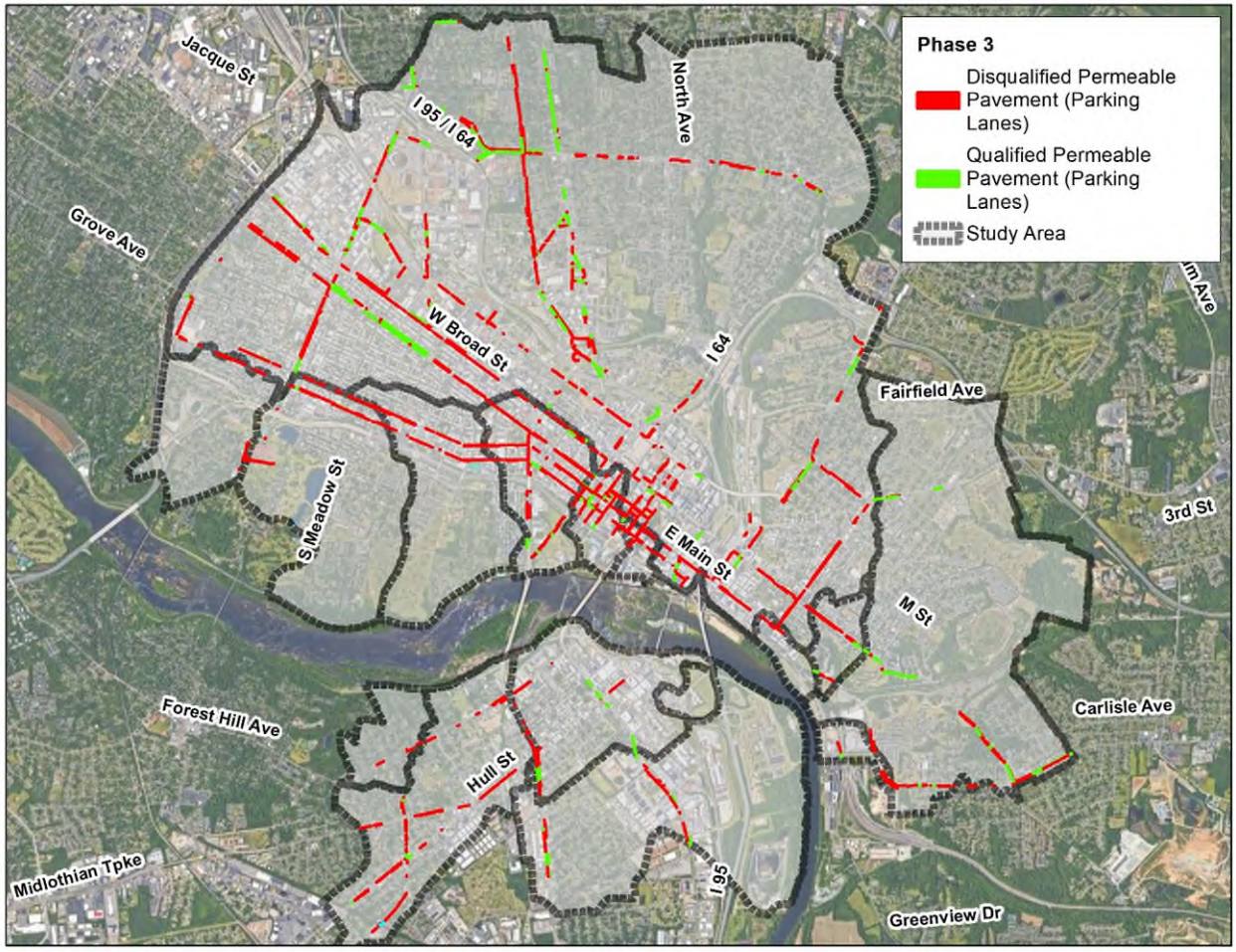


Figure 4-21. Map of Permeable Parking Lanes in Major Roadways in Phase 3

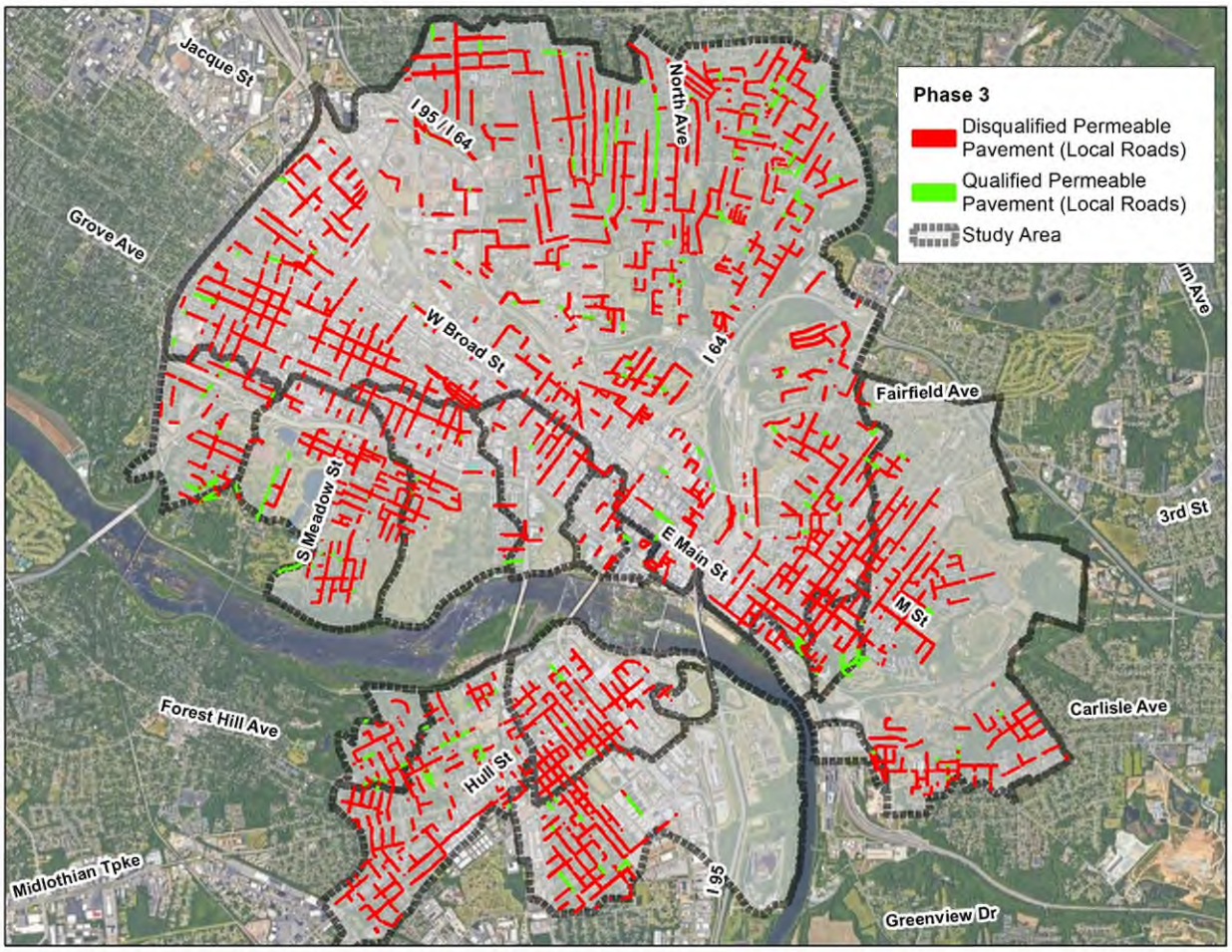


Figure 4-22. Map of Permeable Pavement in Local Roads in Phase 3

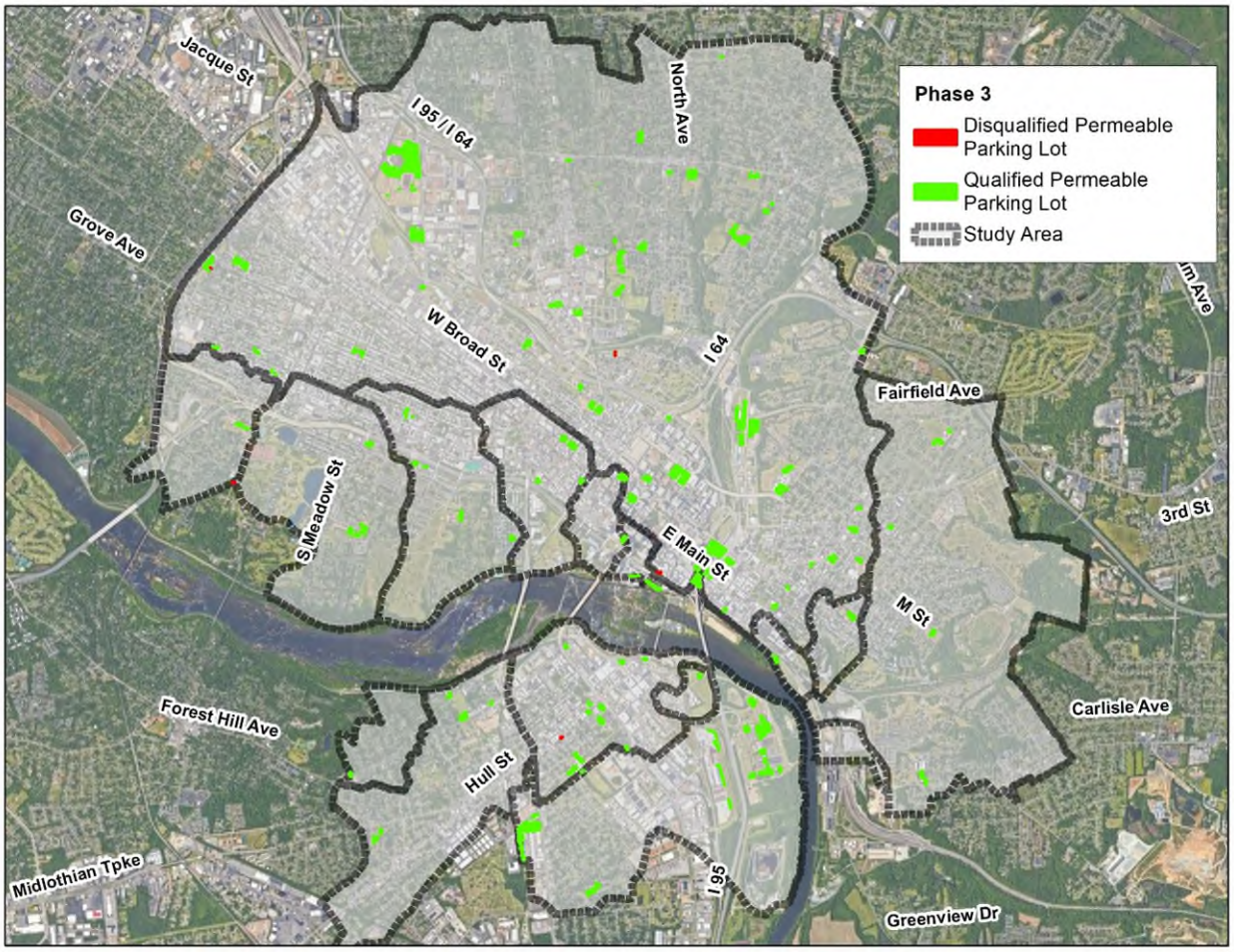
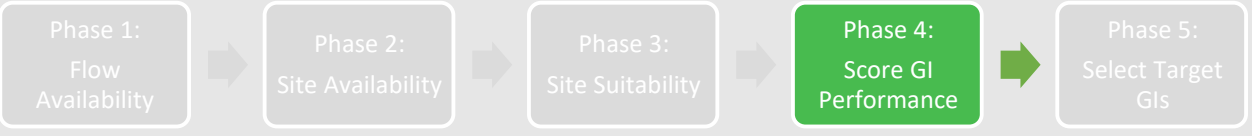


Figure 4-23. Map of Permeable Pavement in Parking Lots in Phase 3

4.5 GI Performance Scoring



Phase 4 in developing the GI Ranking Tool involved scoring GI performance at sites across a range of criteria that meet the study target goals. Initial criteria for GI performance evaluation were identified early in the GI Ranking Tool development process and included both surface and subsurface factors. The goal was to be objective and not overemphasize individual criterion. Key criteria were updated during the GI Ranking Tool development process to include the following:

- Reduce flow amount
- Reduce impervious area
- Improve water quality
- Minimize existing flooding
- Provide socioeconomic benefits
- Minimize maintenance costs
- Confirm slope suitability
- Utilize soil infiltration
- Align with planned CIPs
- Improve urban tree canopy
- Align with current Citywide GI implementation programs
- Address City MS4 requirements
- Align with past GI reports (see Section 2.5)
- Align with Health Opportunity Index

Specific GIS layers used in the initial GI performance scoring process analysis are shown in Table 4-8. Some of the key criteria listed above could not be used due to lack of sufficient GIS data.

Table 4-8. GIS Data Used in the Site Suitability Analysis

Evaluation Phase	Scoring Criteria	GIS Layer(s)
Score GI Performance	Reduce Flow Amount	No new GIS layer; tool used the runoff volume calculated in Phase 1
	Reduce Impervious Area	Impervious layer (e.g., parking lots, buildings, roads)
	Reduce CSO Activation	CSO locations
	Low Maintenance	
	Improve Water Quality	
	Minimize Existing Flooding	Flooding complaints data
	Provide Socioeconomic Benefits	City parks layer
		Resiliency - Social Vulnerability Analysis
	Improve Urban Tree Canopy	Impervious and pervious area
	Confirm Slope Suitability	DEM
	Utilize Soil Infiltration	Soil data

Incorporation of information from current and past reports into the criteria analysis was done during the benefit prioritization stage. Criteria were reviewed at monthly status meetings, and the process used to develop and refine GI scoring and weighting was discussed and collectively determined. For example, a review and discussion of GI scoring for socioeconomic data resulted in a switch from 0.25 miles to 0.10 miles for the distance to parks to be used in the GI Ranking Tool. Three different tiers were initially established for the criteria based on potential benefits or importance to the evaluation process: Tier 1 – very beneficial/important, Tier 2 – beneficial/important, and Tier 3 – somewhat beneficial/important. While all metrics considered are beneficial/important, there was some overlap in criteria where some metrics were determined to provide more benefit or be of higher importance than others.

Eleven different metrics for GI performance scoring were ultimately selected for the GI Ranking Tool. Each was assigned to one of the three aforementioned tiers. The model was initially run (Scenario 1) for sites within both public parcels and public corridors for all criteria. The results from Arcadis were shared with DPU and the Alliance on what types of sites typically scored low versus high as a first step in agreeing on how to weight the scoring. Three of the 11 metrics (Improve Urban Tree Canopy, Improve Water Quality, Minimize Existing Flooding) were determined to be highly impacted by parcel / runoff catchment size (larger parcels or runoff catchment score higher), so adjustments were made to those criteria to reduce their impact.

As shown in Table 4-9, the initial analysis started with an even weighting of the metrics but moved to weighing Tier 2 and Tier 3 categories lower than Tier 1 (1/2 and 1/3 weight, respectively) to reduce the impact of the lower priority items. Two other performance factors, slope suitability and soil infiltration, were added as a fourth tier, Tier 4, with the lowest weighting (1/4 weight) since they are important to site analysis but can be addressed during design. The final GI Ranking Tool performance criteria weighting and maximum and minimum scoring is shown in Table 4-10.

Table 4-9. GI Performance Metrics Weights Scenarios

Metric	Description	Tier	Scenario 1 Weight %	Scenario 2 Weight %	Scenario 3 Weight %
Reduce Runoff/Flow	Flow reduction	1	100%	100%	100%
	CSO activation reduction	1	100%	100%	100%
Reduce Impervious Area	Permeable pavement or bioretention in parking lots	1	100%	100%	100%
Low Maintenance	-	1	100%	100%	100%
Provide Socioeconomic Benefits	Near open space	1	100%	100%	100%
	Social equity	1	100%	100%	100%
Minimize Existing Flooding	-	2	100%	50%	50%
Improve Urban Tree Canopy	-	2	100%	50%	50%
Improve Water Quality	-	3	100%	25%	33%
Maintain Slope Suitability	In open areas (<5%, 5% to 10%, 10% to 15%, 15% to 20%, >20%)	4	100%	10%	25%
Utilize Soil Infiltration	Soil type	4	100%	10%	25%

Table 4-10. GI Ranking Tool Performance Criteria Scoring

Metric	Description	Tier	Max Score	Min Score	Weight %	Scoring
Reduce Runoff/Flow	Flow reduction	1	10	1	100%	Proportional to runoff volume
	CSO activation reduction	1	10	1	100%	CSO threshold for overflow
Reduce Impervious Area	Permeable pavement or bioretention in parking lots	1	10	1	100%	Impervious area removed
Low Maintenance	-	1	10	5	100%	BMP type
Provide Socioeconomic Benefits	Near open space	1	10	0	100%	Within 0.10 mile
	Social equity	1	10	1	100%	City Social Vulnerability Analysis
Minimize Existing Flooding	-	2	10	0	50%	-----
Improve Urban Tree Canopy	-	2	10	0	50%	Area to be used
Improve Water Quality	-	3	10	0	33%	Proportional to area to be used
Confirm Slope Suitability	In open areas (<5%, 5% to 10%, 10% to 15%, 15% to 20%, >20%)	4	10	-10	25%	10, 7.5, 2.5, 0, -10
Utilize Soil Infiltration		4	10 or 5	-10	25%	Soil A or B (10), Soil C (5), Soil D or urban (-10)

Descriptions of the individual metrics, scoring parameters used for each, and the basis for the maximum and minimum scores are as follows:

- ***Reduce Runoff/Flow:*** The score for minimizing existing flooding is based on two elements – flow reduction and CSO activation reduction, with scores ranging from a minimum of 1 to a maximum of 10 for each. Flow reduction is proportional to the runoff volume tributary to the parcel, with possible scores ranging from 1 to 10. CSO activation reduction is based on the CSO volume threshold required to cause an overflow with those tributary areas to CSOs that activate at a low volume receiving a higher score. Areas with rain threshold for overflow between 0.2 and 0.3 inches per hour = 10, area with rain threshold for overflow between 0.3 and 0.7 inches per hour = 5, area with rain threshold for overflow between 0.7 and 1.0 inches per hour = 2.5, and area with rain threshold for overflow greater than 1.0 inches per hour = 1.
- ***Reduce Impervious Area:*** Scoring for impervious area reduction ranges from a maximum of 10 to a minimum of 1. It is proportional to the available impervious area within the City-owned parcels or the impervious area within the runoff catchment that included the selected site in the public corridor.
- ***Low Maintenance:*** The score for maintenance is based on the type of GI selected using cost data available from the Virginia BMP Clearinghouse in combination with the capability for DPU to provide maintenance using their current equipment and personnel. Scoring includes 10 for permeable pavement and 5 for bioretention.

- ***Provide Socioeconomic Benefits:*** Due to the importance of social considerations and their tie-in to the co-benefits of GI, this category has two elements – parcel distance to open (green) space and social equity/increased resilience with scores that range from a minimum of 0 to a maximum of 10. Those parcels with no current GI/open space within a 0.1 mile = 10, parcels with existing GI/open space within 0.1 mile = 0. Climate equity data are based on a summation of individual scores ranked 1 to 10 by census track and covers a broad range of potential socioeconomic benefits of using GI. Scores are taken directly from the shapefiles developed by the City's Office of Sustainability for the RVAgreen 2050 Climate Equity Index.
- ***Minimize Existing Flooding:*** The score for minimizing existing flooding is based on a compilation of four items – collection system, runoff catchments, Phase 3 qualified sites, and sites with flooding issues. The scores range from a minimum of 0 to a maximum of 10.
- ***Improve Urban Tree Canopy:*** The score for improving urban tree canopy was based on the available open area within City-owned parcels for tree plantings. The scores range from a minimum of 0 to a maximum of 10.
- ***Improve Water Quality:*** Improved water quality scoring is proportional to the drainage area considered. The scores range from a minimum of 0 to a maximum of 10. Projects that provide infiltration and minimize off-site drainage = 10, projects that will not provide infiltration but will capture/slow down significant drainage = 5, and projects that will not provide infiltration and only limited capture/detention = 0; however, since engineered fill can be designed to address these limitations, few sites had a zero value.
- ***Confirm Slope Suitability:*** The score for slope suitability takes into account that it is more challenging to site GI on steep slopes. The scores range from a maximum of 10 to a minimum of -10 with slope <5% = 10, slope 5-10% = 7.5, slope 10-15% = 2.5, slope 15-20% = 0, and slope > 20% = -10.
- ***Utilized Soil Infiltration:*** Soil infiltration scoring was based on United States Department of Agriculture (USDA) Soil Survey information. The scores range from a maximum of 10 to a minimum of -10. Soil Type A or B = 10, Soil Type C = 5, and Soil Type D or urban soil = -10.

As GIS data for individual metrics were evaluated for use in the GI Ranking Tool, there were several considerations for improvements or modifications that became necessary:

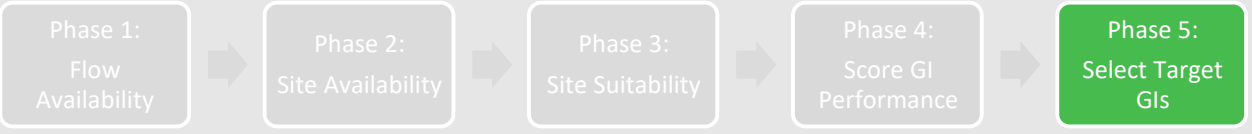
- ***Minimize Existing Flooding:*** Flood complaint data were available digitally for the project through complaint records but were in a format that made it initially difficult to use. Flood area addresses were converted to zip codes in GIS that were used to develop shapefiles for inclusion in the GI Ranking Tool.
- ***Provide Socioeconomic Benefit – Social Equity:*** Consideration of equity issues within the model was determined to be of high importance, so shapefile data from the RVAgreen 2050 Climate Equity Index from the City's Office of Sustainability were used. These data included overall climate equity data based on a summation of individual scores ranked 1 to 10 by census track and covered a broad range of potential socioeconomic benefits of using GI. (https://cor.maps.arcgis.com/apps/webappviewer/index.html?id=e4d732f225fe457d83df11fe9bf71daf)
- ***Improve Urban Tree Canopy:*** Initial tree canopy data from Urban Forestry were very sparse and most data were at least 5 years old. Therefore, this metric was developed to not depend on existing tree data but, instead, be a function of the available open space for tree plantings in City-owned parcels.

- ***Utilize Soil Infiltration:*** Soil information was based on information from USDA Soil Survey, which was available on a large scale but not down to a parcel level. While utilizing soil to infiltrate stormwater is desirable for groundwater recharge and improved water quality, since soil can be improved as part of a project, existing types and conditions are not critical. This value was ranked very low in the model compared to other metrics due to this fact.

Incorporating feedback from other City departments was important in the development of the final scoring criteria used to rank GI performance of public parcels within the City. Representatives of City departments that participated in the first workshop mentioned that water volume capture, socioeconomic issues, maintenance, and alignment with current/past reports and programs were specific criteria of interest. They also stated their interest in being involved in the weighting of criteria used in the GI Ranking Tool, and their feedback at each of the workshops was considered during modifications of criteria scoring and weighting.

Stakeholder feedback was not limited to criteria scoring and weighting. During the second workshop, discussions regarding a large site with limited available area for GI prompted a further discussion on how best to present and evaluate tree canopy and severe slopes on large parcels within the GI Ranking Tool. The results included a change to the GI Ranking Tool to better consider these elements, their function, and how they should be evaluated.

4.6 Selection of Target GIs



Ranking and prioritization of GI solutions are addressed in Section 5 and conceptual designs of recommended solutions to demonstrate the usefulness of the GI Ranking Tool are shown in Section 6.

5 Project Ranking and Prioritization of GI Solutions

5.1 Ranking of Projects

Following scoring of GI in public parcels and corridors using the final performance criteria, projects were ranked for each GI type evaluated. The final ranking of GI performance by qualifying sites is presented in Table 5-1. Individual pdfs of the top 40% of sites within each category, including a breakdown of scoring results, is provide in Appendix D.

Table 5-1. GI Performance Analysis Qualifying Parcels by GI Type

GI Type	Qualified Sites	Number in Top 40%
Permeable pavement parking lots	113	58
Bioretention in parking lots	81	41
Bioretention in open areas	1,803	970
Bioretention in sidewalks	2,224	355
Permeable parking lanes in local and collector roads	959	474
Permeable parking lanes in major roadways	182	91
Permeable pavement in local roads	313	91
Green alleys	18	11

As the results clearly indicate, bioretention in open areas of public parcels and the space between curb and sidewalks in the public right-of-way had the highest number of qualifying sites for incorporating GI. Bioretention in parking lots and use of green alleys had significantly smaller numbers of qualifying sites.

The GI Ranking Tool was used to produce eight maps – one for each GI type evaluated – showing the ranking of sites. Rankings shown are based on a parcel's score and the percentage of other sites it ranks higher than for that GI type. Those parcels that are dark green in color are most favorable for GI, ranking higher in score than 80% of other similar GI types. Color changes to light green (60-80%), yellow (40-60%), light red (20-40%), and dark red (0-20%) as the parcel scores and, therefore, the favorability for GI decreases, with dark red indicating the least favorable for implementing GI. Optimal areas for siting permeable pavement in parking lots are included as Figure 5-1. Preferred parcels for bioretention in parking lots are provided as Figure 5-2. Optimal parcels for siting bioretention in open areas are included as Figure 5-3. Preferred areas for bioretention in sidewalks are provided as Figure 5-4. Optimal areas to locate permeable parking lanes in local/collector roads and major roadways are shown in Figures 5-5 and 5-6, respectively. Preferred areas for siting permeable pavement in local roads are included in Figure 5-7. Optimal areas for green alleys are shown in Figure 5-8.

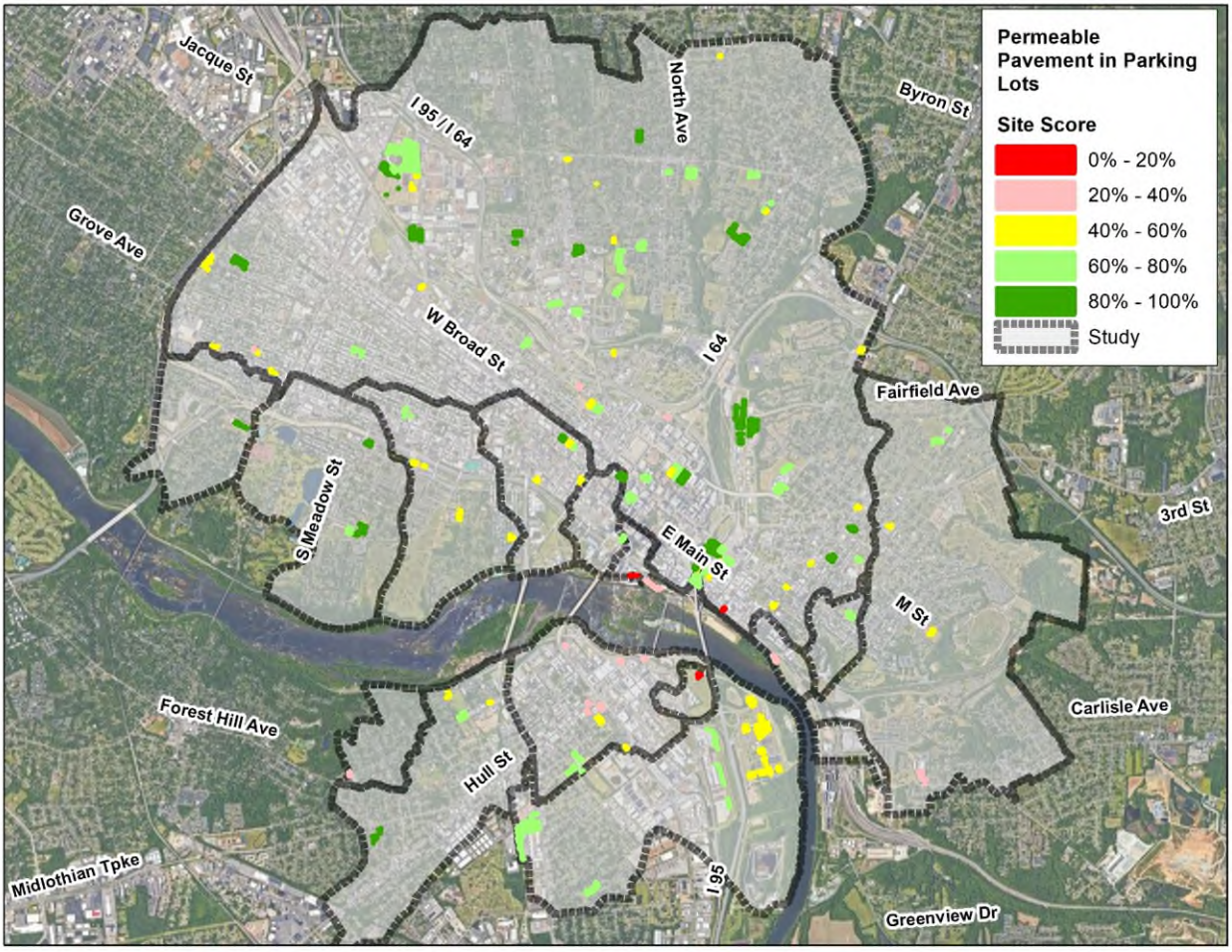


Figure 5-1. Optimal Areas for Permeable Pavement in Parking Lots

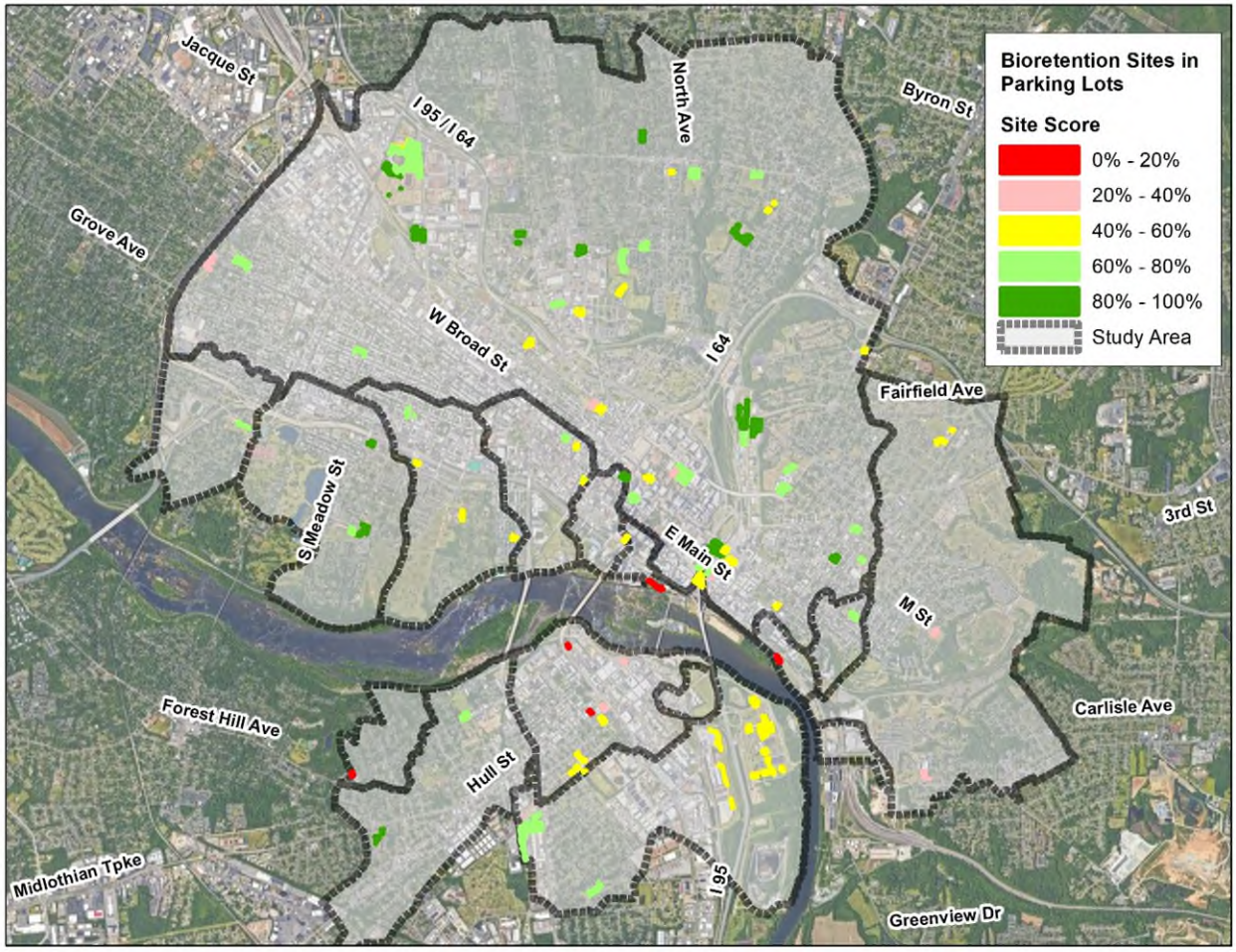


Figure 5-2. Optimal Areas for Bioretention Sites in Parking Lots

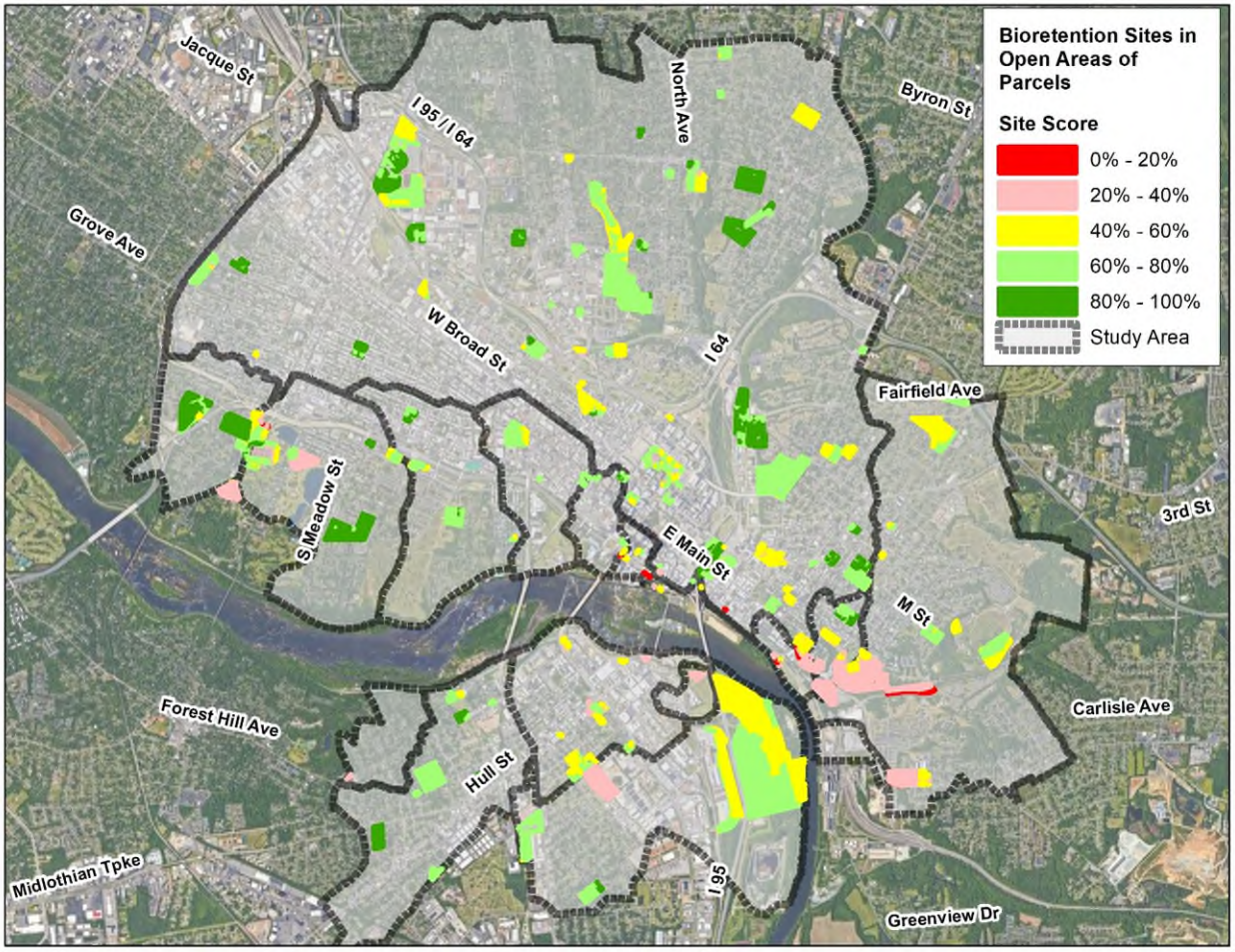


Figure 5-3. Optimal Areas for Bioretention Sites in Open Areas of Parcels

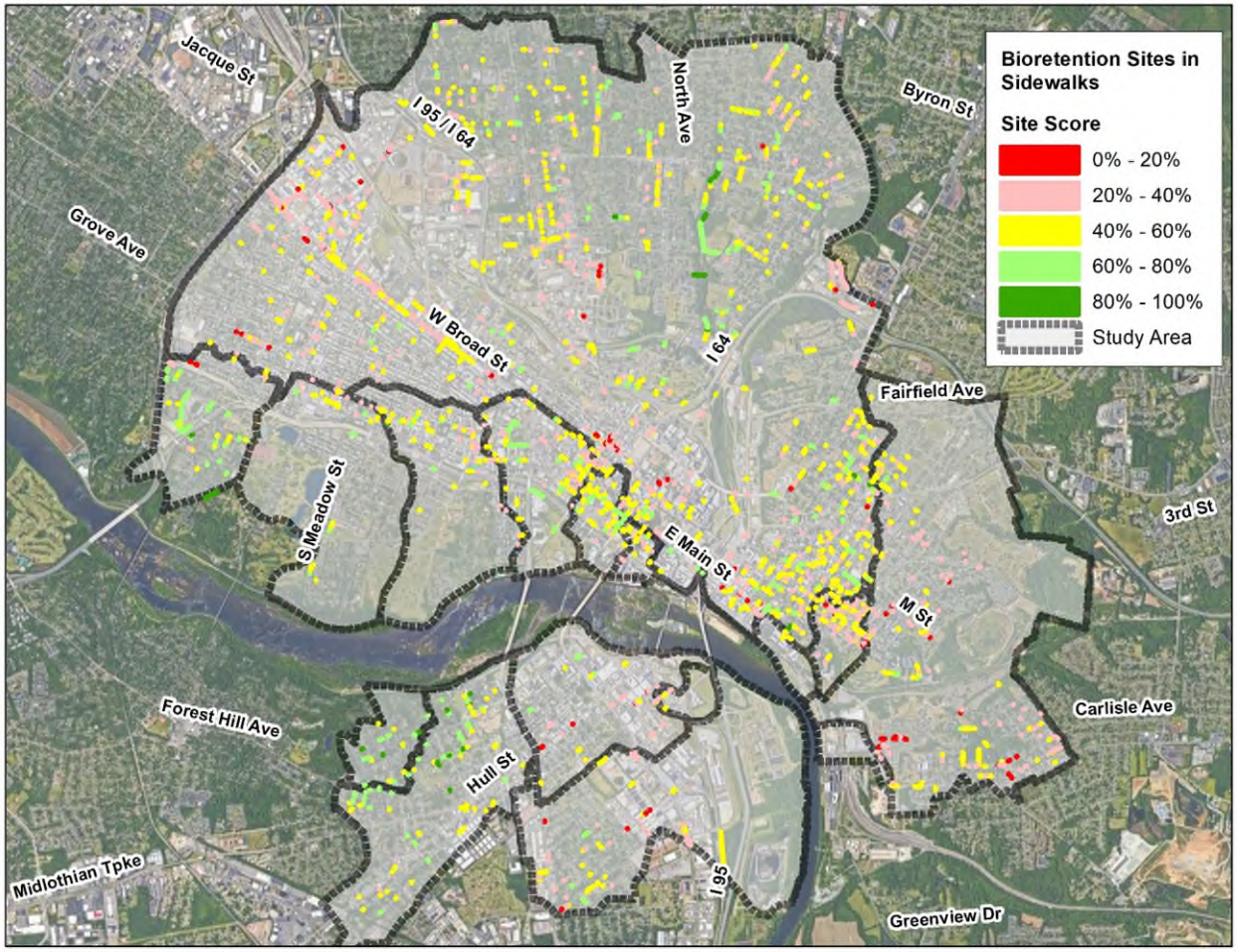


Figure 5-4. Optimal Areas for Bioretention Sites in Sidewalks

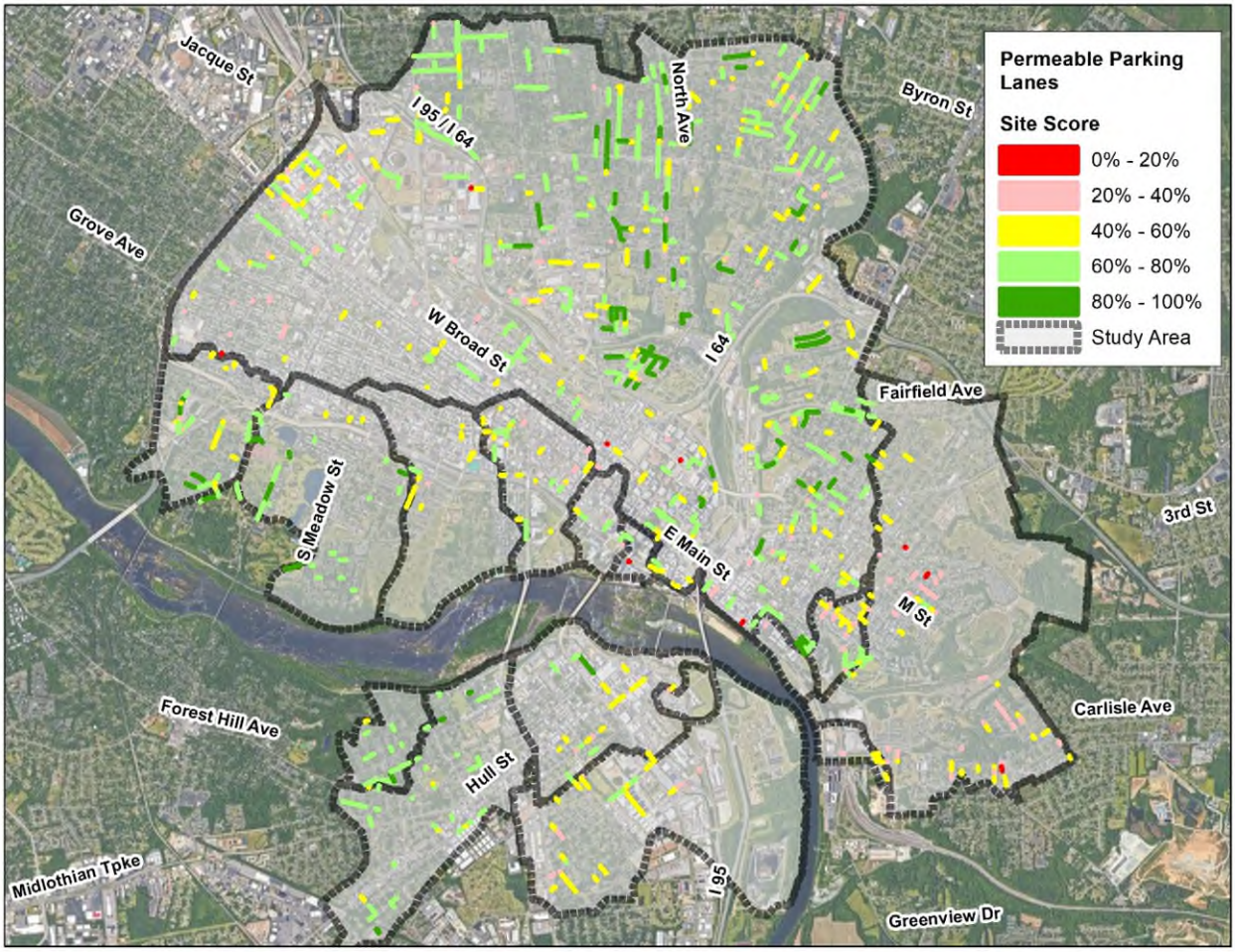


Figure 5-5. Optimal Areas for Permeable Parking Lanes in Local and Collector Roads

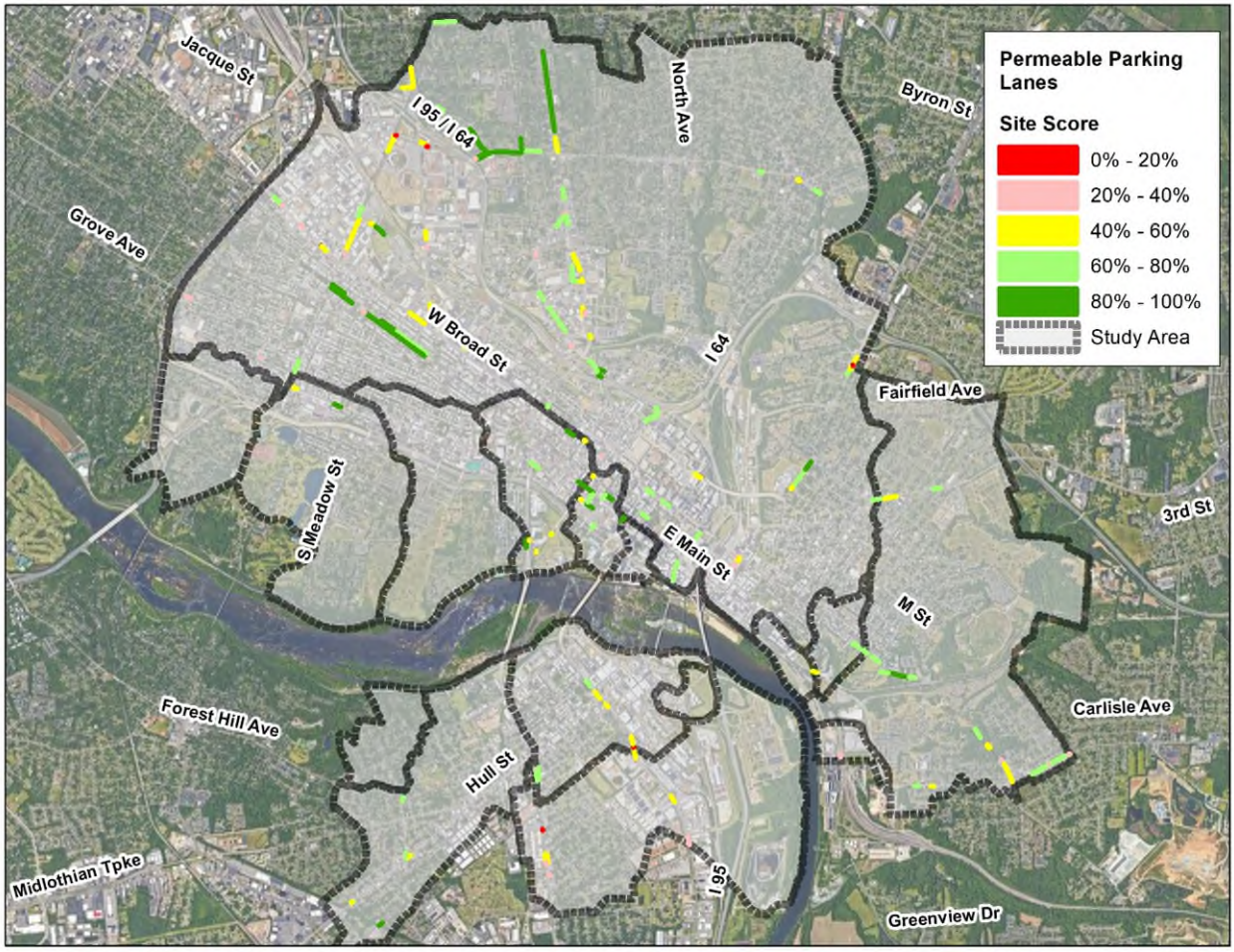


Figure 5-6. Optimal Areas for Permeable Parking Lanes in Major Roadways

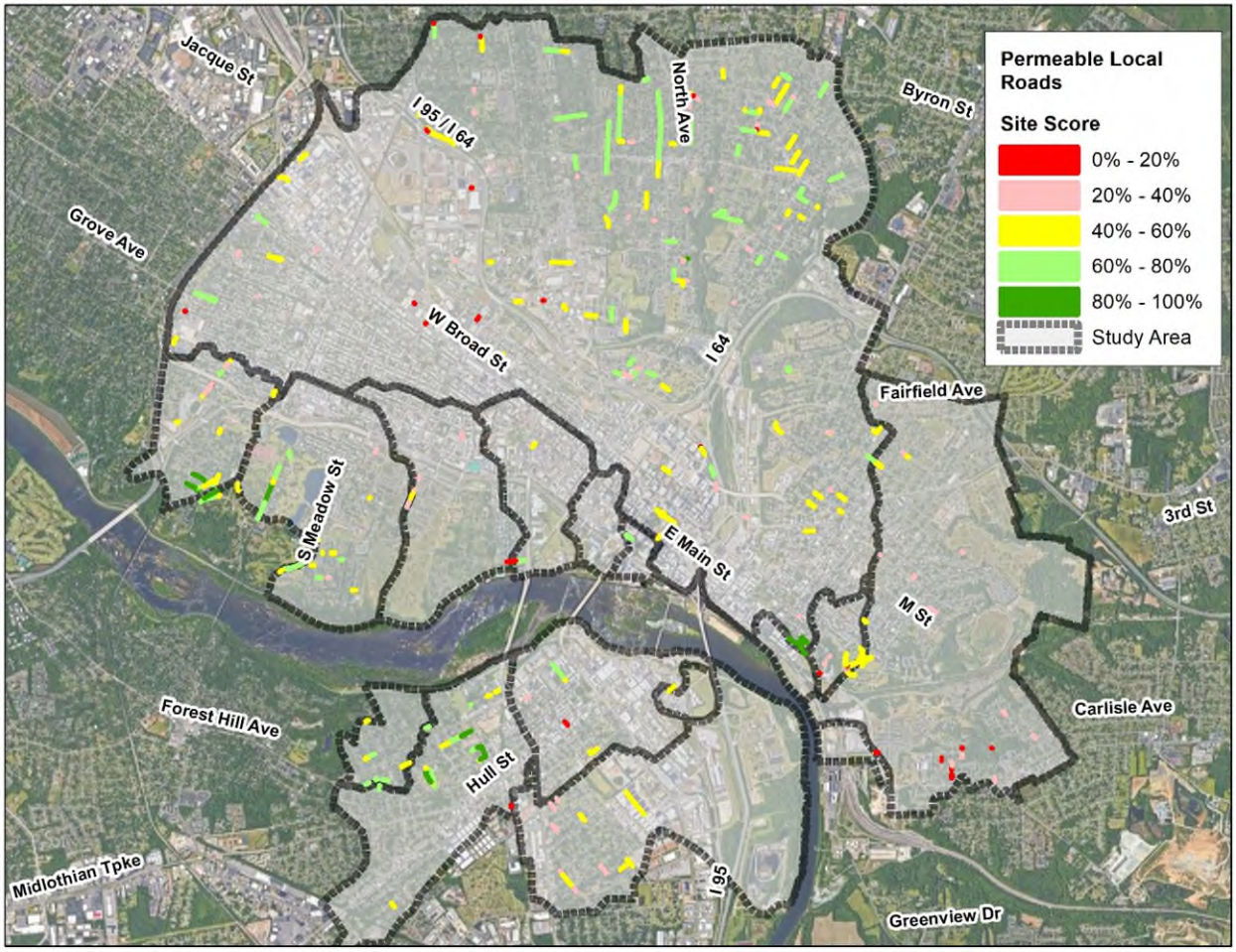


Figure 5-7. Optimal Areas for Permeable Local Roads

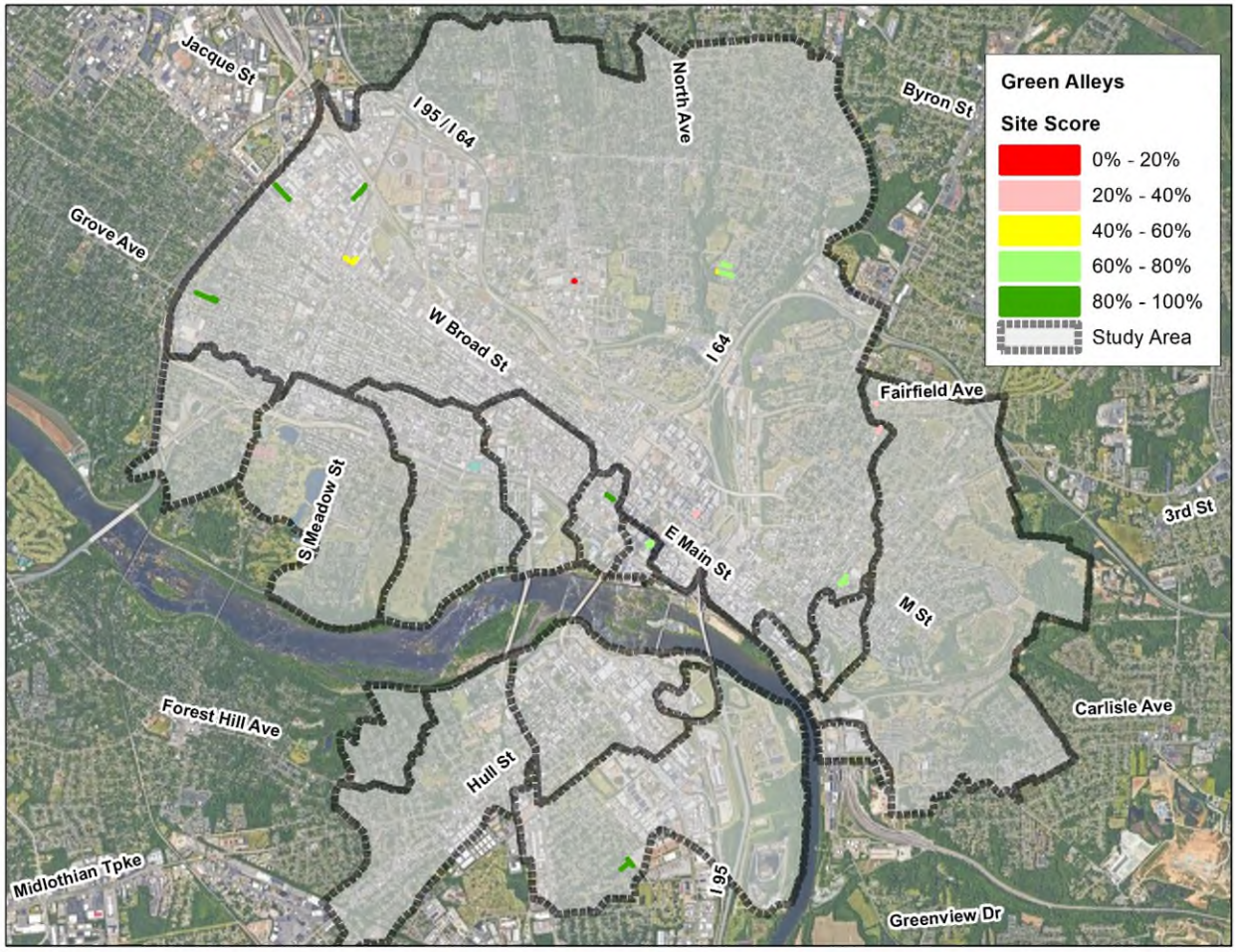


Figure 5-8. Optimal Areas for Green Alleys

5.2 Ranking of Watersheds

5.2.1 Existing Flooding Problems

Repetitive flooding occurs in several areas within the three priority watersheds and is a result of several factors, including limited collection system capacity, topography, and location. Figure 5-9 shows those areas prone to flooding. Scores are based on the number of flood complaint sites within each CSO basin and range from a minimum of 0 (blue - limited flooding) to a maximum of 10 (red - flood prone). The worst flooding occurs in the Manchester area south of the James River and a few locations close to the James River at the downstream end of the collection system.

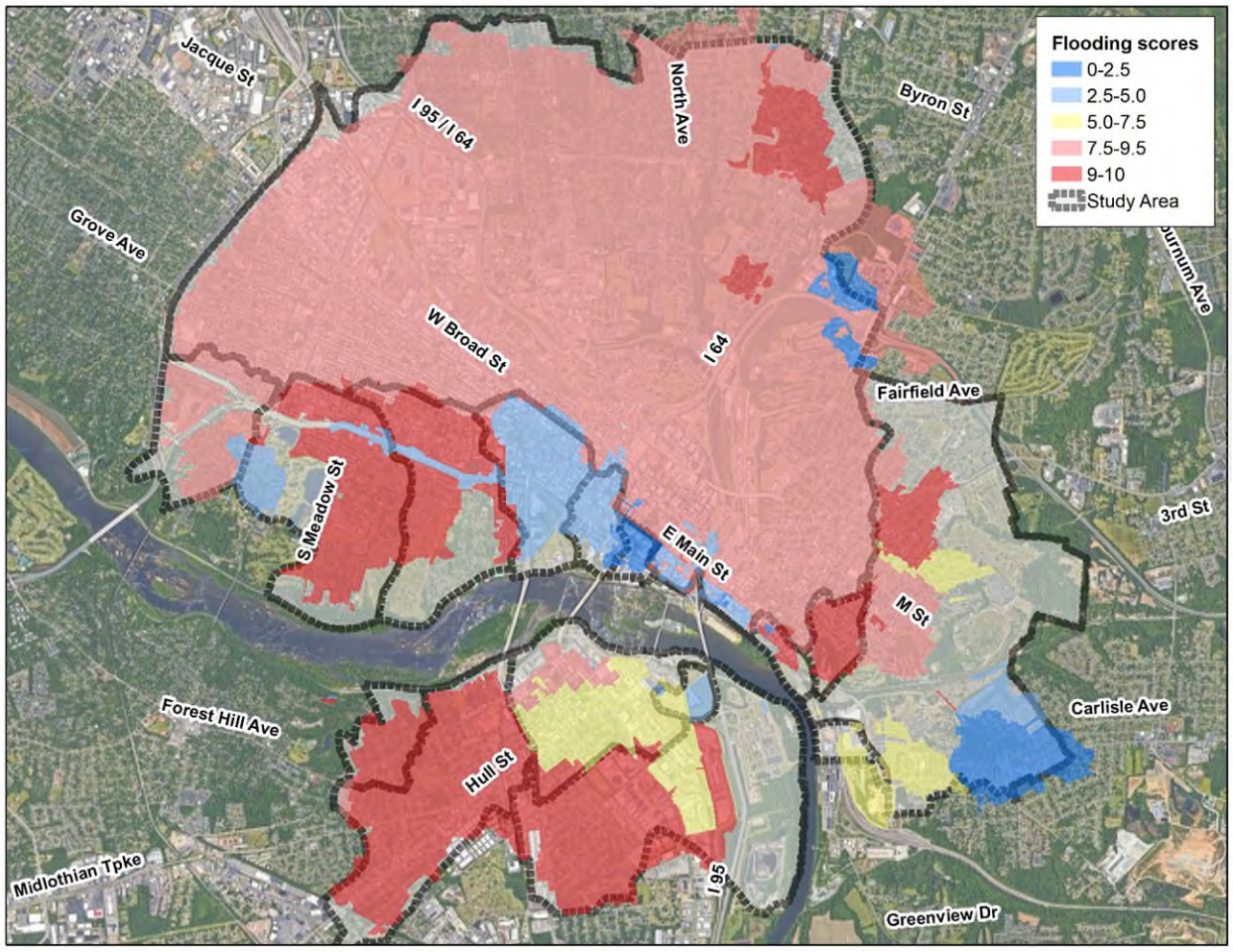


Figure 5-9. Flooding Scores Based on Number of Complaints

5.2.2 Tree Canopy

Increasing green space, including tree canopy, is a stated goal of both DPU and the Alliance. Figure 5-10 shows locations with significant impervious area where improved tree canopy should be targeted as part of future public improvement projects. The score for improving urban tree canopy is based on the available open area within City-owned parcels for tree plantings and ranges from a minimum of 0 to a maximum of 10. Similar to the project rankings by GI type explained earlier in this section, sites that are dark green in color are most favorable, with color changing to light green, yellow, light red and dark red as least favorable.

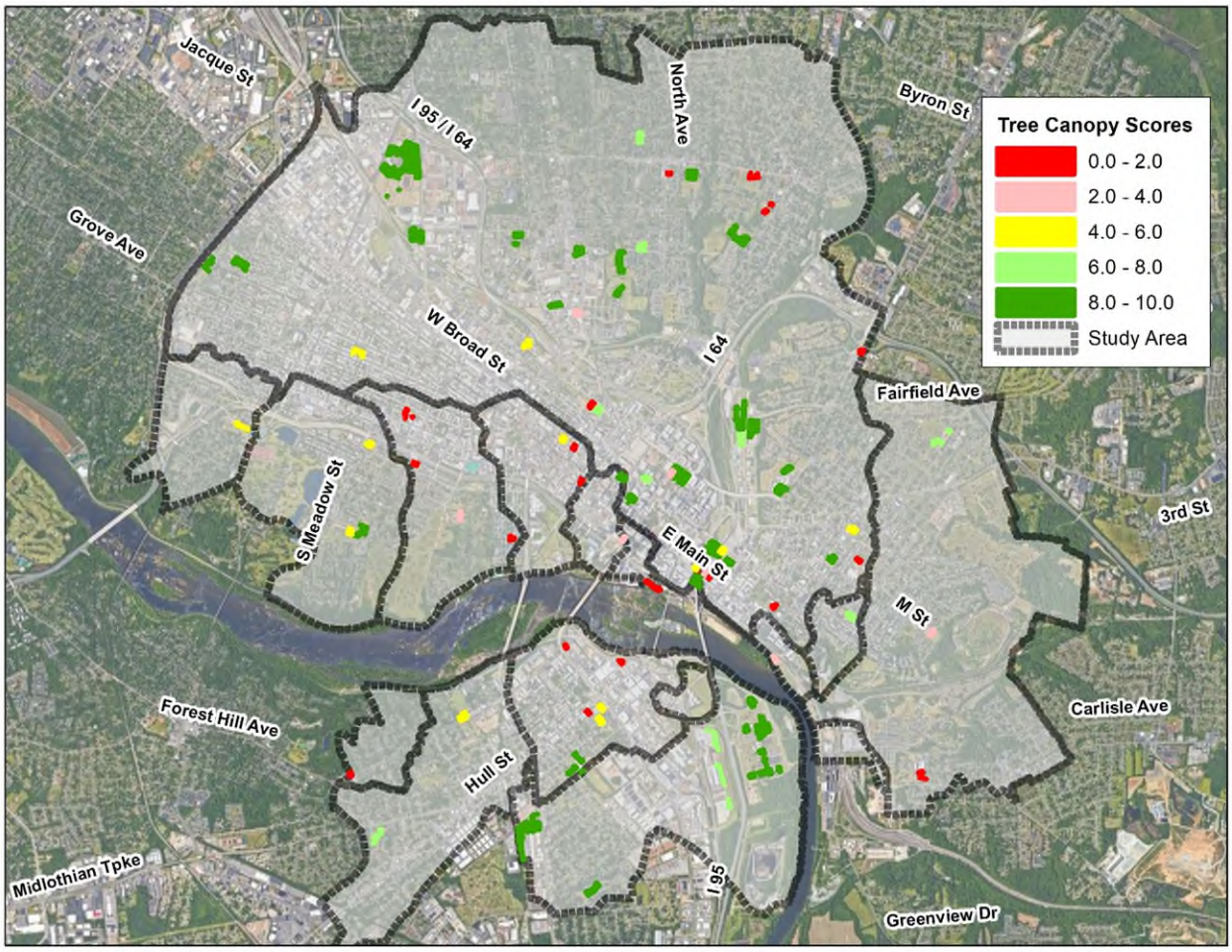


Figure 5-10. Tree Canopy Scores

5.2.3 Areas Needing Additional Capacity

The GIS information used to analyze volume reduction was based on flow reduction and CSO activation threshold/reduction and not on system capacity. Therefore, areas needing additional capacity were not able to be determined using the available information.

5.3 Recommended GI Solutions

The optimal parcels/areas identified for the eight different GI types presented in Section 5.1 can be further evaluated using the digital mapping aids presented in Section 7.0 – Project Implementation Considerations. This includes the following:

- **ARCGIS Map of GI Ranking Results:** Final shapefiles for each of the eight GI types are located on the DPU server and can be accessed via coordination with DPU. This information is similar to the maps provided in Section 5.1, but the software will allow the user to zoom in on individual parcels to observe site features and potential site constraints. It also allows individual layers, such as utility conflicts, to be turned on/off for clarity or to look at specific criteria.
- **PowerBI GI Ranking Tool Interface:** An interactive map of the three priority watersheds is available using a PowerBI interface available from DPU. The PowerBI interface provides a more robust companion piece to the ARCGIS map. Criteria scoring and weighting information for a range of parcels and GI types can be accessed and modified using the PowerBI interface. Where the ARCGIS map is focused on evaluation of individual sites, the PowerBI interface is more useful when looking at a neighborhood- or watershed-scale to identify a number of parcels that may want to be considered for further evaluation.

An example of how changes in the GI Ranking Tool to emphasize (or decrease) certain criteria of interest impacts the scoring results is illustrated on Table 5-2. In this example, the weighting of both socioeconomic benefits and tree canopy are increased threefold to significantly emphasize the importance of those criteria. In Figure 5-11, the map on the top shows the original results of the selected scenario (bioretention sites in parking lots), and the map on the bottom shows the modified weighting. While the results are not transformative, differences in site scoring are evident.

Table 5-2. Example Weighting to GI Performance Metrics Weights Scenarios

Metric	Description	Tier	Weight %
Reduce Runoff/Flow	Flow reduction	1	100%
	CSO activation reduction	1	100%
Reduce Impervious Area	Permeable pavement or bioretention (in parking lots)	1	100%
Low Maintenance	-	1	100%
Provide Socioeconomic Benefits	Near open space	1	300%
	Social equity	1	300%
Minimize Existing Flooding	-	2	100%
Improve Urban Tree Canopy	-	2	300%
Improve Water Quality	-	3	100%
Provide Slope Suitability	In open areas (<5%, 5% to 10%, 10% to 15%, 15% to 20%, >20%)	4	100%
Provide Soil Infiltration		4	100%

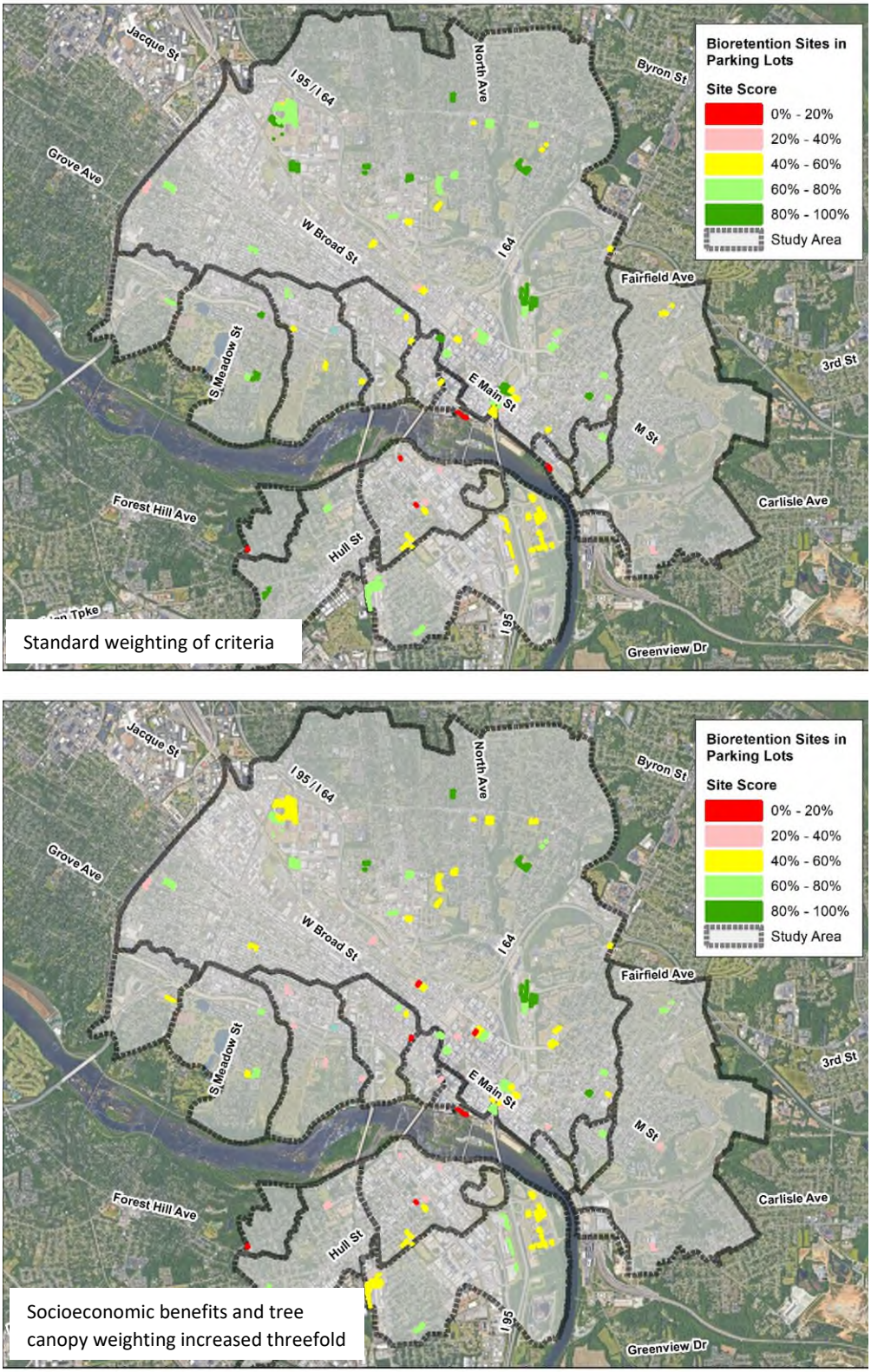


Figure 5-11. Comparison of Scoring Changes Based on Different Criteria Weighting

The map on the top shows the original results of the selected scenario (bioretention sites in parking lots), while the map on the bottom shows the modified weighting.

6 Conceptual Designs of Recommended Solutions/Projects

6.1 Conceptual Design Development Process

As part of the RVAH2O Green Infrastructure Master Plan project, the Alliance and DPU will implement one GI project to demonstrate the usefulness of the GI Ranking Tool and to promote the greening of the City. Select sites ranked in the top 20% for the three GI types on public parcels – permeable pavement in parking lots, bioretention in parking lots, and bioretention in open areas – were presented at Workshop #1 on October 19, 2020, for City departments to determine if those who owned the parcels would be interested in having conceptual designs developed to construct GI on those parcels. Sites from each major department in attendance were reviewed and discussed. This workshop was an introduction to the GI Ranking Tool and the initial parcels that scored high for optimal GI.

In Workshop #2 on January 28, 2021, three potential sites were reviewed with representatives from City departments to introduce participants to the GI Ranking Tool's scoring and weighting process. These sites included Powhatan Hill Community Center, Gillies Creek Greenway between Main Street and Jennie Scher Road, and Hull Street between 4th and Commerce. This educational process helped set the stage for how the GI Ranking Tool functions, with the intent of increasing buy-in for future use of the tool.

In Workshop #3 on May 18, 2021, the final selected sites were presented to the participants. Background on the sizing, site constraints, cost, and maintenance requirements required of the sites selected for GI conceptual designs are provided in the following sections.

6.1.1 Sizing Criteria and Site Constraints

One of the primary objectives of the GI Master Plan is to use GI to capture/infiltrate stormwater and minimize CSO discharges. Therefore, the sizing of GI differs from those typically used in the area. GI requirements in the City and other communities in the Chesapeake Bay are typically water quality based. The goals of the GI identified for conceptual design by the GI Ranking Tool are focused on stormwater capture and are volume based.

The difference in design philosophy is evidenced in the loading ratios used. According to the Virginia BMP Clearinghouse requirements of the Chesapeake Bay, a 2:1 loading ratio for water quality based BMPs is required. However, the loading ratio for BMPs focused on water quantity and considered for the GI conceptual designs is in the 10:1 range and is based on typical values experienced by other combined sewer communities with notable GI programs, including the City of Philadelphia and New York City. For bioretention and permeable pavement, this requires the use of areas that are much larger and/or depths that are much deeper to address the stormwater runoff volume capture component in addition to water quality. Groundwater depths need to be investigated to make sure storage depth designs are above the water table.

6.1.2 Capital Costs and Maintenance Requirements

Information on capital costs and suggested inspection and maintenance frequency/guidelines considered for the proposed GI are from state standards (e.g., BMP manuals, Virginia BMP Clearinghouse), since these reference documents were developed specifically for GI in the region and were augmented by bid tab and design information collected by Arcadis from previous projects, where warranted.

6.1.3 GI Project Selection

Based on the feedback received from representatives from various City departments that attended the workshops, a comparison of high-ranking GI sites to proposed CIPs, and GI recommendations from other studies that were not able to be incorporated into the Gi Ranking Tool, the portfolio of sites presented was reduced to a short list of approximately six sites. Ultimately, two sites were selected – one is a public parcel and the other is within the right-of-way – that ranked within the top 20% of sites identified by the GI Ranking Tool. These sites provide opportunities for both bioretention and permeable pavement and were in highly visible areas within the City to help promote GI and its use. The sites selected for conceptual design and possible construction are the Annie Giles Community Resource Center and 15th/16th Street.

6.2 Annie Giles Community Resource Center – Permeable Pavement and Rain Garden

The Annie Giles Community Resource Center is located at 1400 Oliver Hill Way, Richmond, VA 23219 in the Shockoe Creek Watershed. The GI Ranking Tool ranked this location high for installation of permeable pavement in the parking lot. The site also provides a viable opportunity for siting a bioretention area/rain garden between the curb and parking lot in the front of the property to provide a highly visible display of aesthetically pleasing GI. An aerial of the site is provided as Figure 6-1, and the location of the proposed GI is shown in Figure 6-2.

The site was recommended by the Department of Parks, Recreation, and Community Facilities. It was initially thought the property was owned by the City; however, it was determined that the property belongs to Virginia Commonwealth University (VCU). VCU is currently in the initial stages of developing a Campus Master Plan, and it was determined that development of a conceptual design for GI at the facility would be consistent with the type of sustainable and visual improvement desired in the future.

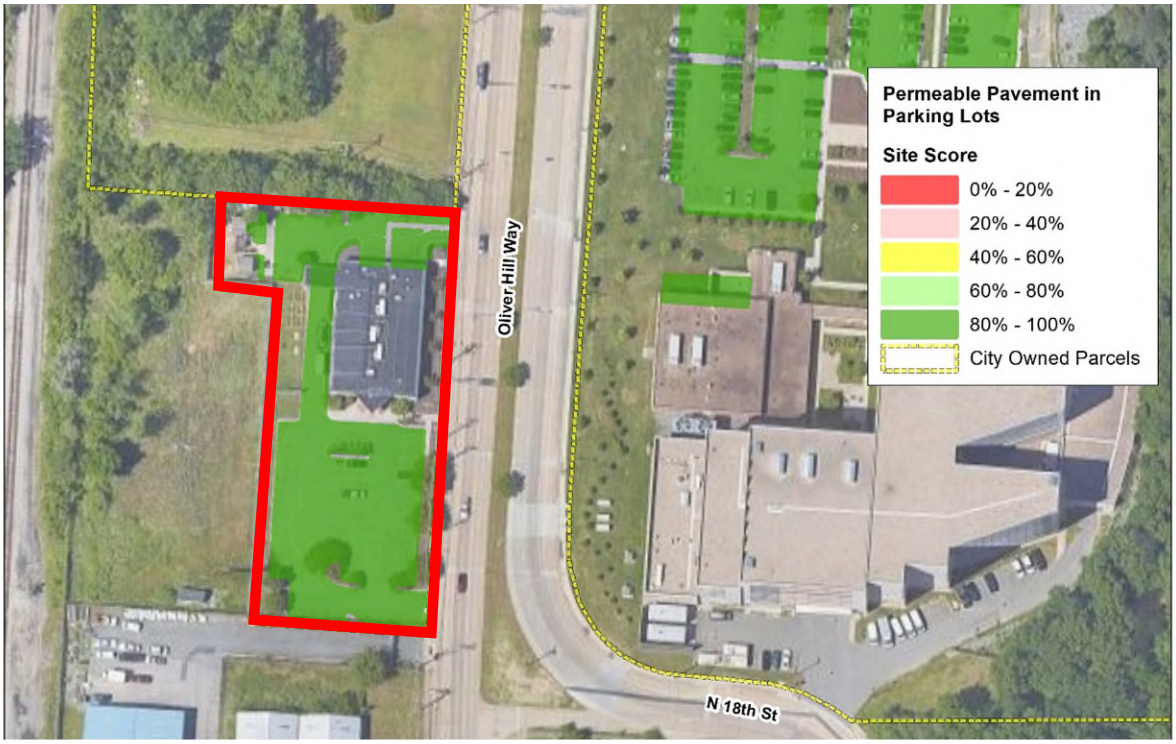
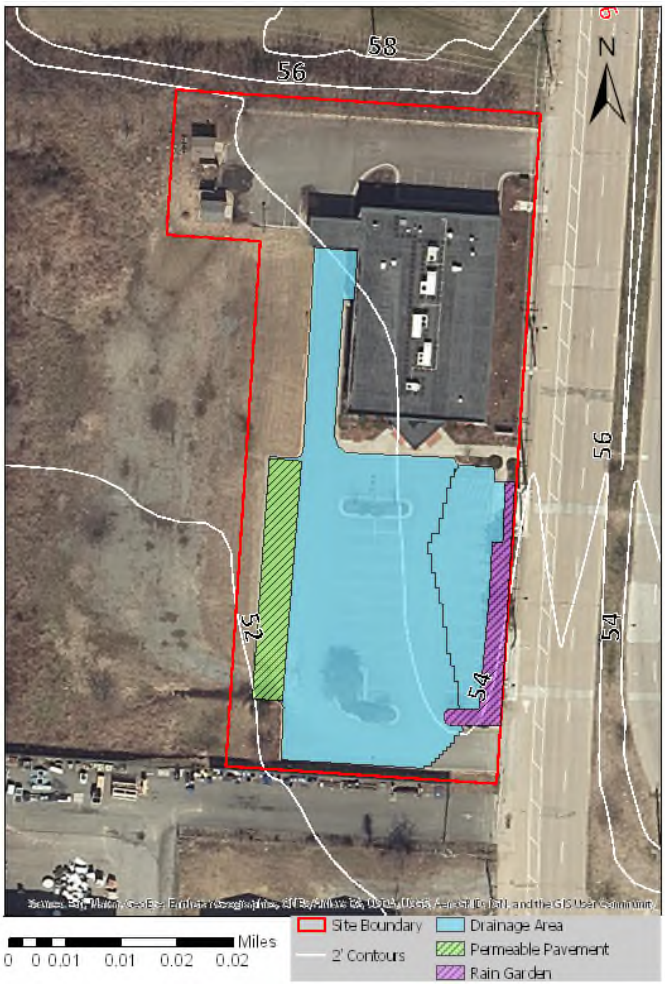


Figure 6-1. Aerial View of Annie Giles Community Resource Center



The recommended conceptual design, shown in Figures 6-3 and 6-4, includes permeable pavement in the western parking lanes that receive runoff from the primary parking lot. Drainage from the far east section of the primary parking lot drains to a bioretention facility on the far east of the parking lot adjacent to Oliver Hill Way. The site has the following components:

- Total impervious area of property: 37,000 square feet (71%)
- Total pervious area of property: 15,000 square feet (29%)

Rain Garden to Manage 2 Inches of Runoff

- Design dimensions: 1,300 SF x 2 feet soil media
- Construction cost: $21,000
- Annual maintenance cost: $300

Permeable Pavement to Manage 2 Inches of Runoff

- Design dimensions: 2,000 SF x 3.5 feet stone reservoir layer
- Construction cost: $32,000
- Annual maintenance cost: $500

Figure 6-2. Proposed GI for Annie Giles Community Resource Center

The proposed GI Concepts, assuming 2 inches per hour infiltration rate, is estimated to manage 21,000 square feet (57% of the total impervious area). It will not eliminate any existing parking spaces, and it will increase the existing 6% green space in the property (approximately 3,000 square feet) to 10% (approximately 5,000 square feet). When the permeable parking lot is maintained properly by vacuum sweeping annually or as needed, it is expected to have a life span of 15 to 20 years. The rain garden is expected to last 10 to 25 years with proper annual spring inspection, trash removal, revegetation, sediment removal once every 2 to 3 years, and mulch layer replacement every 3 years. More conceptual design details are included in Appendix E.

Figure 6-3. Proposed Permeable Pavement Rendering

Figure 6-4. Proposed Rain Garden Rendering

6.3 15th/16th Street Area – Permeable Parking Lanes

The 15th/16th Street site is located between Boston Avenue and Everett Street in the Manchester Canal/Goose Creek Watersheds. The GI Ranking ranked this location high for installation of permeable pavement in the site's parking lanes. The proposed GI includes permeable pavement in the parking lanes on the south side of 16th Street west of Maury Street, the north side of 16th Street east of Maury Street, and the south side of 15th Street east of Maury Street, as shown in the aerial site view in Figure 6-5. Adjacent properties on Everett Street in the northeast section of the site are Blackwell Community Center, Blackwell Elementary School, and Blackwell Pool. The Charlie Sydnor Playground is to the east of 15th Street.

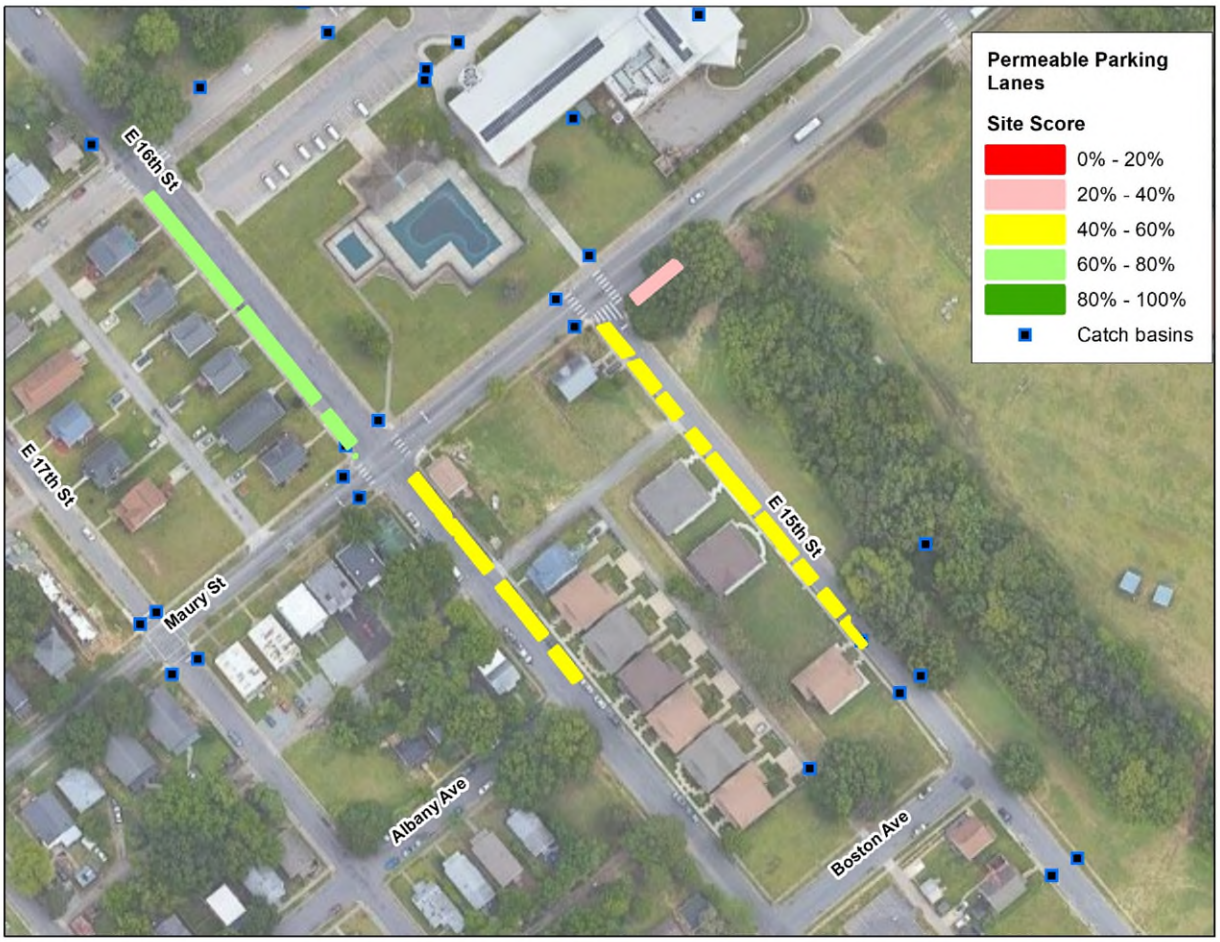


Figure 6-5. Proposed GI for the 15th/16th Street Area

The drainage area tributary to each GI on 15th Street and 16th Street are provided in Figure 6-6. Since the site selection is large, the drainage areas were further divided to provide more appropriate depths for each section of permeable parking lanes. Surface runoff generally drains to the east into catch basins, as indicated in Figure 6-5. The site has the following components:

- Total impervious area: 49,000 square feet (33%)
- Total pervious area: 98,000 square feet (67%)

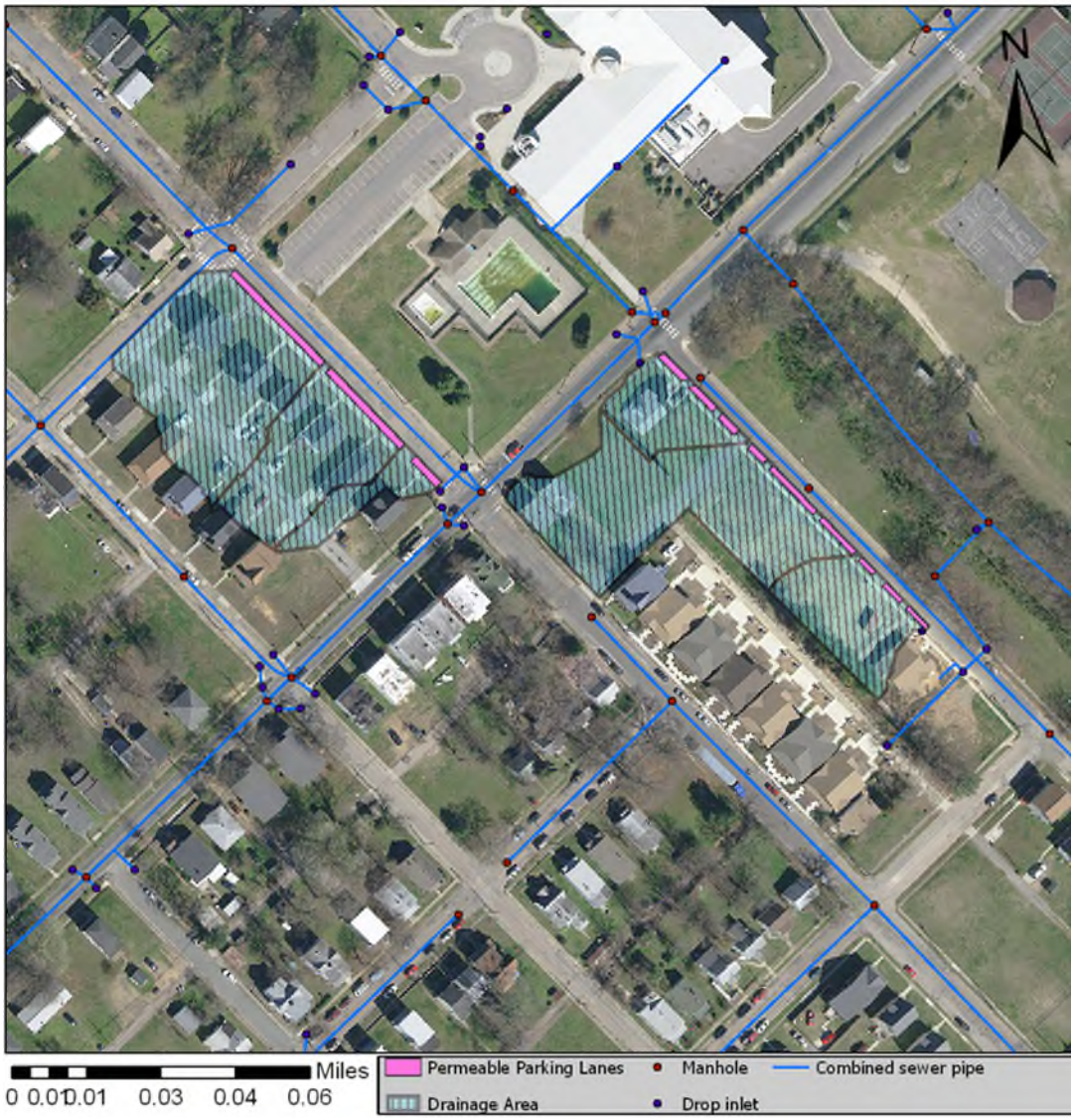


Figure 6-6. Drainage Area Tributary to GI on 15th/16th Street Area

The preliminary survey crew estimated catchment basin depths to be around 3 feet, which is the minimum stone reservoir layer depth. The stone reservoir layer necessary to manage the 1-inch runoff ranged from 3 feet to 9 feet, which exceeds the catchment basin depths. The 0.5-inch runoff scenario was analyzed and determined to be a viable option but only for the segments on 15th Street east of Maury Street and on 16th Street west of Maury Street. The recommended conceptual designs, shown in Figures 6-7 and 6-8, include permeable pavement in the south parking lanes. Design details are summarized below and provided in Appendix F. If maintained properly by vacuum sweeping annually or as needed, the permeable parking lanes are expected to last 15 to 20 years.

Permeable pavement for 0.5 inches of runoff

- Design dimensions: 5,900 square feet x 2.0 to 4.6 feet stone reservoir layer
- Construction cost: $126,000
- Annual maintenance cost: $1,500
- Cost-Benefit: Approximately $3.40 per gallon treated

Figure 6-7. Proposed Permeable Pavement on East 15th Street from Maury Street Facing South

Figure 6-8. Proposed Permeable Pavement on East 16th Street from Everett Street Facing South

7 Project Implementation Considerations

7.1 GI Ranking Tool Interface

The optimal parcels and areas identified for the eight different GI types presented in Section 5 can be evaluated using two options: 1) ARCGIS maps that have been created for each of the eight GI types to allow for evaluation of individual sites; and 2) a PowerBI interface that has been created to allow users to look across multiple sites. The files are available for use by City staff in coordination with DPU. Stakeholders outside of the City need to work with DPU or other City departments to have GI ranking information gathered for them.

7.1.1 Overview of ArcGIS map and PowerBI dashboard

Final shapefiles for each of the eight GI types identified in Section 5 are available as ARCGIS (KMZ) files and can be accessed via the DPU server. This information allows users to navigate using Google Earth to zoom in on individual parcels to observe site features and potential site constraints and view the scoring of any site. It also allows individual layers, such as utility conflicts, to be turned on/off for clarity or to look at specific criteria.

An interactive map of the three priority watersheds is available using a PowerBI interface available from DPU. This interface provides a more robust companion piece to the ARCGIS map. Criteria scoring and weighting information for a range of parcels and GI types can be accessed and modified using the PowerBI interface. A screenshot of the PowerBI interface is provide in Figure 7-1. The number callouts in the figure correspond to the numbered items in the description of their functionality provided on the following page.

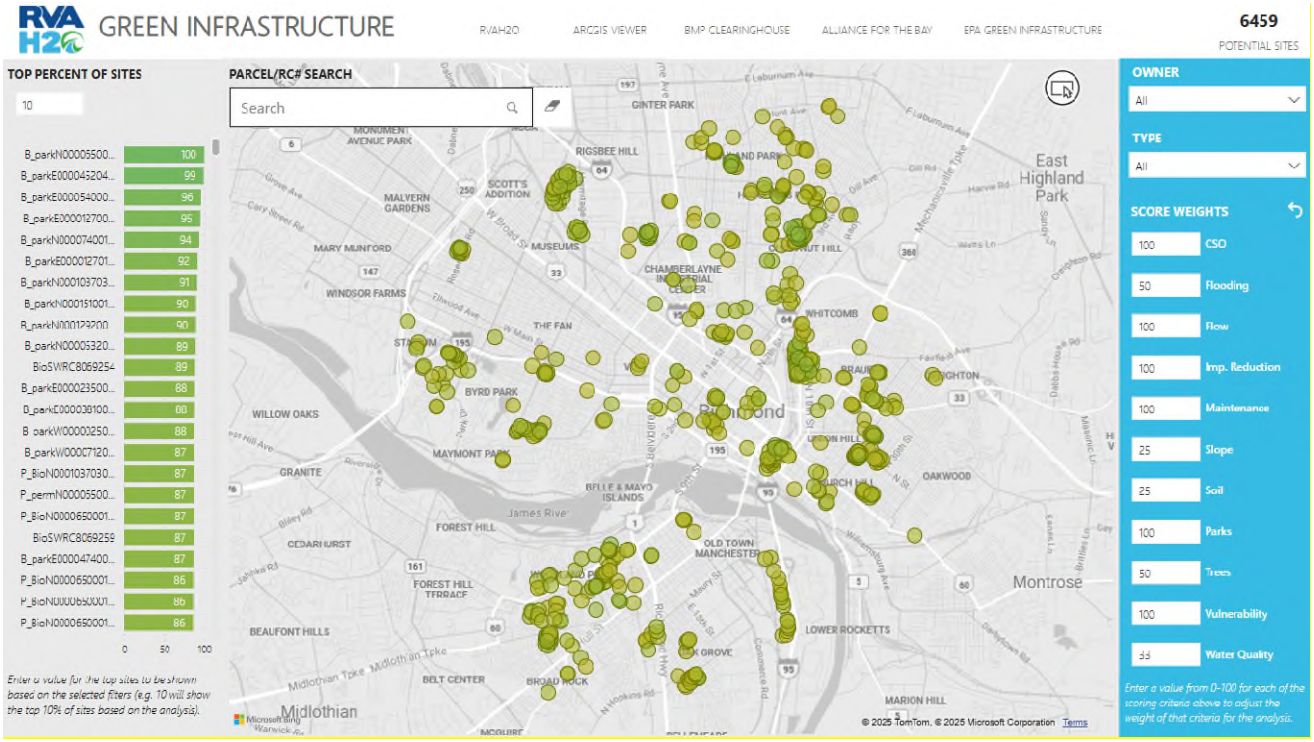


Figure 7-1. Screenshot of PowerBI Interface

The PowerBI interface allows users to modify many of the inputs to view different subsets of the results. The following items correspond to interaction points shown on Figure 7-1:

1. By default, the interface only shows the top 10% of sites that were evaluated to reduce the amount of data shown on the screen. To adjust the sites that are shown, input a different value in the box provided.
2. The left-hand chart in Figure 7-1 shows the top sites based on the current criteria. If one of the sites is selected by clicking on its bar, it will zoom in on the map to show the site. The data in this chart can also be exported to Excel by hovering in the top right corner, selecting the ellipsis (…) and selecting "Export data."
3. If a parcel number or runoff catchment number is known, it can be entered in the search box to filter both the map and the result charts.
4. Each individual point on the map corresponds to a potential GI site. More information about the site can be found by hovering over a point or selecting it.
5. Groups of sites can also be selected for evaluation by clicking the lasso tool in the top right and outlining the sites to be reviewed.
6. The links across the top will navigate to relevant resources about GI and RVAH2O.
7. The Key Performance Indicator (KPI) in the top right corner of the screen will show the total potential sites available based on the current selections.
8. The sites being evaluated can also be filtered to smaller sets of data for review by different departments or for review of different types of sites. Use the two drop downs to filter the data.
9. The criteria used for the evaluation can be adjusted to change the priorities for different reviewers. Modifying the values in each of the Score Weight boxes will recalculate the analysis and change the results of the prioritization. An example of scoring results using modified criteria weighting is provided in Section 5.3. All of the filters and inputs can be reset using the arrow to the right.

7.1.2 Adjustment of Parcel Criteria/Weighting

An example of scoring results using modified criteria weighting is provided in Section 5.3.

7.1.3 Future Maintenance of the GI Ranking Tool

As new information becomes available – whether it is improved GIS data, updated flood information, or incorporating the removal of individual CSOs from the collection system – the GI Ranking Tool will be updated to stay current. Additional concepts for consideration in future iterations of the GI Ranking Tool could include the expansion of the tool to other watersheds in the City and the inclusion of private parcels and tax-delinquent properties.

7.2 Coordination Across City Departments

The City has a significant amount of existing GI, as shown in Figure 7-2. The Alliance and DPU coordinated meetings across City departments to discuss the GI Ranking Tool, gauge their interest in its use, and discuss how it can be used in the future to increase the amount of GI in the City. Most departments have access to ARCGIS and are familiar with its use, but few have access or familiarity with PowerBI; therefore, several initiatives will need to be performed to ensure greater success with its use by other departments.

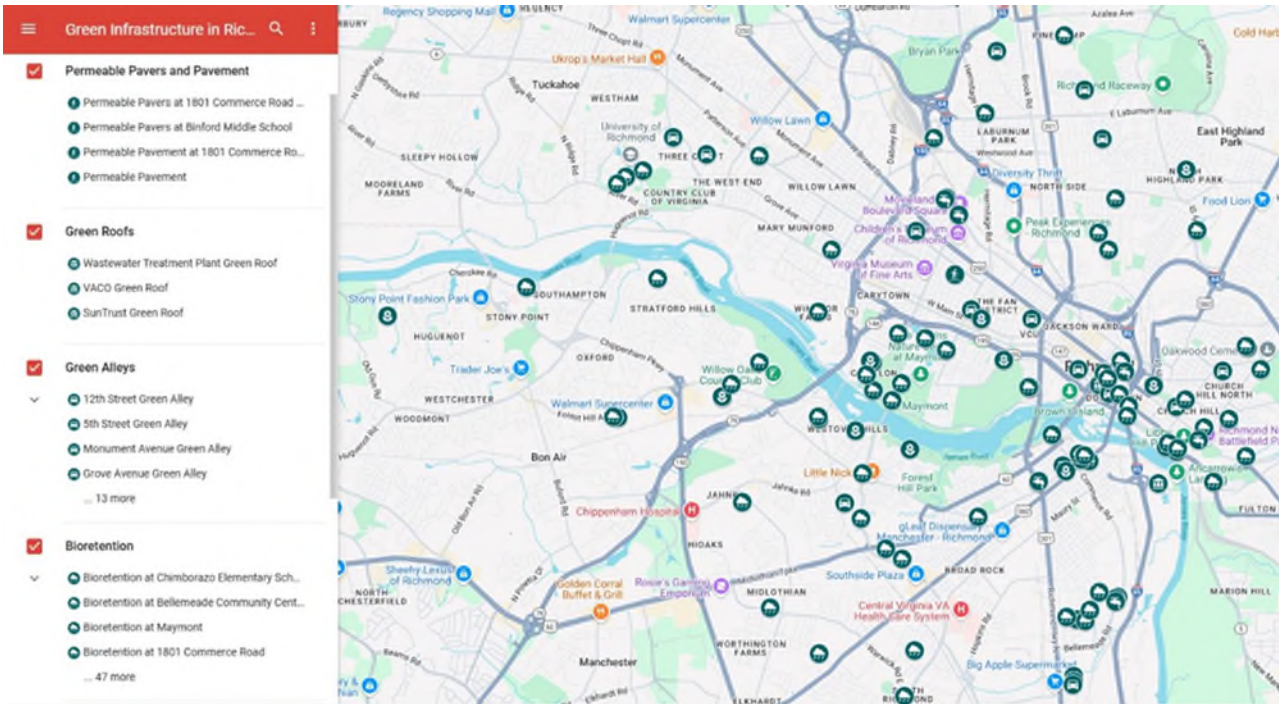


Figure 7-2. Screenshot of Selection of Existing GI in the City of Richmond

Additional training on use of the GI Ranking Tool has been requested and should be provided. A training manual for how to effectively use the tool would also be helpful. The most important element for increasing consideration of GI in City department CIPs is the development of a workflow document in the future. DPU should be involved in the project development process so that green features are considered on a regular basis. GI needs to be a regular agenda item on monthly department coordination meetings as well.

7.3 GI Implementation Considerations

Following its development during the GI Master Plan, the GI Ranking Tool should be used in the future to identify and confirm the benefit of GI in different locations as part of CIPs or other improvement projects. Recommendations for GI implementation considerations are provided below.

7.3.1 Incorporation of GI Projects with Other City CIPs

Primary goals of the GI Master Plan project include promoting the use of GI, providing a GI Ranking Tool with real world data to make it easier for City staff to better locate GI on projects to improve water quality and quantity, and increasing collaboration between departments to make bigger, better, more sustainable projects. A process is being developed (see Section 7.3.4) that will create a project flow chart for City departments to use that will include consideration of GI.

7.3.2 Utility Coordination

The Gi Ranking Tool contains GIS information for most utilities across the three priority watersheds' areas. It can be a useful first step in determining the extent and location of utilities within select parcels or the right-of-way and identify those utilities that need to be contacted and coordinated with as part of a project.

7.3.3 GI Maintenance

For any project where GI is identified as feasible and included in the design, perpetual maintenance, both in terms of the responsible party and adequate funding, needs to be included. Traditionally, short-term GI maintenance is provided as part of a project to ensure establishment of vegetation or confirm design performance, but long-term maintenance is critical to the ongoing success of GI.

7.3.4 Development of Process Template

The most important element for increasing consideration of GI on City department CIPs is the development of a workflow process document in the future that will be used by all departments. This could be as simple as a flowchart with references to detailed workflow information to a more robust document with specific details. It should encourage more interagency coordination and have DPU involved in the project development process so that green features are considered on a regular basis. This workflow process template is reportedly in development with backing from the mayor's office.

7.4 Implementation Strategy

It is recommended that the GI Master Plan and the GI Ranking Tool be used by City departments to identify opportunities for GI on CIPs, large or small, and help make recommendations around areas of priority for funding and implementation of holistic projects. GI needs to be a regular agenda item on monthly department coordination meetings as well. Making the GI Master Plan and associated tools available to other departments will facilitate implementation of GI in City projects.

7.5 Monitoring and Assessing Progress

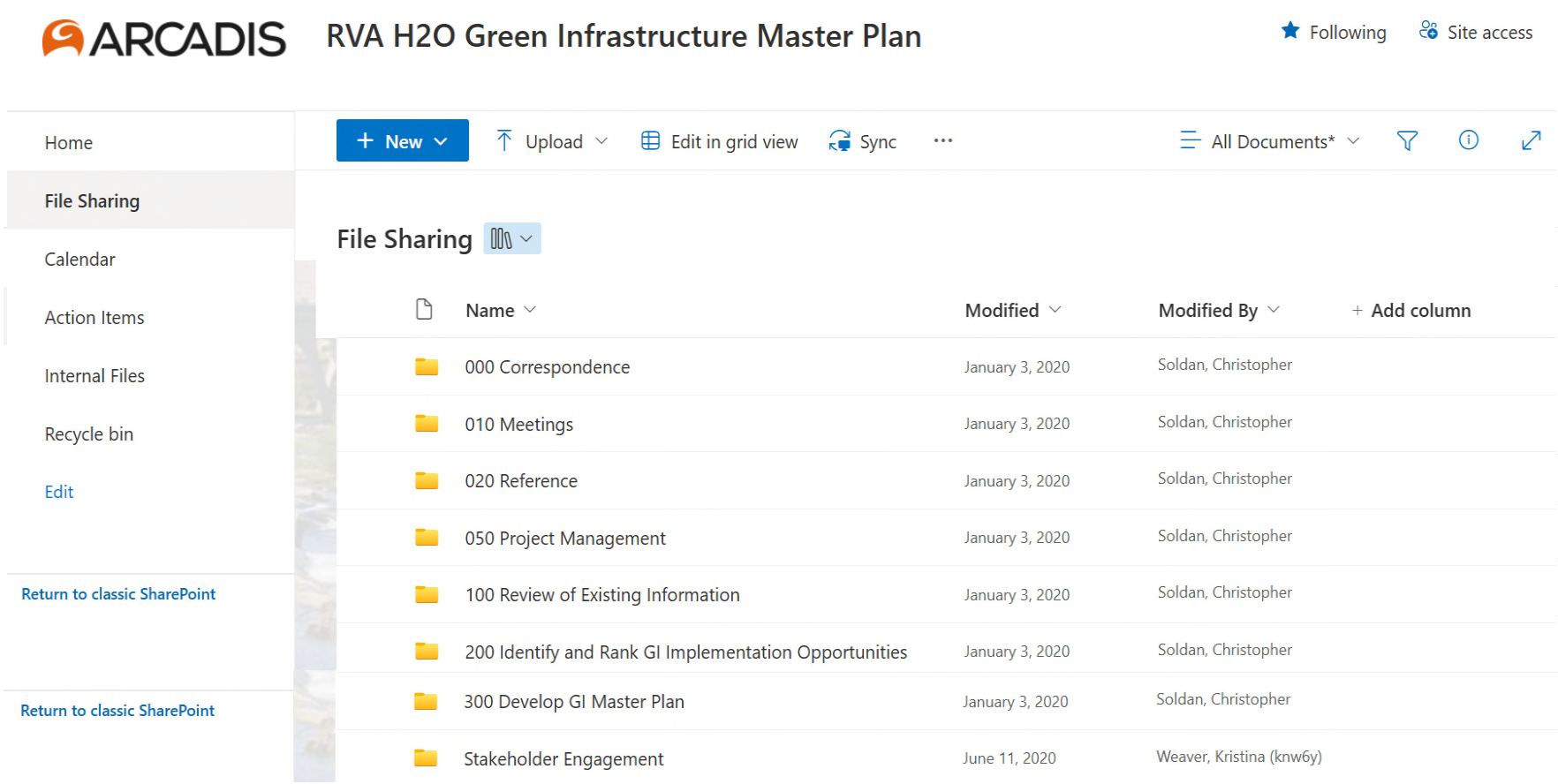
Measuring and assessing progress of GI implementation in the City will take place along the following two tracks:

1. DPU will continually monitor the progress toward achieving the goals set out in the RVA Clean Water Plan.
2. The Alliance will continually monitor progress to determine the effectiveness in achieving the goals set out in their grant proposal.

Determining the level of progress that has been made as a result of the City's investments in GI will be a key element to the success of the RVA Clean Water Plan and its ultimate support by the public and stakeholders. Consistent with the goals of the RVA Clean Water Plan, as GI is implemented, measuring progress will fall into three categories: Water Quality Monitoring, Programmatic Monitoring, and Modeling. Progress will also be assessed by determining attitudes and behaviors within City departments that could serve as barriers to GI use. The City believes the GI Ranking Tool can increase the ability to engage all partners in a creative process to identify and prioritize projects. Ultimately, a key measure of success will be working through RVAH2O to influence policy and management changes so that GI becomes a core function of how all City departments plan, prioritize funding, and implement CIPs.

Appendix A

SharePoint Collaboration Site Files


ARCADIS
RVA H2O Green Infrastructure Master Plan
Following
Site access
Home
File Sharing
Calendar
Action Items
Internal Files
Recycle bin
Edit
Return to classic SharePoint
Return to classic SharePoint
New
Upload
Edit in grid view
Sync
All Documents*
File Sharing
Name
Modified
Modified By
Add column
000 Correspondence
January 3, 2020
Soldan, Christopher
010 Meetings
January 3, 2020
Soldan, Christopher
020 Reference
January 3, 2020
Soldan, Christopher
050 Project Management
January 3, 2020
Soldan, Christopher
100 Review of Existing Information
January 3, 2020
Soldan, Christopher
200 Identify and Rank GI Implementation Opportunities
January 3, 2020
Soldan, Christopher
300 Develop GI Master Plan
January 3, 2020
Soldan, Christopher
Stakeholder Engagement
June 11, 2020
Weaver, Kristina (knw6y)

Appendix B

References

Benjamin P. Jones (Virginia Commonwealth University 2019). *Green Infrastructure Initiative Plan*. Accessed June 2019. https://scholarscompass.vcu.edu/cgi/viewcontent.cgi?article=1013&context=murp_capstone

Arcadis (City of Lancaster, PA 2019). Green Infrastructure Design Manual. Accessed January 2021. https://www.cityoflancasterpa.com/wp-content/uploads/2014/03/Lancaster-GI-Design-Manual_Final_reduced_0.pdf

City of Richmond, Virginia (City of Richmond, VA 2019). *Proposed Capital Improvement Plan for Fiscal Years 2020-2024*. Accessed April 2021.

City of Richmond, Virginia (City of Richmond, VA 2020). *Richmond 300: A Guide for Growth*. Accessed January 2021. https://www.rva.gov/sites/default/files/2021-03/R300_Adopted_210304.pdf

City of Richmond, Virginia (City of Richmond, VA 2020). *Social Vulnerability Index*. Accessed January 2021.

City of Richmond, Virginia (City of Richmond, VA 2020). *Green Team.* Undated.

Green Infrastructure Center and E^2 Inc. (GIC and E^2 Inc. 2010). *Richmond Green Infrastructure Assessment.* Accessed June 2019. http://www.gicinc.org/PDFs/RichmondGIA_Report_FINAL.pdf

LimnoTech (LimnoTech 2017). *RVA Clean Water Plan.* Accessed June 2019. https://j3n7e4b9.stackpathcdn.com/wp-content/uploads/2020/02/Final_RVA_Clean_Water_Plan.pdf

Peter Girardi (Truetimber Tree Service, Inc. 2009). *STRATUM Sample Survey of Richmond Street Trees*. November 2020.

Virginia Stormwater Best Management Practice Clearinghouse (VA Stormwater BMP Practice Clearinghouse 2013). 2013 Draft Design Specifications for Practices 1-15. Accessed March 2021. https://swbmp.vwrrc.vt.edu/

Appendix C

Stakeholder Workshop Summaries

RVAH2O Green Infrastructure Master Plan Kick-Off Meeting, 5 August 2020

- The goals of this one-hour engagement were to: (1) Pitch the value of green infrastructure and create buy-in, and (2) Generate enthusiasm for ongoing participation in the project.
- The meeting centered on an orientation about the goals and methodology of the Master Plan Project, including the Green Infrastructure Screening and Prioritization Tool.
- The meeting featured discussion of real Richmond project sites as well as a "pop quiz" on green infrastructure to communicate benefits of these projects.
- In a robust and inclusive large group dialogue, departmental representatives responded to four key questions:
    - What have your experiences been with green infrastructure? For those who have worked on Richmond projects, what have you learned about what's working well and what could be improved?
    - What has your experience been working with community partners? What other partners should be at the table in these conversations?
    - What is the best way to keep departments engaged? What is the best way to engage community stakeholders?
    - What current or potential Richmond projects are "shovel ready" for the kind of collaboration we are discussing?

RVAH2O Green Infrastructure Master Plan Workshop, 19 October 2020

- The goals of this 90-minute engagement were to: (1) Learn about the issues and opportunities city leaders see for green infrastructure planning, implementation, and collaboration, using real Richmond case studies for context, and (2) Garner feedback on the scoring criteria being considered in the Green Infrastructure Screening and Prioritization Tool.
- The meeting centered on an engaging participants in breakout group exercises that allowed them to experience what it's like to make green infrastructure selection and siting decisions in real Richmond scenarios, and to provide feedback for the development of the Tool as part of that collaborative exercise. The scenarios were linked to three geographic sites that are real candidates for green infrastructure development in Richmond: Gillies Creek, Powhatan, and Hull Street.
- Members of the project team (Arcadis, the Alliance, and the Department of Public Utilities) The meeting gathering participant input via collaborative google documents and a brief segment of large group discussion.

RVAH2O Green Infrastructure Master Plan Site Election Workshop, 28 January 2021

- The goals of this engagement were to: (1) Provide an update on the development of the Green Infrastructure Screening and Prioritization Tool and share how prior stakeholder input had been incorporated into the design; (2) Present sites that the project team was considering for

conceptual designs and garner input to identify three to develop further; and (3) Identify strategies for strengthening collaboration around green infrastructure among city departments.

- The meeting featured a presentation and facilitated large group discussion using the virtual engagement tool menti.com to gather input. Participants were asked to respond to four discussion prompts:
    - How does green infrastructure advance your department's goals or interests? How can departments collaborate more effectively in light of these interests?
    - How would you rank common challenges: funding, regulatory requirements, follow-up maintenance, lack of understanding of green infrastructure and its benefits. What additional challenges and mitigation strategies are there?
    - What non-city resources / funding sources can be tapped into to get more green infrastructure projects completed for Richmond?
    - What's the best way to keep you / your department engaged? How can we continue to build on communication and collaboration?

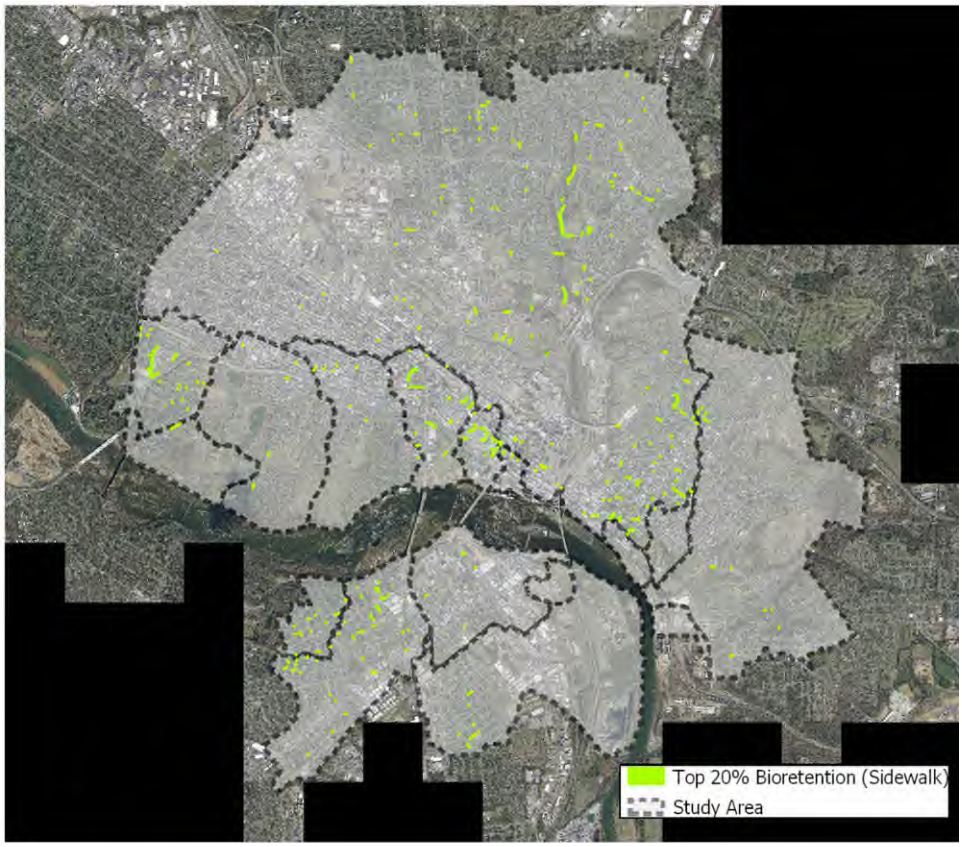
RVAH2O Green Infrastructure Master Plan Tool Demonstration Workshop, **18 May, 2021**

- The goals of this 60-minute engagement were to:
    - (1) Discuss potential workflow mechanisms that can improve consideration of GI on future CIPs;
    - (2) Present updates on the two sites recommended for conceptual design by the project team; and
    - 3) Present the Green Infrastructure Ranking Tool interface, gauge stakeholder interest on future use, and seek input on ways to improve its format and usability.

A total of X representatives of X City departments attended all of these engagements. Members of Arcadis and the Alliance also presented updates on the project at two RVAH2O meetings during the project period. All engagements were held remotely in light of the Covid 19 pandemic.

Appendix D

GI Ranking Tool Results by GI Category for Top 40% Sites



Top 40% Bioretention in ROW Sidewalk

Top 40% Bioretention in Right-of-Way Sidewalk

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC8069254	603 W 22nd St	1.00
BioSWRC8069259	616 W 21st St	0.97
BioSWRC711225	227 W 26th St	0.95
BioSWRC6536114	18 W 27th St	0.85
BioSWRC12511934	2827 Richmond Henrico Tpke	0.85
BioSWRC12511935	2827 Richmond Henrico Tpke	0.85
BioSWRC12511936	2831 Richmond Henrico Tpke	0.85
BioSWRC12511937	2835 Richmond Henrico Tpke	0.85
BioSWRC9096163	Rugby Road	0.84
BioSWRC13741940	451 E Brookland Park Blvd	0.83
BioSWRC13741904	2641 Richmond Henrico Tpke	0.83
BioSWRC27711796	2100 Richmond Henrico Tpke	0.83
BioSWRC27711797	210 Vale St	0.83
BioSWRC90971794	1530 Valley Road	0.83
BioSWRC7107251	610 W 24th St	0.82
BioSWRC77221244	3224 Condie St	0.82
BioSWRC693427	514 W 27th St	0.82
BioSWRC664698	3018 Springhill Ave	0.82
BioSWRC7112122	2410 Perry St	0.82
BioSWRC8070256	600 W 22nd St	0.82
BioSWRC688823	2606 Perry St	0.82
BioSWRC621115	618 W 32nd St	0.82
BioSWRC8412220	2600 The Terrace	0.81
BioSWRC8807267	2320 T St	0.81
BioSWRC89352203	1401 N 22nd St	0.81
BioSWRC56691509	1900 W Cary St	0.80
BioSWRC5948893	2521 E Franklin St	0.80
BioSWRC7090249	619 W 26th St	0.79
BioSWRC39971513	3301 Maplewood Ave	0.79
BioSWRC76941254	3512 Rosewood Ave	0.79
BioSWRC60745	200 W 34th St	0.79
BioSWRC7129232	1423 Perry St	0.79
BioSWRC61392169	617 W 31st St	0.79
BioSWRC9139507	2301 E Grace St	0.78
BioSWRC4063988	2902 Garrett St	0.78
BioSWRC40661233	3118 Garrett St	0.78
BioSWRC48711238	3108 Condie St	0.78
BioSWRC7112121	2418 Perry St	0.78
BioSWRC54141348	2701 W Cary St	0.78
BioSWRC5948892	2521 E Franklin St	0.77

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC39971356	3301 Maplewood Ave	0.77
BioSWRC33081828	1700 N 21st St	0.77
BioSWRC7605189	W Byrd St	0.77
BioSWRC7605190	W Byrd St	0.77
BioSWRC7692181	1 E Cary St	0.77
BioSWRC60906	217 W 34th St	0.76
BioSWRC9443699	1217 E Main St	0.76
BioSWRC9139321	2400 E Franklin St	0.76
BioSWRC89352200	1400 N 23rd St	0.76
BioSWRC23941342	114 W Main St	0.76
BioSWRC39642065	1405 St James St	0.76
BioSWRC618962	1805 Edwards Ave	0.76
BioSWRC7129231	1429 Perry St	0.76
BioSWRC59502172	527 E Main St	0.76
BioSWRC59552191	620 E Cary St	0.76
BioSWRC5955730	629 E Main St	0.76
BioSWRC6735108	3050 Decatur St	0.75
BioSWRC59502171	527 E Main St	0.75
BioSWRC5898700	2215 E Broad St	0.75
BioSWRC5898701	2201 E Broad St	0.75
BioSWRC6633104	3510 Stockton St	0.75
BioSWRC8070257	600 W 22nd St	0.74
BioSWRC9139506	2301 E Grace St	0.74
BioSWRC6650100	501 W 29th St	0.74
BioSWRC13841092	1200 Chamberlayne Pkwy	0.74
BioSWRC9267217	116 S 3rd St	0.74
BioSWRC60919	211 W 33rd St	0.74
BioSWRC40501234	3010 Douglasdale Road	0.73
BioSWRC48701240	3101 French St	0.73
BioSWRC60747	212 W 34th St	0.73
BioSWRC7112143	2517 Hargrove St	0.73
BioSWRC7112144	2517 Hargrove St	0.73
BioSWRC609118	3210 Forest Hill Ave	0.73
BioSWRC7518159	1821 Amelia St	0.73
BioSWRC39971247	3301 Maplewood Ave	0.72
BioSWRC7112126	2400 Mcdonough St	0.72
BioSWRC8194156	1601 Hampton St	0.72
BioSWRC48511386	700 Blanton Ave	0.72
BioSWRC611616	518 W 32nd St	0.72
BioSWRC711224	227 W 26th St	0.72
BioSWRC55721561	719 W Franklin St	0.72
BioSWRC55721632	719 W Franklin St	0.72

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC9259192	420 E Cary St	0.72
BioSWRC677794	3055 Lawson St	0.72
BioSWRC8202312	4000 Government Road	0.72
BioSWRC5955733	617 E Main St	0.71
BioSWRC8194155	1601 Hampton St	0.71
BioSWRC6941120	300 W 26th St	0.71
BioSWRC11151883	1518 Custer St	0.71
BioSWRC3252804	1000 Mosby St	0.71
BioSWRC609912	112 W 32nd St	0.71
BioSWRC5981592	26 S 8th St	0.70
BioSWRC6139101	614 W 30th St	0.70
BioSWRC39672137	18 W Baker St	0.70
BioSWRC39672138	18 W Baker St	0.70
BioSWRC39732064	1420 St Peter St	0.70
BioSWRC6881119	316 W 28th St	0.70
BioSWRC5892846	21 S 21st St	0.70
BioSWRC7112125	2400 Mcdonough St	0.70
BioSWRC665165	2301 Old Dominion St	0.70
BioSWRC7499129	2201 Mcdonough St	0.70
BioSWRC12031927	1009 E Brookland Park Blvd	0.69
BioSWRC12511933	500 Fourqurean Lane	0.69
BioSWRC12511939	503 E Brookland Park Blvd	0.69
BioSWRC8069255	613 W 22nd St	0.69
BioSWRC2663791	529 Mosby St	0.69
BioSWRC77221243	3224 Condie St	0.69
BioSWRC6776109	3010 Lawson St	0.69
BioSWRC9295227	700 Semmes Ave	0.68
BioSWRC6825132	310 W 31st St	0.68
BioSWRC6825133	310 W 31st St	0.68
BioSWRC9295224	332 W 7th St	0.68
BioSWRC39672055	2 W Baker St	0.68
BioSWRC6087115	3201 Forest Hill Ave	0.68
BioSWRC683095	3101 Forest Hill Ave	0.68
BioSWRC39672052	2 E Baker St	0.68
BioSWRC60918	203 W 33rd St	0.68
BioSWRC31361800	1321 N 21st St	0.68
BioSWRC10541175	3121 Moss Side Ave	0.68
BioSWRC10552221	3128 Edgewood Ave	0.68
BioSWRC10732225	500 W Ladies Mile Road	0.68
BioSWRC12601981	3100 Alvis Ave	0.68
BioSWRC13702131	500 Dove St	0.68
BioSWRC13741903	500 Dove St	0.68

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC13741905	2600 Richmond Henrico Tpke	0.68
BioSWRC5971212	2901 Seminary Ave	0.68
BioSWRC5971213	2901 Seminary Ave	0.68
BioSWRC90971795	1601 Sewell St	0.68
BioSWRC94881902	2700 Richmond Henrico Tpke	0.68
BioSWRC95341876	500 Dove St	0.68
BioSWRC95342085	2209 Althea St	0.68
BioSWRC9691188	3404 Montrose Ave	0.68
BioSWRC9752152	3101 Fendall Ave	0.68
BioSWRC9861976	3104 Hanes Ave	0.68
BioSWRC27542084	1606 Matthews St	0.68
BioSWRC27542151	1700 1st Ave	0.68
BioSWRC10411166	3208 Noble Ave	0.68
BioSWRC55721671	719 W Franklin St	0.68
BioSWRC45771993	609 Bancroft Ave	0.68
BioSWRC7518160	1821 Amelia St	0.68
BioSWRC621117	603 W 33rd St	0.67
BioSWRC5875582	2511 E Grace St	0.67
BioSWRC45541974	748 Arnold Ave	0.67
BioSWRC618964	1801 Edwards Ave	0.67
BioSWRC9139320	2418 E Franklin St Unit 108	0.67
BioSWRC12031911	2900 Groveland Ave	0.67
BioSWRC12031912	2900 Groveland Ave	0.67
BioSWRC31492103	1501 N 20th St	0.67
BioSWRC31492122	1501 N 20th St	0.67
BioSWRC32962105	1400 Mechanicsville Tpke	0.67
BioSWRC33081827	1700 N 21st St	0.67
BioSWRC33081829	2010 Brauers Lane	0.67
BioSWRC33402094	1606 Mechanicsville Tpke	0.67
BioSWRC27521852	1823 1st Ave	0.67
BioSWRC7718991	3000 Grant St	0.67
BioSWRC57101634	1432 Floyd Ave	0.67
BioSWRC95352086	2211 Althea St	0.67
BioSWRC18031250	3501 Rosewood Ave	0.66
BioSWRC18031251	3506 Maplewood Ave	0.66
BioSWRC7421792	2000 Greenwood Ave	0.66
BioSWRC86391103	1834 Thomas St	0.66
BioSWRC53591540	2100 W Cary St	0.66
BioSWRC740868	2022 Bainbridge St	0.66
BioSWRC76781412	2100 Idlewood Ave	0.66
BioSWRC76941253	3501 Idlewood Ave	0.66
BioSWRC13741941	451 E Brookland Park Blvd	0.66

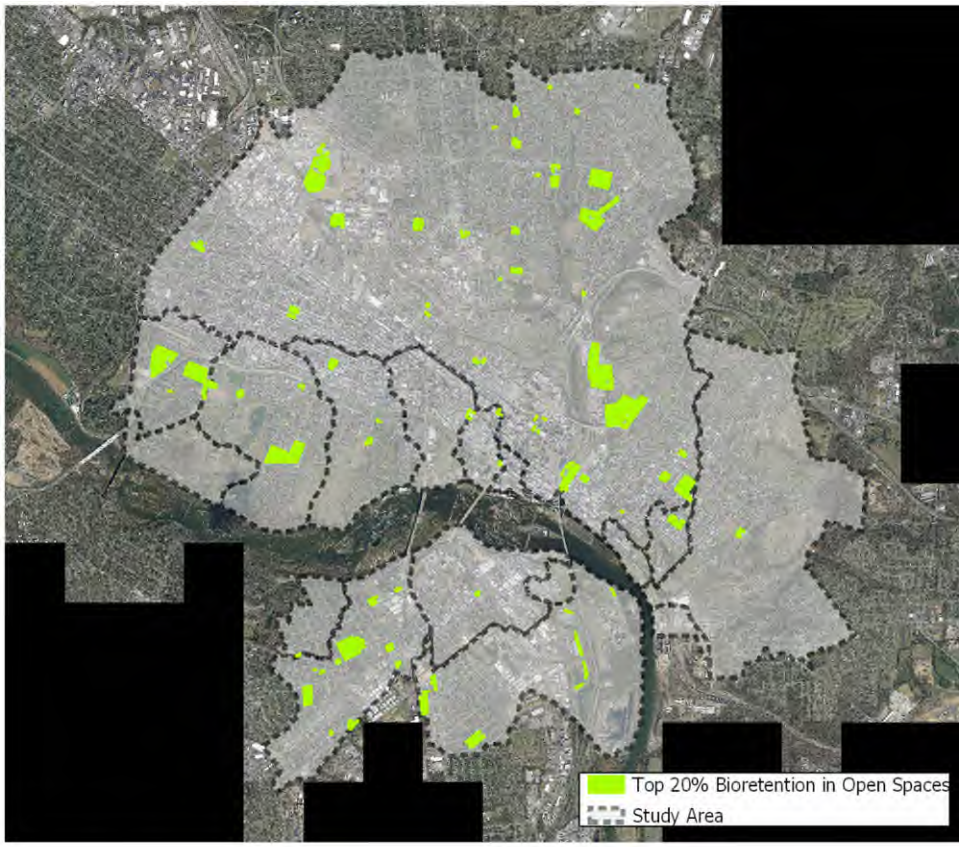
BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC32962106	1400 Mechanicsville Tpke	0.66
BioSWRC20892204	1506 N 25th St	0.66
BioSWRC2091274	1501 N 25th St	0.66
BioSWRC2498651	2601 O St	0.66
BioSWRC2498706	832 N 27th St	0.66
BioSWRC8807342	1406 N 25th St	0.66
BioSWRC10552045	3128 Edgewood Ave	0.66
BioSWRC2544782	2108 E Clay St	0.66
BioSWRC391512	3301 Maplewood Ave	0.65
BioSWRC7102127	400 W 24th St	0.65
BioSWRC2091467	1500 N 26th St	0.65
BioSWRC8973709	1500 E Main St	0.65
BioSWRC91661713	1627 Floyd Ave	0.65
BioSWRC2523335	2416 Venable St	0.65
BioSWRC79371371	1703 W Main St	0.65
BioSWRC8498215	110 Spring St	0.65
BioSWRC3248284	1122 N 21st St	0.65
BioSWRC3248286	1121 N 20th St	0.65
BioSWRC8245229	212 W 7th St	0.65
BioSWRC56531575	1809 W Main St	0.65
BioSWRC7645766	916 E Cary St	0.65
BioSWRC16771574	1100 W Franklin St	0.65
BioSWRC20261154	1210 Rennie Ave	0.65
BioSWRC5965801	606 E Main St	0.65
BioSWRC5965802	606 E Main St	0.65
BioSWRC6007824	107 N 8th St	0.65
BioSWRC6007826	107 N 8th St	0.65
BioSWRC6012754	1300 E Main St	0.65
BioSWRC6012755	1300 E Main St	0.65
BioSWRC6012808	1200 Bank St	0.65
BioSWRC6012809	1200 Bank St	0.65
BioSWRC82101158	909 Rennie Ave	0.65
BioSWRC7692180	1 E Cary St	0.65
BioSWRC20261058	1305 Westwood Ave	0.65
BioSWRC8973873	1519 E Franklin St	0.65
BioSWRC76781411	2100 Idlewood Ave	0.64
BioSWRC7106252	710 W 24th St	0.64
BioSWRC5741204	801 Edgehill Road	0.64
BioSWRC8041203	801 W Lancaster Road	0.64
BioSWRC391351	3301 Maplewood Ave	0.64
BioSWRC391352	3301 Maplewood Ave	0.64
BioSWRC39971357	3301 Maplewood Ave	0.64

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC77151353	3301 Maplewood Ave	0.64
BioSWRC77151354	3301 Maplewood Ave	0.64
BioSWRC7102128	404 W 24th St	0.64
BioSWRC89352201	1400 N 23rd St	0.64
BioSWRC28211789	1507 Call St	0.64
BioSWRC618963	1803 Edwards Ave	0.64
BioSWRC11991909	2820 Groveland Ave	0.64
BioSWRC9295223	332 W 7th St	0.64
BioSWRC2520796	1107 N 23rd St	0.64
BioSWRC7067130	619 W 30th St	0.64
BioSWRC12421963	600 Montvale Ave	0.63
BioSWRC10541174	3121 Moss Side Ave	0.63
BioSWRC401355	800 Freeman Road	0.63
BioSWRC15311618	2201 W Grace St	0.63
BioSWRC5888492	2301 E Franklin St	0.63
BioSWRC6880116	301 W 30th St	0.63
BioSWRC401358	800 Freeman Road	0.63
BioSWRC5875581	2513 E Grace St	0.63
BioSWRC22891311	414 W Broad St	0.63
BioSWRC78891656	713 W Broad St	0.63
BioSWRC80871684	620 W Cary St	0.63
BioSWRC6921124	422 W 27th St	0.63
BioSWRC20261153	1210 Rennie Ave	0.63
BioSWRC7067131	619 W 30th St	0.63
BioSWRC3469413	4609 Government Road	0.63
BioSWRC3472308	1301 Denny St	0.63
BioSWRC31302101	1501 N 21st St	0.63
BioSWRC31302102	1501 N 21st St	0.63
BioSWRC84661718	300 Randolph St	0.63
BioSWRC16371486	1403 W Leigh St	0.63
BioSWRC5909325	2100 E Franklin St	0.63
BioSWRC31302100	1501 N 21st St	0.63
BioSWRC51171383	2228 Stuart Ave	0.63
BioSWRC76232176	112 S 7th St	0.63
BioSWRC76232179	112 S 7th St	0.63
BioSWRC12511938	2835 Richmond Henrico Tpke	0.63
BioSWRC609119	3206 Forest Hill Ave	0.63
BioSWRC609120	3206 Forest Hill Ave	0.63
BioSWRC5963174	112 S 7th St	0.63
BioSWRC5955732	617 E Main St	0.63
BioSWRC14291477	914 Bowe St	0.63
BioSWRC16381521	916 Norton St	0.63

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC16781658	1021 W Clay St	0.63
BioSWRC61061	401 W 34th St	0.63
BioSWRC56111631	719 W Franklin St	0.62
BioSWRC56111669	719 W Franklin St	0.62
BioSWRC56111670	719 W Franklin St	0.62
BioSWRC48711241	3109 French St	0.62
BioSWRC10871885	1515 Custer St	0.62
BioSWRC45762004	501 Bancroft Ave	0.62
BioSWRC94242133	3100 Carolina Ave	0.62
BioSWRC11361899	2901 2nd Ave	0.62
BioSWRC4818989	3001 Grant St	0.62
BioSWRC8070219	2201 Semmes Ave	0.62
BioSWRC9691187	3400 Montrose Ave	0.62
BioSWRC2557812	810 N 21st St	0.62
BioSWRC21381328	1 W Grace St	0.62
BioSWRC21381331	2 W Franklin St	0.62
BioSWRC21381332	2 W Franklin St	0.62
BioSWRC21401302	17 E Grace St	0.62
BioSWRC21401305	12 E Franklin St	0.62
BioSWRC27521851	1823 1st Ave	0.62
BioSWRC31302099	1501 N 21st St	0.62
BioSWRC740969	2100 Bainbridge St	0.62
BioSWRC39572059	1026 N 2nd St	0.61
BioSWRC13722132	500 Dove St	0.61
BioSWRC7427221	2107 Semmes Ave	0.61
BioSWRC7427233	2107 Semmes Ave	0.61
BioSWRC7427234	2101 Semmes Ave	0.61
BioSWRC2559336	861 Jessamine St	0.61
BioSWRC2959445	3613 E Broad St	0.61
BioSWRC3248287	1121 N 20th St	0.61
BioSWRC76971258	918 Chamberlayne Pkwy	0.61
BioSWRC6012807	1200 Bank St	0.61
BioSWRC44352042	3607 Missouri Ave	0.61
BioSWRC44352043	3615 Missouri Ave	0.61
BioSWRC10571156	3201 Chamberlayne Ave	0.61
BioSWRC18601033	1519 Palmyra Ave	0.61
BioSWRC18651022	1512 Wilmington Ave	0.61
BioSWRC18651025	1525 W Laburnum Ave	0.61
BioSWRC19821079	1401 Wentbridge Road	0.61
BioSWRC20161165	1210 Rennie Ave	0.61
BioSWRC2446761	420 N 26th St	0.61
BioSWRC2462540	602 N 29th St	0.61

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC2470656	701 N 27th St	0.61
BioSWRC2470669	710 N 29th St	0.61
BioSWRC2470671	714 N 30th St	0.61
BioSWRC2470672	714 N 30th St	0.61
BioSWRC2470673	710 N 29th St	0.61
BioSWRC2585739	2308 E Clay St	0.61
BioSWRC2585742	513 N 23rd St	0.61
BioSWRC12601980	3122 Alvis Ave	0.61
BioSWRC8321882	2601 The Terrace	0.61
BioSWRC2585743	2307 Jefferson Ave	0.61
BioSWRC45251999	606 Bancroft Ave	0.61
BioSWRC45252000	600 Bancroft Ave	0.61
BioSWRC693428	517 W 28th St	0.61
BioSWRC18901037	1305 Westwood Ave	0.61
BioSWRC660236	2301 Joplin Ave	0.61
BioSWRC660237	2300 Ingram Ave	0.61
BioSWRC696342	2301 Halifax Ave	0.61
BioSWRC9861977	3104 Hanes Ave	0.61
BioSWRC7801125	2520 Northumberland Ave	0.61
BioSWRC19951057	1304 Whitby Road	0.61
BioSWRC2132168	400 E Main St	0.60
BioSWRC2133201	4 N 4th St	0.60
BioSWRC2411198	16 S 3rd St	0.60
BioSWRC2411199	16 S 3rd St	0.60
BioSWRC2411200	10 S 3rd St	0.60
BioSWRC2411208	219 E Main St	0.60
BioSWRC2411209	219 E Main St	0.60
BioSWRC9260195	301 E Main St	0.60
BioSWRC86132146	1700 1st Ave	0.60
BioSWRC7107250	602 W 24th St	0.60
BioSWRC76232175	112 S 7th St	0.60
BioSWRC76232180	112 S 7th St	0.60
BioSWRC11991908	2814 Groveland Ave	0.60
BioSWRC2470657	701 N 27th St	0.60
BioSWRC16241392	2300 Park Ave	0.60
BioSWRC16181559	421 Stuart Cir	0.60
BioSWRC10531149	3036 Moss Side Ave	0.60
BioSWRC27601850	1714 4th Ave	0.60
BioSWRC44172025	3511 Maryland Ave	0.60
BioSWRC2537753	801 N 23rd St	0.60
BioSWRC88072078	1416 N 24th St	0.60
BioSWRC8011210	2622 Seminary Ave	0.60

BioSWRC_ID	Address of nearest parcel	Normalized Score
BioSWRC609510	128 W 33rd St	0.60
BioSWRC10871886	2829 4th Ave	0.60
BioSWRC2544781	2114 E Clay St	0.60
BioSWRC8568879	2006 E Broad St	0.60
BioSWRC8070264	510 W 22nd St	0.60
BioSWRC8070265	510 W 22nd St	0.60
BioSWRC6017813	1201 E Marshall St	0.60
BioSWRC39672139	917 St John St	0.60
BioSWRC13841259	1200 Chamberlayne Pkwy	0.60
BioSWRC5892845	2125 E Main St	0.60
BioSWRC5892848	2101 E Main St	0.60
BioSWRC8306843	2000 E Cary St	0.60
BioSWRC13742164	451 E Brookland Park Blvd	0.60
BioSWRC13742165	451 E Brookland Park Blvd	0.60
BioSWRC606911	124 W 34th St	0.60
BioSWRC4590378	5100 Montebello Cir	0.60
BioSWRC2420679	2518 E Grace St	0.60
BioSWRC2433573	2600 E Grace St Unit 23	0.60
BioSWRC2663790	521 Mosby St	0.60
BioSWRC5909774	200 N 22nd St	0.60
BioSWRC57101635	1432 Floyd Ave	0.60



Top 40% Bioretention in Open Spaces

Top 40% Bioretention in Open Spaces

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW0000712050537	W0000712050	1211 S Allen Ave	City Of Richmond School Board	1.00
P_BioW0000712050538	W0000712050	1211 S Allen Ave	City Of Richmond School Board	1.00
P_BioS0001720001298	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	1.00
P_BioS0001720001283	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	1.00
P_BioS0001720001294	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	1.00
P_BioS0001720001296	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.99
P_BioW0000712050535	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.99
P_BioW0000712050541	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.99
P_BioS0001720001297	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.99
P_BioN00010370303929	N0001037030	3101 Fendall Ave	City Of Richmond School Board	0.98
P_BioN00006500013834	N0000650001	2310 1st Ave	City Of Richmond School Board	0.98
P_BioS0001720001284	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.98
P_BioW0000835001551	W0000835001	1821 Amelia St	City Of Richmond School Board	0.97
P_BioW0000835001553	W0000835001	1821 Amelia St	City Of Richmond School Board	0.97
P_BioN00007400133027	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.97
P_BioN00006500013841	N0000650001	2310 1st Ave	City Of Richmond School Board	0.97
P_BioN00006500013844	N0000650001	2310 1st Ave	City Of Richmond School Board	0.97
P_BioN00007400133033	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.97
P_BioN00006500013846	N0000650001	2310 1st Ave	City Of Richmond School Board	0.97
P_BioS0001720001295	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.96
P_BioN00006500013830	N0000650001	2310 1st Ave	City Of Richmond School Board	0.96
P_BioN00006500013826	N0000650001	2310 1st Ave	City Of Richmond School Board	0.96
P_BioW00008790032146	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.96
P_BioN00007400133034	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.95
P_BioW00013430012438	W0001343001	3000 Grant St	City Of Richmond School Board	0.95
P_BioW00013430012439	W0001343001	3000 Grant St	City Of Richmond School Board	0.95
P_BioW00013430012440	W0001343001	3000 Grant St	City Of Richmond School Board	0.95
P_BioW00013430012441	W0001343001	3000 Grant St	City Of Richmond School Board	0.95
P_BioW00013430012442	W0001343001	3000 Grant St	City Of Richmond School Board	0.95
P_BioN00006500013840	N0000650001	2310 1st Ave	City Of Richmond School Board	0.95
P_BioN00007400133036	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.95
P_BioN00006500013843	N0000650001	2310 1st Ave	City Of Richmond School Board	0.95
P_BioS0001720001289	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.95
P_BioW0000712050533	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.94
P_BioW00013430012437	W0001343001	3000 Grant St	City Of Richmond School Board	0.94
P_BioW0000835001548	W0000835001	1821 Amelia St	City Of Richmond School Board	0.94
P_BioW0000835001545	W0000835001	1821 Amelia St	City Of Richmond School Board	0.94
P_BioN00010370303927	N0001037030	3101 Fendall Ave	City Of Richmond School Board	0.94
P_BioS0001720001281	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.93

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW00016170012511	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.93
P_BioN00006500013825	N0000650001	2310 1st Ave	City Of Richmond School Board	0.93
P_BioN00007400133029	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.92
P_BioS0000863001239	S0000863001	2100 Ingram Ave	City Of Richmond	0.92
P_BioW00008470452020	W0000847045	301 S Meadow St	City Of Richmond Public Works	0.92
P_BioW00013430012436	W0001343001	3000 Grant St	City Of Richmond School Board	0.92
P_BioN00006500013827	N0000650001	2310 1st Ave	City Of Richmond School Board	0.92
P_BioS0001720001291	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.92
P_BioS0001720001285	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.92
P_BioN00006500013829	N0000650001	2310 1st Ave	City Of Richmond School Board	0.92
P_BioE0000381001965	E0000381001	701 N 25th St	City Of Richmond Public Works	0.91
P_BioE0000127005696	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.91
P_BioN00006500013824	N0000650001	2310 1st Ave	City Of Richmond School Board	0.91
P_BioE0000127016708	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.91
P_BioE00005400013376	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.91
P_BioS0001720001287	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.91
P_BioW0000712050539	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.90
P_BioW00016170014222	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.90
P_BioW00008470452019	W0000847045	301 S Meadow St	City Of Richmond Public Works	0.90
P_BioE0000127016710	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.90
P_BioW00016170012944	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.90
P_BioW0000712050540	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.90
P_BioN00007400133028	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.90
P_BioN00006500013822	N0000650001	2310 1st Ave	City Of Richmond School Board	0.89
P_BioE00004740011011	E0000474001	2517 Q St	City Of Richmond Public Works	0.89
P_BioN00006500013820	N0000650001	2310 1st Ave	City Of Richmond School Board	0.89
P_BioW0000712050534	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.89
P_BioW00008470452021	W0000847045	301 S Meadow St	City Of Richmond Public Works	0.89
P_BioE00005400013367	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.89
P_BioE0000381001983	E0000381001	701 N 25th St	City Of Richmond Public Works	0.89
P_BioN00006500013838	N0000650001	2310 1st Ave	City Of Richmond School Board	0.89
P_BioW00008790032133	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.89
P_BioS0001720001299	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.88
P_BioS0001720001292	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.88
P_BioN00006500013832	N0000650001	2310 1st Ave	City Of Richmond School Board	0.88
P_BioE00004520403309	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.88
P_BioE00004520403310	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.88
P_BioE00004520403311	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.88
P_BioE00004520403315	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.88
P_BioE00004520403316	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.88
P_BioE00005400013338	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.88

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00006500013828	N0000650001	2310 1st Ave	City Of Richmond School Board	0.88
P_BioW0000712050536	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.88
P_BioN00010370303928	N0001037030	3101 Fendall Ave	City Of Richmond School Board	0.88
P_BioW0000835001552	W0000835001	1821 Amelia St	City Of Richmond School Board	0.88
P_BioN00006500013837	N0000650001	2310 1st Ave	City Of Richmond School Board	0.88
P_BioS0001720001290	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.87
P_BioS0000482040177	S0000482040	2313 Wise St	City Of Richmond Public Utilities	0.87
P_BioN00006500013845	N0000650001	2310 1st Ave	City Of Richmond School Board	0.87
P_BioW00016170014221	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.87
P_BioE00005400013363	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.87
P_BioW0000835001549	W0000835001	1821 Amelia St	City Of Richmond School Board	0.87
P_BioW0000428002521	W0000428002	601 S Harrison St	City Of Richmond School Board	0.87
P_BioW0000428002524	W0000428002	601 S Harrison St	City Of Richmond School Board	0.87
P_BioE00005400013373	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.87
P_BioS0000482040178	S0000482040	2313 Wise St	City Of Richmond Public Utilities	0.87
P_BioE0000107025649	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.87
P_BioE0000107025652	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.87
P_BioN00006500013821	N0000650001	2310 1st Ave	City Of Richmond School Board	0.86
P_BioE0000090003626	E0000090003	1537 E Main St	City Of Richmond Dept Of Public Works	0.86
P_BioN00006500013842	N0000650001	2310 1st Ave	City Of Richmond School Board	0.86
P_BioE00004520723327	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.86
P_BioW00013430012435	W0001343001	3000 Grant St	City Of Richmond School Board	0.86
P_BioW0000835001550	W0000835001	1821 Amelia St	City Of Richmond School Board	0.86
P_BioE0000381001987	E0000381001	701 N 25th St	City Of Richmond Public Works	0.86
P_BioN00006500013831	N0000650001	2310 1st Ave	City Of Richmond School Board	0.86
P_BioN00006500013839	N0000650001	2310 1st Ave	City Of Richmond School Board	0.86
P_BioE00005400013366	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.86
P_BioW00008790032141	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.86
P_BioN00006500013823	N0000650001	2310 1st Ave	City Of Richmond School Board	0.86
P_BioS0001720001286	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.86
P_BioN00006500013835	N0000650001	2310 1st Ave	City Of Richmond School Board	0.86
P_BioN00008980013889	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.85
P_BioE00004520403317	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.85
P_BioS0000863001240	S0000863001	2100 Ingram Ave	City Of Richmond	0.85
P_BioW00008790032145	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.85
P_BioE00004520403303	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.85
P_BioN00009080193899	N0000908019	1015 E Brookland Park Blvd	City Of Richmond Recreation & Parks	0.85
P_BioN00009080193900	N0000908019	1015 E Brookland Park Blvd	City Of Richmond Recreation & Parks	0.85

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00009080193904	N0000908019	1015 E Brookland Park Blvd	City Of Richmond Recreation & Parks	0.85
P_BioN00007400133037	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.85
P_BioS0001720001282	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.85
P_BioW00016170014220	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.85
P_BioW00008790032142	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.84
P_BioE0000381001986	E0000381001	701 N 25th St	City Of Richmond Public Works	0.84
P_BioE00005400013344	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.84
P_BioW00016170012509	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.84
P_BioW00008470452023	W0000847045	301 S Meadow St	City Of Richmond Public Works	0.84
P_BioN00015100123147	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioN00015100203209	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00015100203231	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00015100203232	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00015100203234	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00015100203237	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00015100203238	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00015100203239	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00015100203240	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.84
P_BioN00012920043112	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.84
P_BioN00015100123149	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioW00008790032129	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.84
P_BioN00015100123151	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioN00015100124304	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioN00015100123145	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioE00004520403282	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.84
P_BioN00015100123146	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioE00005750011188	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.84
P_BioN00015100124303	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioE00005400013354	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.84
P_BioN00015100124301	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.84
P_BioN00004860013787	N0000486001	219 W Graham Road	City Of Richmond School Board	0.84
P_BioE00005400013362	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.84
P_BioE00005750011214	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.84
P_BioN00004860013783	N0000486001	219 W Graham Road	City Of Richmond School Board	0.83
P_BioE00005250011028	E0000525001	710 N 29th St	City Of Richmond School Board	0.83
P_BioE00005250011037	E0000525001	710 N 29th St	City Of Richmond School Board	0.83
P_BioE00005250011038	E0000525001	710 N 29th St	City Of Richmond School Board	0.83
P_BioE00005250011041	E0000525001	710 N 29th St	City Of Richmond School Board	0.83
P_BioE00004740011008	E0000474001	2517 Q St	City Of Richmond Public Works	0.83
P_BioE00005250011044	E0000525001	710 N 29th St	City Of Richmond School Board	0.83
P_BioE00005250011043	E0000525001	710 N 29th St	City Of Richmond School Board	0.83

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00004690032937	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.83
P_BioE0000381001964	E0000381001	701 N 25th St	City Of Richmond Public Works	0.83
P_BioE00005400013361	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.83
P_BioW00007290082661	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.83
P_BioW00007290082658	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.83
P_BioN00015100123158	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.83
P_BioN00012920043114	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.83
P_BioE0000381001992	E0000381001	701 N 25th St	City Of Richmond Public Works	0.83
P_BioE0000107025651	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.83
P_BioW00016170012515	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.83
P_BioW0000835001547	W0000835001	1821 Amelia St	City Of Richmond School Board	0.83
P_BioN00012920043079	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.83
P_BioW00007290082664	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.83
P_BioE0000381001963	E0000381001	701 N 25th St	City Of Richmond Public Works	0.83
P_BioE00005400013365	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.82
P_BioE00005400013371	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.82
P_BioW00000250014026	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.82
P_BioE0000381001978	E0000381001	701 N 25th St	City Of Richmond Public Works	0.82
P_BioE0000381001984	E0000381001	701 N 25th St	City Of Richmond Public Works	0.82
P_BioE00005250011026	E0000525001	710 N 29th St	City Of Richmond School Board	0.82
P_BioW00016170012512	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.82
P_BioE0000381001961	E0000381001	701 N 25th St	City Of Richmond Public Works	0.82
P_BioW0001502001T2479	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.82
P_BioW0001502001T2487	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.82
P_BioN00015100203208	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.82
P_BioW00016170012510	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.82
P_BioS0001720001288	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.82
P_BioE00005400013342	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.82
P_BioW00000250014022	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.82
P_BioN00015100203214	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.82
P_BioS0000500028193	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.82
P_BioE00005250011046	E0000525001	710 N 29th St	City Of Richmond School Board	0.82
P_BioW0001502001T2488	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.82
P_BioE00005750011200	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.82
P_BioN00003660024289	N0000366002	400 School St	City Of Richmond Public Works	0.82
P_BioE0000127016709	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.82
P_BioE0000381001997	E0000381001	701 N 25th St	City Of Richmond Public Works	0.82
P_BioE0000381001982	E0000381001	701 N 25th St	City Of Richmond Public Works	0.82

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00012920043117	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.82
P_BioE00004520403287	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.82
P_BioW0001502001T2472	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.81
P_BioW0000835001544	W0000835001	1821 Amelia St	City Of Richmond School Board	0.81
P_BioE0000127016705	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.81
P_BioW00016170014223	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.81
P_BioE0000381001966	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioE0000127016713	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.81
P_BioE0000127005693	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.81
P_BioW0001502001T2496	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.81
P_BioE00005750011202	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.81
P_BioE00004520403296	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.81
P_BioE0000381001989	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioE0000381001985	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioE0000381001974	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioN00015100203222	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.81
P_BioE0000381001973	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioW0000835001542	W0000835001	1821 Amelia St	City Of Richmond School Board	0.81
P_BioN00008030013865	N0000803001	1111 Fourqurean Lane	City Of Richmond Public Works	0.81
P_BioE0000381001994	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioE0000381001959	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioN00001220012780	N0000122001	119 W Leigh St	City Of Richmond School Board	0.81
P_BioE0000381001967	E0000381001	701 N 25th St	City Of Richmond Public Works	0.81
P_BioN00008030013864	N0000803001	1111 Fourqurean Lane	City Of Richmond Public Works	0.81
P_BioS0000863001243	S0000863001	2100 Ingram Ave	City Of Richmond	0.81
P_BioE00004740011020	E0000474001	2517 Q St	City Of Richmond Public Works	0.81
P_BioE00004520403314	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.81
P_BioE00005400013379	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.81
P_BioW00008790032144	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.80
P_BioE0000107025646	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.80
P_BioE00004740011005	E0000474001	2517 Q St	City Of Richmond Public Works	0.80
P_BioW00010420192373	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.80
P_BioW00010420192377	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.80
P_BioW00010420192386	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.80
P_BioW0001502001T2494	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.80
P_BioS0000863001237	S0000863001	2100 Ingram Ave	City Of Richmond	0.80
P_BioW00008790032131	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.80
P_BioE0000381001995	E0000381001	701 N 25th St	City Of Richmond Public Works	0.80
P_BioE00005400013341	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.80

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW0001502001T2492	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.80
P_BioE00005400013346	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.80
P_BioN00015100203236	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.80
P_BioE00005250011035	E0000525001	710 N 29th St	City Of Richmond School Board	0.80
P_BioE00005750011220	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.80
P_BioE00005250011036	E0000525001	710 N 29th St	City Of Richmond School Board	0.79
P_BioN00004860013786	N0000486001	219 W Graham Road	City Of Richmond School Board	0.79
P_BioE00004740011012	E0000474001	2517 Q St	City Of Richmond Public Works	0.79
P_BioN00015100203224	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.79
P_BioE0000127005695	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.79
P_BioN00015100123144	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.79
P_BioN00012920043105	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.79
P_BioE0000127005689	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.79
P_BioS0000863001242	S0000863001	2100 Ingram Ave	City Of Richmond	0.79
P_BioS0070774010360	S0070774010	2214 Maury St	City Of Richmond Public Works	0.79
P_BioS0000863001235	S0000863001	2100 Ingram Ave	City Of Richmond	0.79
P_BioS0000863001238	S0000863001	2100 Ingram Ave	City Of Richmond	0.79
P_BioE00004740011010	E0000474001	2517 Q St	City Of Richmond Public Works	0.79
P_BioN00000040023530	N0000004002	400 N 9th St	City Of Richmond Public Works	0.79
P_BioS0070774010353	S0070774010	2214 Maury St	City Of Richmond Public Works	0.79
P_BioS0070774010320	S0070774010	2214 Maury St	City Of Richmond Public Works	0.79
P_BioE0000381001970	E0000381001	701 N 25th St	City Of Richmond Public Works	0.79
P_BioW0001502001T2474	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.79
P_BioE00004520403293	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.79
P_BioN00015100203225	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.79
P_BioE0000127005685	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.79
P_BioN00004860013785	N0000486001	219 W Graham Road	City Of Richmond School Board	0.79
P_BioS0000863001241	S0000863001	2100 Ingram Ave	City Of Richmond	0.79
P_BioW0001502001T2484	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.79
P_BioE00005400013336	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.79
P_BioW00000250014037	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.79
P_BioE0000107025632	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.79
P_BioE0000127002683	E0000127002	1607 E Broad St	City Of Richmond Public Works	0.79
P_BioW00000250014024	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.79
P_BioN00012920043100	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.79
P_BioE00004520723328	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.79
P_BioE0000127016711	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.79

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW00000250014023	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.79
P_BioE00005400013334	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.79
P_BioE00004520723333	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.79
P_BioN00015100124305	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.79
P_BioS00701910121924	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.79
P_BioE00005250011033	E0000525001	710 N 29th St	City Of Richmond School Board	0.79
P_BioE0000381001991	E0000381001	701 N 25th St	City Of Richmond Public Works	0.79
P_BioE00004520403283	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.79
P_BioE0000381001980	E0000381001	701 N 25th St	City Of Richmond Public Works	0.78
P_BioN00007400133032	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.78
P_BioE00005250011031	E0000525001	710 N 29th St	City Of Richmond School Board	0.78
P_BioE00004520403291	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.78
P_BioE00005250011034	E0000525001	710 N 29th St	City Of Richmond School Board	0.78
P_BioE00005400013368	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.78
P_BioE00005400013335	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.78
P_BioE00005750011186	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.78
P_BioE00004520723320	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.78
P_BioE0000175001T4184	E0000175001T	301 N 9th St	City Of Richmond Public Works	0.78
P_BioE00005250011032	E0000525001	710 N 29th St	City Of Richmond School Board	0.78
P_BioN00007400133031	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.78
P_BioW0000428002519	W0000428002	601 S Harrison St	City Of Richmond School Board	0.78
P_BioN00008940153872	N0000894015	2901 North Ave	City Of Richmond Public Works	0.78
P_BioE00005400013343	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.78
P_BioE00002350013261	E0000235001	501 N 9th St	City Of Richmond Public Works	0.78
P_BioS0070817003362	S0070817003	3055 Logandale Ave	City Of Richmond Recreation & Parks	0.78
P_BioE00004520403313	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.78
P_BioE00005250011024	E0000525001	710 N 29th St	City Of Richmond School Board	0.78
P_BioE00004520403307	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.78
P_BioE00005250011027	E0000525001	710 N 29th St	City Of Richmond School Board	0.78
P_BioE00005400013378	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.78
P_BioW00008790032122	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.78
P_BioW0000428002520	W0000428002	601 S Harrison St	City Of Richmond School Board	0.77
P_BioE0000381001990	E0000381001	701 N 25th St	City Of Richmond Public Works	0.77
P_BioE0000381001960	E0000381001	701 N 25th St	City Of Richmond Public Works	0.77
P_BioE00004520403290	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.77
P_BioE00005400013347	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.77
P_BioE00005400013337	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.77
P_BioN00015100203233	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.77
P_BioE00004520403306	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.77
P_BioN00008030013863	N0000803001	1111 Fourqurean Lane	City Of Richmond Public Works	0.77

P_BioID	PIN	Address	Owner	Normalized Score
P_BioE00004520403305	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.77
P_BioN00015100124309	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.77
P_BioW0001502001T2486	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.77
P_BioN00008980013887	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.77
P_BioW00000170212003	W0000017021	800 P2 E Canal St	City Of Richmond	0.77
P_BioE00005400013350	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.77
P_BioE00004520723326	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.77
P_BioN00015100203217	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.77
P_BioE00005400013359	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.77
P_BioN00012920043085	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.77
P_BioE00005400013381	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.77
P_BioE00004520403286	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.77
P_BioE0000107025643	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.77
P_BioE00005400013339	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.77
P_BioE00004520403289	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.77
P_BioE0000299001909	E0000299001	2301 E Grace St	City Of Richmond School Board	0.77
P_BioN00015100124307	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.77
P_BioE00004520403308	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioE00005400013348	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.76
P_BioE00005750011219	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.76
P_BioW00008790032127	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.76
P_BioE00005400013340	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.76
P_BioE00004520403292	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioW00000620014264	W0000062001	101 E Franklin St	City Of Richmond	0.76
P_BioE00004520403304	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioS0000500028181	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.76
P_BioN00005320012964	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.76
P_BioE00005400013349	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.76
P_BioE00004520403278	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioE00005400013374	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.76
P_BioE00004520403281	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioE00004520403280	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioW0000835001543	W0000835001	1821 Amelia St	City Of Richmond School Board	0.76
P_BioE00004520403288	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioS000008100166	S0000081001	920 Hull St	City Of Richmond Public Works	0.76
P_BioE00004520403279	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioW00016170012514	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.76
P_BioN00004860013779	N0000486001	219 W Graham Road	City Of Richmond School Board	0.76
P_BioE00003620014209	E0000362001	1000 Mosby St	City Of Richmond School Board	0.76
P_BioE0000381001993	E0000381001	701 N 25th St	City Of Richmond Public Works	0.76

P_BioID	PIN	Address	Owner	Normalized Score
P_BioS000008100168	S0000081001	920 Hull St	City Of Richmond Public Works	0.76
P_BioN00015100123162	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.76
P_BioE00004520403297	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.76
P_BioE00004520403294	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.75
P_BioW00008790032137	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.75
P_BioE00004520403312	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.75
P_BioW00008790032132	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.75
P_BioE00003620014193	E0000362001	1000 Mosby St	City Of Richmond School Board	0.75
P_BioE00003620013268	E0000362001	1000 Mosby St	City Of Richmond School Board	0.75
P_BioN00012920043091	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.75
P_BioN00009080193903	N0000908019	1015 E Brookland Park Blvd	City Of Richmond Recreation & Parks	0.75
P_BioE00005750011204	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.75
P_BioE00003620013270	E0000362001	1000 Mosby St	City Of Richmond School Board	0.75
P_BioS0070774010351	S0070774010	2214 Maury St	City Of Richmond Public Works	0.75
P_BioE00003620013271	E0000362001	1000 Mosby St	City Of Richmond School Board	0.75
P_BioS00702920091976	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.75
P_BioS00702920091967	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.75
P_BioS00702920091973	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.75
P_BioN00012920043097	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.75
P_BioE0000127005697	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.75
P_BioE00005250011040	E0000525001	710 N 29th St	City Of Richmond School Board	0.75
P_BioN00008030013861	N0000803001	1111 Fourqurean Lane	City Of Richmond Public Works	0.75
P_BioE00005750011218	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.75
P_BioN00001220012786	N0000122001	119 W Leigh St	City Of Richmond School Board	0.75
P_BioE00004520723321	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.75
P_BioE00004520723332	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.75
P_BioS0000302012163	S0000302012	1905 Semmes Ave	City Of Richmond C/o City Attorney	0.74
P_BioN00015100124299	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.74
P_BioE00005250011039	E0000525001	710 N 29th St	City Of Richmond School Board	0.74
P_BioN00003660024283	N0000366002	400 School St	City Of Richmond Public Works	0.74
P_BioE00005250011023	E0000525001	710 N 29th St	City Of Richmond School Board	0.74
P_BioW0001502001T2491	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.74
P_BioE00003620014211	E0000362001	1000 Mosby St	City Of Richmond School Board	0.74
P_BioS0001130013275	S0001130013	2901 Bainbridge St	City Of Richmond Public Works	0.74
P_BioN00015100124306	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.74
P_BioE00004520723319	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.74
P_BioW0001502001T2478	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.74
P_BioE00004520723322	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.74
P_BioS0000500028182	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.74

P_BioID	PIN	Address	Owner	Normalized Score
P_BioE00005750011190	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.74
P_BioN00015100123157	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.74
P_BioW00007290082666	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.74
P_BioN00012920043084	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.74
P_BioW00008790032116	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.74
P_BioN00008980013885	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.74
P_BioN00008980013879	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.74
P_BioN00012920043080	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.74
P_BioW0001502001T2489	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.74
P_BioS00702920091987	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.74
P_BioE0000175001T796	E0000175001T	301 N 9th St	City Of Richmond Public Works	0.74
P_BioN00008030013862	N0000803001	1111 Fourqurean Lane	City Of Richmond Public Works	0.74
P_BioE00004520403302	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.74
P_BioS00702920091969	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.74
P_BioN00012580203971	N0001258020	410 Pollock St	City Of Richmond Public Works	0.73
P_BioW00007290082667	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.73
P_BioE00003620014210	E0000362001	1000 Mosby St	City Of Richmond School Board	0.73
P_BioN00012920043096	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioN00015100123148	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.73
P_BioE00003620014207	E0000362001	1000 Mosby St	City Of Richmond School Board	0.73
P_BioN00005320012953	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.73
P_BioE00003620014208	E0000362001	1000 Mosby St	City Of Richmond School Board	0.73
P_BioN00007400133035	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.73
P_BioN00015100123152	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.73
P_BioE0000160013791	E0000160013	212 N 18th St	City Of Richmond Recreation & Parks	0.73
P_BioW00008790412169	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.73
P_BioE00004520403299	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.73
P_BioS00702920091974	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.73
P_BioN00012920043082	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioN00012920043101	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioS0000914001274	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73
P_BioS0000914001272	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73
P_BioN00012920043098	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioN00015100203210	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.73
P_BioN00012920043078	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioW00007290082663	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.73
P_BioS0000914001245	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73

P_BioID	PIN	Address	Owner	Normalized Score
P_BioS0000914001267	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73
P_BioS0000914001263	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73
P_BioN00012920043107	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioN00015100123154	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.73
P_BioN00007400133030	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.73
P_BioS0000914001271	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73
P_BioW00007290082665	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.73
P_BioN00015100203230	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.73
P_BioN00005320012952	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.73
P_BioN00015100203242	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.73
P_BioN00005320012954	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.73
P_BioE00005750011205	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.73
P_BioW00000620014260	W0000062001	101 E Franklin St	City Of Richmond	0.73
P_BioE00005750011215	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.73
P_BioW00008790522324	W0000879052	600 Swan Lake Dr	City Of Richmond Recreation & Parks	0.73
P_BioS0000914001255	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73
P_BioN00005320012955	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.73
P_BioN00012920043088	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioS0000914001260	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.73
P_BioN00012920043109	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.73
P_BioE00005750011198	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72
P_BioW00008790522323	W0000879052	600 Swan Lake Dr	City Of Richmond Recreation & Parks	0.72
P_BioN00015100203243	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72
P_BioN00008980013888	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.72
P_BioE00005750011194	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72
P_BioN00004860013782	N0000486001	219 W Graham Road	City Of Richmond School Board	0.72
P_BioW0001502001T2476	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.72
P_BioE00005250021085	E0000525002	714 N 30th St	City Of Richmond Public Utilities	0.72
P_BioN00015100123156	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.72
P_BioW00008790522320	W0000879052	600 Swan Lake Dr	City Of Richmond Recreation & Parks	0.72
P_BioE0000175001T3260	E0000175001T	301 N 9th St	City Of Richmond Public Works	0.72
P_BioN00005320012960	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.72
P_BioS00701910121925	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.72
P_BioE00005750011217	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72
P_BioE00005750011191	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72

P_BioID	PIN	Address	Owner	Normalized Score
P_BioE0000127016704	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.72
P_BioE00014140011458	E0001414001	701 N 37th St	City Of Richmond School Board	0.72
P_BioE00014140011460	E0001414001	701 N 37th St	City Of Richmond School Board	0.72
P_BioN00015100203241	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72
P_BioN00015100203219	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72
P_BioN00005320012951	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.72
P_BioN00005320012961	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.72
P_BioN00015100124302	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.72
P_BioN00015100123141	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.72
P_BioW0000835001546	W0000835001	1821 Amelia St	City Of Richmond School Board	0.72
P_BioN00012920043083	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.72
P_BioW00007290082668	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.72
P_BioW00000620012736	W0000062001	101 E Franklin St	City Of Richmond	0.72
P_BioN00012580203969	N0001258020	410 Pollock St	City Of Richmond Public Works	0.72
P_BioN00005320012963	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.72
P_BioE0000127005700	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.72
P_BioN00012920043081	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.72
P_BioN00005320012957	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.72
P_BioE00005400013353	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.72
P_BioN00015100203211	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72
P_BioN00015100203221	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72
P_BioN00008030133870	N0000803013	2614 1st Ave	City Of Richmond Public Works	0.72
P_BioN00012920043094	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.72
P_BioN00012920043103	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.72
P_BioE00005750011216	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72
P_BioN00008980013883	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.72
P_BioE00005750011189	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72
P_BioN00015100203216	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72
P_BioN00012920043108	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.72
P_BioN00015100123143	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.72
P_BioN00003660024292	N0000366002	400 School St	City Of Richmond Public Works	0.72
P_BioE00005750011197	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72
P_BioS00702920091963	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.72
P_BioE00005250021083	E0000525002	714 N 30th St	City Of Richmond Public Utilities	0.72
P_BioN00012920043086	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.72
P_BioW00000170212002	W0000017021	800 P2 E Canal St	City Of Richmond	0.72
P_BioE00005750011206	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.72
P_BioN00012920043115	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.72
P_BioN00015100203213	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00005320012956	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.72
P_BioE0000175001T799	E0000175001T	301 N 9th St	City Of Richmond Public Works	0.72
P_BioW00008790522325	W0000879052	600 Swan Lake Dr	City Of Richmond Recreation & Parks	0.72
P_BioS0070774010316	S0070774010	2214 Maury St	City Of Richmond Public Works	0.72
P_BioE00002350013262	E0000235001	501 N 9th St	City Of Richmond Public Works	0.72
P_BioN00005320012962	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.72
P_BioN00015100203204	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.72
P_BioW00007290082662	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.72
P_BioS0070774010318	S0070774010	2214 Maury St	City Of Richmond Public Works	0.72
P_BioS00702920091961	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.72
P_BioW00000250014021	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.72
P_BioN00008940153873	N0000894015	2901 North Ave	City Of Richmond Public Works	0.72
P_BioN00012920043090	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.71
P_BioE00005750011193	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioN00000090013603	N0000009001	808 E Clay St	City Of Richmond Dept Of Public Works	0.71
P_BioW0001502001T2495	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.71
P_BioE0000127016702	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.71
P_BioE00005750011192	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioE00005750011196	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioS00702920091966	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.71
P_BioE00005250011025	E0000525001	710 N 29th St	City Of Richmond School Board	0.71
P_BioW00000080014009	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.71
P_BioS0000500028188	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.71
P_BioE00005750011203	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioE0000090003625	E0000090003	1537 E Main St	City Of Richmond Dept Of Public Works	0.71
P_BioE00005750011207	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioN00012920043111	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.71
P_BioN00004860013780	N0000486001	219 W Graham Road	City Of Richmond School Board	0.71
P_BioW00008790032091	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.71
P_BioN00012920043104	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.71
P_BioN00001220012784	N0000122001	119 W Leigh St	City Of Richmond School Board	0.71
P_BioW00000080011997	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.71
P_BioN00000110023609	N0000011002	500 E Marshall St	City Of Richmond C/o Decd Main Street Station	0.71
P_BioN00004690032926	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.71
P_BioN00015100093121	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.71

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00015100093124	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.71
P_BioN00015100093129	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.71
P_BioN00015100093137	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.71
P_BioN00015100093138	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.71
P_BioE00005750011187	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioE0000107025633	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.71
P_BioN00015100093136	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.71
P_BioN00001220012781	N0000122001	119 W Leigh St	City Of Richmond School Board	0.71
P_BioN00004860013784	N0000486001	219 W Graham Road	City Of Richmond School Board	0.71
P_BioS0070774010327	S0070774010	2214 Maury St	City Of Richmond Public Works	0.71
P_BioE00005250011045	E0000525001	710 N 29th St	City Of Richmond School Board	0.71
P_BioN00003660024293	N0000366002	400 School St	City Of Richmond Public Works	0.71
P_BioE00005250011029	E0000525001	710 N 29th St	City Of Richmond School Board	0.71
P_BioS0000914001254	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.71
P_BioN00004690032930	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.71
P_BioS00702920091978	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.71
P_BioN00003660013704	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.71
P_BioN00008940153875	N0000894015	2901 North Ave	City Of Richmond Public Works	0.71
P_BioN00004760062941	N0000476006	1617 Brook Road	City Of Richmond	0.71
P_BioE00005750011195	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioN00000070013566	N0000007001	600 E Clay St	City Of Richmond	0.71
P_BioS00702920091977	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.71
P_BioN00003660024284	N0000366002	400 School St	City Of Richmond Public Works	0.71
P_BioN00008940153877	N0000894015	2901 North Ave	City Of Richmond Public Works	0.71
P_BioE00005750011221	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.71
P_BioW00007290082669	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.71
P_BioS0070774010328	S0070774010	2214 Maury St	City Of Richmond Public Works	0.71
P_BioN00004390032917	N0000439003	1600 Chamberlayne Pkwy	City Of Richmond Public Works	0.71
P_BioN00015100093134	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.71
P_BioE00005400013380	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.71
P_BioN00004690032936	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.71
P_BioS00702920091968	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.71
P_BioS0000500028183	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.71
P_BioS0070774010313	S0070774010	2214 Maury St	City Of Richmond Public Works	0.71
P_BioN00008940153874	N0000894015	2901 North Ave	City Of Richmond Public Works	0.71
P_BioE0000090003624	E0000090003	1537 E Main St	City Of Richmond Dept Of Public Works	0.71

P_BioID	PIN	Address	Owner	Normalized Score
P_BioE0000127016703	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.71
P_BioW00008790032094	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.71
P_BioS0070774010341	S0070774010	2214 Maury St	City Of Richmond Public Works	0.71
P_BioW00008790032109	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.71
P_BioW00008790032092	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.71
P_BioN00015100113139	N0001510011	2909 N Arthur Ashe Blvd	City Of Richmond Public Works	0.70
P_BioW0001502001T2493	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.70
P_BioS00702920091982	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.70
P_BioE00005750011222	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.70
P_BioS0070774010319	S0070774010	2214 Maury St	City Of Richmond Public Works	0.70
P_BioE00003620014186	E0000362001	1000 Mosby St	City Of Richmond School Board	0.70
P_BioN00001220012778	N0000122001	119 W Leigh St	City Of Richmond School Board	0.70
P_BioN00005320012950	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.70
P_BioN00003660014280	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.70
P_BioW00000080014007	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.70
P_BioE00005400013358	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.70
P_BioN00012580203970	N0001258020	410 Pollock St	City Of Richmond Public Works	0.70
P_BioS0000500028190	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.70
P_BioW00008790032117	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.70
P_BioN00000070013564	N0000007001	600 E Clay St	City Of Richmond	0.70
P_BioN00003660024294	N0000366002	400 School St	City Of Richmond Public Works	0.70
P_BioN00000080013584	N0000008001	512 N 8th St	City Of Richmond Dept Of Public Works	0.70
P_BioN00000070013550	N0000007001	600 E Clay St	City Of Richmond	0.70
P_BioN00004690032934	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.70
P_BioE00003620014203	E0000362001	1000 Mosby St	City Of Richmond School Board	0.70
P_BioN00003660024297	N0000366002	400 School St	City Of Richmond Public Works	0.70
P_BioW00000080014008	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.70
P_BioW00000620012733	W0000062001	101 E Franklin St	City Of Richmond	0.70
P_BioW00008790022079	W0000879002	2701 Park Dr	City Of Richmond Public Utilities	0.70
P_BioN00003660013707	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.70
P_BioW00000250014013	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.70
P_BioW00000250014017	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.70
P_BioW00000080011994	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.70
P_BioE0000107025645	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.70
P_BioW00000620014261	W0000062001	101 E Franklin St	City Of Richmond	0.70
P_BioE0000127002675	E0000127002	1607 E Broad St	City Of Richmond Public Works	0.70
P_BioN00001220012782	N0000122001	119 W Leigh St	City Of Richmond School Board	0.70

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW00000250014025	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.69
P_BioW00000250014012	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.69
P_BioE0000127005698	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.69
P_BioW00000250014027	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.69
P_BioN00003660013703	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.69
P_BioE01204000013513	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.69
P_BioN00015100093122	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.69
P_BioN00004690032928	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.69
P_BioW00010420192376	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.69
P_BioW00000080014005	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.69
P_BioW00000080011995	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.69
P_BioW00000080014214	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.69
P_BioW00000080011996	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.69
P_BioE0000107025634	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.69
P_BioW00000080014215	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.69
P_BioE00004520403300	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.69
P_BioN00012920043113	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.69
P_BioW00000080014006	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.69
P_BioE00005250011030	E0000525001	710 N 29th St	City Of Richmond School Board	0.69
P_BioW00013400012427	W0001340001	700 Blanton Ave	City Of Richmond Recreation & Parks	0.69
P_BioW00008790412170	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.69
P_BioS000008100158	S0000081001	920 Hull St	City Of Richmond Public Works	0.69
P_BioE0000175001T798	E0000175001T	301 N 9th St	City Of Richmond Public Works	0.69
P_BioW00000620012739	W0000062001	101 E Franklin St	City Of Richmond	0.69
P_BioN00004760062943	N0000476006	1617 Brook Road	City Of Richmond	0.69
P_BioW00008790032113	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.69
P_BioS0070774010323	S0070774010	2214 Maury St	City Of Richmond Public Works	0.69
P_BioE01204000013512	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.69
P_BioN00003660024295	N0000366002	400 School St	City Of Richmond Public Works	0.68
P_BioW00006010012577	W0000601001	1501 Grayland Ave	City Of Richmond School Board	0.68
P_BioN00003660024296	N0000366002	400 School St	City Of Richmond Public Works	0.68
P_BioN00003660024286	N0000366002	400 School St	City Of Richmond Public Works	0.68
P_BioW00006010012586	W0000601001	1501 Grayland Ave	City Of Richmond School Board	0.68
P_BioE00003620013269	E0000362001	1000 Mosby St	City Of Richmond School Board	0.68

P_BioID	PIN	Address	Owner	Normalized Score
P_BioE01201460023496	E0120146002	2011 Mechanicsville Tpke	City Of Richmond Richmond Nursing Health	0.68
P_BioE00003620013267	E0000362001	1000 Mosby St	City Of Richmond School Board	0.68
P_BioE0000299001914	E0000299001	2301 E Grace St	City Of Richmond School Board	0.68
P_BioS0070774010342	S0070774010	2214 Maury St	City Of Richmond Public Works	0.68
P_BioE01204000013518	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.68
P_BioN00004760062940	N0000476006	1617 Brook Road	City Of Richmond	0.68
P_BioW00016570044233	W0001657004	414 N Thompson St	City Of Richmond Recreation & Parks	0.68
P_BioN00004390032920	N0000439003	1600 Chamberlayne Pkwy	City Of Richmond Public Works	0.68
P_BioE0000127005701	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.68
P_BioS00701910121825	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioS00701910121864	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioS00701910121879	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioS00701910121858	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioE01204000013514	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.68
P_BioS00701910121886	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioS00701910121863	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioS0070774010314	S0070774010	2214 Maury St	City Of Richmond Public Works	0.68
P_BioS00701910121872	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioN00004690032935	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.68
P_BioW00000480012738	W0000048001	107 N 2nd St	City Of Richmond Dept Of Public Works	0.68
P_BioS00702920091975	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.68
P_BioN00004760062938	N0000476006	1617 Brook Road	City Of Richmond	0.68
P_BioW00010420192378	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.68
P_BioS0070774010350	S0070774010	2214 Maury St	City Of Richmond Public Works	0.68
P_BioN00004760062939	N0000476006	1617 Brook Road	City Of Richmond	0.68
P_BioW00010420192375	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.68
P_BioN00008030133871	N0000803013	2614 1st Ave	City Of Richmond Public Works	0.68
P_BioS00701910121842	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioS00702920091970	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.68
P_BioN00015570014001	N0001557001	463 E Ladies Mile Road	City Of Richmond Recreation & Parks	0.68
P_BioS00701910121839	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.68
P_BioN00015570014003	N0001557001	463 E Ladies Mile Road	City Of Richmond Recreation & Parks	0.68
P_BioN00004690032924	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.68
P_BioN00004390032919	N0000439003	1600 Chamberlayne Pkwy	City Of Richmond Public Works	0.67
P_BioE01204000013519	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.67
P_BioN00010980012840	N0001098001	914 Hermitage Road	City Of Richmond Public Works	0.67
P_BioN00003660013711	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.67

P_BioID	PIN	Address	Owner	Normalized Score
P_BioS0070774010357	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioS0070774010356	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioS0070774010334	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioW00000620012731	W0000062001	101 E Franklin St	City Of Richmond	0.67
P_BioN00015570013998	N0001557001	463 E Ladies Mile Road	City Of Richmond Recreation & Parks	0.67
P_BioE0000066032611	E0000066032	100 Virginia St	City Of Richmond Dept Of Public Works	0.67
P_BioS0000500035222	S0000500035	2210 Riverside Dr	City Of Richmond Finance	0.67
P_BioS0070774010358	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioW00008790032103	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.67
P_BioS00701910121851	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.67
P_BioS0070774010338	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioW00007240322651	W0000724032	301 S Allen Ave	City Of Richmond Recreation & Parks	0.67
P_BioS0070774010322	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioE0000127002676	E0000127002	1607 E Broad St	City Of Richmond Public Works	0.67
P_BioS00701910121816	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.67
P_BioS0070774010335	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioW00000480012737	W0000048001	107 N 2nd St	City Of Richmond Dept Of Public Works	0.67
P_BioS0070774010348	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioS00701910121843	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.67
P_BioS0070774010317	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioS0070774010330	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioS0070774010337	S0070774010	2214 Maury St	City Of Richmond Public Works	0.67
P_BioE0000127002678	E0000127002	1607 E Broad St	City Of Richmond Public Works	0.67
P_BioE0000127002677	E0000127002	1607 E Broad St	City Of Richmond Public Works	0.67
P_BioS000008100152	S0000081001	920 Hull St	City Of Richmond Public Works	0.67
P_BioS00702920091962	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.67
P_BioN00004390032915	N0000439003	1600 Chamberlayne Pkwy	City Of Richmond Public Works	0.67
P_BioS0070774010324	S0070774010	2214 Maury St	City Of Richmond Public Works	0.66
P_BioW00008790022075	W0000879002	2701 Park Dr	City Of Richmond Public Utilities	0.66
P_BioS00701910121840	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.66
P_BioW00003520012751	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012754	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012758	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012764	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012763	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520014237	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW00003520014235	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012766	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioS00701910121859	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.66
P_BioW00003520014234	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012769	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012776	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520014238	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012775	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520014239	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00008790022059	W0000879002	2701 Park Dr	City Of Richmond Public Utilities	0.66
P_BioE0000066032610	E0000066032	100 Virginia St	City Of Richmond Dept Of Public Works	0.66
P_BioN00005320012958	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.66
P_BioN00003660023719	N0000366002	400 School St	City Of Richmond Public Works	0.66
P_BioS0000500035221	S0000500035	2210 Riverside Dr	City Of Richmond Finance	0.66
P_BioW00003520014240	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioW00003520012773	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.66
P_BioE0000299001910	E0000299001	2301 E Grace St	City Of Richmond School Board	0.66
P_BioW00001440152720	W0000144015	120 S Jefferson St	City Of Richmond Public Works	0.66
P_BioS00702920091972	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.66
P_BioN00000080013583	N0000008001	512 N 8th St	City Of Richmond Dept Of Public Works	0.66
P_BioE0000127005699	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.66
P_BioE00005400013360	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.66
P_BioW0000428002523	W0000428002	601 S Harrison St	City Of Richmond School Board	0.65
P_BioE00005400013352	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.65
P_BioS00701910121884	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.65
P_BioS000008100142	S0000081001	920 Hull St	City Of Richmond Public Works	0.65
P_BioN00002510114272	N0000251011	316 Calhoun St	City Of Richmond Recreation & Parks	0.65
P_BioN00006920014372	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.65
P_BioN00006920013012	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.65
P_BioE0000299001911	E0000299001	2301 E Grace St	City Of Richmond School Board	0.65
P_BioN00006920013011	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.65
P_BioW0000428002526	W0000428002	601 S Harrison St	City Of Richmond School Board	0.65

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00006920014371	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.65
P_BioN00002510114268	N0000251011	316 Calhoun St	City Of Richmond Recreation & Parks	0.65
P_BioN00006920014350	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.65
P_BioS00701910121898	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.65
P_BioN00002510114273	N0000251011	316 Calhoun St	City Of Richmond Recreation & Parks	0.65
P_BioS00701910121869	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.65
P_BioW0001502001T2490	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.65
P_BioW00006010012578	W0000601001	1501 Grayland Ave	City Of Richmond School Board	0.65
P_BioS00701910121836	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.65
P_BioW00008790522319	W0000879052	600 Swan Lake Dr	City Of Richmond Recreation & Parks	0.65
P_BioN00000090013605	N0000009001	808 E Clay St	City Of Richmond Dept Of Public Works	0.65
P_BioN00002510114271	N0000251011	316 Calhoun St	City Of Richmond Recreation & Parks	0.65
P_BioE00014140011456	E0001414001	701 N 37th St	City Of Richmond School Board	0.65
P_BioN00000090013604	N0000009001	808 E Clay St	City Of Richmond Dept Of Public Works	0.65
P_BioS00701910121870	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.65
P_BioN00015100113140	N0001510011	2909 N Arthur Ashe Blvd	City Of Richmond Public Works	0.65
P_BioS000008100149	S0000081001	920 Hull St	City Of Richmond Public Works	0.65
P_BioE00005250011042	E0000525001	710 N 29th St	City Of Richmond School Board	0.65
P_BioN00002510114267	N0000251011	316 Calhoun St	City Of Richmond Recreation & Parks	0.65
P_BioN00004390032918	N0000439003	1600 Chamberlayne Pkwy	City Of Richmond Public Works	0.65
P_BioE01204000013515	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.65
P_BioN00006920014337	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.65
P_BioE00003620014185	E0000362001	1000 Mosby St	City Of Richmond School Board	0.65
P_BioS00702920091981	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.65
P_BioE00004520403301	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.65
P_BioW00003520012757	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.65
P_BioW00003520012743	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.65
P_BioS000008100138	S0000081001	920 Hull St	City Of Richmond Public Works	0.65
P_BioS000008100139	S0000081001	920 Hull St	City Of Richmond Public Works	0.65
P_BioW00007240322623	W0000724032	301 S Allen Ave	City Of Richmond Recreation & Parks	0.65
P_BioN00006920013013	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.64
P_BioW00003520012753	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.64

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW00003520012752	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.64
P_BioN00004690032927	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.64
P_BioN00008980013886	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.64
P_BioN00000110023611	N0000011002	500 E Marshall St	City Of Richmond C/o Decd Main Street Station	0.64
P_BioW00007240322630	W0000724032	301 S Allen Ave	City Of Richmond Recreation & Parks	0.64
P_BioE0000063010605	E0000063010	1000 E Canal St	City Of Richmond Public Works	0.64
P_BioE00005400013372	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.64
P_BioW00003520012729	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.64
P_BioN00000070013567	N0000007001	600 E Clay St	City Of Richmond	0.64
P_BioN00006920013015	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.64
P_BioS00701910121841	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.64
P_BioW00008790412168	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.64
P_BioE01204000013520	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.64
P_BioN00003660014277	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.64
P_BioS0000188001139	S0000188001	1401 Maury St	City Of Richmond School Board	0.64
P_BioN00003660013705	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.64
P_BioN00006920014370	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.64
P_BioS0000188001142	S0000188001	1401 Maury St	City Of Richmond School Board	0.64
P_BioN00006920013023	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.64
P_BioE0000160013790	E0000160013	212 N 18th St	City Of Richmond Recreation & Parks	0.64
P_BioS0000188001134	S0000188001	1401 Maury St	City Of Richmond School Board	0.64
P_BioN00000080013588	N0000008001	512 N 8th St	City Of Richmond Dept Of Public Works	0.64
P_BioN00015100093126	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.64
P_BioS0000914001269	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.64
P_BioE01201460023495	E0120146002	2011 Mechanicsville Tpke	City Of Richmond Richmond Nursing Health	0.64
P_BioW00003520012727	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.64
P_BioS0000914001249	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.64
P_BioS0000188001135	S0000188001	1401 Maury St	City Of Richmond School Board	0.63
P_BioS0000914001248	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.63
P_BioE00005250021084	E0000525002	714 N 30th St	City Of Richmond Public Utilities	0.63
P_BioN00006920013014	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.63
P_BioE00003620014205	E0000362001	1000 Mosby St	City Of Richmond School Board	0.63
P_BioS0000188001112	S0000188001	1401 Maury St	City Of Richmond School Board	0.63

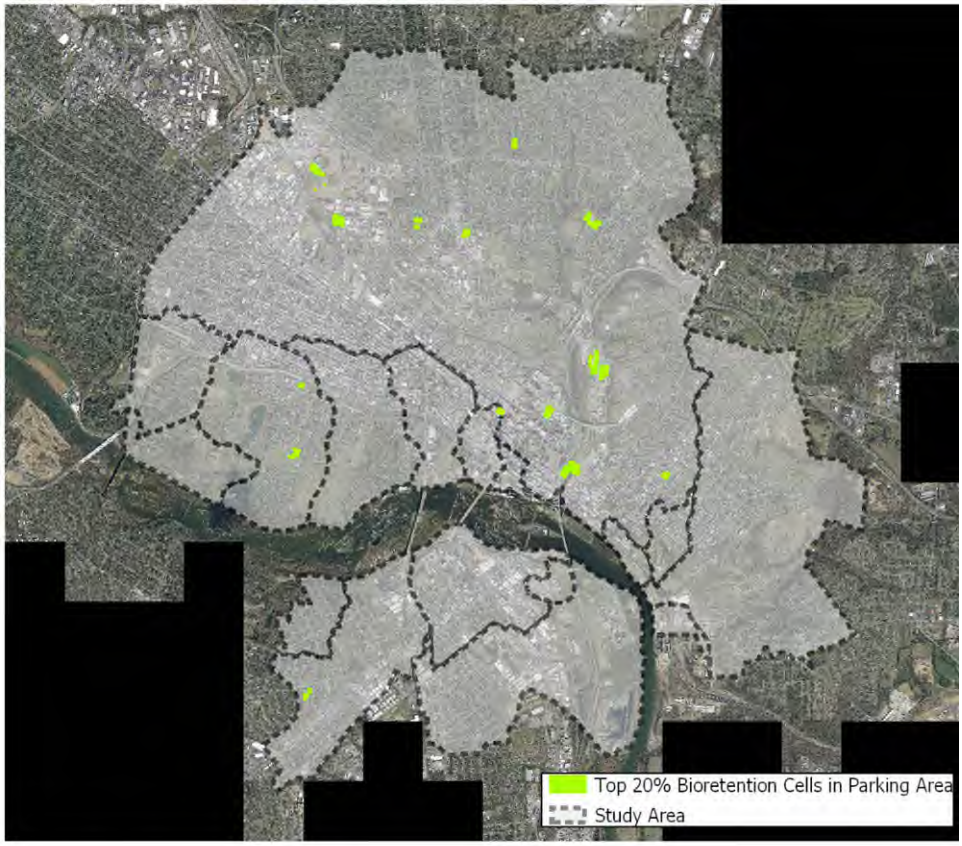
P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00010980012841	N0001098001	914 Hermitage Road	City Of Richmond Public Works	0.63
P_BioW00007240322627	W0000724032	301 S Allen Ave	City Of Richmond Recreation & Parks	0.63
P_BioE01202640023504	E0120264002	2510 Phaup St	City Of Richmond School Board	0.63
P_BioE01202640023506	E0120264002	2510 Phaup St	City Of Richmond School Board	0.63
P_BioS00701910121857	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.63
P_BioE00005400013357	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.63
P_BioE00005640221176	E0000564022	1235 N 28th St	City Of Richmond Public Works	0.63
P_BioW00008790032123	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.63
P_BioS00000500035218	S0000500035	2210 Riverside Dr	City Of Richmond Finance	0.63
P_BioW0000161004465	W0000161004	600 S Pine St	City Of Richmond School Board	0.63
P_BioW00003520014236	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.63
P_BioN00006920014329	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.63
P_BioW00003520012750	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.63
P_BioN00006920013026	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.63
P_BioS000008100143	S0000081001	920 Hull St	City Of Richmond Public Works	0.63
P_BioN00003660023718	N0000366002	400 School St	City Of Richmond Public Works	0.63
P_BioS00000914001253	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.63
P_BioS00701910121868	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.63
P_BioE00003620014198	E0000362001	1000 Mosby St	City Of Richmond School Board	0.63
P_BioE00003620014192	E0000362001	1000 Mosby St	City Of Richmond School Board	0.62
P_BioS000008100126	S0000081001	920 Hull St	City Of Richmond Public Works	0.62
P_BioN00006920014369	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.62
P_BioN00006920013010	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.62
P_BioE01202640023503	E0120264002	2510 Phaup St	City Of Richmond School Board	0.62
P_BioS0000188001116	S0000188001	1401 Maury St	City Of Richmond School Board	0.62
P_BioE0000335005916	E0000335005	2405 Jefferson Ave	City Of Richmond Public Works	0.62
P_BioS0000188001105	S0000188001	1401 Maury St	City Of Richmond School Board	0.62
P_BioE0000175001T795	E0000175001T	301 N 9th St	City Of Richmond Public Works	0.62
P_BioE00003620014201	E0000362001	1000 Mosby St	City Of Richmond School Board	0.62
P_BioE00005750011212	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.62
P_BioS0000188001137	S0000188001	1401 Maury St	City Of Richmond School Board	0.62
P_BioW00007240322640	W0000724032	301 S Allen Ave	City Of Richmond Recreation & Parks	0.62
P_BioW00006010242603	W0000601024	1507 Grayland Ave	City Of Richmond Recreation & Parks	0.62
P_BioN00003660014278	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.62
P_BioS000008100120	S0000081001	920 Hull St	City Of Richmond Public Works	0.62
P_BioE00014140011457	E0001414001	701 N 37th St	City Of Richmond School Board	0.62

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00015100133171	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioN00015100133191	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioN00015100133183	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioN00015100133190	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioS0000188001132	S0000188001	1401 Maury St	City Of Richmond School Board	0.62
P_BioN00015100133169	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioW00013400012433	W0001340001	700 Blanton Ave	City Of Richmond Recreation & Parks	0.62
P_BioN00015100133185	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioN00015100133203	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioS00701910121844	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.62
P_BioN00015100093132	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.62
P_BioS0070774010321	S0070774010	2214 Maury St	City Of Richmond Public Works	0.62
P_BioW00008790522315	W0000879052	600 Swan Lake Dr	City Of Richmond Recreation & Parks	0.62
P_BioN00015100133167	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.62
P_BioE0000335005915	E0000335005	2405 Jefferson Ave	City Of Richmond Public Works	0.62
P_BioE0000335005917	E0000335005	2405 Jefferson Ave	City Of Richmond Public Works	0.62
P_BioW0001502001T2485	W0001502001T	3301 Maplewood Ave	City Of Richmond Community Facilities	0.62
P_BioE0000108061672	E0000108061	50 N 17th St	City Of Richmond Recreation & Parks	0.62
P_BioN00006920014325	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.62
P_BioN00003660024287	N0000366002	400 School St	City Of Richmond Public Works	0.62
P_BioN00003660023717	N0000366002	400 School St	City Of Richmond Public Works	0.62
P_BioN00000070013573	N0000007001	600 E Clay St	City Of Richmond	0.62
P_BioS00002240111798	S0000224011	411 Commerce Road	City Of Richmond Public Works	0.62
P_BioE0000335005918	E0000335005	2405 Jefferson Ave	City Of Richmond Public Works	0.62
P_BioW00010420192385	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.61
P_BioS0000482040164	S0000482040	2313 Wise St	City Of Richmond Public Utilities	0.61
P_BioW00008790032111	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.61
P_BioN00006920013025	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.61
P_BioS0000500035219	S0000500035	2210 Riverside Dr	City Of Richmond Finance	0.61
P_BioS00701910121848	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.61
P_BioW00003520014241	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.61
P_BioW00003520012772	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.61
P_BioN00006920013016	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.61
P_BioS00701910121835	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.61
P_BioW00008790522321	W0000879052	600 Swan Lake Dr	City Of Richmond Recreation & Parks	0.61

P_BioID	PIN	Address	Owner	Normalized Score
P_BioW00003520012747	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.61
P_BioE0000107035660	E0000107035	1500 A E Main St	City Of Richmond Public Works	0.61
P_BioE00003620014202	E0000362001	1000 Mosby St	City Of Richmond School Board	0.61
P_BioN00000040023532	N0000004002	400 N 9th St	City Of Richmond Public Works	0.61
P_BioN00004690032925	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.61
P_BioW00008790412184	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.61
P_BioN00000070013574	N0000007001	600 E Clay St	City Of Richmond	0.61
P_BioE0000299001912	E0000299001	2301 E Grace St	City Of Richmond School Board	0.61
P_BioN00006920014351	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.61
P_BioN00000090013602	N0000009001	808 E Clay St	City Of Richmond Dept Of Public Works	0.61
P_BioE0000108061669	E0000108061	50 N 17th St	City Of Richmond Recreation & Parks	0.61
P_BioW00008790022055	W0000879002	2701 Park Dr	City Of Richmond Public Utilities	0.61
P_BioE00003620014212	E0000362001	1000 Mosby St	City Of Richmond School Board	0.61
P_BioS0000914001256	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.61
P_BioW00013400012424	W0001340001	700 Blanton Ave	City Of Richmond Recreation & Parks	0.61
P_BioS000008100167	S0000081001	920 Hull St	City Of Richmond Public Works	0.61
P_BioN00004390032916	N0000439003	1600 Chamberlayne Pkwy	City Of Richmond Public Works	0.61
P_BioS0000914001246	S0000914001	2715 Bainbridge St	City Of Richmond Recreation & Parks	0.61
P_BioN00000070013541	N0000007001	600 E Clay St	City Of Richmond	0.61
P_BioS0070774010349	S0070774010	2214 Maury St	City Of Richmond Public Works	0.61
P_BioW00006010012579	W0000601001	1501 Grayland Ave	City Of Richmond School Board	0.61
P_BioN00008980013880	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.61
P_BioS00701910121951	S0070191012	1400 Brander St	City Of Richmond Public Utilities	0.61
P_BioN00000070013538	N0000007001	600 E Clay St	City Of Richmond	0.61
P_BioN00008980013882	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.60
P_BioW00003520012777	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.60
P_BioN00008980013884	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.60
P_BioS00002240111801	S0000224011	411 Commerce Road	City Of Richmond Public Works	0.60
P_BioN00003660023715	N0000366002	400 School St	City Of Richmond Public Works	0.60
P_BioN00008980013881	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.60
P_BioW00008790412147	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00013400012434	W0001340001	700 Blanton Ave	City Of Richmond Recreation & Parks	0.60
P_BioW00003520012768	W0000352001	719 W Franklin St	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412204	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00015100133173	N0001510013	2804 Hermitage Road	City Of Richmond Public Works	0.60
P_BioE00033050031753	E0003305003	3800 J East Richmond Road	City Of Richmond Public Works	0.60
P_BioN00003660013699	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.60
P_BioW00008790412158	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790032140	W0000879003	1100 Blanton Ave	City Of Richmond Public Utilities	0.60
P_BioE00007030013399	E0000703001	1925 U St	City Of Richmond Recreation & Parks	0.60
P_BioN00000110023608	N0000011002	500 E Marshall St	City Of Richmond C/o Decd Main Street Station	0.60
P_BioN00003660013710	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.60
P_BioW0000428002516	W0000428002	601 S Harrison St	City Of Richmond School Board	0.60
P_BioE00007740193405	E0000774019	1501 N 20th St	City Of Richmond Recreation & Parks	0.60
P_BioE00007030013400	E0000703001	1925 U St	City Of Richmond Recreation & Parks	0.60
P_BioN00010980012852	N0001098001	914 Hermitage Road	City Of Richmond Public Works	0.60
P_BioN00000080013587	N0000008001	512 N 8th St	City Of Richmond Dept Of Public Works	0.60
P_BioN00015100093123	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioS0000188001150	S0000188001	1401 Maury St	City Of Richmond School Board	0.60
P_BioW00008790412195	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412191	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412208	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412212	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412217	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412216	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412189	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412224	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioN00000070013554	N0000007001	600 E Clay St	City Of Richmond	0.60
P_BioN00001220012779	N0000122001	119 W Leigh St	City Of Richmond School Board	0.60
P_BioN00000080013579	N0000008001	512 N 8th St	City Of Richmond Dept Of Public Works	0.60
P_BioW00008790412190	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioW00008790412203	W0000879041	600 S Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioN00006920014334	N0000692001	2801 Dupont Cir	City Of Richmond Recreation & Parks	0.60
P_BioN00001220012785	N0000122001	119 W Leigh St	City Of Richmond School Board	0.60
P_BioN00000080013581	N0000008001	512 N 8th St	City Of Richmond Dept Of Public Works	0.60

P_BioID	PIN	Address	Owner	Normalized Score
P_BioN00003660013708	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.60
P_BioN00015100093120	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.60
P_BioE00033050031752	E0003305003	3800 J East Richmond Road	City Of Richmond Public Works	0.60
P_BioW0000428002518	W0000428002	601 S Harrison St	City Of Richmond School Board	0.60
P_BioN00010980012849	N0001098001	914 Hermitage Road	City Of Richmond Public Works	0.60
P_BioN00000080013589	N0000008001	512 N 8th St	City Of Richmond Dept Of Public Works	0.60
P_BioN00010980052859	N0001098005	914 A Hermitage Road	City Of Richmond Public Works	0.60
P_BioN00015570013999	N0001557001	463 E Ladies Mile Road	City Of Richmond Recreation & Parks	0.60
P_BioW00013400012430	W0001340001	700 Blanton Ave	City Of Richmond Recreation & Parks	0.60
P_BioE0000175001T797	E0000175001T	301 N 9th St	City Of Richmond Public Works	0.60
P_BioE00014140011454	E0001414001	701 N 37th St	City Of Richmond School Board	0.60

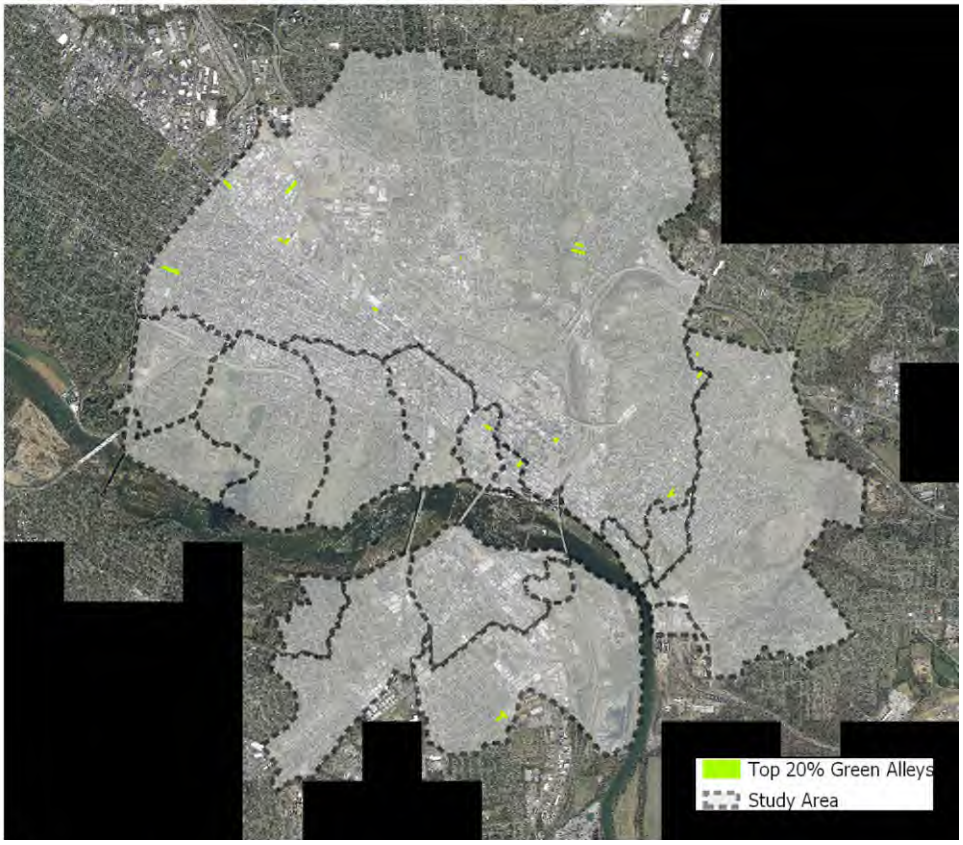


Top 40% Bioretention Cells in Parking Area

Top 40% Bioretention Cells in Parking Area

P_permID	PIN	Address	Owner	Normalized Score
P_permN000065000153	N0000650001	2310 1st Ave	City Of Richmond School Board	1.00
P_permE000012700510	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.98
P_permE000045204023	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.95
P_permW0000712050105	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.92
P_permE000012701611	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.91
P_permN000074001355	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.90
P_permS000172000186	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.89
P_permE000054000127	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.89
P_permN000103703062	N0001037030	3101 Fendall Ave	City Of Richmond School Board	0.87
P_permW000002500193	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.83
P_permN000151001267	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.82
P_permN000129200464	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.82
P_permW0000847045108	W0000847045	301 S Meadow St	City Of Richmond Public Works	0.82
P_permE000038100122	E0000381001	701 N 25th St	City Of Richmond Public Works	0.82
P_permN000053200152	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.82
P_permE000023500117	E0000235001	501 N 9th St	City Of Richmond Public Works	0.80
P_permW0000148022100	W0000148022	210 W Grace St	City Of Richmond Public Works	0.79
P_permW0001617001116	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.79
P_permW0001343001112	W0001343001	3000 Grant St	City Of Richmond School Board	0.78
P_permE000047400125	E0000474001	2517 Q St	City Of Richmond Public Works	0.77
P_permN000151002069	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.74
P_permN000151001166	N0001510011	2909 N Arthur Ashe Blvd	City Of Richmond Public Works	0.74
P_permE00001070337	E0000107033	1519 E Franklin St	City Of Richmond Dept Of Public Works	0.74
P_permE000045207224	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.72
P_permE000036200121	E0000362001	1000 Mosby St	City Of Richmond School Board	0.71
P_permW000000800191	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.71
P_permE000057500130	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.69
P_permN000048600151	N0000486001	219 W Graham Road	City Of Richmond School Board	0.69
P_permS007077401090	S0070774010	2214 Maury St	City Of Richmond Public Works	0.68
P_permS000086300185	S0000863001	2100 Ingram Ave	City Of Richmond	0.68
P_permN000089800160	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.68
P_permW0000835001107	W0000835001	1821 Amelia St	City Of Richmond School Board	0.68
P_permN000047600650	N0000476006	1617 Brook Road	City Of Richmond	0.67
P_permN000036600146	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.66
P_permN000000900138	N0000009001	808 E Clay St	City Of Richmond Dept Of Public Works	0.66
P_permS000050002883	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.65

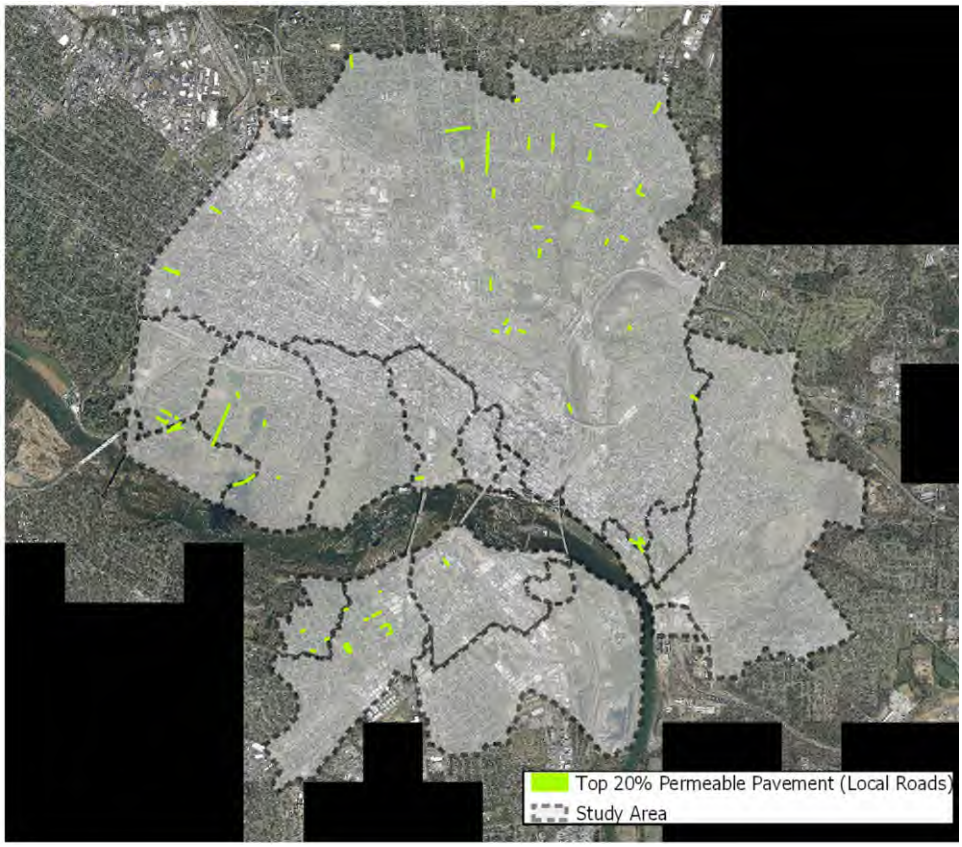
P_permID	PIN	Address	Owner	Normalized Score
P_permN000090801961	N0000908019	1015 E Brookland Park Blvd	City Of Richmond Recreation & Parks	0.64
P_permW0001042019110	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.62
P_permW0000729008106	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.62
P_permE000052500126	E0000525001	710 N 29th St	City Of Richmond School Board	0.62
P_permE00001070255	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.61



Top 40% Green Alleys

Top 40% Green Alleys

GAlley_ID	Address of nearest parcel	Normalized Score
GAll10	210 N Nansemond St	1.00
GAll9	3530 Grove Ave	1.00
GAll8	1704 Ingram Ave	0.97
GAll1	6 N 5th St	0.94
GAll13	3600 W Broad St	0.84
GAll14	3600 W Broad St	0.84
GAll15	3014 Norfolk St	0.84
GAll4	11 S 10th St	0.80
GAll3	612 N 28th St	0.79
GAll2	1101 Cypress St	0.73
GAll17	1125 Althea St	0.71



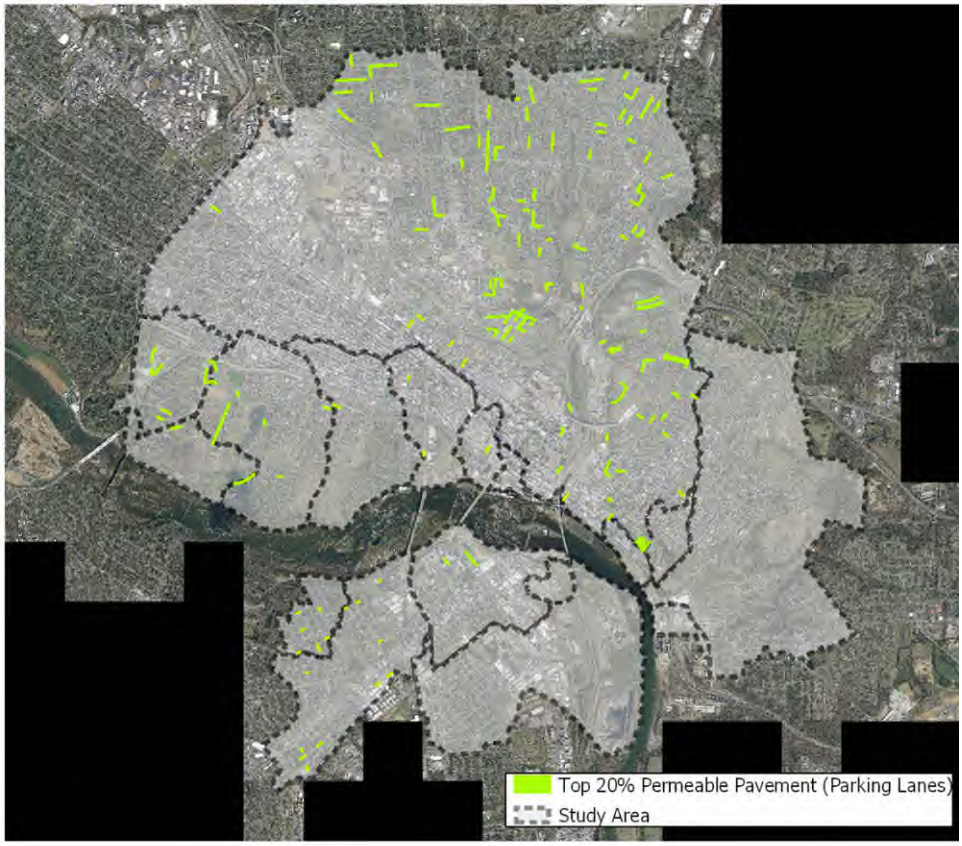
Top 40% Permeable Pavement in Local Roads

Top 40% Permeable Pavement in Local Roads

PLocal_ID	Address of nearest parcel	Normalized Score
LocalPRC749960	401 W 24th St	1.00
LocalPRC9096130	Rugby Road	0.91
LocalPRC852846	2213 Bainbridge St	0.90
LocalPRC749961	2301 Mcdonough St	0.89
LocalPRC686033	2715 Bainbridge St	0.89
LocalPRC714548	113 W 24th St	0.89
LocalPRC8410142	Lake Road	0.88
LocalPRC4055149	3112 Rendale Ave	0.86
LocalPRC4060133	3106 Sunset Ave	0.86
LocalPRC299584	2807 E Franklin St	0.85
LocalPRC4886136	2601 Police Memorial Way	0.82
LocalPRC3878220	2204 Monteiro St	0.81
LocalPRC4060141	3121 Sunset Ave	0.81
LocalPRC654534	2715 Bainbridge St	0.79
LocalPRC714547	113 W 24th St	0.76
LocalPRC4410299	3508 Enslow Ave	0.76
LocalPRC9096123	Close to Rugby Road	0.75
LocalPRC1023273	3100 Lamb Ave	0.74
LocalPRC1044279	3200 Noble Ave	0.74
LocalPRC1370245	515 Pelham Dr	0.74
LocalPRC558256	2903 Montrose Ave	0.74
LocalPRC579274	3006 Montrose Ave	0.74
LocalPRC897302	3333 Hanes Ave	0.74
LocalPRC5353159	600 Swan Lake Dr	0.74
LocalPRC804900189	2107 Wood St	0.73
LocalPRC1136247	2918 3rd Ave	0.73
LocalPRC7835167	615 N 10th St	0.72
LocalPRC7949203	504 W Bacon St	0.72
LocalPRC3776187	951 Chamberlayne Pkwy	0.72
LocalPRC2109157	1600 N 23rd St	0.72
LocalPRC4060140	1108 Sunset Ave	0.72
LocalPRC806967	515 W 22nd St	0.71
LocalPRC8197101	1700 Hampton St	0.71
LocalPRC9277185	1105 St James St	0.71
LocalPRC993270	3127 Garland Ave	0.71
LocalPRC682527	319 W 32nd St	0.70
LocalPRC1096224	2401 4th Ave	0.70
LocalPRC8210276	909 Rennie Ave	0.70
LocalPRC1139240	2901 3rd Ave	0.70
LocalPRC1242260	600 Montvale Ave	0.69

PLocal_ID	Address of nearest parcel	Normalized Score
LocalPRC3942188	951 Chamberlayne Pkwy	0.69
LocalPRC1746211	3530 Grove Ave	0.69
LocalPRC1752212	210 N Nansemond St	0.69
LocalPRC237234	3400 W Grace St	0.69
LocalPRC8390257	2915 Hawthorne Ave	0.69
LocalPRC552599	721 Oregon Hill Pkwy	0.69
LocalPRC1139248	2901 3rd Ave	0.69
LocalPRC4887118	2601 Police Memorial Way	0.69
LocalPRC825377	1000 Semmes Ave	0.68
LocalPRC685037	401 W 30th St	0.68
LocalPRC8487193	951 Chamberlayne Pkwy	0.68
LocalPRC3888216	2024 Barton Ave	0.68
LocalPRC614345	601 W 32nd St	0.67
LocalPRC1865312	1512 Wilmington Ave	0.67
LocalPRC4525281	610 Bancroft Ave	0.67
LocalPRC9094120	1401 Pump House Dr	0.66
LocalPRC739230	2401 North Ave	0.66
LocalPRC4736100	1501 Greenville Ave	0.66
LocalPRC841244	2617 Edgewood Ave	0.66
LocalPRC711256	311 W 25th St	0.65
LocalPRC4873152	2601 Police Memorial Way	0.65
LocalPRC693662	518 W 26th St	0.65
LocalPRC1319221	2206 3rd Ave	0.65
LocalPRC4491293	3325 Delaware Ave	0.65
LocalPRC4492287	3301 Maryland Ave	0.65
LocalPRC1149251	3124 4th Ave	0.65
LocalPRC4395304	3423 Florida Ave	0.65
LocalPRC1002294	3314 Garland Ave	0.64
LocalPRC637243	2608 Edgewood Ave	0.64
LocalPRC8410126	2100 Powhatan St	0.64
LocalPRC507261	3028 Garland Ave	0.63
LocalPRC1056278	3133 Edgewood Ave	0.63
LocalPRC4522269	620 Northside Ave	0.63
LocalPRC613328	400 W 32nd St	0.62
LocalPRC1013282	3213 Garland Ave	0.62
LocalPRC4060134	3106 Sunset Ave	0.62
LocalPRC5459186	3300 Grayland Ave	0.62
LocalPRC711258	2400 Mcdonough St	0.61
LocalPRC1074291	3200 Edgewood Ave	0.61
LocalPRC477693	1615 S Meadow St	0.61
LocalPRC654324	2715 Bainbridge St	0.61
LocalPRC4365306	418 Milton St	0.61

PLocal_ID	Address of nearest parcel	Normalized Score
LocalPRC1016283	3224 Garland Ave	0.60
LocalPRC951309	3601 Chamberlayne Ave	0.60
LocalPRC2179180	209 Hospital St	0.60
LocalPRC5991109	800 P1 E Canal St	0.60
LocalPRC716073	1000 Mcdonough St	0.60
LocalPRC610626	400 W 33rd St	0.60
LocalPRC608723	3201 Forest Hill Ave	0.60
LocalPRC3110125	1200 N 23rd St	0.60
LocalPRC7949198	1501 Fendall Ave	0.60



Top 40% Permeable Pavement in Parking Lanes

Top 40% Permeable Pavement in Parking Lanes

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC3986726	1300 St John St	1.00
PLaneRC3284669	1300 Coalter St	0.98
PLaneRC4840391	600 S Arthur Ashe Blvd	0.96
PLaneRC4840392	1100 Blanton Ave	0.96
PLaneRC2995240	2807 E Franklin St	0.95
PLaneRC4055973	3112 Rendale Ave	0.95
PLaneRC4056974	3109 Rendale Ave	0.95
PLaneRC4060128	3121 Sunset Ave	0.95
PLaneRC4886119	2601 Police Memorial Way	0.91
PLaneRC3997431	3301 Maplewood Ave	0.91
PLaneRC3997426	3301 Maplewood Ave	0.90
PLaneRC710776	601 W 25th St	0.89
PLaneRC5353383	600 Swan Lake Dr	0.87
PLaneRC1113813	2800 4th Ave	0.87
PLaneRC1113821	2818 4th Ave	0.87
PLaneRC3284663	1300 Coalter St	0.87
PLaneRC8061664	1300 Coalter St	0.86
PLaneRC663022	801 Prince Hall Dr	0.86
PLaneRC3978710	951 Chamberlayne Pkwy	0.86
PLaneRC8489716	951 Chamberlayne Pkwy	0.86
PLaneRC8489724	951 Chamberlayne Pkwy	0.86
PLaneRC9277697	1105 St James St	0.86
PLaneRC9277713	951 Chamberlayne Pkwy	0.86
PLaneRC9277714	951 Chamberlayne Pkwy	0.86
PLaneRC9448718	951 Chamberlayne Pkwy	0.86
PLaneRC9448719	951 Chamberlayne Pkwy	0.86
PLaneRC3062354	1005 Mosby St	0.86
PLaneRC3967691	18 W Baker St	0.86
PLaneRC4410914	3508 Enslow Ave	0.85
PLaneRC9096112	Rugby Road	0.85
PLaneRC8219313	1921 Princess Anne Ave	0.85
PLaneRC1117801	2521 5th Ave	0.85
PLaneRC1405983	951 Chamberlayne Pkwy	0.84
PLaneRC9295145	314 W 7th St	0.84
PLaneRC682554	310 W 31st St	0.84
PLaneRC3967690	916 St James St	0.84
PLaneRC1023873	3100 Lamb Ave	0.84
PLaneRC1044606	3200 Noble Ave	0.84
PLaneRC1053596	3030 Moss Side Ave	0.84
PLaneRC2814743	1613 Lamb Ave	0.84

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC3888779	2024 Barton Ave	0.84
PLaneRC558582	2903 Montrose Ave	0.84
PLaneRC579597	3006 Montrose Ave	0.84
PLaneRC720808	2500 North Ave	0.84
PLaneRC720823	2710 North Ave	0.84
PLaneRC748802	2406 North Ave	0.84
PLaneRC9531784	1101 Althea St	0.84
PLaneRC889856	3100 Griffin Ave	0.83
PLaneRC8489721	951 Chamberlayne Pkwy	0.83
PLaneRC2714729	2302 A Carmine St	0.83
PLaneRC3131355	2013 Fairmount Ave	0.83
PLaneRC3149656	1501 N 20th St	0.83
PLaneRC3364680	1601 Gay St	0.83
PLaneRC3364684	1906 Redd St	0.83
PLaneRC9486728	2302 A Carmine St	0.83
PLaneRC9486733	2302 A Carmine St	0.83
PLaneRC1136831	2918 3rd Ave	0.83
PLaneRC4379935	474 Hunt Ave	0.83
PLaneRC8069139	702 W 21st St	0.82
PLaneRC3546529	1203 W Graham Road	0.82
PLaneRC780546	2622 Northumberland Ave	0.82
PLaneRC7835673	615 N 10th St	0.82
PLaneRC7949486	504 W Bacon St	0.82
PLaneRC7949746	1610 Fendall Ave	0.82
PLaneRC7949747	1601 Hickory St	0.82
PLaneRC8084343	1213 E Clay St	0.82
PLaneRC837804	315 Overbrook Road	0.82
PLaneRC840806	316 Overbrook Road	0.82
PLaneRC841553	2617 Edgewood Ave	0.82
PLaneRC9456476	504 W Bacon St	0.82
PLaneRC8410129	Lake Road	0.82
PLaneRC945924	3406 North Ave	0.82
PLaneRC3327759	1601 Rogers St	0.82
PLaneRC3776981	951 Chamberlayne Pkwy	0.82
PLaneRC2109654	1600 N 23rd St	0.81
PLaneRC8197105	1700 Hampton St	0.81
PLaneRC4382936	3600 Meadow Bridge Road	0.81
PLaneRC4368962	503 Patrick Ave	0.81
PLaneRC4368963	503 Patrick Ave	0.81
PLaneRC3082352	1100 N 20th St	0.81
PLaneRC8245142	212 W 7th St	0.81
PLaneRC3973723	951 Chamberlayne Pkwy	0.81

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC6630966	3701 E Broad Rock Road	0.81
PLaneRC676792	2121 Miller Ave	0.80
PLaneRC993866	3127 Garland Ave	0.80
PLaneRC5818371	1612 Wallace St	0.80
PLaneRC3878782	2204 Monteiro St	0.80
PLaneRC7829984	2801 Dupont Cir	0.80
PLaneRC1139822	2901 3rd Ave	0.80
PLaneRC1139832	2901 3rd Ave	0.80
PLaneRC39416	3301 Maplewood Ave	0.80
PLaneRC4839423	600 S Arthur Ashe Blvd	0.80
PLaneRC5834372	1500 Idlewood Ave	0.80
PLaneRC1096788	2401 4th Ave	0.80
PLaneRC66101	3601 Stockton St	0.80
PLaneRC8557615	3412 Chamberlayne Ave	0.79
PLaneRC8557616	3412 Chamberlayne Ave	0.79
PLaneRC8210601	909 Rennie Ave	0.79
PLaneRC3303770	1544 N 19th St	0.79
PLaneRC702824	3301 E Broad Rock Road	0.79
PLaneRC693674	518 W 26th St	0.79
PLaneRC1242848	600 Montvale Ave	0.79
PLaneRC3942700	951 Chamberlayne Pkwy	0.79
PLaneRC237538	3400 W Grace St	0.79
PLaneRC3259357	1900 Venable St	0.79
PLaneRC6085967	102 W Blake Lane	0.79
PLaneRC8390584	2915 Hawthorne Ave	0.79
PLaneRC3317769	1541 Mechanicsville Tpke	0.79
PLaneRC3878783	2204 Monteiro St	0.78
PLaneRC8218302	1921 Princess Anne Ave	0.78
PLaneRC1983589	1324 Wentbridge Road	0.78
PLaneRC4887108	2601 Police Memorial Way	0.78
PLaneRC5963148	112 S 7th St	0.78
PLaneRC739800	2401 North Ave	0.78
PLaneRC9465422	301 W Clay St	0.78
PLaneRC4426930	3519 Delaware Ave	0.78
PLaneRC2832752	750 Hospital St	0.78
PLaneRC3270662	1300 Coalter St	0.78
PLaneRC2995238	2807 E Franklin St	0.78
PLaneRC8253143	1000 Semmes Ave	0.78
PLaneRC2823731	1501 4th Ave	0.78
PLaneRC1679446	707 N Harrison St	0.78
PLaneRC8487711	951 Chamberlayne Pkwy	0.78
PLaneRC622219	800 W 31st St	0.78

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC4736103	1500 Carter St	0.78
PLaneRC7894758	1601 Mechanicsville Tpke	0.78
PLaneRC3321760	1601 N 19th St	0.78
PLaneRC2758745	1610 4th Ave	0.78
PLaneRC539824	2701 North Ave	0.77
PLaneRC5888263	2301 E Franklin St	0.77
PLaneRC3776982	951 Chamberlayne Pkwy	0.77
PLaneRC666047	2500 Decatur St	0.77
PLaneRC689162	2411 Bainbridge St	0.77
PLaneRC3315771	1736 N 20th St	0.77
PLaneRC2995239	2807 E Franklin St	0.77
PLaneRC1836637	1413 Wilmington Ave	0.77
PLaneRC1857625	1608 Palmyra Ave	0.77
PLaneRC1865643	1512 Wilmington Ave	0.77
PLaneRC1882623	3413 Gloucester Road	0.77
PLaneRC1892631	1603 Confederate Ave	0.77
PLaneRC1894632	1515 Confederate Ave	0.77
PLaneRC1946622	1605 Brookland Pkwy	0.77
PLaneRC2470285	710 N 29th St	0.77
PLaneRC8845640	1401 Wilmington Ave	0.77
PLaneRC8846642	1215 Wilmington Ave	0.77
PLaneRC8142151	600 China St	0.77
PLaneRC4525880	610 Bancroft Ave	0.77
PLaneRC896073	2819 Stonewall Ave	0.77
PLaneRC1159847	3101 2nd Ave	0.76
PLaneRC610614	400 W 33rd St	0.76
PLaneRC670944	2601 Maury St	0.76
PLaneRC614318	601 W 32nd St	0.76
PLaneRC4405922	3517 Carolina Ave	0.76
PLaneRC8616311	1401 Bank St	0.76
PLaneRC1649456	817 N Harrison St	0.76
PLaneRC3395753	1956 Raven St	0.76
PLaneRC8410130	2100 Powhatan St	0.76
PLaneRC9276712	951 Chamberlayne Pkwy	0.75
PLaneRC5572398	719 W Franklin St	0.75
PLaneRC8979283	1701 E Main St	0.75
PLaneRC926932	3512 North Ave	0.75
PLaneRC2689305	1921 Princess Anne Ave	0.75
PLaneRC5909279	2201 E Grace St	0.75
PLaneRC720809	16 W Lancaster Road	0.75
PLaneRC1939621	1617 Brookland Pkwy	0.75
PLaneRC4873975	2601 Police Memorial Way	0.75

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC534816	2701 Hanes Ave	0.75
PLaneRC2733696	2309 Hospital St	0.75
PLaneRC4825407	3000 Grant St	0.75
PLaneRC1048614	3121 Moss Side Ave	0.75
PLaneRC4475904	3401 Carolina Ave	0.75
PLaneRC4491902	3325 Delaware Ave	0.75
PLaneRC4492893	3301 Maryland Ave	0.75
PLaneRC4446863	3201 Carolina Ave	0.75
PLaneRC4578876	618 E Gladstone Ave	0.75
PLaneRC1149834	3124 4th Ave	0.75
PLaneRC1116797	2500 Robert Moore Cir	0.75
PLaneRC3776442	951 Chamberlayne Pkwy	0.75
PLaneRC4395926	3423 Florida Ave	0.75
PLaneRC4049417	3301 Maplewood Ave	0.75
PLaneRC4736104	1501 Greenville Ave	0.74
PLaneRC1002903	3314 Garland Ave	0.74
PLaneRC897918	3333 Hanes Ave	0.74
PLaneRC9138715	951 Chamberlayne Pkwy	0.74
PLaneRC3158340	1101 N 22nd St	0.74
PLaneRC4435938	3607 Missouri Ave	0.74
PLaneRC637552	2608 Edgewood Ave	0.74
PLaneRC66083	3514 Decatur St	0.74
PLaneRC3867439	521 Catherine St	0.74
PLaneRC9550536	2417 Northumberland Ave	0.74
PLaneRC554854	3016 Edgewood Ave	0.74
PLaneRC685059	401 W 30th St	0.74
PLaneRC1901638	1501 Wilmington Ave	0.74
PLaneRC507850	3028 Garland Ave	0.74
PLaneRC365510	3300 Park Ave	0.74
PLaneRC4907124	Close to Park Dr	0.74
PLaneRC8142149	603 Spring St	0.73
PLaneRC2559334	861 Jessamine St	0.73
PLaneRC3545528	1203 W Graham Road	0.73
PLaneRC59138	2310 Riverside Dr	0.73
PLaneRC4899123	Close to Park Dr	0.73
PLaneRC1856628	1600 Palmyra Ave	0.73
PLaneRC1056878	3133 Edgewood Ave	0.73
PLaneRC4522865	620 Northside Ave	0.73
PLaneRC8487705	951 Chamberlayne Pkwy	0.73
PLaneRC1876641	1209 Wilmington Ave	0.73
PLaneRC8060666	1000 Mosby St	0.73
PLaneRC1858626	1500 Palmyra Ave	0.73

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC1826634	1020 Melrose Ave	0.73
PLaneRC9094110	1401 Pump House Dr	0.73
PLaneRC911931	3513 Garland Ave	0.73
PLaneRC4060115	3106 Sunset Ave	0.73
PLaneRC7820568	2817 Hawthorne Ave	0.72
PLaneRC684458	318 W 30th St	0.72
PLaneRC682552	310 W 31st St	0.72
PLaneRC620573	2901 Seminary Ave	0.72
PLaneRC1435473	1400 W Leigh St	0.72
PLaneRC1013881	3213 Garland Ave	0.72
PLaneRC1942599	3106 Chatham Road	0.72
PLaneRC4056131	3100 Sunset Ave	0.72
PLaneRC7692163	1 E Cary St	0.72
PLaneRC2738748	1801 3rd Ave	0.72
PLaneRC4840408	600 S Arthur Ashe Blvd	0.72
PLaneRC3779695	910 St John St	0.72
PLaneRC982888	3219 Fendall Ave	0.71
PLaneRC4428933	3610 Delaware Ave	0.71
PLaneRC9456740	504 W Bacon St	0.71
PLaneRC810539	800 W Lancaster Road	0.71
PLaneRC1074898	3200 Edgewood Ave	0.71
PLaneRC2004613	3308 Gloucester Road	0.71
PLaneRC654351	2715 Bainbridge St	0.71
PLaneRC613820	815 W 31st St	0.71
PLaneRC611617	518 W 32nd St	0.71
PLaneRC387515	3500 Kensington Ave	0.71
PLaneRC714568	113 W 24th St	0.71
PLaneRC4365928	418 Milton St	0.71
PLaneRC3268767	1300 Coalter St	0.71
PLaneRC1016882	3224 Garland Ave	0.70
PLaneRC951635	3601 Chamberlayne Ave	0.70
PLaneRC3992717	951 Chamberlayne Pkwy	0.70
PLaneRC867883	3219 Barton Ave	0.70
PLaneRC484843	23 W Brookland Park Blvd	0.70
PLaneRC4450877	3220 Carolina Ave	0.70
PLaneRC702823	3309 E Broad Rock Road	0.70
PLaneRC5414433	201 S Arthur Ashe Blvd	0.70
PLaneRC3583572	1200 Sherwood Ave	0.70
PLaneRC9292917	3401 Delaware Ave	0.70
PLaneRC3110346	1200 N 23rd St	0.70
PLaneRC9096113	Rugby Road	0.70
PLaneRC8594595	3000 Moss Side Ave	0.70

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC682553	319 W 32nd St	0.70
PLaneRC3832487	504 W Bacon St	0.70
PLaneRC5838381	1731 Idlewood Ave	0.70
PLaneRC8304524	2304 Langston Ave	0.70
PLaneRC613316	3204 Mcdonough St	0.70
PLaneRC4561862	701 Northside Ave	0.69
PLaneRC620437	2201 Fairfax Ave	0.69
PLaneRC1045608	3108 Noble Ave	0.69
PLaneRC613315	3204 Mcdonough St	0.69
PLaneRC1196837	3021 2nd Ave	0.69
PLaneRC3323687	1701 N 19th St	0.69
PLaneRC714563	2407 Bainbridge St	0.69
PLaneRC60959	125 W 34th St	0.69
PLaneRC974889	3116 Fendall Ave	0.69
PLaneRC4504900	3326 Delaware Ave	0.69
PLaneRC5846161	600 S Lombardy St	0.69
PLaneRC3269661	1300 Coalter St	0.69
PLaneRC3186675	1906 Redd St	0.69
PLaneRC534825	2709 Hanes Ave	0.69
PLaneRC4394921	3411 Florida Ave	0.69
PLaneRC490833	2809 North Ave	0.69
PLaneRC892899	3201 Edgewood Ave	0.69
PLaneRC7574387	918 W Cary St	0.69
PLaneRC608749	3201 Forest Hill Ave	0.69
PLaneRC9522929	451 Patrick Ave	0.69
PLaneRC4060127	3007 Sunset Ave	0.69
PLaneRC688060	317 W 30th St	0.69
PLaneRC2018590	1304 Wentbridge Road	0.69
PLaneRC9139266	2418 E Franklin St Unit 108	0.68
PLaneRC5851111	1728 Blair St	0.68
PLaneRC3024229	3301 E Broad St	0.68
PLaneRC60958	128 W 33rd St	0.68
PLaneRC739803	2401 North Ave	0.68
PLaneRC2596297	600 N 25th St	0.68
PLaneRC688064	318 W 29th St	0.68
PLaneRC6133968	400 W 32nd St	0.68
PLaneRC924799	1715 Texas Ave	0.68
PLaneRC5572405	719 W Franklin St	0.68
PLaneRC731094	117 E 13th St	0.68
PLaneRC482842	101 W Brookland Park Blvd	0.67
PLaneRC665072	501 W 29th St	0.67
PLaneRC4776101	1615 S Meadow St	0.67

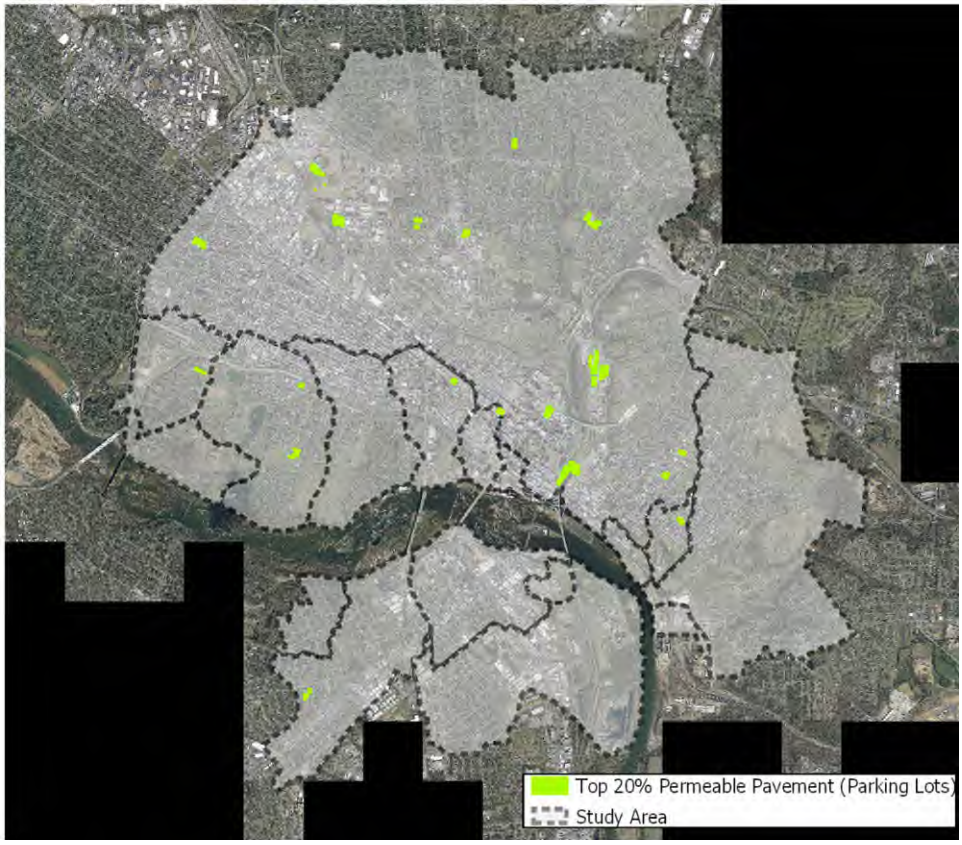
P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC5991317	801 E Cary St	0.67
PLaneRC2126351	1309 N 24th St	0.67
PLaneRC1815469	116 S Nansemond St	0.67
PLaneRC1929598	1401 Little John Road	0.67
PLaneRC2557333	1929 Carrington St	0.67
PLaneRC5572411	719 W Franklin St	0.67
PLaneRC3014224	3301 E Broad St	0.67
PLaneRC708370	2918 Springhill Ave	0.67
PLaneRC4060116	3101 Sunset Ave	0.67
PLaneRC606911	215 Dundee Ave	0.67
PLaneRC148551	3300 W Clay St	0.67
PLaneRC156581	1509 Belleville St	0.67
PLaneRC1648455	1200 W Marshall St	0.67
PLaneRC171585	3420 Norfolk St	0.67
PLaneRC204564	3014 Norfolk St	0.67
PLaneRC204565	3014 Norfolk St	0.67
PLaneRC2364651	800 E Duval St	0.67
PLaneRC241543	3216 W Broad St	0.67
PLaneRC3635571	2901 Hermitage Road	0.67
PLaneRC3640574	2949 N Arthur Ashe Blvd	0.67
PLaneRC3934504	1001 School St	0.67
PLaneRC3935506	1705 Brook Road	0.67
PLaneRC3973735	1501 Fendall Ave	0.67
PLaneRC6017339	1220 E Broad St	0.67
PLaneRC7758468	1100 W Leigh St	0.67
PLaneRC9360559	3600 W Broad St	0.67
PLaneRC9360560	3600 W Broad St	0.67
PLaneRC9474646	512 N 8th St	0.67
PLaneRC9528786	1115 Dove St	0.67
PLaneRC688167	316 W 28th St	0.67
PLaneRC6133969	3204 Mcdonough St	0.67
PLaneRC5956152	201 S 3rd St	0.67
PLaneRC66072	3513 Stockton St	0.67
PLaneRC8303527	2305 Cecil Road	0.67
PLaneRC5349394	2327 Rosewood Ave	0.67
PLaneRC3296668	1400 Mechanicsville Tpke	0.67
PLaneRC3138657	1925 U St	0.67
PLaneRC1264836	3002 Meadow Bridge Road	0.67
PLaneRC3071348	1010 N 21st St	0.66
PLaneRC4476894	3418 Enslow Ave	0.66
PLaneRC8639526	1838 Thomas St	0.66
PLaneRC4055121	1112 Sunset Ave	0.66

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC958633	3421 Hawthorne Ave	0.66
PLaneRC265530	3131 W Grace St	0.66
PLaneRC3014230	3215 E Broad St	0.66
PLaneRC3014232	3215 E Broad St	0.66
PLaneRC3014236	3301 E Broad St	0.66
PLaneRC3016233	3215 E Broad St	0.66
PLaneRC7731603	3207 N Arthur Ashe Blvd	0.66
PLaneRC1609453	1700 Monument Ave	0.66
PLaneRC684148	3001 Bainbridge St	0.66
PLaneRC7148135	601 W 21st St	0.66
PLaneRC804900703	2107 Wood St	0.66
PLaneRC3824502	504 W Bacon St	0.66
PLaneRC2359344	900 E Broad St	0.66
PLaneRC1021870	3119 Barton Ave	0.66
PLaneRC9486727	2302 A Carmine St	0.66
PLaneRC3867429	400 W Clay St	0.66
PLaneRC804900704	1900 Eastview Lane	0.66
PLaneRC684455	315 W 31st St	0.66
PLaneRC3363681	1906 Redd St	0.66
PLaneRC3635570	1505 Robin Hood Road	0.66
PLaneRC3361682	1906 Redd St	0.66
PLaneRC3361683	1906 Redd St	0.66
PLaneRC1648458	1200 W Marshall St	0.66
PLaneRC765513	2011 Northumberland Ave	0.66
PLaneRC604550	600 Edgehill Road	0.66
PLaneRC5298370	735 Byrd Park Ct	0.66
PLaneRC4496859	3100 Enslow Ave	0.66
PLaneRC686057	2715 Bainbridge St	0.65
PLaneRC670942	2601 Maury St	0.65
PLaneRC1673444	1103 W Grace St	0.65
PLaneRC7591337	1200 Bank St	0.65
PLaneRC8561330	1200 Bank St	0.65
PLaneRC8561338	1200 Bank St	0.65
PLaneRC4060122	3009 Sunset Ave	0.65
PLaneRC1942604	3106 Chatham Road	0.65
PLaneRC3121341	1000 N 21st St	0.65
PLaneRC8359137	519 W 20th St	0.65
PLaneRC3422228	3301 E Broad St	0.65
PLaneRC3422234	3301 E Broad St	0.65
PLaneRC3423235	3301 E Broad St	0.65
PLaneRC4060126	1108 Sunset Ave	0.65
PLaneRC60997	119 W 33rd St	0.65

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC3973737	1501 Fendall Ave	0.65
PLaneRC7148136	600 W 20th St	0.65
PLaneRC711269	2501 Hargrove St	0.65
PLaneRC456537	3301 W Grace St	0.65
PLaneRC2457361	2711 M St	0.65
PLaneRC2457362	2711 M St	0.65
PLaneRC4485885	3300 1st Ave	0.65
PLaneRC5880264	2300 E Cary St	0.65
PLaneRC664671	2918 Springhill Ave	0.65
PLaneRC681725	3151 Hull St	0.65
PLaneRC1008907	3328 North Ave	0.65
PLaneRC4570871	710 E Gladstone Ave	0.65
PLaneRC3144653	1925 U St	0.65
PLaneRC469826	2711 Hanes Ave	0.65
PLaneRC9384106	1411 Georgia Ave	0.65
PLaneRC1877617	3218 Chamberlayne Ave	0.65
PLaneRC606910	124 W 34th St	0.65
PLaneRC9096114	Close to Rugby Road	0.64
PLaneRC675843	2850 Lawson St	0.64
PLaneRC7602852	3018 Fendall Ave	0.64
PLaneRC4914972	1105 Sunset Ave	0.64
PLaneRC636487	321 E 16th St	0.64
PLaneRC1628451	1700 Monument Ave	0.64
PLaneRC7601853	3011 Fendall Ave	0.64
PLaneRC8626272	1901 E Main St	0.64
PLaneRC3106350	1120 N 22nd St	0.64
PLaneRC3888775	2000 Barton Ave	0.64
PLaneRC1649457	811 N Harrison St	0.64
PLaneRC40418	800 Freeman Road	0.64
PLaneRC4284271	900 N 36th St	0.64
PLaneRC689946	2701 Hull St	0.64
PLaneRC2401167	101 W Cary St	0.64
PLaneRC714566	2301 Bainbridge St	0.64
PLaneRC896075	2820 New Kent Ave	0.63
PLaneRC4060117	3013 Sunset Ave	0.63
PLaneRC492874	3130 Woodrow Ave	0.63
PLaneRC1642464	1117 W Leigh St	0.63
PLaneRC4060118	3015 Sunset Ave	0.63
PLaneRC1319785	2206 3rd Ave	0.63
PLaneRC7591320	1200 Bank St	0.63
PLaneRC5511150	601 China St	0.63
PLaneRC670941	2601 Maury St	0.63

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC945920	3407 Garland Ave	0.63
PLaneRC4731107	1501 Georgia Ave	0.63
PLaneRC1154844	3122 Utah Pl	0.63
PLaneRC288516	3000 Monument Ave	0.63
PLaneRC3141660	1816 T St	0.63
PLaneRC2056679	1816 N 21st St	0.63
PLaneRC897919	3333 Hanes Ave	0.63
PLaneRC555857	3019 Edgewood Ave	0.62
PLaneRC7511102	1511 Hampton St	0.62
PLaneRC5991318	800 P1 E Canal St	0.62
PLaneRC1943610	1606 Wentbridge Road	0.62
PLaneRC5298369	735 Byrd Park Ct	0.62
PLaneRC3934491	1001 School St	0.62
PLaneRC1386493	1300 School St	0.62
PLaneRC608712	3215 Forest Hill Ave	0.62
PLaneRC3140672	1440 Rogers St	0.62
PLaneRC4737100	1520 Carter St	0.62
PLaneRC5613400	811 S Cathedral Pl	0.62
PLaneRC651165	2301 Bainbridge St	0.62
PLaneRC7057140	601 W 19th St	0.61
PLaneRC651161	2301 Bainbridge St	0.61
PLaneRC9295144	700 Semmes Ave	0.61
PLaneRC3882774	104 Poe St	0.61
PLaneRC334522	2810 W Marshall St	0.61
PLaneRC60626	3162 Moody Ave	0.61
PLaneRC2063686	1813 N 20th St	0.61
PLaneRC737292	225 E 12th St	0.61
PLaneRC9295146	700 Semmes Ave	0.61
PLaneRC6240178	901 Dinwiddie Ave	0.61
PLaneRC6394971	1101 Dinwiddie Ave	0.61
PLaneRC7654315	701 E Cary St	0.61
PLaneRC1158846	3104 3rd Ave	0.61
PLaneRC2457363	2712 E Leigh St	0.61
PLaneRC2457364	2712 E Leigh St	0.61
PLaneRC154541	3010 W Clay St	0.61
PLaneRC2140373	12 E Franklin St	0.61
PLaneRC1984594	1406 Wentbridge Road	0.61
PLaneRC500841	2901 North Ave	0.61
PLaneRC6005312	1200 Bank St	0.61
PLaneRC4570879	700 E Gladstone Ave	0.60
PLaneRC7718406	3000 Grant St	0.60
PLaneRC60625	3163 Midlothian Tpke	0.60

P_LaneID	Address of nearest parcel	Normalized Score
PLaneRC4060125	1108 Sunset Ave	0.60
PLaneRC8183324	1200 Bank St	0.60
PLaneRC2821732	1509 Court St	0.60
PLaneRC8843639	1400 Confederate Ave	0.60
PLaneRC4883109	901 Spottswood Road	0.60
PLaneRC9305645	1412 Wilmington Ave	0.60
PLaneRC5988299	110 S 13th St	0.60
PLaneRC498851	3025 North Ave	0.60
PLaneRC3997434	3301 Maplewood Ave	0.60
PLaneRC4581858	601 Arnold Ave	0.60
PLaneRC1838629	1412 Palmyra Ave	0.60
PLaneRC6266170	710 Commerce Road	0.60
PLaneRC3503206	2010 Carlisle Ave	0.60
PLaneRC2084655	1713 N 25th St	0.60



Top 40% Permeable Pavement in Parking Lots

Top 40% Permeable Pavement in Parking Lots

P_permID	PIN	Address	Owner	Normalized Score
P_permN000065000153	N0000650001	2310 1st Ave	City Of Richmond School Board	1.00
P_permW0000712050105	W0000712050	1211 S Allen Ave	City Of Richmond School Board	0.95
P_permS000172000186	S0001720001	3160 Midlothian Tpke	City Of Richmond School Board	0.95
P_permE000012701611	E0000127016	1500 B E Main St	City Of Richmond Public Works	0.93
P_permN000103703062	N0001037030	3101 Fendall Ave	City Of Richmond School Board	0.93
P_permN000074001355	N0000740013	1202 W Graham Road	City Of Richmond Public Works	0.92
P_permE000012700510	E0000127005	1500 E Franklin St	City Of Richmond Dept Of Public Works	0.92
P_permE000054000127	E0000540001	1701 Fairfield Way	City Of Richmond Public Works	0.92
P_permE000045204023	E0000452040	1600 Oliver Hill Way	City Of Richmond Public Works	0.90
P_permW0000148022100	W0000148022	210 W Grace St	City Of Richmond Public Works	0.88
P_permE000038100122	E0000381001	701 N 25th St	City Of Richmond Public Works	0.88
P_permW000002500193	W0000025001	415 E Broad St	City Of Richmond Dept Of Public Works	0.87
P_permN000151001267	N0001510012	2949 N Arthur Ashe Blvd	City Of Richmond Public Works	0.86
P_permN000129200464	N0001292004	2400 Hermitage Road	City Of Richmond Public Works	0.86
P_permE000047400125	E0000474001	2517 Q St	City Of Richmond Public Works	0.86
P_permN000053200152	N0000532001	2219 Chamberlayne Pkwy	City Of Richmond Public Works	0.86
P_permE000023500117	E0000235001	501 N 9th St	City Of Richmond Public Works	0.84
P_permW0000847045108	W0000847045	301 S Meadow St	City Of Richmond Public Works	0.84
P_permW0001617001116	W0001617001	3400 Patterson Ave	City Of Richmond School Board	0.84
P_permE00001070337	E0000107033	1519 E Franklin St	City Of Richmond Dept Of Public Works	0.83
P_permE000045207224	E0000452072	1400 Oliver Hill Way	Virginia Commonwealth Univ	0.82
P_permW0001343001112	W0001343001	3000 Grant St	City Of Richmond School Board	0.81
P_permE000057500130	E0000575001	3000 E Marshall St	City Of Richmond School Board	0.79
P_permN000048600151	N0000486001	219 W Graham Road	City Of Richmond School Board	0.79
P_permW0000835001107	W0000835001	1821 Amelia St	City Of Richmond School Board	0.78
P_permE000036200121	E0000362001	1000 Mosby St	City Of Richmond School Board	0.77
P_permW000000800191	W0000008001	609 E Grace St	City Of Richmond Dept Of Public Works	0.77
P_permN000047600650	N0000476006	1617 Brook Road	City Of Richmond	0.76
P_permS000050002883	S0000500028	2211 Semmes Ave	City Of Richmond Public Works	0.76
P_permS000086300185	S0000863001	2100 Ingram Ave	City Of Richmond	0.75
P_permN000089800160	N0000898001	2900 Woodrow Ave	City Of Richmond Public Works	0.75
P_permW0001042019110	W0001042019	2300 Hanover Ave	City Of Richmond School Board	0.75
P_permN000151002069	N0001510020	3003 N Arthur Ashe Blvd	City Of Richmond	0.74
P_permN000151001166	N0001510011	2909 N Arthur Ashe Blvd	City Of Richmond Public Works	0.74
P_permN000036600146	N0000366001	2000 Fendall Ave	City Of Richmond School Board	0.73
P_permN000000900138	N0000009001	808 E Clay St	City Of Richmond Dept Of Public Works	0.73

P_permID	PIN	Address	Owner	Normalized Score
P_permS007029200989	S0070292009	1400 Goodes St	City Of Richmond Public Works	0.71
P_permN000090801961	N0000908019	1015 E Brookland Park Blvd	City Of Richmond Recreation & Parks	0.71
P_permE000052500126	E0000525001	710 N 29th St	City Of Richmond School Board	0.69
P_permW0000729008106	W0000729008	1701 Floyd Ave	City Of Richmond School Board	0.69
P_permS007077401090	S0070774010	2214 Maury St	City Of Richmond Public Works	0.69
P_permE000016001315	E0000160013	212 N 18th St	City Of Richmond Recreation & Parks	0.68
P_permE00001070255	E0000107025	1500 E Main St	City Of Richmond Dept Of Public Works	0.68
P_permN000012200141	N0000122001	119 W Leigh St	City Of Richmond School Board	0.67
P_permN000151000965	N0001510009	3017 N Arthur Ashe Blvd	City Of Richmond Recreation & Parks	0.67
P_permN000036600247	N0000366002	400 School St	City Of Richmond Public Works	0.67
P_permE000012702012	E0000127020	1615 E Broad St	City Of Richmond Public Works	0.67
P_permN000080300156	N0000803001	1111 Fourqurean Lane	City Of Richmond Public Works	0.67
P_permN000046900349	N0000469003	1100 W Leigh St	City Of Richmond School Board	0.66
P_permE00001270029	E0000127002	1607 E Broad St	City Of Richmond Public Works	0.66
P_permS000018800180	S0000188001	1401 Maury St	City Of Richmond School Board	0.66
P_permN000043900348	N0000439003	1600 Chamberlayne Pkwy	City Of Richmond Public Works	0.65
P_permE00000900034	E0000090003	1537 E Main St	City Of Richmond Dept Of Public Works	0.65
P_permE012040000136	E0120400001	2305 Fairfield Ave	City Of Richmond School Board	0.64
P_permW000001702192	W0000017021	800 P2 E Canal St	City Of Richmond	0.64
P_permW000012701895	W0000127018	100 W Grace St	City Of Richmond Dept Of Public Works	0.61
P_permN000089401559	N0000894015	2901 North Ave	City Of Richmond Public Works	0.61
P_permN000000500137	N0000005001	607 E Marshall St	City Of Richmond Dept Of Public Works	0.60

Appendix E

Annie Giles Community Resource Center – GI Conceptual Design Calculations and Costs

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT ANNIE GILES COMMUNITY RESOURCE CENTER

Figure 1. Site map showing topography and drainage patterns

SITE OVERVIEW

- Location: 1400 Oliver Hill Way, Richmond, VA 23219
- Watershed: Shockoe
- Size of Property: 53,000 SF
  - Total Impervious Area of Property: 37,000 SF (71%)
  - Total Pervious Area of Property: 15,000 SF (29%)
- Size of Building: 14,000 SF
- Adjacent Properties: vacant private property in the west and in the north, Richmond City Sheriff's Office in the east, a warehouse in the south
- Permeable Pavement Site Ranking: 49/180 (Top 20%)
- Owner: Virginia Commonwealth University

Figure 2. Site ranking from the Tool

Existing Site Conditions

- Small/medium trees and some vegetation in parking lot islands
- Surface runoff from the parking lot generally drains to the west and the runoff from the building drains to the east onto the adjacent streets
- No stormwater inlets or BMP exist in the parcel

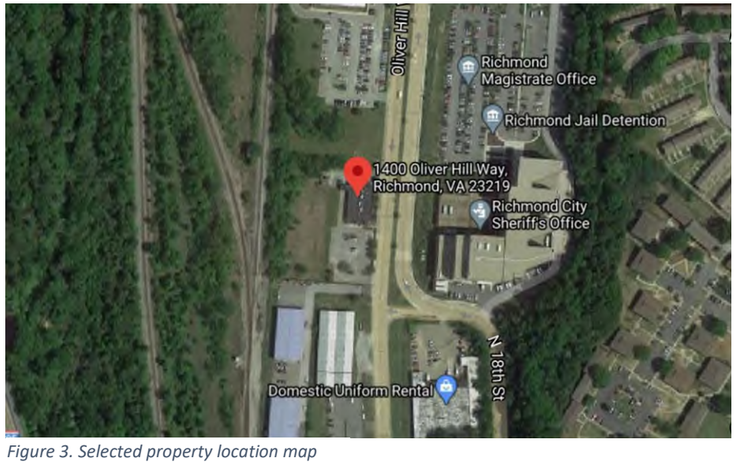


Figure 3. Selected property location map

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT ANNIE GILES COMMUNITY RESOURCE CENTER

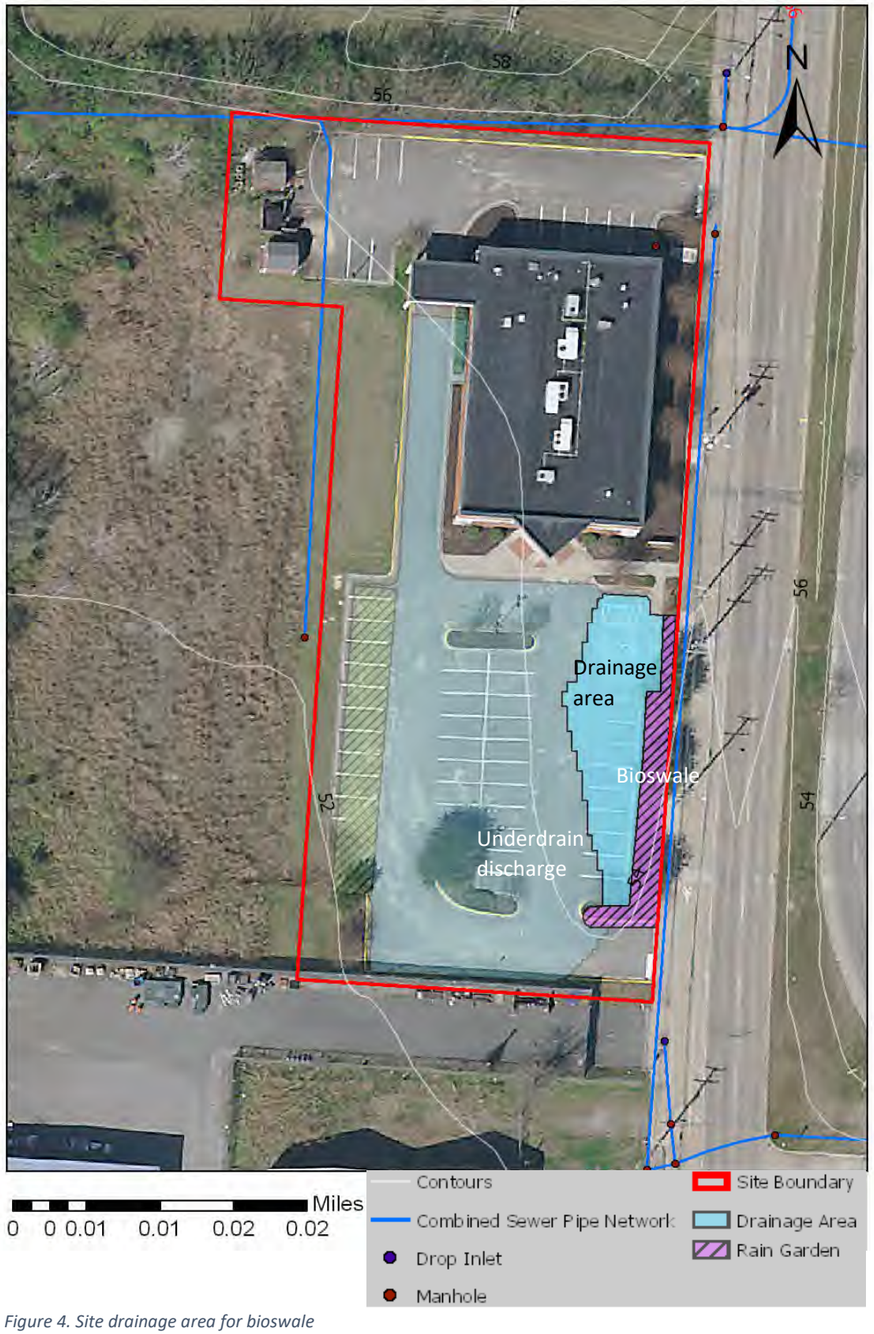


Figure 4. Site drainage area for bioswale

Green Infrastructure Concept 1

Bioswale

- A bioswale is used to retain rainwater by collecting and managing the runoff from the adjacent impervious areas. The intent of the proposed concept is to manage a portion of the parking lot runoff using a rain garden constructed in place of the existing landscape island.
- A site visit was conducted to confirm site drainage patterns and identify any issues that may affect the design.

Conceptual Design

- Drainage Area: 4,000 SF (in light blue)
- Bioswale Area: 1,300 SF (in purple)
- Bioswale Soil Media Thickness: 2 ft to manage 2” runoff

Opinion of Costs

- Construction Cost: = $33,000
- Annual Maintenance Cost: $0.50/sf x 1,300 sf = $650
- Cost-Benefit: Approx. $2.83 / gal treated

Inspection & Maintenance Requirements

- Inspection: Annually in Spring
- Trash Removal and Revegetation: Annually
- Sediment Removal Frequency: Once every 2 to 3 years
- Mulch Layer Replacement: Every 3 years
- Facility Life Span: 10 to 25 years

Figure 5. Existing conditions

Figure 6. Future street view of bioswale

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT ANNIE GILES COMMUNITY RESOURCE CENTER

Figure 7. Site drainage area for permeable pavement

Green Infrastructure Concept 2

Permeable Pavement

- Permeable pavement allows stormwater runoff to filter through voids in the pavement surface into an underlying stone reservoir, where it is temporarily stored and/or infiltrated. It consists of a surface pavement layer, an underlying stone aggregate reservoir layer and a filter layer or fabric installed on the bottom.

Conceptual Design

- Drainage Area: 17,000 SF (in light blue)
- Permeable Pavement Area: 2,000 SF (in green hatch)
- Permeable Pavement Stone Reservoir Layer Thickness: 3.5 ft for 2" runoff

Opinion of Costs

- Construction Cost: = $55,000
- Annual Maintenance Cost: $0.25/sf x 2,000 sf = $500
- Cost-Benefit: Approx. $1.69 / gal treated

Maintenance Requirements

- Vacuum Sweeping Frequency: Annually or as needed
- Facility Life Span: 15 to 20 years

Figure 8. Existing parking lot

Figure 9. Proposed permeable pavement location

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT ANNIE GILES COMMUNITY RESOURCE CENTER

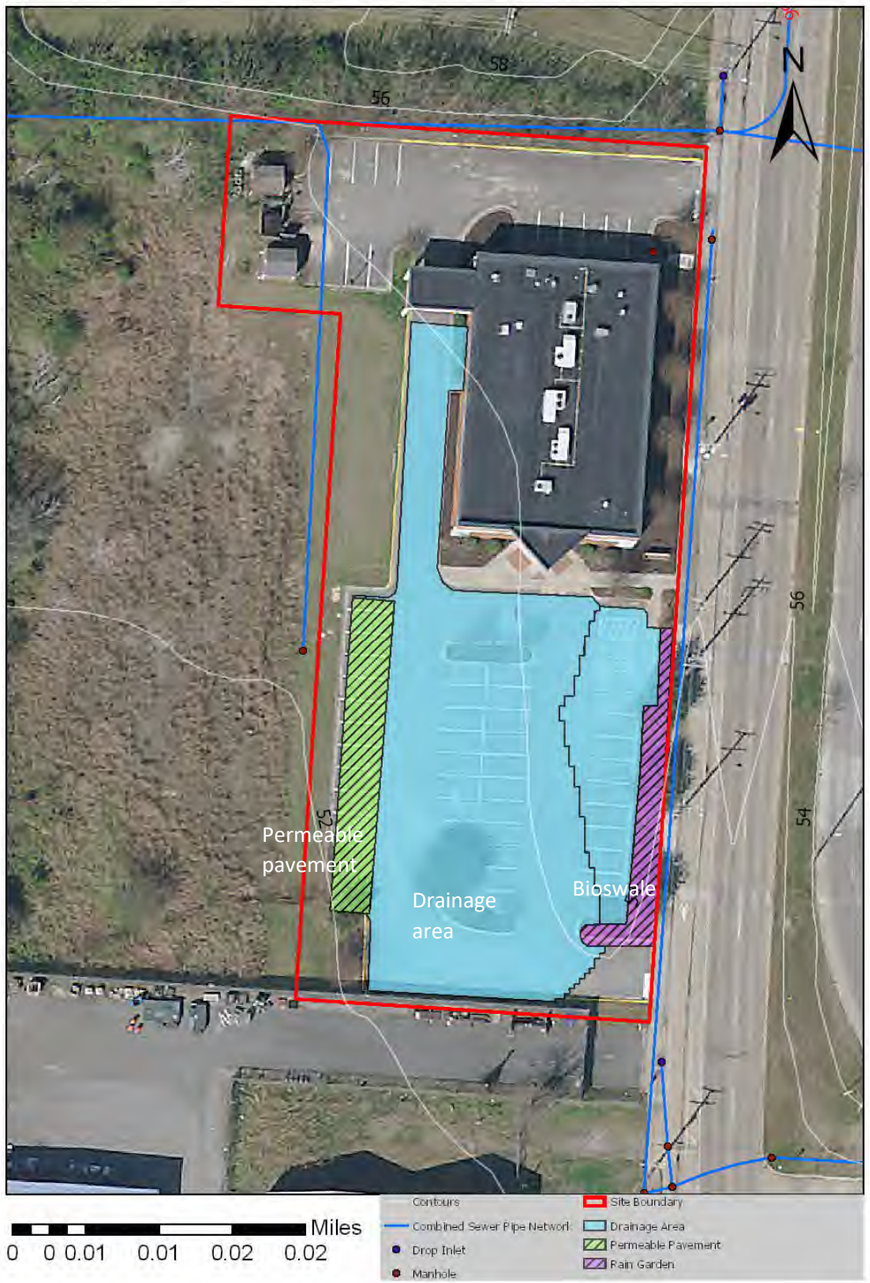


Figure 10. Overall Design Layout

Summary

Proposed Green Infrastructure Concepts

- Total onsite impervious area managed providing detention for a 2" storm event: 21,146 SF, 57% of the total impervious area
- Total footprint of proposed GI to capture onsite runoff: 3,316 SF (2,020 SF of permeable pavement area, 1,296 garden)
- Total Parking Spaces eliminated: 0
- Green Space Created: The proposed GI Concepts assuming 2" per hour infiltration rate increase the existing 6% green space in the property (about 3,000 SF) to 10% (about 5,000 SF)

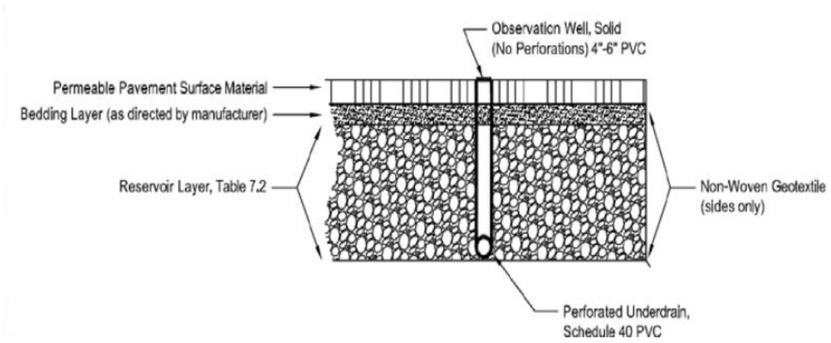


Figure 11. Typical section permeable pavement

SF of rain

Recommendation:

- The site location, feasibility to provide both bioretention and permeable pavement, increase green space, and manage 2" runoff make this a good option to move forward to design.

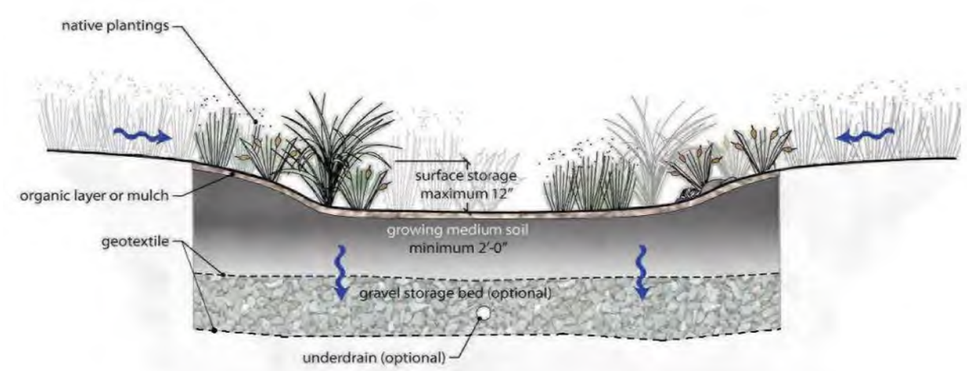


Figure 12. Typical section rain garden

Next Steps:

- Obtained detailed geotechnical data to identify potential for infiltration at site
- Obtain topographical and utility location survey for detailed design

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT ANNIE GILES COMMUNITY RESOURCE CENTER

Item:	Units	Qty	Unit Cost	Total Cost
Bioretention Rain Garden - Annie Giles				
Bioretention Area	*SY*	*144*		
Bioretention Depth	*FT*	*2.0*		
Excavation/Grading	CY	120	$20	$2,407
Material disposal	CY	120	$25	$3,009
Bioretention Media	CY	96	$65	$6,259
No. 57 Stone	CY	36	$45	$1,625
No. 8 Pea Gravel	CY	12	$50	$602
Geotextile	SY	144	$3	$433
6" PVC Underdrain Pipe	LF	125	$15	$1,875
6" PVC Observation Wells	EA	2	$100	$200
Bioretention Plantings - 1 Gallon	EA	325	$15	$4,875
Bioretention Plantings - 3 Gallon	EA	13	$20	$260
Mulching	CY	16	$50	$794
Parking Closure & Safety Fence Rental	LS	1	$5	$1,000
Mob/Demobilization, Testing, Bonds, Ins, Etc.	LS	1	10%	$2,200
Survey	LS	1	$1,500	$1,500
Sub-Total				$27,000
Contingency			25%	$7,000
Total				**$34,000**
Permeable Pavement - Annie Giles				
Permeable Parking Area	*SY*	*225*		
Permeable Parking Depth	*FT*	*3.5*		
Existing Pavement Demolition	SY	225	$15	$3,375
Excavation	CY	296	$20	$5,926
Material disposal	CY	296	$25	$7,407
Porous Asphalt	SY	225	$20	$4,500
No. 57 Stone	CY	222	$45	$10,000
Bedding Layer	CY	37	$50	$1,852
Geotextile	SY	225	$3	$675
6" PVC Underdrain Pipe	LF	200	$15	$3,000
6" PVC Cleanouts	EA	4	$100	$400
Underdrain connection to downstream inlet	EA	1	$5,000	$5,000
Mob/Demobilization, Testing, Bonds, Ins, Etc.	LS	1	10%	$3,700
Survey	LS	1	$1,500	$1,500
Sub-Total				$44,000
Contingency			25%	$11,000
Total				**$55,000**

Appendix F

15th/16th Street – GI Conceptual Design Calculations and Costs

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT E 15th AND 16th PARKING LANES

Figure 1. Site topography and drainage areas

SITE OVERVIEW

- Location: E 15th/16th St and Maury St, Richmond, VA 23219
- Watershed: Manchester
- Size of Project Area within R/W: 5,900 SF
  - Permeable Parking Lane Width: 8ft
  - Total Permeable Parking Lane Length: 80ft
- Project area divided into two sites with subdivisions as indicated in topographic figure on the left
- Adjacent Properties: Blackwell Community Center, Blackwell Elementary School and Blackwell Pool on Everett St in the northeast of the site, and Charlie Sydnor Playground in the east of 15th St
- Owner: Department of Public Works (Right of Way)

Figure 2. Site ranking from the Tool

Existing Site Conditions

- Residential area with back alleys
- Surface runoff generally drains to the East onto the adjacent streets, 15th and 16th St
- Storm water inlets exist on both 15th and 16th St

Figure 3. E 16th St existing condition from Everett St facing South

Figure 4. E 15th St existing condition from Maury St facing South

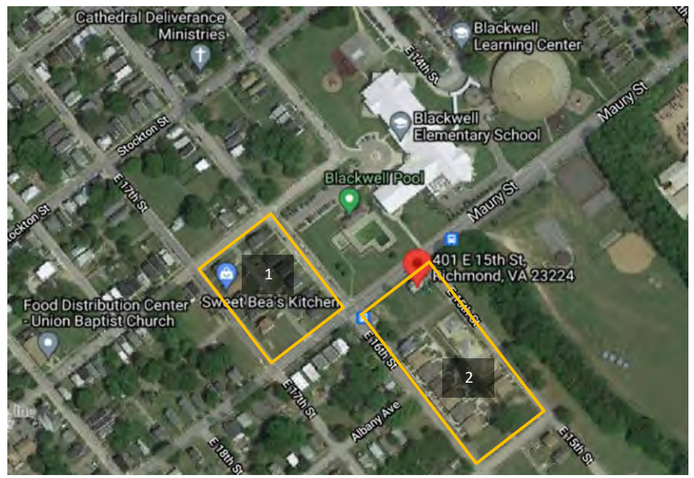


Figure 5. Selected project location map

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT E 15th AND 16th PARKING LANES

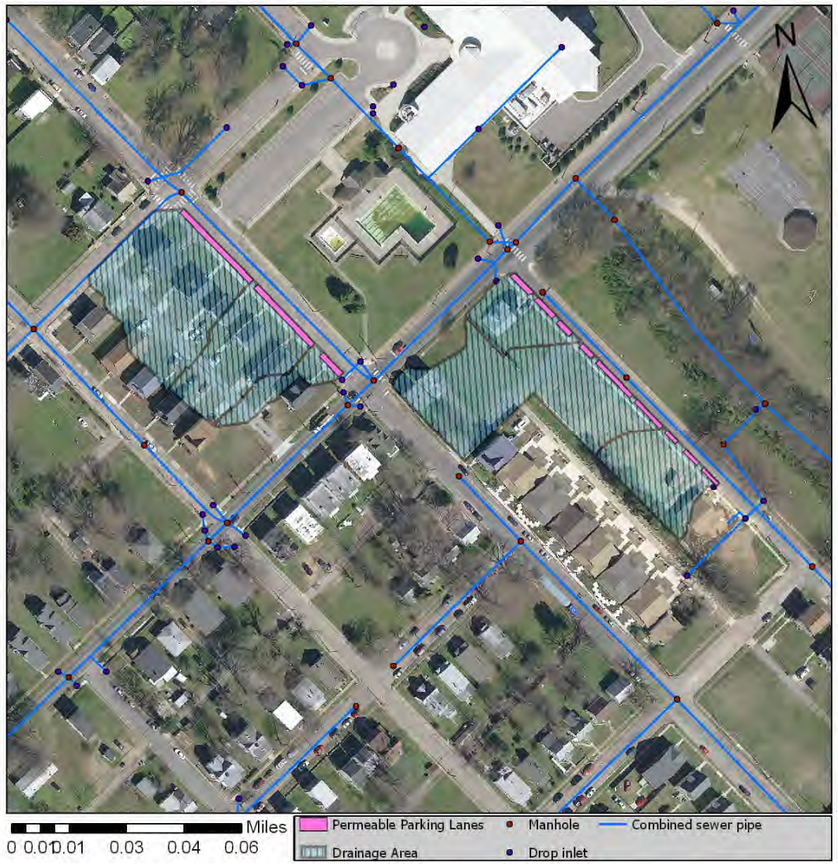


Figure 6. Tributary drainage areas to permeable pavement sections

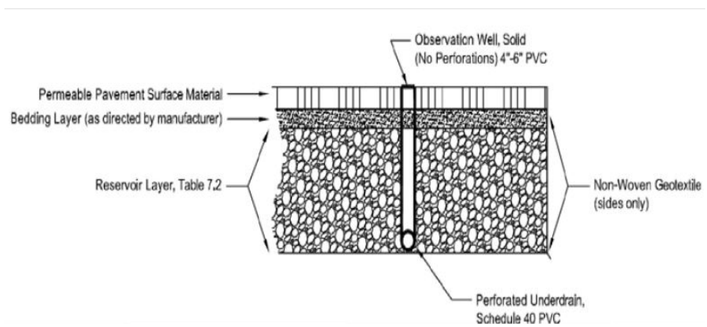


Figure 8. Typical Section Permeable Pavement

Green Infrastructure Concept 1

Permeable Parking

- Permeable pavement in parking lanes allows stormwater runoff to filter through voids in the pavement surface into an underlying stone reservoir, where it is temporarily stored and/or infiltrated. It consists of a surface pavement layer, an underlying stone aggregate reservoir layer and a filter layer or fabric installed on the bottom. A field visit was conducted to obtain invert elevations of the existing drainage system and confirm drainage patterns.

Figure 7. Proposed permeable pavement on E 15th St from Maury St facing South

Conceptual Design

- Drainage Area: 148,000 SF (in light blue)
  - Total Impervious Area of Property: 49,000 SF (33%)
  - Total Pervious Area of Property: 98,000 SF (67%)
- Permeable Parking Lanes Area: 5,900 SF (in pink)
- Permeable Parking Stone Reservoir Layer Thickness: 2 to 4.6 ft for 0.5” runoff
- Underdrains tie into downstream storm inlets.

Opinion of Costs

- Construction Cost: $126,000
- Annual Maintenance Cost: $0.25/sf x 5,900 sf = $1,500
- Cost-Benefit: Approx. $3.40 / gal treated

Maintenance Requirements

- Vacuum Sweeping Frequency: Annually or as needed
- Facility Life Span: 15 to 20 years

Figure 9. Proposed permeable pavement on E 16th St from Everett St facing South

Design Details

0.5-inch Precipitation Scenario

Drainage Area Name	Total Depth of Permeable Pavement Stone Storage (ft)	Permeable Pavement Area (SF)	Runoff Volume		Pavement Storage Required (ft^3)	Downstream Structure Depth (inch)
			ft^3	gallon		
1.1	3.5	31,000	1,300	10,000	3,000	
1.2	2.5	18,000	800	6,000	2,000	
1.3	2.5	6,000	200	2,000	600	
Total DA 1		**55,000**	**2,300**	**18,000**	**5,600**	**27**
2.1	2.0	9,000	400	3,000	1,000	
2.2	3.0	35,000	1,600	12,000	4,000	
2.3	3.5	13,000	500	4,000	1,000	
Total DA 2		**57,000**	**2,500**	**19,000**	**6,000**	**53**

* The void ratio was assumed to be 0.40

* Volumetric runoff coefficient for impervious cover = 0.95

Recommendation & Next Steps:

- Obtain detailed geotechnical data to identify potential for infiltration and topographical and utility location survey for detailed design.

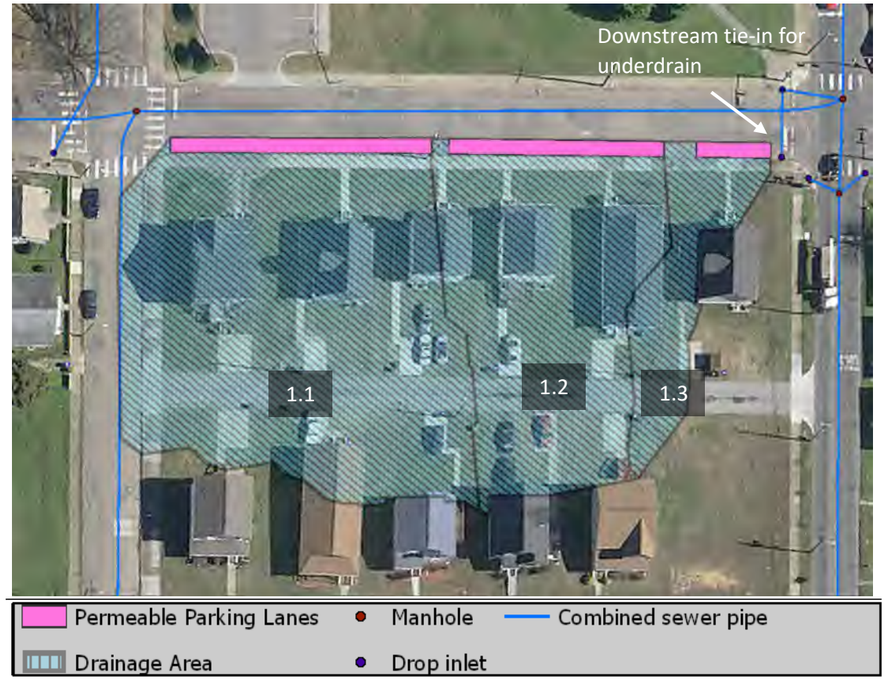


Figure 10. Drainage Area 1 Design Details

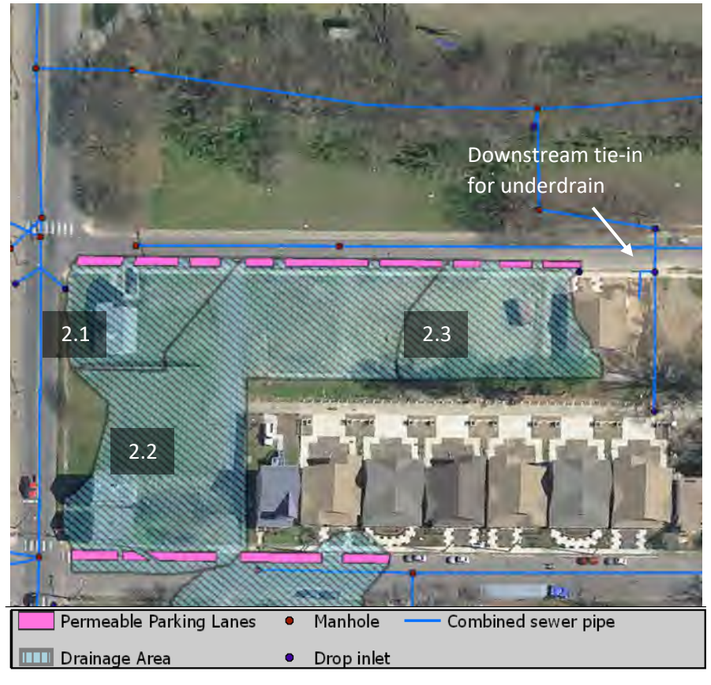


Figure 11. Drainage Area 2 Design Details

CONCEPTUAL DESIGNS FOR PROPOSED GREEN INFRASTRUCTURE CONCEPTS AT E 15th AND 16th PARKING LANES

Item:	Units	Qty	Unit Cost	Total Cost
Permeable Parking Lanes - E 16th St. DA 1				
Permeable Parking Lane Area & Stone Depth (DA 1.1)	*SY*	*119*	*FT*	*3.0*
Permeable Parking Lane Area & Stone Depth (DA 1.2)	*SY*	*100*	*FT*	*2.1*
Permeable Parking Lane Area & Stone Depth (DA 1.3)	*SY*	*35*	*FT*	*1.9*
Existing Pavement Demolition	SY	254	$15	$3,808
Excavation	CY	253	$20	$5,065
Material disposal	CY	253	$25	$6,332
Porous Asphalt	SY	254	$20	$5,078
No. 57 Stone	CY	169	$45	$7,589
Bedding Layer	CY	42	$50	$2,116
Geotextile	SY	254	$3	$762
6" PVC Underdrain Pipe	LF	350	$15	$5,250
6" PVC Cleanouts	EA	7	$100	$700
Underdrain connection to downstream inlet	EA	1	$5,000	$5,000
Mob/Demobilization, Testing, Bonds, Ins, Etc.	LS	1	10%	$3,700
Work In R/W Permitting & Traffic Control	LS	1	10%	$5,000
Survey	LS	1	$1,500	$1,500
Sub-Total				$48,000
Contingency			25%	$12,000
Total				**$60,000**
Permeable Parking Lanes - E 15th St. DA 2				
Permeable Parking Lane Area & Stone Depth (DA 2.1)	*SY*	*48*	*FT*	*2.3*
Permeable Parking Lane Area & Stone Depth (DA 2.2)	*SY*	*186*	*FT*	*2.3*
Permeable Parking Lane Area & Stone Depth (DA 2.3)	*SY*	*49*	*FT*	*3.1*
Existing Pavement Demolition	SY	283	$15	$4,242
Excavation	CY	277	$20	$5,538
Material disposal	CY	277	$25	$6,923
Porous Asphalt	SY	283	$20	$5,656
No. 57 Stone	CY	183	$45	$8,219
Bedding Layer	CY	47	$50	$2,356
Geotextile	SY	283	$3	$848
6" PVC Underdrain Pipe	LF	450	$15	$6,750
6" PVC Cleanouts	EA	9	$100	$900
Underdrain connection to downstream inlet	EA	1	$5,000	$5,000
Mob/Demobilization, Testing, Bonds, Ins, Etc.	LS	1	10%	$4,100
Work In R/W Permitting & Traffic Control	LS	1	10%	$5,000
Survey	LS	1	$1,500	$1,500
Sub-Total				$53,000
Contingency			25%	$13,000
Total				**$66,000**