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Scott's Addition Green Space Plan: Small Changes Making a Big Impact

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Prepared For
Scott's Addition Boulevard Association

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A huge thank you to my family; mom, dad, and my sister Angela, for their unwavering support in all my endeavors. An equally huge thank you to my partner Andrew for always pulling me out of the weeds and helping me see the big picture.

Finally, I would like to thank my dog Kingslayer. Although he knows nothing about urban planning and cannot read this acknowledgement, I do my best thinking on our daily walks.

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Executive Summary

Scott's Addition is a fast growing, postindustrial neighborhood situated on the north side of West Broad street and bordering Henrico county to the west. The current building stock in Scott's Addition consists of industrial and manufacturing buildings, and warehouses, much of which have been converted into multi-family residential buildings, commercial businesses, office and restaurant space (Neighborhood History, 2018). As a consequence of its original land use and zoning most of Scott's Addition is dominated by concrete surface area and sprawling, one to two story building structures. Impervious surface areas that are prevalent in Scott's Addition directly contribute to latent heat production and ultimately creates an urban heat island effect. Research shows that there is a direct correlation between reduced latent heat production and green infrastructure. This design plan provides the framework for implementation of small scale green space projects by businesses on private property and can be the catalyst for a neighborhood-wide green transformation in the Scott's Addition neighborhood.

Client

The client for this plan is the Scott's Addition Boulevard Association (SABA) which is comprised of businesses and residents of the Scott's Addition neighborhood. The membership-based association focuses on various projects and events in Scott's Addition and serves as a networking and promotional agency for local businesses. The association works directly with councilperson Kimberly Gray to utilize city funds and enact neighborhood policies which benefit the fastest growing neighborhood in the Richmond area. One of the primary missions of the Scott's Addition Boulevard Association is to bolster beautification projects such as tree planting, trash clean up, and installing street signage to improve the neighborhood aesthetic and attract patrons to supporting businesses.

Introduction

The purpose for this green space plan is to mitigate some of the factors directly contributing to the urban heat island in Scott's Addition. There are several characteristics of an urban landscape that directly influence the production of latent heat, however for Scott's Addition the prevalence of impervious surfaces is the biggest contributor to amplifying heat in the neighborhood.

Plan Purpose

The relationship between climate and the city is reciprocal on both the macro and micro scale: the climate of an area influences how space within a city is used and the city with its man-made structures influence the climate (Kleerekoper, 2012). On the micro scale, spacing, orientation, materials of buildings, and open space have a strong influence on the microclimate of the city. On the macro scale, a city alters the regional climate resulting in differences in cloud cover, precipitation, air temperature and air quality when compared to its rural surroundings. This resulting temperature difference is referred to as the urban heat island effect. There is a direct correlation between the urban heat island and how cities are arranged, materials of the built environment, building geometry and orientation, and combustion processes from vehicles or building HVAC systems.

The urban heat island (UHI) effect is not a new phenomenon and is a well-researched topic among climate scientists and environmentalists however, in recent years, planners are also working to counteract the harmful effects of excessive urban heat by incorporating urban green infrastructure into planning practice. As more regions move towards urbanization, increased density and population of urban areas will continue to amplify the urban heat island ultimately effecting the health and well-being of urban populations (Gunawardena, 2017). Increasing vegetation or green infrastructure in the city is just one way to address the growing urban heat issue. Through the process of evapotranspiration, water loss from a plant is released into the air in the form of vapor which consumes energy from solar radiation and latent heat, cooling the leaf and the air surrounding it.

Although increased ambient temperature is a city-wide issue, interventions made at the neighborhood and building scale can impact the overall urban heat island. The cooling effects of vegetation can produce energy savings and reduce the cooling load of buildings as much as 10% (Gago, 2013). Even though the cooling effects of parks or urban forests have shown to have the biggest impact on mitigating urban heat, green areas do not have to be large to generate a cooling effect (Kleerekoper, 2012). Neighborhood-scale green spaces such as street trees or green roofs can cool the surrounding air to an equivalent of 10 air conditioners. Green facades also contribute to cooling the ambient temperature and can save 4-40% on energy costs for building cooling and heating (Susca, 2011, Kleerekoper, 2012). Additionally, urban green space has shown to improve the overall quality of life for residents, improves the city biodiversity, and assist with stormwater management practices (Gago, 2013, Norton, 2015).

Impervious surfaces, both building and non-building, trap heat generated throughout the day and slowly release it at night keeping the surrounding area consistently warm (Norton, 2015). An increase in green space, especially where there is a high impervious surface area, can significantly impact the ambient temperature. In the city of Richmond, Scott's Addition is one of the neighborhoods with the highest percentage of impervious surfaces when compared across the city.

The purpose of this professional plan is to provide a selection of small-scale green space interventions that can be easily implemented throughout the Scott's Addition neighborhood by business owners and private sector stakeholders in order to

counter act the harmful effects of the urban heat island. Small scale green space interventions can be the catalyst for additional neighborhood-wide green initiatives and set the foundation for a community dedicated to helping the environment.

Plan Context

Existing Conditions

Scott's Addition is a fast growing, postindustrial neighborhood situated on the north side of West Broad street, bordering Henrico county to the west (see Figure 1). Since being designated as a historic district in 2005 by the National Register of Historic Places, Virginia's historic tax credit program has incentivized consistent development in the area (Neighborhood History, 2018). The installation of the rapid bus transit line (the Pulse) which runs east and west along Broad street, prompted a change in zoning for Scott's Addition from auto-oriented manufacturing and commercial use (M-1) to transit-oriented development (TOD-1) along Broad street and the Boulevard with multi-family and commercial mixed-use throughout the rest of the neighborhood (City of Richmond: Zoning Ordinance, 2017). This change in zoning ordinance reflects a steady shift in building stock from industrial to a vibrant mixed-use neighborhood.

The current building stock in Scott's Addition consists of industrial and manufacturing buildings, and warehouses, much of which have been converted into multi-family residential buildings, commercial businesses, office and restaurant space (Neighborhood History, 2018). As a consequence of its original land use and zoning, most of Scott's Addition is dominated by sprawling, one to two

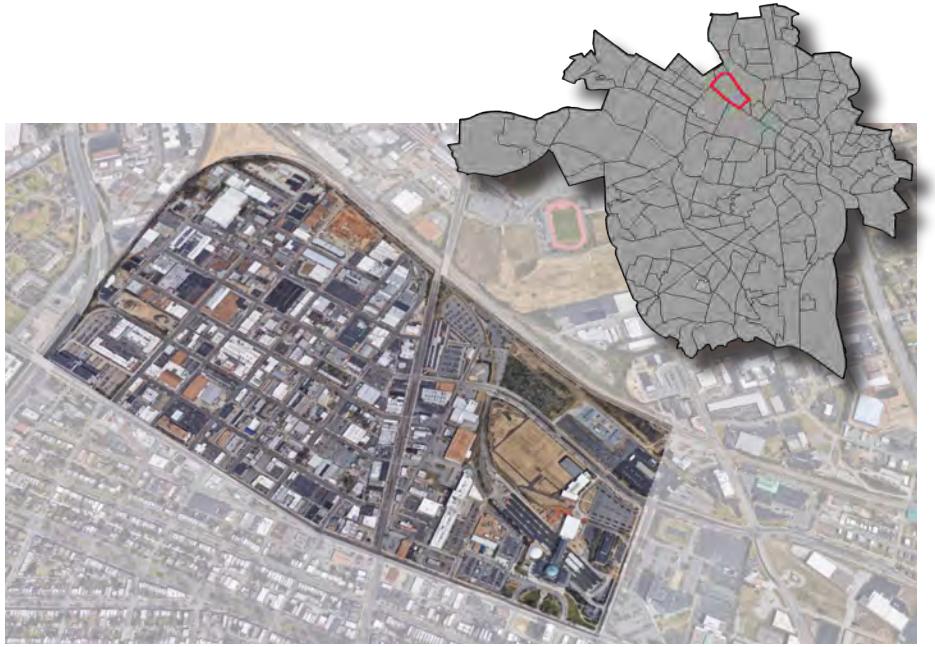


Figure 1: Location of Scott's Addition Neighborhood. Google (2018). [Google Earth aerial view of Scott's Addition neighborhood]. Retrieved February 2, 2019.

story building structures. Adaptive reuse of existing buildings has brought new investment and residents into the neighborhood however, the landscape has largely stayed the same. Figure 2 shows the existing land use of the area courtesy of the Center for Urban and Regional Analysis at VCU. This map shows industrial use as still the prominent land use type in the neighborhood, however with the recent zoning change and steadily increasing land value, we will most likely see a shift in land use designation over the next 5 to 10 years.

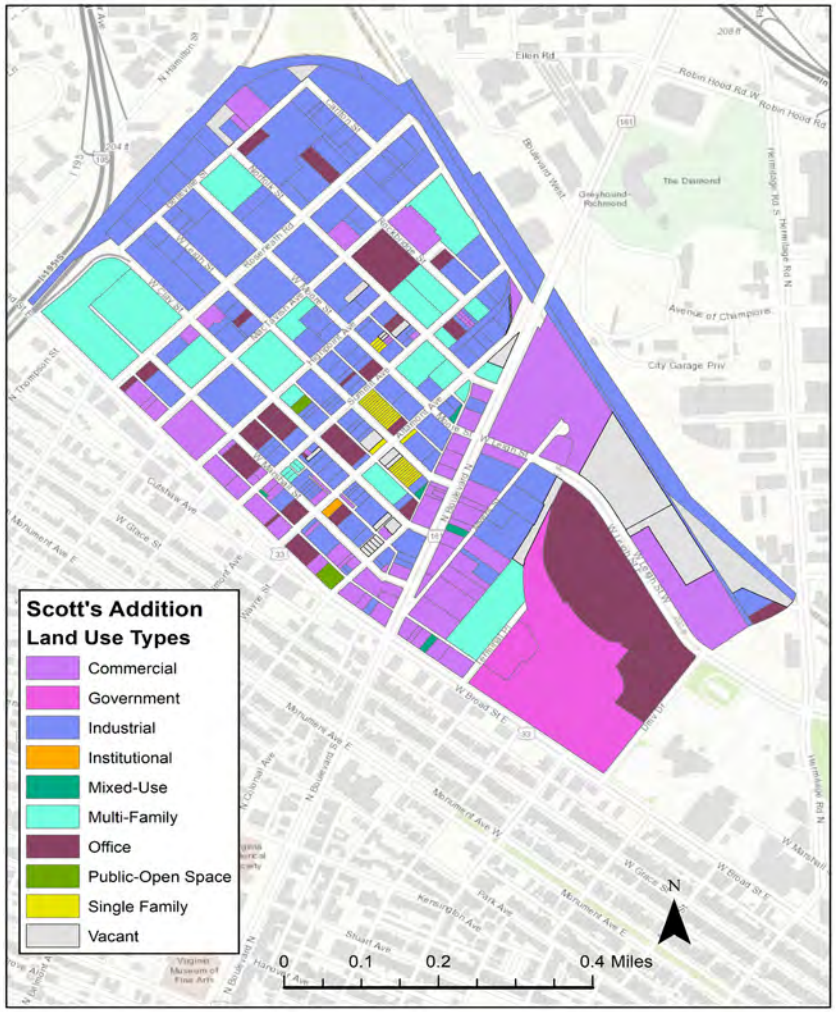


Figure 2: Land Use Map Scott's Addition. Virginia Commonwealth University: Center for Urban and Regional Analysis Metroview. 2017.

Most of Scott's Addition is dominated by impervious surfaces including flat roofs, parking lots, and wide streets that directly contribute to increased urban heat. Figure 3 shows a land cover raster map of Scott's Addition collected from the Virginia Geospatial Extension Program.

According to the land cover data, Scott's Addition is 40% impervious surface with 22% from buildings and 18% from non-building land cover such as parking lots, roadways, and surface asphalt (Virginia Geospatial Extension Program, 2010). On average impervious surfaces absorb around 85-90% of radiation and warm the surrounding air 2-8 degrees Fahrenheit (Richards, 2018).

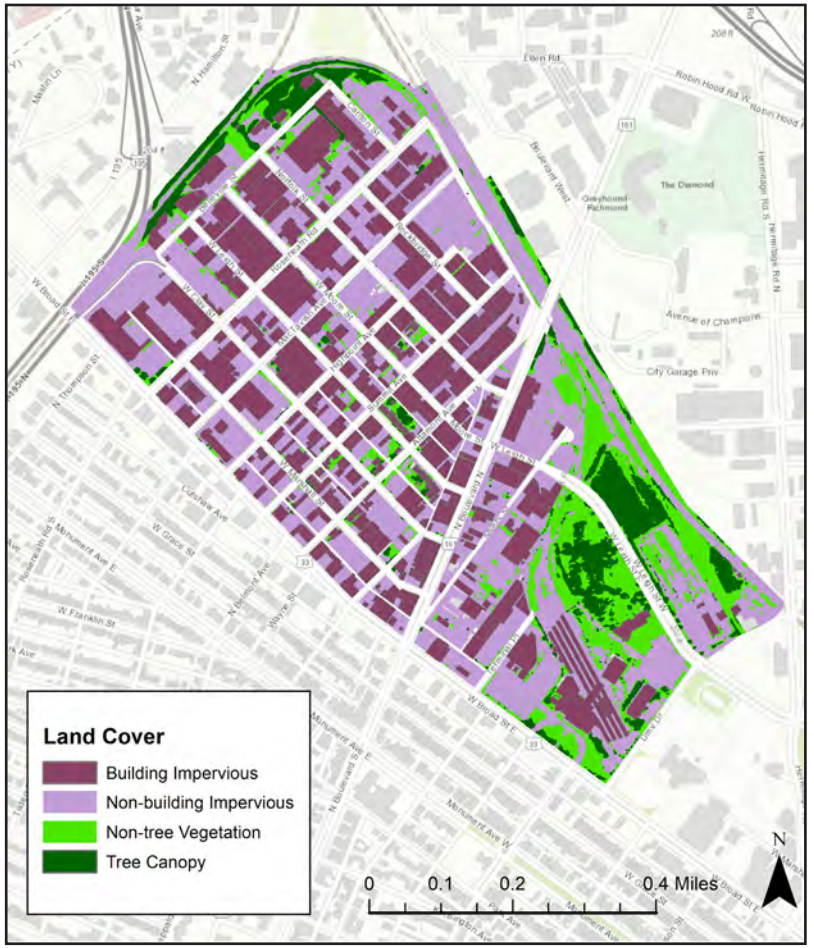


Figure 3: Land cover map of Richmond, Virginia. Virginia Geospatial Extension Program (VGEP). LANDCOVER. Virginia Polytechnical Institute: Department of Forest Resources Environmental Conservation and University of Vermont: Spatial Analysis Laboratory (SAL). 201

Along with the prevalence of impervious surface in Scott's Addition is the lack of tree canopy coverage, a vital green space component that can have the most impact on mitigating the urban heat island effect. Figure 4 shows the tree canopy percentage for the entire city of Richmond with Scott's Addition highlighted in red. Research from environmental scientists and planners suggests that areas with higher tree canopy cover tend to be significantly cooler than areas with only grass and some tree cover (Bowler, 2010).

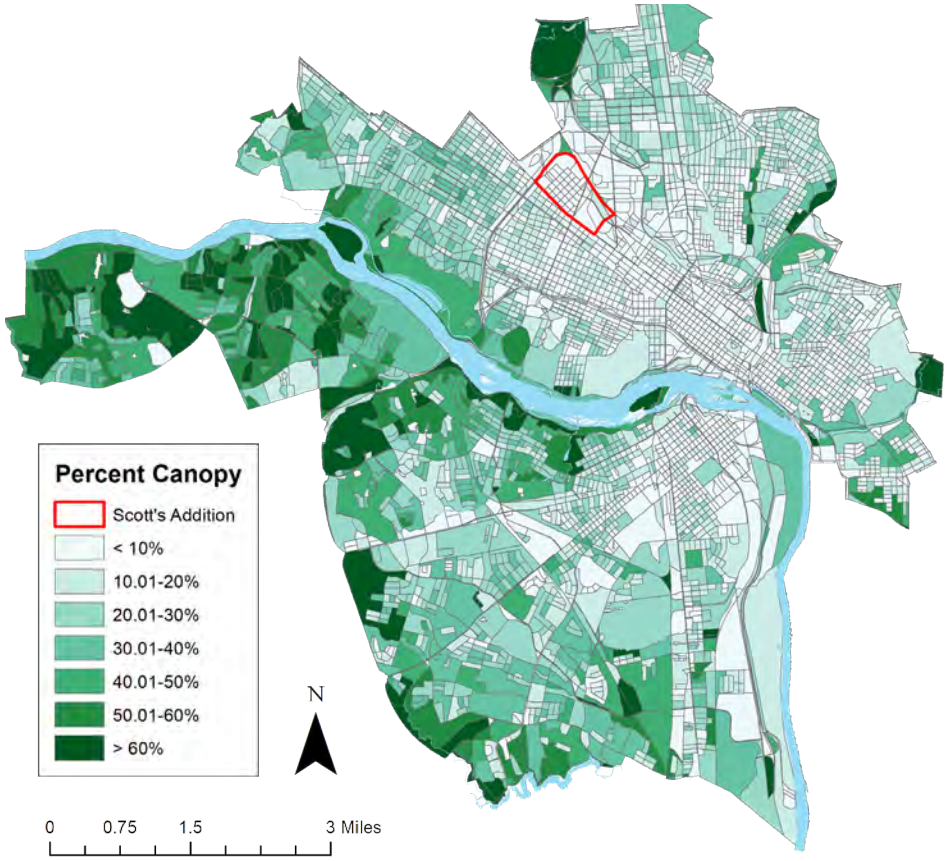


Figure 4: Richmond Tree Canopy. Remfert. Richmond Canopy by Census Block. Virginia Commonwealth University: Office of Sustainability. 2016.

The lack of green space in Scott's Addition is an on-going issue among residents, visitors, and business owners in the area. In 2015 the Scott's Addition Boulevard Association began work on planting street trees along Altamont, Summit, Moore, and Norfolk streets. Since beginning the street tree project, SABA has planted over 150 trees along the four key streets previously listed, however there are still numerous empty tree wells available in the Scott's Addition neighborhood, particularly along the Boulevard and Altamont Avenues.

During the creation of this plan, students in the VCU environmental studies program senior capstone class categorized and mapped all street trees in Scott's Addition to measure the environmental impact of individual trees. Although the street tree data from the capstone class will not be available until after this plan is finalized, a map with preliminary findings from their research can be found in Figure 5. The map shows planted trees marked in green dots and vacant tree wells marked in red X.

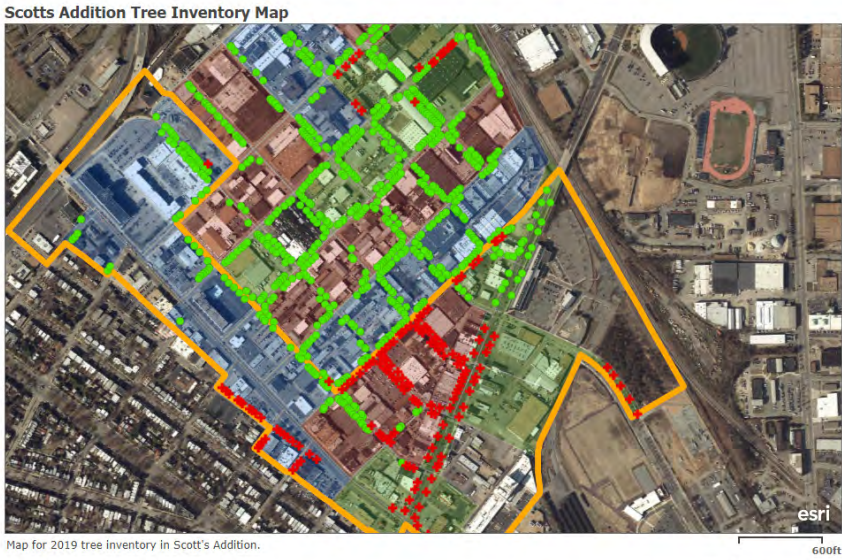


Figure 5: Scott's Addition Tree Inventory Map. ENVS 490: Research Seminar in Environmental Studies. Spring 2019.

The combination of high impervious surface and lack of tree canopy, Scott's Addition is one of the hottest microclimates in the city and directly contributes to the urban heat island effect. Through a climate and urban heat island study directed by the Science Museum of Virginia, direct temperature observations were taken by several vehicle air temperature probes, simultaneously across the city during three periods on July 13, 2017, one of the hottest days of the year. Morning (6-7 a.m.), afternoon (3-4 p.m.), and evening (7-8 p.m.) temperature measurements, over 100,000 in total, were collected and modeled in a heat map. The results show a clear distribution of hot air temperature throughout the day in several places across the city and in Scott's Addition, outlined in black. Figure 6 shows a raster heat map of the mean temperatures during the observation period. It is important to note that due to the lack of green space in Scott's Addition, the ambient temperature remains high throughout the day when compared to other areas across the city with higher tree density and more green space. The mean temperature for Scott's Addition in the morning was 81 degrees and increased to 97 degrees by the afternoon. Since impervious surfaces trap heat and release it back into the atmosphere, the mean evening temperature for the neighborhood only cooled to 94 degrees.

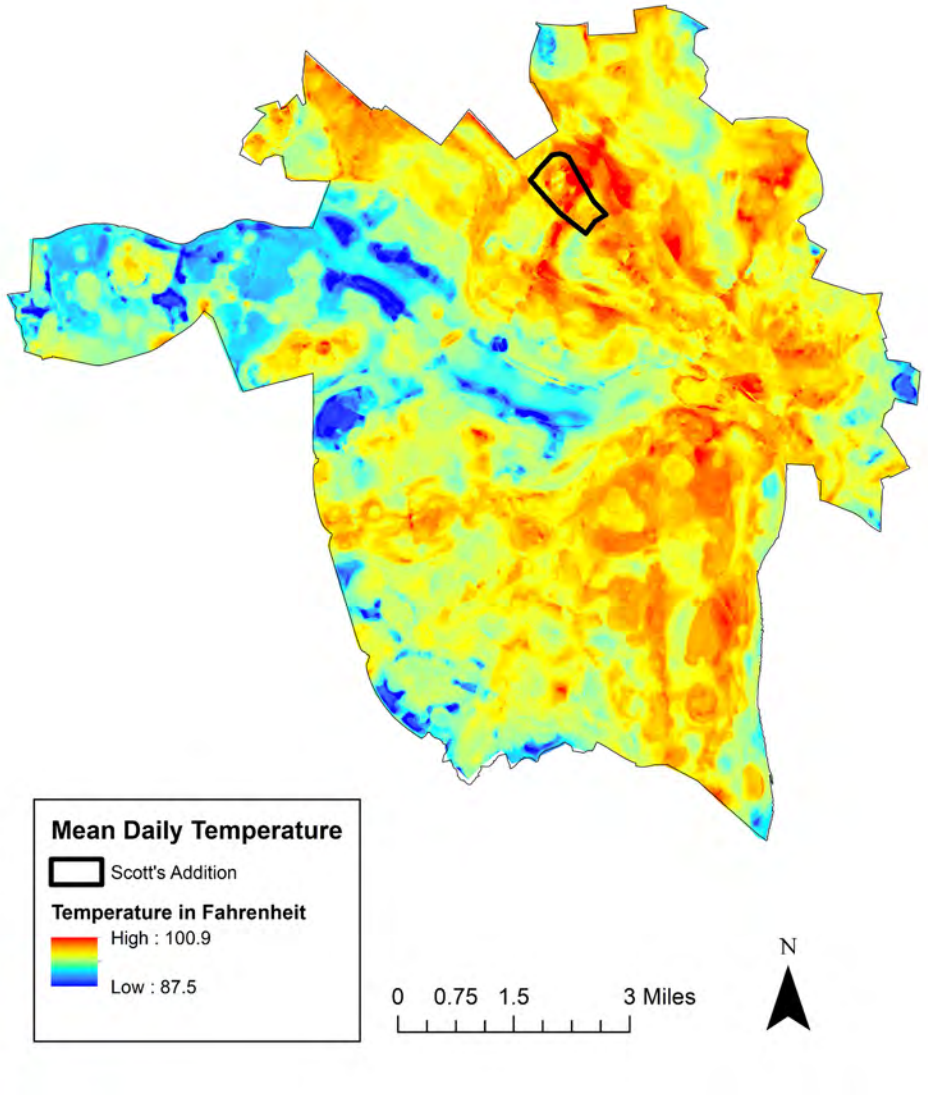


Figure 6: Richmond Heat Map and Areas of Vulnerability. Hoffman, Shandas, & Voelkel. Science Museum of Virginia. 2017.

Existing Knowledge

Nationally there are numerous green space projects that are working to address the ever-growing urban heat island effect. In New York City, a city-wide zoning amendment approved in 2007 applied design regulations for commercial and community facility parking lots to visually improve appearance and safety of lots and require planting of shade trees and efficient storm water runoff management. The zoning amendment requires that developments with "open parking areas of at least 18 spaces or 6,000 square feet" plant one tree for every 25 feet of frontage (Design Regulations for Commercial & Community Facility Parking Lot, 2007). This zoning amendment made over ten years ago has since led to broader reforms for green infrastructure across the city and has since been integrated into New York's complete, green streets plan and contributes to the sustainability goals of the "PlaNYC 2030" initiative (Benfield, 2012). Parking lots are a prime location for green space implementation and change towards sustainability. There is an estimated three nonresidential parking spaces for every car in the United States and in some cities like Orlando and Los Angeles, parking lots are estimated to cover at least one-third of the urban land area (Benfield, 2012). Including green infrastructure in parking facilities redefines the space, offers additional public uses, and mitigates its effect on the environment.

In Philadelphia the department of water stormwater management provides a guidance manual with a chapter dedicated to the installation and maintenance of green roofs for existing buildings. Green roofs are well suited for spaces where roofs make up a large portion of total impervious surface area or where ground-level space constraints do not allow for green space interventions. Along with the stormwater benefits of a green roof, evapotranspiration of precipitation by planted vegetation cools the surrounding air and aids to mitigate some of the heat generated by excessive impervious surfaces. Green roofs also help preserve the longevity of built materials and reduce heating and cooling costs for the entire building (Philadelphia Stormwater Management Guidance Manual, 2018). Green roofs are categorized as extensive with a 3-5-inch depth range; semi-intensive with a 5-7-inch depth range; and intensive with a 7-24-inch depth range. Structures with over 24 inches of soil depth that are covered on three sides are referred to as "earth-sheltered" structures (Richards, 2018).

Locally, the city of Richmond began a parklet program in the spring of 2016 in order to give communities an opportunity to create more vibrant commercial corridors. A parklet is street level platform that takes the place of two or more on-street parking spaces and act as a "community front porch" where residents can gather and enjoy a public space (Planning and Development Review, 2016). Parklets are meant to be temporary spaces, permits in Richmond allow a parklet to be in place for three years, and can incorporate green infrastructure. The Richmond department of Planning and Development Review provides design guidelines for parklets and encourages community and business collaboration for implementing the temporary structures.

Theoretical Framework

Over the last eighteen years, sustainability has emerged as a new paradigm in planning rhetoric. Almost akin to the Industrial Revolution, the "sustainability revolution" has developed support across diverse sectors. Involvement from individuals, organizations, and special interest groups all working on behalf of community sustainability has decentralized leadership within communities and places change directly in the hands of the public. The core values of sustainability; thinking long term, care in allocating resources, and understanding the extent and severity of the ecological impacts of human action are rooted in activism and wide spread environmental awareness (Beatley, 2012).

Green roof of True Nature Foods, Chicago, IL. CookJenshel Photography

In order to understand the evolution of urban environments and how current problems arose, it is critical to know how our built surroundings coevolved with environmental, political, social, economic, or technical factors, and how specific planning interventions effected this evolution. Understanding the past is the prelude to better planning in the future. A part of long-term planning perspective requires action of small, incremental changes in the present which interrelate and reinforce one another to "build a more sustainable society in the future" (Wheeler, 2004).

The holistic outlook of sustainability planning sees the relationship between things and how different scales—national, regional, local, neighborhood, and site—planning reinforces one another and actions at each level should be seen in terms of their impacts on other levels (Wheeler, 2004). Sustainability has moved beyond just the non-built environment and into incorporating community and city-wide sustainability for planning and building better spaces (Mueller & Dooling, 2011). In the context of Scott's Addition, the model of sustainability planning fits well into the small scale, community driven nature of this green space plan.

Research findings

This section highlights the key research findings gathered from one community survey. Responses from the primary survey of business and property owners influenced site selections for green space designs. Data and analysis from this section will directly inform the recommendation section of this plan document.

Community Engagement

In order to engage the community of Scott's Addition in a wholistic and accessible way, an online survey was created for business and property owners and distributed via email listserv, on the public Scott's Addition Boulevard Association Facebook page and promoted at the group's bi-monthly public meeting. The survey sampling frame consisted of approximately 900 people which includes business owners, property owners, friends of the neighborhood, and residents of Scott's Addition. The survey was kept open for two weeks and made available to a wide range of respondents, including those living or working outside of Scott's Addition. Some general demographic questions were included in order to narrow down responses for specific data.

The survey consisted of twenty-one questions and received eighty-two responses from both business and property owners in the Scott's Addition neighborhood. The full survey can be found in the appendix of this document. Out of the total responses 48% of respondents identified as property or business owners while the remaining 51% identified as working or living in the neighborhood. The survey ranged from building specific questions, such as the square footage of the roof, to broader neighborhood questions related to existing green space and desired green space. Respondents were also asked to provide the address and building name of their business or property. This data was then geocoded and mapped to identify specific sites for green space designs. Sites were chosen based on individual survey responses to key questions. The process for site selection is highlighted in the following section.

The survey questions were tailored in order to identify possible sites for certain green space designs. Three questions were posed about street type and characteristics to narrow down potential sites for street trees and parklets. Street characteristics such as type and direction are important factors for this plan to gauge the flow of traffic and space potential for installing parklets. Most responses indicated that they are located on a two-way main street, see Figure 7 for street characteristics, however this street type may not be suitable for a parklet design.

Figure 7: Survey responses for street characteristics, street type and direction

Respondents were also asked whether there is a sidewalk in front of their business, a question meant to identify places where tree wells could be easily installed. In cross examination most businesses located on main streets also indicated there is a sidewalk to the front of their building. Tables 1, 2, and 3 show the number of responses for each of the street characteristics questions.

Table 1: Survey responses for street characteristics, street type

Survey question	Main street	Side street	Alley	No response	Total
Does the entrance to your business face a main street, side street or an alley?	55	20	3	4	82
	67.1%	24.4%	3.7%	4.6%	100%

Table 2: Survey responses for street characteristics, street direction

Survey question	One-way	Two-way	No response	Total
Are you located on a one-way or two-way street?	21	58	3	82
	25.6%	70.7%	3.7%	100%

Table 3: Survey responses for street characteristics, streetscape

Survey question	Yes	No	No response	Total
Is there a sidewalk in front of your building?	65	12	5	82
	79.3%	14.6%	6.1%	100%

Table 4: Survey responses for existing green space

Survey question	Yes	No	No response	Total
Is there any existing green space on or around your property?	40	41	1	82
	48.8%	50.0%	1.3%	100%

The next set of survey questions identified locations of existing green spaces and types as well as assessing the barriers respondents felt prevented them from even considering green space installation on their property. Responses were evenly split on the presence of existing green space (see Table 4) and when compared with the street type, most of the responses with existing green space were from businesses along main streets in Scott's Addition (see Figure 8).

Respondents indicated that most of the existing green space in the neighborhood are street trees. This information was not surprising considering that SABA orchestrated planting of over 100 street trees in 2015 along a few key streets. Figure 9 shows the breakdown of existing green space types according to those surveyed.

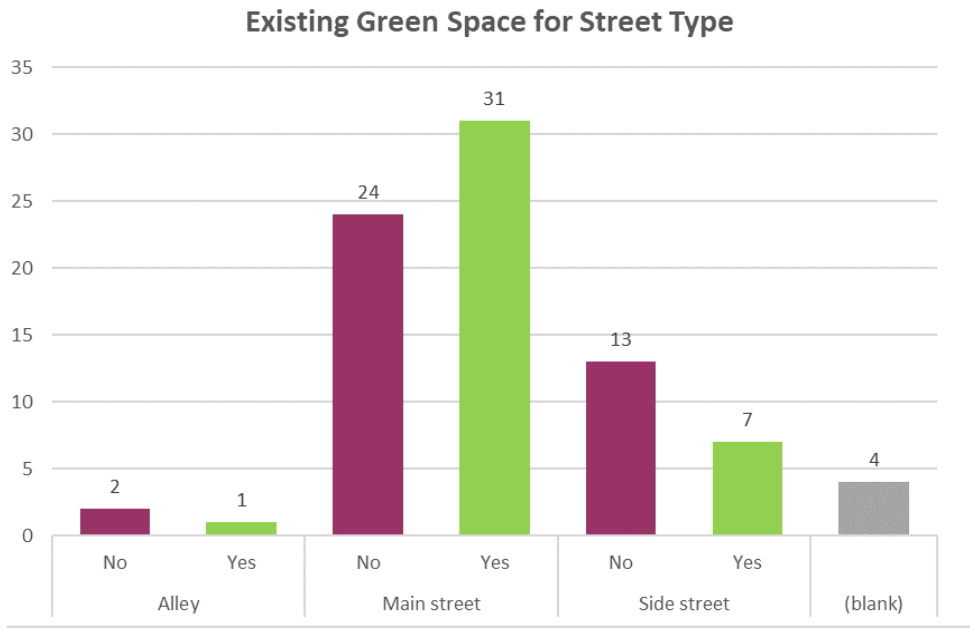


Figure 8: Street type and presence of green space

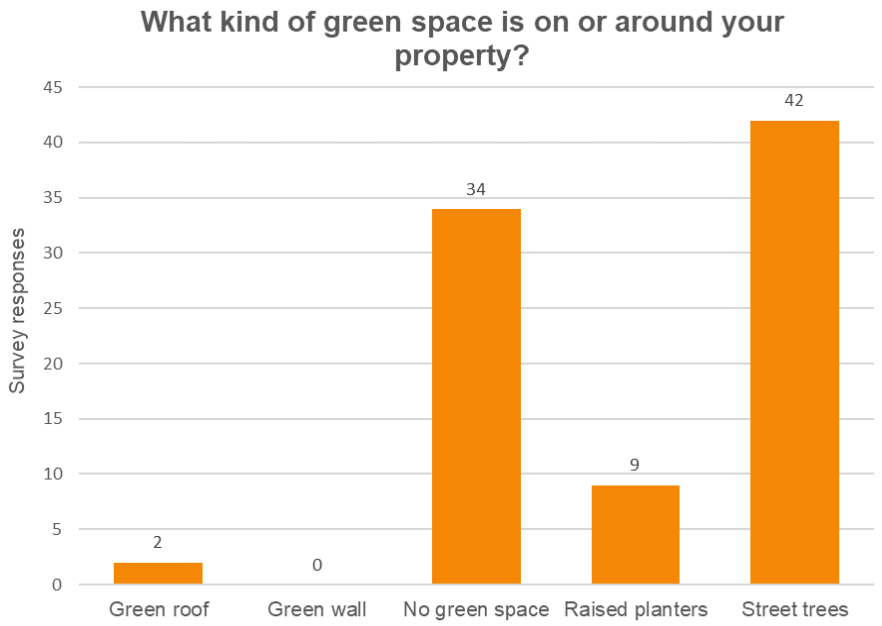


Figure 9: Survey responses for existing green space

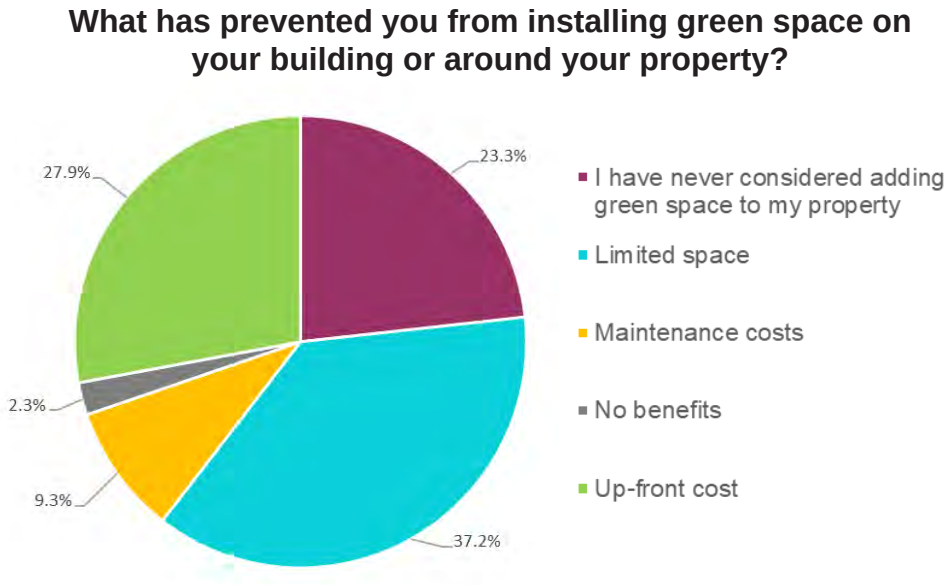


Figure 10: Barriers to green space installation

The final question of this section asked what barriers business owners feel prevent them from installing green space on their property. Responses from this question will directly impact the recommendation section of this plan document. In order to overcome the barriers to wide spread green space in Scott's Addition, a creative approach to design and cost analysis will be vital to encourage business and property owners to take initiative in implementing green space. According to the survey nearly half of those respondents had considered installing green space on their property (Table 5) however as shown in the pie chart in Figure 10, both upfront cost and limited space have prevented those interested in green infrastructure from pursuing installation.

Table 5: Survey responses for existing green space, barriers

Survey question	Yes	No	No response	Total
Have you considered implementing green space on your building or around your property?	31	43	8	82
	37.8%	52.4%	9.8%	100%

The subsequent section of questions in the business and property owner survey were directly related to parking lot green space. Respondents were first asked if they have a parking lot and if it is shared or private. This question was posed primarily to determine whether a design for parking lot green space is even feasible given the existing parking structure of the neighborhood. Surprisingly, the majority of respondent indicated that their business or property has access to a private lot as shown in Figure 11.

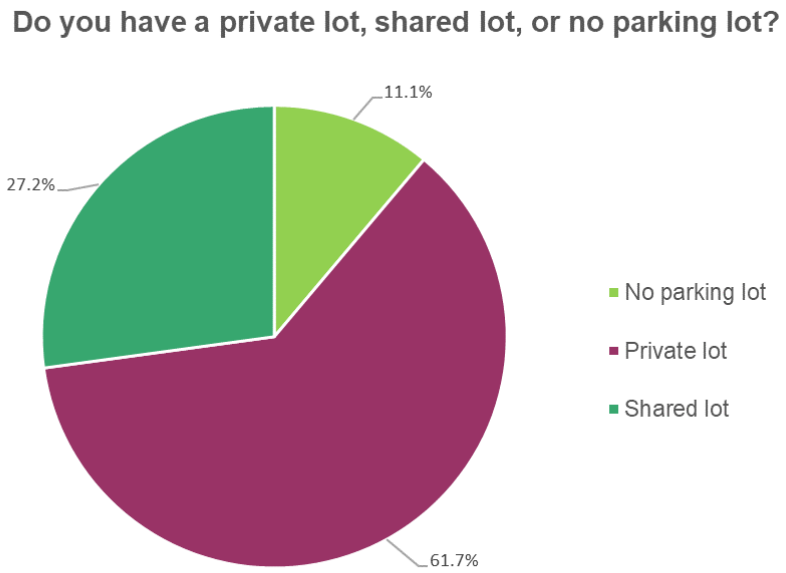


Figure 11: Existing parking lot access

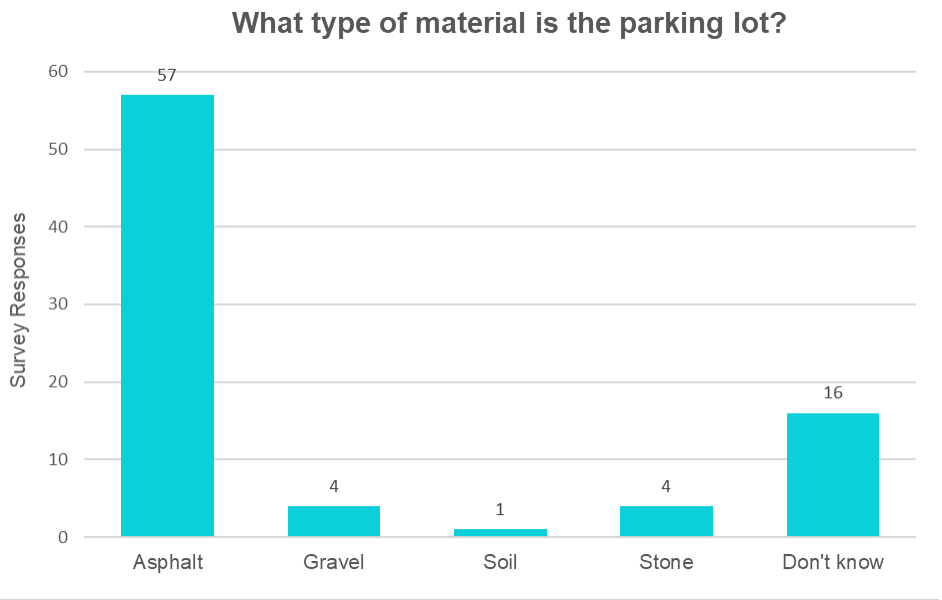


Figure 12: Parking lot material

From there respondents were prompted to indicate what material is their parking lot. Most respondents reported asphalt as the main lot material, but all results are shown in Figure 12.

The last question in the survey asked respondents what types of green space they would like to see implemented in the neighborhood. The question allowed for multiple responses and an option to write in additional answers. The most popular green space option respondents chose was street trees closely followed by pocket parks and parklets. Figure 13 shows the results of this survey question. Among the write in responses a few respondents indicated a community garden would be an ideal green space addition to the neighborhood.

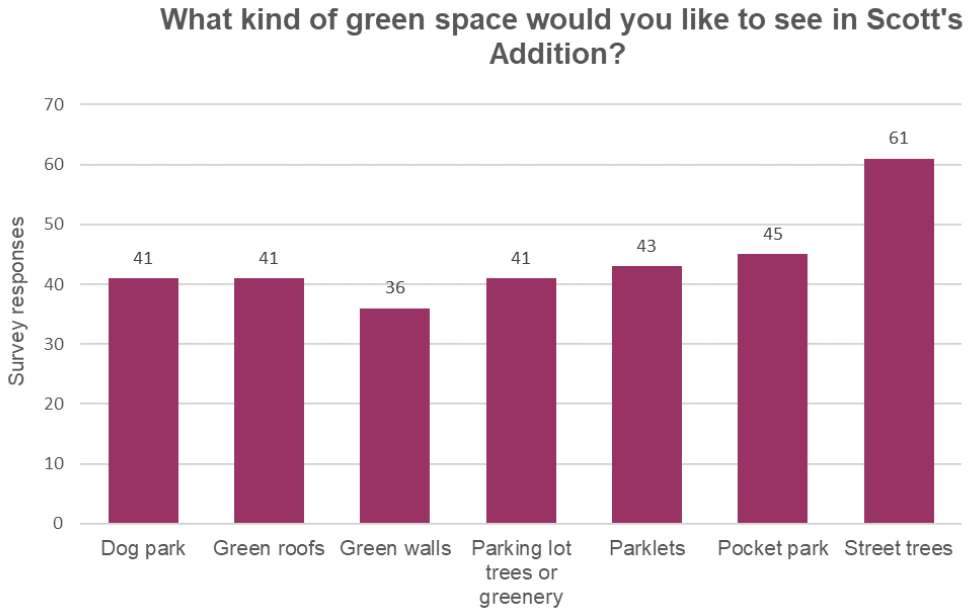


Figure 13: Green space needs for Scott's Addition

Site Selections

The community input provided from the business and property owner survey directly influenced the site selections for the green space designs created in this plan. Among the twenty-one questions, the community survey also asked respondents to provide the physical address of their business or property. Those answers were then geocoded and mapped in ArcGIS (see Appendix for a map of all survey responses). A smaller selection of the geocoded properties were then categorized based on other survey responses to determine which locations would be ideal for four varieties of green space interventions; parklets, green roofs, street trees, and green walls.

Figure 14 shows a map of all the sites categorized by future green space design. Sites were chosen based on responses provided by the business or property owner of each location. Two locations for green roofs and one location for a green wall were chosen based on survey feedback. Additionally, two locations were selected for parklets based on both survey responses and a cross examination of the existing streetscape.

Figure 14: Map of geocoded survey results by green space intervention

The two sites chosen for green roof designs were selected based on four main criteria; the survey respondent owns the property, the building roof can support a green infrastructure, roof size, and building use. The first site for a green roof (number 1, Green Roof Site 1 in Figure 14) is a multi-unit residential property called The Preserve, located at 1310 Roseneath Road. The total square footage for the building roof is 230,000 (data provided by the property owner) divided into two separate buildings with a parking lot in the center. The layout of the building allows for more versatility in the green roof design and given that the property is residential, any additional green spaces can be a vital marketing tool for new residents and improve the property value for current tenants. An aerial shot of the roof for Site 1 can be found in Figure 15.

Figure 15: Aerial shot of Green Roof Site 1. Google (2018). [Google Earth aerial view of 1310 Roseneath Road]. Retrieved February 2, 2019.

The second site for a green roof (number 2, Green Roof Site 2 in Figure 14) is a mixed-use office and commercial building which includes a local distillery at the street level, located at 1800 Summit Avenue. The square footage of the building is 35,000 (provided by the property owner) and unlike the property in Site 1, is one continuous structure. Site 2 provides an opportunity for a different type of green roof design that is not intended for public use but instead only be used to save energy costs for the building. An aerial shot of the roof of Site 2 is in Figure 16.

Figure 16: Aerial shot of Green Roof Site 2. Google (2018). [Google Earth aerial view of 1800 Summit Avenue]. Retrieved February 2, 2019.

The site chosen for a green wall intervention was selected based on ownership, space restrictions, and availability of a mostly plain exterior wall. The survey respondent for the green wall site (labeled number 3 in Figure 14) indicated that they rent the property for their businesses but is permitted from the property owner to install a green wall on the exterior of the building.

A renter was chosen specifically for a green wall intervention because unlike a green roof, a green wall can be a low impact structure that will not significantly damage or drastically change the building structure. The location chosen for a green wall structure is Courthouse Creek Cidery at 3300 W Broad Street (Figure 17).

This site is unique because the building which houses the cidery is part of a larger property but has a separate entrance via the alley behind Broad Street. The alley entrance offers an advantage to this property by creating a natural sound barrier for outdoor seating off the main busy street. In addition, the cidery has its own indoor beehive with access to the outside for the bees to come and go from the hive. The hive offers a unique feature for the cidery and would benefit from a green wall with pollinating plants.

Figure 17: Street level view for Green Wall Site

The last two sites for green interventions are locations for parklets (numbers 4 and 5 in Figure 14). The fist site, Parklet Site 1, is located on West Moore Street outside HackRVA. Although the street address for HackRVA is on Roseneath Road, Moore Street was chosen because it typically has less steady vehicle traffic than Roseneath but is still a popular route for pedestrians walking to breweries and restaurants. HackRVA is an ideal business to implement a parklet because it has a shared parking lot in the rear of the building, so a temporary parklet installation will not impact parking for patrons of the collaboration space and surrounding businesses. Additionally, implementing the parklet on a side street like Moore will have less impact on street parking for the main road. Figure 18 shows a street level view of the location for Parklet Site 1.

The second site for a parklet is located on the corner of 1726 Altamont Avenue outside of MyBirth, LLC. This site is ideal for a parklet for similar reasons as the first parklet site; MyBirth, LLC has a private lot for its customers and typically does not encourage street parking directly outside of the entrance. Altamont Avenue runs north-south along Scott's Addition but does not see as much heavy traffic as other north-south streets making it a good choice for a street level green space intervention. Figure 19 shows the area in front of MyBirth, LLC which would house Parklet Site 2.

Figure 18: Street level view of Parklet Site 1

Figure 19: Street level view of Parklet Site 2

Recommendations

The following section describes the vision, goals, objectives, and actions for implementing this neighborhood green space plan. Each goal is developed based on results found from the community survey, site analysis, and existing conditions in Scott's Addition. Objectives for each goal detail how the goal can be achieved, and actions provide a specific incremental guide for carrying out each objective.

Vision

This Scott's Addition green space plan establishes a foundation for implementable, private property green space interventions, while taking neighborhood scale into consideration, in order to make positive incremental changes on the industrial landscape and heat generation of the Scott's Addition neighborhood. This plan identifies a selection of properties ideal for green space implementation intended to serve as a scalable model for widespread application. The combination of these green space initiatives will reduce the overall impervious surface area in the neighborhood and contribute to reducing the urban heat island effect.

Goals, Objectives and Actions

Goal 1: Reduce latent heat production contributing to the urban heat island in the Scott's Addition neighborhood.

Goal 2: Establish a library of resources for business and property owners to finance building or maintenance of green spaces.

Goal 3: Create an incentive program for creating new green spaces.

Goal 1

Reduce latent heat production contributing to the urban heat island in the Scott's Addition neighborhood.

Objective 1.1: Fill all vacant tree wells

Currently Scott's Addition has less than 10% tree canopy coverage across the entire neighborhood. Since there are no public or private parks in the neighborhood, street trees make up the only existing tree canopy. Although an effort has been made since 2016 to fill empty tree wells, there are still stretches of vacant tree wells throughout the neighborhood. Street trees play an integral role in cooling the ambient temperature along sidewalks and store frontages. Street trees improve the health and wellbeing of Scott's Addition residents and visitors, contribute to a reduction in cooling costs for storefronts, and make the neighborhood a safer and more comfortable place to walk around.

Action 1.1.1: Utilize students from the VCU environmental science program to map trees and measure the green impact on latent heat in the neighborhood.

Part of the research for this plan was inspired by existing research out of the Science Museum of Virginia, the VCU Office of Sustainability, and the VCU environmental science senior capstone project. The continued momentum for creating green spaces in Scott's Addition and mitigating the urban heat island of the neighborhood will rely on a working relationship between the Scott's Addition Boulevard Association, VCU, and the Science Museum of Virginia.

Action 1.1.2: Advertise tax deduction from EnRichmond for purchasing street trees through TreeLab program.

EnRichmond is a nonprofit organization dedicated to serving the people, parks, and public spaces of Richmond. TreeLab, a program out of EnRichmond, is a nonprofit greenhouse which grows trees and plants to beautify and improve the city.[1] The TreeLab greenhouse provides a selection of trees for purchase with prices ranging from $20 to $195 per tree. Purchasing a tree from the TreeLab is considered a tax-deductible donation.

Action 1.1.3: Develop a tree steward volunteer group to provide seasonal maintenance to street trees and parklets.

The city of Richmond already has a volunteer group dedicated to tree maintenance across the city, the Richmond Tree Stewards, however according to the organization website, the group has yet to plant or prune any street trees in the Scott's Addition neighborhood.[2] There is a mix of mature and young trees in the Scott's Addition area which will require further maintenance to keep branches pruned and protect still growing saplings. The Scott's Addition Boulevard Association has a strong network of members with a wide range of skills that can be applicable to a tree steward program.

1 https://enrichmond.org/treelab/
2 http://richmondtreestewards.org/street-tree-pruning/

Objective 1.2: Require all new construction or rehab projects to include a green space installation/component.

As outlined in this plan, green spaces, no matter how small, make an impact on the ambient temperature and decrease building heating and cooling costs, but in addition to the positive impact on the environment incorporating green space in commercial and residential properties is an effective marketing tool and beneficial for patrons. Research from the Michigan Municipal League found that green spaces directly impact the placemaking of a community, enhance the pedestrian experience, and connect people and places on a human scale.[3]

Action 1.2.1: Encourage landscape zoning requirements for existing parking lots.

Paved parking lots create large swaths of impervious surface and are a major contributor to generating latent heat. The city of Richmond has parking lot landscape requirements written in the city zoning code; these regulations only appear to be enforced for new lot construction. Requiring landscaped buffers and mature trees does make a difference for mitigating latent heat and improving storm water runoff for new parking lots, existing lots are still contributing to the heat island.

Although the city zoning code does not require existing parking lots to comply to landscape requirements, encouraging property owners to make landscape improvements can increase the longevity of the lot, help alleviate storm water run off and drainage problems, and reduce latent heat abundant in large paved areas.

Action 1.2.2: Establish zoning ordinance for new commercial development to provide canopy trees along all street frontages (except alleys) located between the curb and sidewalk, or within five feet of the right-of-way when no sidewalk exists.

Street trees not only help reduce the surface temperature of streets and sidewalks, they also improve safety for pedestrians and motorists. A growing body of evidence suggests that the inclusion of street trees in roadway design can reduce vehicle crashes by 5-20%.[4]

Action 1.2.3: Set up rotating sites for parklets every three years.

Parklets are a great way to incorporate green space into a streetscape without making permeant and costly changes. Since parklets are temporary structures the materials used to create them can be broken down and reassembled in a different location. In order to participate in the parklet program, a business or property owner will have to apply for a pedestrian enhancement permit and comply with the location and design standards described in the Richmond Parklet Design Guidelines.

3 Craft, S. (2014). The Economic Impact of Placemaking (pp. 2-7, Rep.). The Michigan Municipal League.

4 Dumbaugh, E., & Gattis, J. (2005). Safe Streets, Livable Streets. Journal of the American Planning Association, 71(3), 283-300.

Goal 2

Establish a library of resources for business and property owners to finance building or maintenance of green spaces.

Objective 2.1: Connect property and business owners to resources for creating green spaces.

The Richmond parklet program was established in 2016 but has not been widely publicized. Information on opportunities like the parklet program or purchasing tax deductible street trees should be widely available to the members of SABA or other property owners in the neighborhood. A designated resource for green space interventions would ensure that project information is readily available to those who need it.

Action 2.1.1: Include sample designs and implementation suggestions on the SABA website accessible to the public.

In the implementation section of this plan are a selection of site designs for various green space initiatives that can be used as a template for future designs.

Action 2.1.2: Provide a list of financing resources for large scale green space projects such as green roofs.

Action 2.1.3: Identify neighborhood resources for plants, site designs, and volunteer help for implementation.
The community of Scott's Addition is very diverse with a wide variety of talents among its residents and businesses. The advantage of this community dynamic is a wealth of knowledge within the neighborhood and

Action 2.1.4: Develop a relationship with BeautifulRVA to connect with volunteers for tree planting and other green space projects.

Objective 2.2: Planned green space meetings

Action 2.2.1: Establish a committee/advisory board for green space initiatives with regular meetings.

At the creation of this plan the Scott's Addition Boulevard Association is already working to create a green space committee to advise the neighborhood association on implementing green infrastructure. Establishing an advisory board or committee will ensure that future projects have guidance and serve as a primary contact for SABA members interested in green space.

Action 2.2.2: Conduct green space meetings to coincide with SABA member meetings.

The Scott's Addition Boulevard Association holds a meeting bimonthly for all members and the public to discuss upcoming events, projects, or general association updates. A separate meeting dedicated to discussing green space initiatives could coincide with the regular SABA meetings. These green space meetings could be topic based or general updates from the green advisory board about ongoing green space projects.

Action 2.2.3: Write a tree steward training manual for volunteers and property owners to properly maintain trees.

Interviews with property and businesses owners revealed a common barrier to green space implementation is a lack of confidence for maintaining plants and trees. A written manual with instructions for planting and caring for trees and plants will provide a guide for property owners to install their own green space interventions.

Goal 3

Create an incentive program for creating new green spaces.

Objective 3.1: Create a SABA green program

In order to give legitimacy to the neighborhood wide greening effort the Scott's Addition Boulevard Association should establish an official green program with incentives, guidelines, and resources for businesses and property owners to begin implementation of new green spaces.

Action 3.1.1: Establish a competition for greenest block, street, or property to be judged by the green space committee.

Every year in Brooklyn, New York, the Brooklyn Botanic Garden hosts a "Greenest Block in Brooklyn" contest to bring communities together and make Brooklyn a cleaner and greener place.[1] The contest is open to any residential or commercial block in the neighborhood and encourages participants to work together to improve the neighborhood and fosters a sense of community cohesion.

Action 3.1.2: Provide an award or certification for greenest block, street, or property. Can include a year membership for SABA.

Action 3.1.3: Hold seasonal tree planting and trimming volunteer events

There are two planting seasons during the year in fall and early spring. The planting seasons are also an ideal time to prune mature trees. Orchestrated by the green space advisory board/committee, SABA could hold bi-yearly volunteer events to plant additional street trees and trim the existing stock.

Action 3.1.4: Hold an Arbor Day celebration

Scott's Addition hosts a handful of festivals and large events throughout the year that are widely popular and attract visitors from across the city. Even a small celebration would be sure to attract visitors to the neighborhood and could be a great opportunity to award the "Greenest Block" winner.

The Richmond Tree Stewards hold an Arbor Day celebration every year in October instead of April because the fall is more ideal for tree planting in Virginia, however Scott's Addition already hosts a Halloween festival during that month.

1 https://www.bbg.org/community/greenestblock

Implementation

The implementation for this green space plan will rely heavily on the relationship between the Scott's Addition Boulevard Association and the businesses and residents of the neighborhood. The implementation section of this plan document includes a timeline of general actions organized by phases as well as detailed site designs and cost analysis for three major intervention types.

Timeline for Implementation

Phase 1

The first phase of implementation will focus primarily on establishing leadership and volunteer groups as well as subject matter experts to facilitate and advise future green space projects. The projects listed in this phase are meant to be long term and evolving.

- Establish a green space committee
- Plan bimonthly meetings
- Begin a tree steward volunteer program
  - Allocate training and tree maintenance days in Spring and Fall seasons
- Set up funding source for large scale green space projects
- Create a resource section on the SABA website for public information on green space projects
- Institute a green space incentive program to encourage involvement from businesses and residents

Phase 2

The second phase of implementation will be the beginning of small scale, volunteer based green projects such as filling remaining vacant tree wells, maintaining existing mature trees, and monitoring new plantings. This phase will also involve bolstering relationships among the neighborhood groups and outside resources for more project data and funding.

- Begin training for tree steward volunteer program
- Hold regular green space committee meetings also open to the public
- Designate areas for parklets and begin the application process with the city
- Identify streets or blocks for new tree wells
- Advertise green space incentive program
- Continue to foster working relationships with the Science Museum of Virginia and VCU for resources on grant funding, continued temperature measurements, and data on street trees

Phase 3

The third phase will involve more committee involvement to organize and execute green space “awards” and an Arbor Day/Earth Day neighborhood celebration. The committee should also be responsible for maintaining and updating the resource section of the SABA website.

- Award a “SABA Green Certified” designation for the greenest street, block, or business
- Hold an Arbor/Earth day celebration on the street or block that is “SABA Green Certified”
- Advertise green space award
- Continue to update resource guide for residents and businesses to start their own green space projects

Site Designs

Green Roofs

In urban areas roofs account for 20-25% of impervious surface area (Besir& Cuce, 2018). In previously industrial neighborhoods like Scott's Addition with a high concentration of large, one to two-story warehouse or manufacturing buildings, roofs account for over 30% of impervious surface. Installing green roofs on even a fraction of eligible buildings can greatly impact the urban environment. For this plan, two sites were selected to demonstrate the design potential of two green roof types.

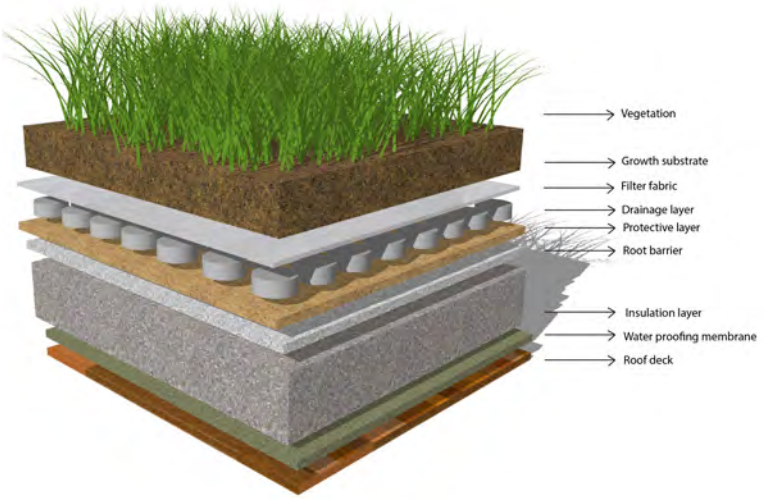


Figure 20: Diagram of layers in a green roof installation.

A green roof is made of several components, illustrated in Figure 20, which protect the roof, allow for proper drainage, and promote plant growth. Green roofs can be split into three categories; extensive, semi-intensive, and intensive, depending on weight, substrate layer, maintenance, cost, irrigation and plant type (see Figure 21 for an illustration of each green roof type). Extensive green roofs have a shallower growth substrate and therefore lighter on a load bearing roof. A thinner substrate also limits the plant types to low profile vegetation with a smaller root network but requires less maintenance than larger plants. An intensive green roof design has a thicker substrate, requires irrigation and ongoing maintenance. Even though it is more involved, an intensive green roof allows for a wider variety of plant types and can even accommodate small trees.

Figure 21: Green roof types

Green Roof Site 1 is an intensive design located at The Preserve apartments at 1310 Roseneath Road. The apartment complex has an existing furnished rooftop deck for residents which is advertised as a unique amenity on the leasing website. The addition of a green roof component in this space will make the deck even more attractive to new tenants and will not alter the picturesque view of the neighborhood that makes the rooftop space appealing. Figure 22 consists of images from The Preserve leasing site where they include the rooftop deck among the other amenities offered to tenants. Taking the deck layout into consideration, Figure 23 shows an intensive green roof design with low groundcover grass along the front of the roof and a variety of taller plant types along either side of the deck lounge area. This design is made specifically to preserve the bird's eye view of the neighborhood from the deck, a highly desirable marketing tool for the apartment complex. These designs are drawn based on approximate measurements and may not be to scale. Additionally, the plants used in these design images are a representation of the types of vegetation that would fit the space and are not specific plant recommendations.

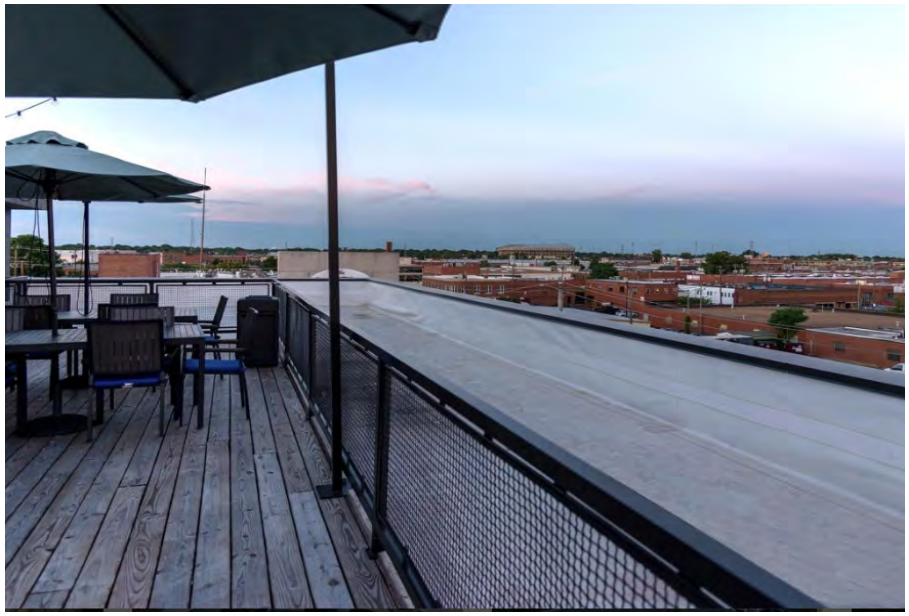


Figure 22: Rooftop deck at The Preserve. The Preserve (2018). [Gallery of photos of The Preserve apartment complex]. Retrieved March 4, 2019.

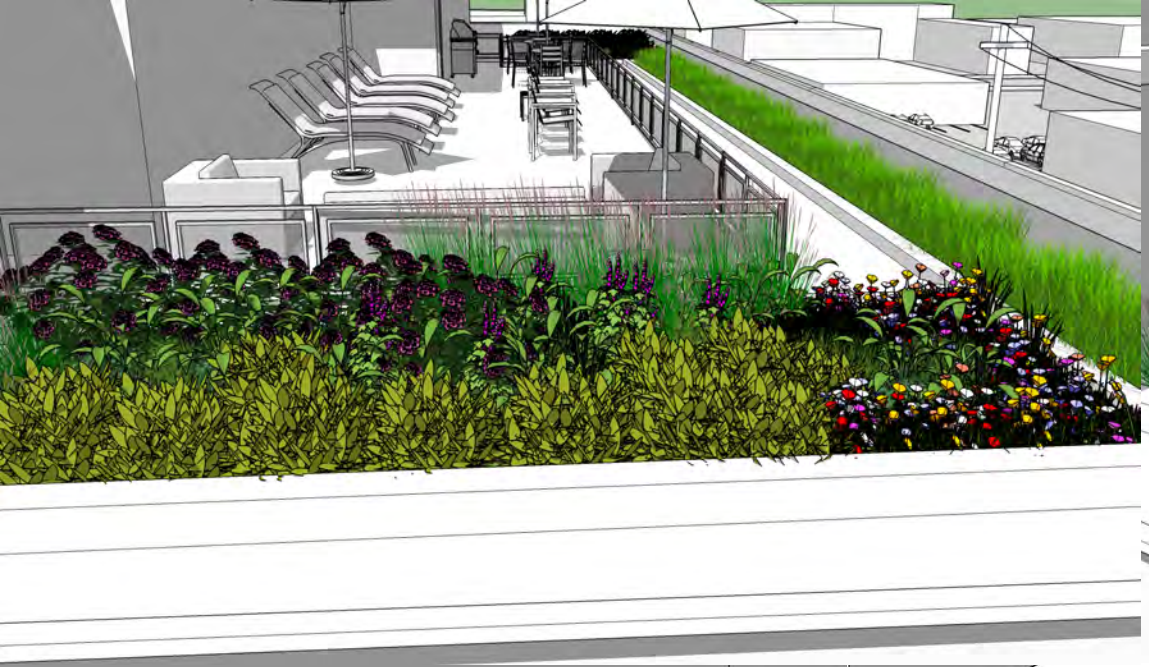
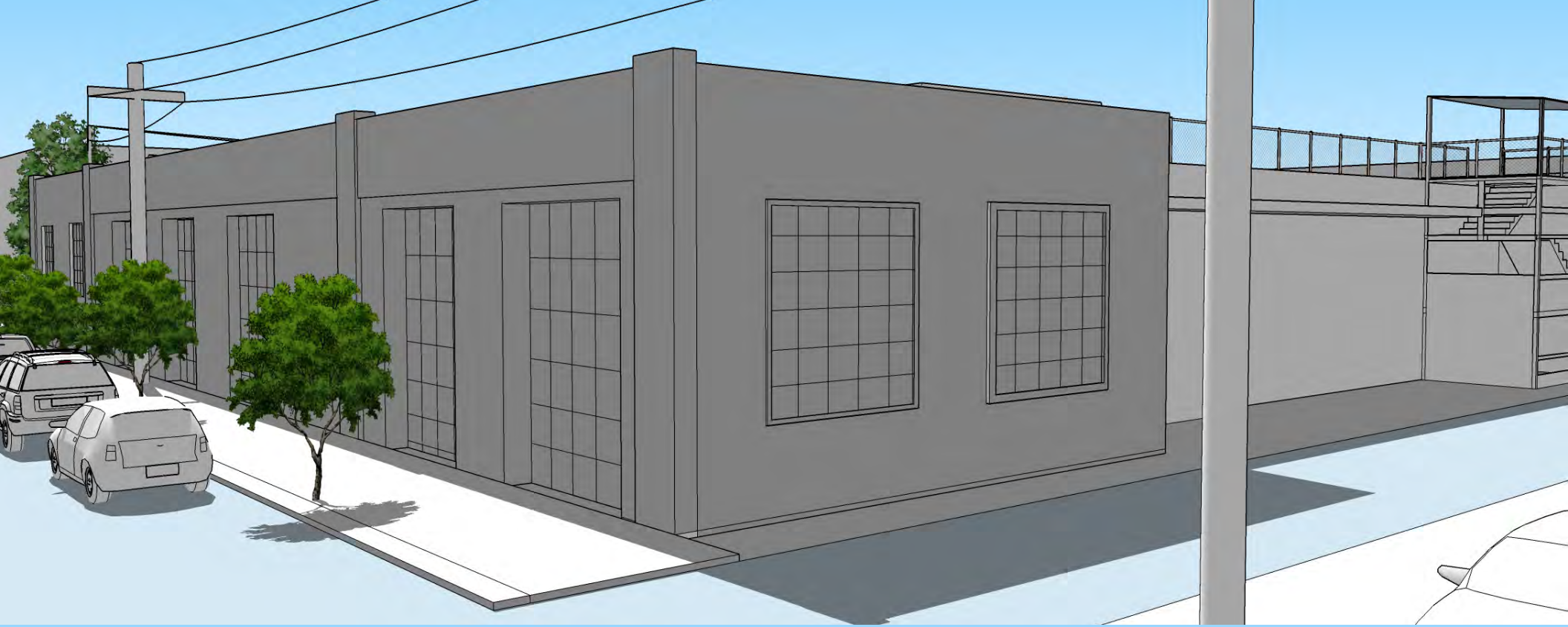


Figure 23: Green roof design for The Preserve rooftop deck.

The second green roof design, Green Roof Site 2, is located at 1800 Summit Avenue on the roof of a multi-business building. The design for Site 2 is an extensive green roof with only low groundcover plants and grass. Since this green roof is not intended for public use functionality and long-term maintenance concerns were the primary focus for the layout. Since there is no public access to the roof at this location, Figure 24 shows a ground level view of the building. The extensive green roof design for 1800 Summit Ave. is in Figure 25.

Figure 24: Ground level shot of Green Roof Site 2. Google (2018). [Google Earth view of 1800 Summit Avenue]. Retrieved March 4, 2019.



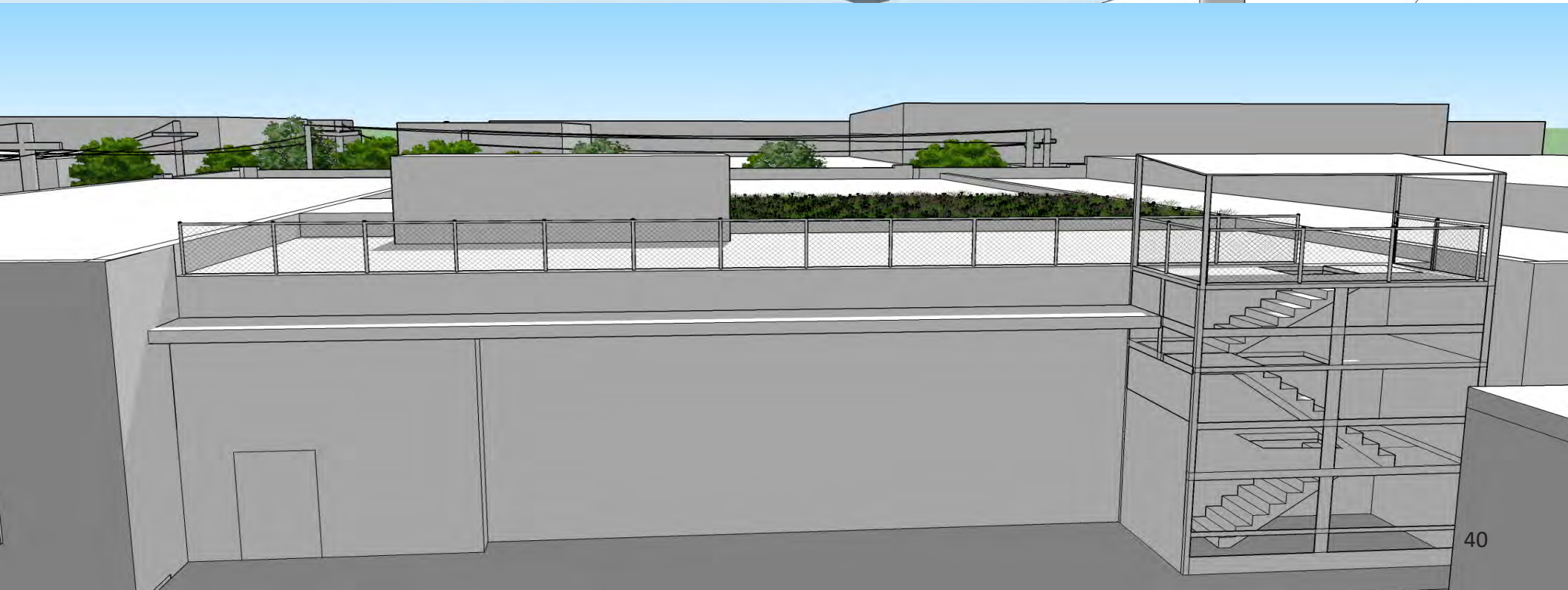


Figure 25: Green roof design for 1800 Summit Avenue.

Green Walls

Like green roofs, green walls, help to mitigate latent urban heat and improve heating and cooling efficiency of a building. Green walls, just one type of vertical greening system, can be distinguished by two types; a green façade and a living wall. The difference between a façade and a living wall is determined if vegetation grows over a building from a growing substrate on the ground (façade) or comprised of pre-vegetated plants growing from cladding structures (living wall). Although both green wall types involve some level of maintenance a living wall installation requires essential materials and load bearing cladding which increases the overall cost and continued maintenance for implementation (Besir& Cuce, 2018). Figure 26 shows a diagram of a living wall and a façade.

Green Wall Site 1 at Courthouse Creek Cidery is a living wall, green wall design since the installation location is on a wall connecting to a patio area. Although installation and maintenance are more extensive for a living wall, there is more opportunity for a wide variety of plants since the growing medium is part of an external structure and can accommodate more than just climbing vegetation. Images of the cidery as it currently exists can be found in Figure 27 and the suggested green wall design is in Figure 28. The cost of a green wall installation depends on the intricacy of the design and price of vegetation. The sample design on Courthouse Creek Cider is a 10 X 10 foot living wall and on average would cost around $150-$265 per square foot, including plants and installation.

Figure 26: Living wall and green wall façade diagram

Figure 27: Ground level photos of Courthouse Creek.

Figure 28: Green wall design for Courthouse Creek.

Parklets

Two locations were identified for implementing parklets in the Site Selection section of this plan document. Both locations were chosen based on street characteristics and interest from survey respondents. The city of Richmond has design guidelines for parklets which were followed in the site designs created for Scott's Addition. These site designs are only suggestions for implementation and will require review by sponsoring businesses, residents, and application approval by the city.

The first site design is in the street parking spaces in front of HackRVA on West Moore Street. This location fits the criteria for a parklet space outlined in the city's design guidelines and would make an ideal community public space for pedestrians and patrons of HackRVA. Street level images of the parklet site are available in Figure 29 and the parklet design is in Figure 30.

The second parklet site is in front of MyBirth at 1726 Altamont Avenue. Like West Moore, Altamont is a not a main street and does not see constant heavy traffic. Street level photos of the parklet site at MyBirth are in Figure 31 and the parklet design images are in Figure 32.

Figure 29: Street level photos of HackRVA parklet site.


hack.rva
makerspace

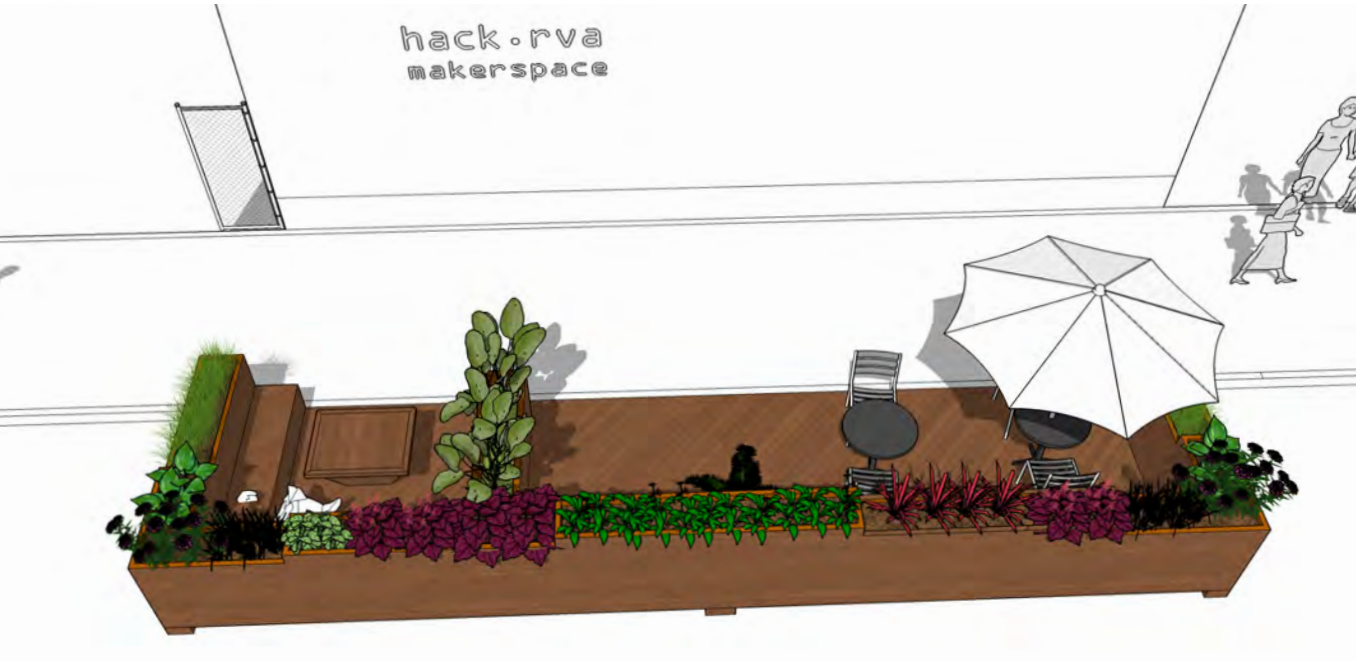


Figure 30: Parklet design for HackRVA.

Figure 31: Street level photos of MyBirth parklet site

Figure 32: Parklet design for MyBirth

Implementation Costs

The green space interventions outlined in this plan range in intensity and upfront cost. Much of the cost for each intervention type depends heavily on the design and plant selection. The following tables show the approximate cost per square foot for three types of green roofs and a living wall. The E.P.A. estimates that the cost per square foot for the three types of green roofs ranges from $10-$25 and can increase depending on plant selection, shipping of materials, and installation labor.[1]

Table 6: Green roof cost by type and square footage

	1,000 ft^2	2,000 ft^2	4,000 ft^2	8,000 ft^2	16,000 ft^2	32,000 ft^2
Extensive	$10,000	$20,000	$40,000	$80,000	$160,000	$320,000
Semi-Intensive	$15,000	$30,000	$60,000	$120,000	$240,000	$480,000
Intensive	$25,000	$50,000	$100,000	$200,000	$400,000	$800,000

A green wall, specifically a living wall, can cost anywhere from $45-$100 per square foot. This wide price range can be attributed to a variety of factors including installation cost, shipping expenses for materials, and the cost of plants. There are a number of companies in the U.S. that specialize in green wall architecture and offer their own unique systems and design. The following pricing table is based on the LiveWall system and an average cost of $60 per square foot, not including cost of installation. LiveWall is a vertical garden enterprise based in Michigan that manufactures and supplies green wall infrastructure components . The company makes and ships every part of their green wall system and provides detailed instructions on installation. Part of the extensive research for this plan included a site visit to a local business that recently installed an interior LiveWall and an interview with the contractor who completed the project. Both the business owner and the contractor were pleased with the LiveWall system.

The cost of a parklet can also vary depending on the design and materials. Although the Richmond parklet design guides do not offer a cost estimate for parklet installation, the Seattle Department of Public Transportation estimates a parklet can cost $15,000 to $50,000 depending on the size, design, and materials used. Businesses who choose to sponsor a parklet should also include application, proposal, and design costs into the budget for a parklet installation.

Table 7: Cost of LiveWall structure by square foot

	5 x 5 (25 ft^2)	10 x 10 (100 ft^2)	15 x 15 (225 ft^2)	20 x 20 (400 ft^2)	25 x 25 (625 ft^2)	30 x 30 (900 ft^2)
LiveWall	$1,500	$6,000	$13,500	$24,000	$37,500	$54,000

1 https://www.epa.gov/heat-islands/using-green-roofs-reduce-heat-islands

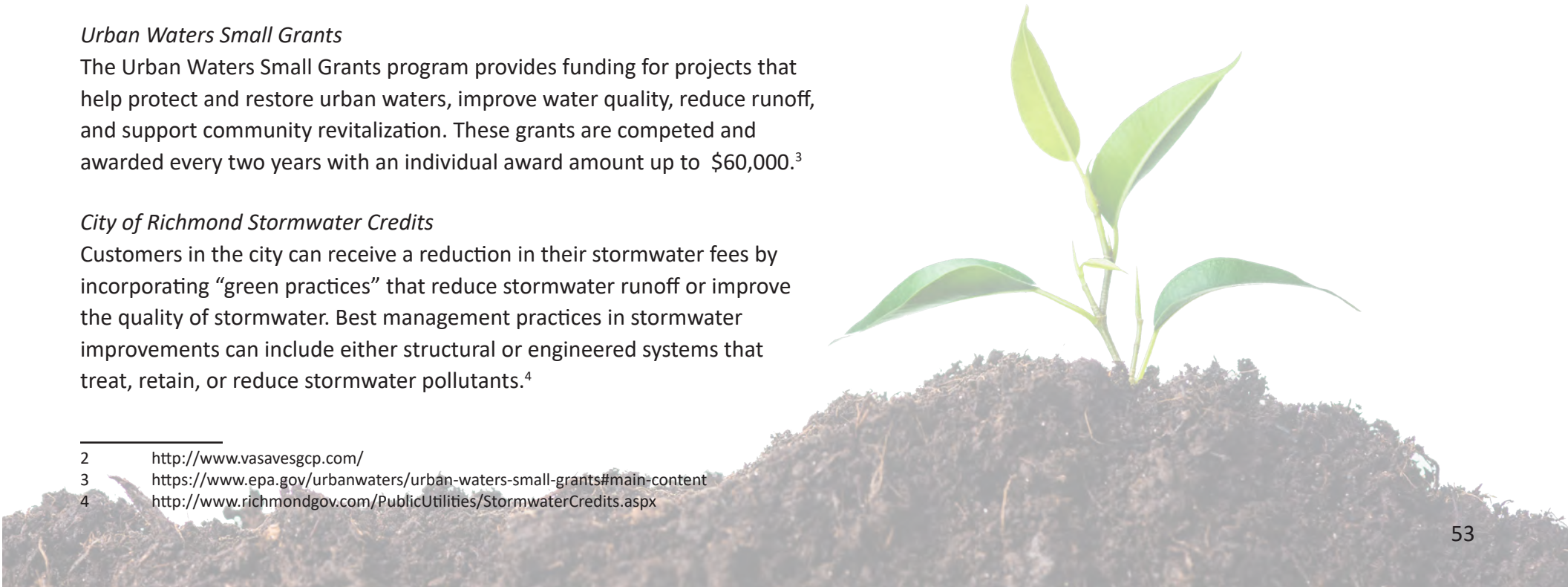
Funding Sources

There are numerous funding sources available to private property owners and commercial businesses for financing green infrastructure projects. Federal and state programs for loans, grants, and tax credits are widely available for projects that meet the eligibility requirements. The following are some suggested funding programs that can be used for funding green space projects in Scott's Addition.

VirginiaSAVES Green Community Loan Program
The VirginiaSAVES program provides low cost financing to private commercial and industrial, non-profits, and local governments to fund a broad range of energy efficiency and renewable projects. Funding for eligible projects is provided by qualified energy conservation bonds (QECBs) and is awarded to any project that meets the requirements of reducing energy consumption, creating new renewable energy sources, and creates jobs and stimulates economic development in the region.[2]

Urban Waters Small Grants
The Urban Waters Small Grants program provides funding for projects that help protect and restore urban waters, improve water quality, reduce runoff, and support community revitalization. These grants are competed and awarded every two years with an individual award amount up to $60,000.[3]

City of Richmond Stormwater Credits
Customers in the city can receive a reduction in their stormwater fees by incorporating "green practices" that reduce stormwater runoff or improve the quality of stormwater. Best management practices in stormwater improvements can include either structural or engineered systems that treat, retain, or reduce stormwater pollutants.[4]



2 http://www.vasavesgcp.com/
3 https://www.epa.gov/urbanwaters/urban-waters-small-grants#main-content
4 http://www.richmondgov.com/PublicUtilities/StormwaterCredits.aspx

Conclusion

The neighborhood of Scott's Addition, previously designated as an auto-oriented industrial zone, is now a fast growing mixed-use commercial and residential area. Adaptive reuse of industrial and warehouse buildings has transformed this area and attributed to its increased popularity, however the landscape of the neighborhood has remained reminiscent of its industrial past and not adapted to the change in land use. The goal of this professional plan is to utilize community input and create a selection of small-scale green space designs that can fit a variety of sites and can be implemented by business and property owners. The successful implementation of these small green spaces can be the catalyst for a neighborhood wide green space plan that incorporates the existing street trees and the plan for a multi-use path along Patton Avenue and the CSX railroad tracks that connects to the Science Museum property. All these green space interventions, small and large, will work together to help mitigate the growing urban heat island problem, add outdoor recreation, and improve the appearance of the neighborhood.

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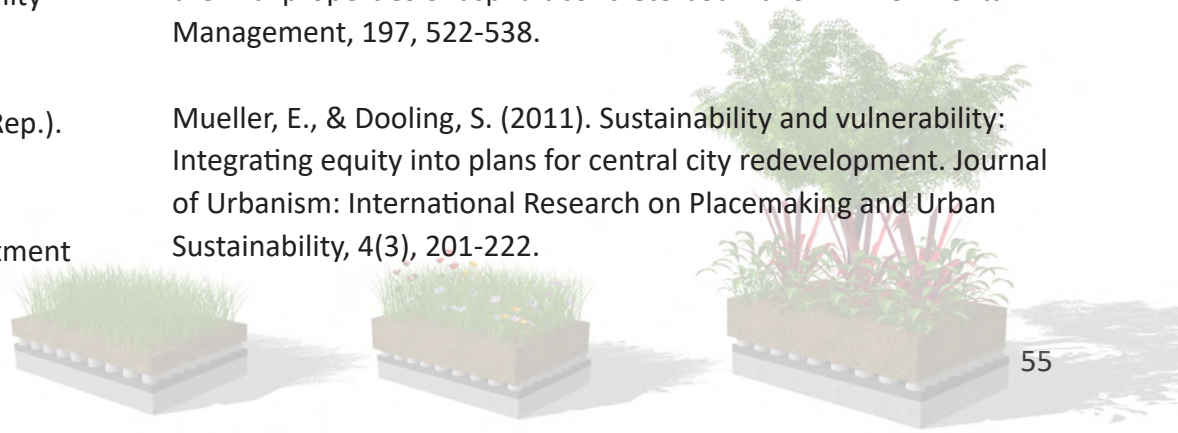

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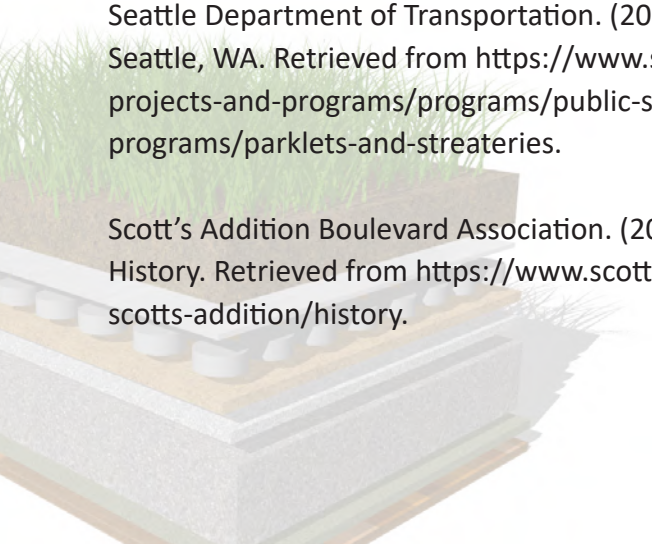

Appendix

Survey Questions

Business and Property Owner Survey Questions

1. Are you a business owner in Scott's Addition? (Y/N)
2. Are you a member of the Scott's Addition Boulevard Association? (Y/N)
3. What is the name of your property?
4. What is the address for your business?
5. Does the entrance to your business face a main street, side street or an alley?
6. Are you located on a one-way or two-way street?
7. Is there a sidewalk in front of your building?
8. Is there any existing green space on your property? (Y/N)
9. Is there any existing green space around your property? Please check all that apply
    a. Street trees
    b. Green wall
    c. Green roof
    d. Raised planters
    e. No green space
10. Have you considered implementing green space on your building or around your property? (Y/N)
11. What has prevented you from installing green space on your building or around your property?
    a. Up-front cost
    b. No benefits
    c. Limited space
    d. Maintenance cost
    e. I have never considered adding green space
12. Do you rent or own your space? (Y/N)
13. Do you have a private or shared parking lot? If you do not have a parking lot, please indicate 'none'.

14. About how many spaces are in the lot?
15. What type of pavement material is the lot?
    a. Asphalt
    b. Stone
    c. Sand
    d. Gravel
    e. Soil
    f. Don’t know
16. Is there existing green space in the parking lot? (Y/N)
17. What is the square footage of the roof of your building?
18. Do you already have a green roof? (Y/N)
19. Can your rooftop support a green roof? (Y/N or not sure)
20. For renters: Do you have permission to install a green wall? (Y/N)
21. What kind of green space would you like to see in Scott’s Addition?
    a. Street trees
    b. Green walls
    c. Green roofs
    d. Parklets
    e. Pocket park
    f. Dog park
    g. Other

Geocoded Survey Responses