A Guide to Understanding & Quantifying the

JOB CREATION & ECONOMIC DEVELOPMENT BENEFITS of Green Stormwater Infrastructure

GSI Impact Hub

Capturing the Multiple Benefits of Green Infrastructure

The Nature Conservancy

Green Infrastructure Leadership Exchange

ONEWATER ECON

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Credit: Sev Smith/TNC

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Credit: Green Infrastructure Leadership Exchange

INTRODUCTION

Making a strong economic case for green stormwater infrastructure (GSI) has been a challenge for many stormwater practitioners. This guide demonstrates how GSI programs can provide significant value to local economies through green job creation and economic development benefits.

In recent years, a relatively significant body of literature has focused on the environmental and social benefits associated with GSI installations, such as cleaner water, improved air quality, and reduced urban heat stress. Less attention has been given to how GSI can affect more traditional economic indicators, such as local job creation and increased economic output. This guide demonstrates that GSI programs can provide significant value to local economies through the following co-benefits:

- Job creation and associated economic activity
- Higher property values, rental rates, and retail sales for businesses
- Increased employee retention and worker productivity
- Business attraction and added value development
- Neighborhood revitalization

GSI Impact Hub

This guide is a component of the GSI Impact Hub, a larger project that provides resources and support related to specific GSI co-benefits. Please visit the GSI Impact Hub website to explore additional resources including:

- Compendium of GSI Co-benefits Valuation Resources
- GSI Impact Calculator, a block-level tool for quantifying and monetizing co-benefits
- Benefit guides related to flood risk reduction, habitat and biodiversity, heat risk reduction, and transportation.

The GSI Impact Hub is a collaboration between The Nature Conservancy, Green Infrastructure Leadership Exchange, One Water Econ, government agencies and technical partners.

Credit: Courtney Baxter/TNC

Credit: Fauna Creative

While stormwater practitioners recognize the potential to create green jobs and other economic development benefits through GSI programs; questions remain on how to optimize and plan for these benefits, address potential equity issues, and demonstrate, quantify, and achieve these benefits within their local context. The objective of this guide is to address these questions with the goal of helping municipalities optimize the implementation of GSI for this purpose. This guide is organized as follows:

- **Section 2** summarizes findings from the literature related to green job creation, the value of GSI installations to businesses, and other economic development benefits that GSI can provide.
- **Section 3** provides guidance and examples on achieving and maximizing green job and economic development benefits of GSI.
- **Section 4** offers guidance on quantifying and monetizing green job creation and other economic benefits associated with GSI.
- **Section 5** describes funding, financing, and partnership opportunities unique to GSI-related job creation and economic development benefits.
- **Section 6** summarizes key takeaways and outlines uncertainties and gaps in research related to this co-benefit.

Key Questions Addressed in This Guide

- What are green jobs?
- How many green jobs does my project or program create?
- What does it take to develop a green jobs program that results in benefits for residents?
- How do the economic impacts of GSI compare with gray infrastructure?
- What are the benefits to businesses from GSI implementation?
- How can I quantify the economic benefits and impacts to help make the business case for GSI?
- Does green job creation and economic development create funding opportunities for GSI?
- How can investments in green jobs be part of a response to local equity and gentrification concerns?

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Overview of Green Jobs & Economic Development Benefits of GSI

Credit: Mark Skalny

OVERVIEW OF GREEN JOBS & ECONOMIC DEVELOPMENT BENEFITS OF GSI

Green stormwater infrastructure has been shown to provide significant value to local economies through green job creation and economic benefits to businesses and local communities.

GSI implementation can create economic development benefits in two ways:

1. Investments in GSI can result in more local employment and spending in the local economy relative to other (e.g., gray infrastructure) stormwater management solutions. GSI investments can also create opportunities for entry-level skilled workers and small local businesses.
2. GSI projects themselves can improve neighborhood aesthetics and quality of life, resulting in economic benefits to businesses and neighborhoods.

The following sections provide an overview of these different benefits, based on findings from relevant literature. However, as depicted in Figure 1, the actualization of these benefits depends on strategic program implementation and intentional design of GSI projects and programs. Section 3 describes these strategies and design elements in more detail.

2.1 Green job creation and local economic impacts

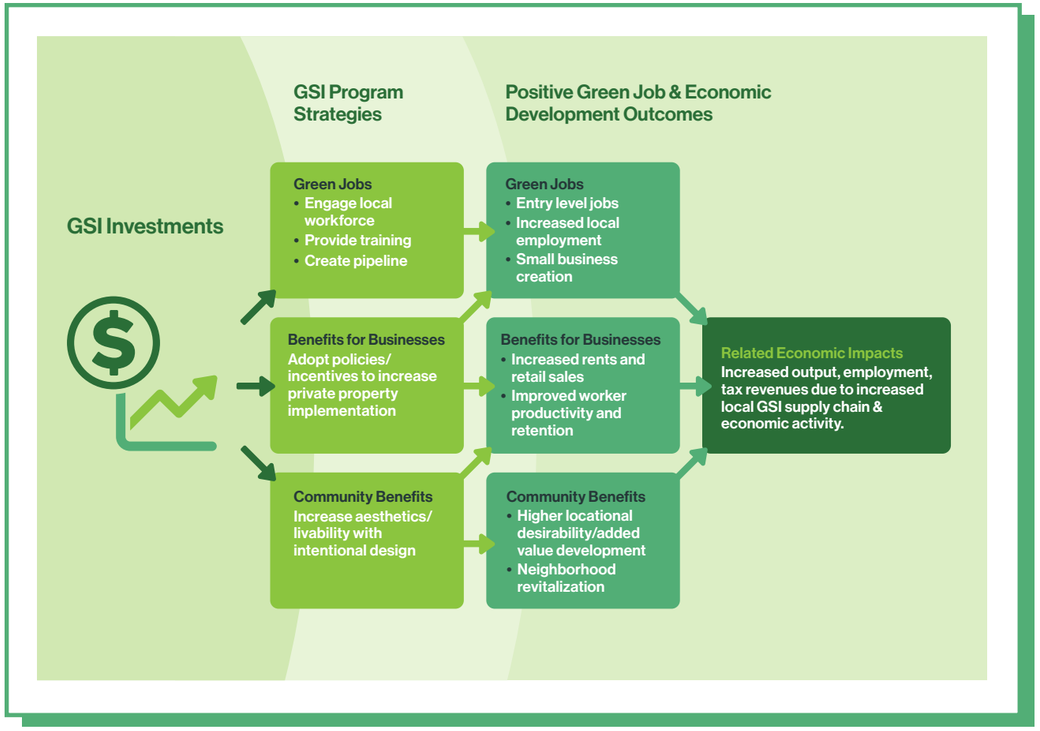
Green jobs, as a term, generally refers to employment in businesses that produce goods and provide services that benefit the environment or conserve natural resources. As used by the U.S. Bureau of Labor Statistics, the green jobs category includes a range of work roles related to (a) pollution and greenhouse gas reduction, (b) natural resource conservation, and (c) environmental compliance, education, and training. Within the context of this guide, green jobs refer to the direct jobs created across the various phases of GSI implementation, including planning, design, construction, and maintenance.

All investments in infrastructure create jobs. However, evidence suggests that compared to gray infrastructure, wide-scale implementation of GSI has the potential to create more high-quality entry level jobs and generate greater impacts in terms of local employment and economic activity. Larger-scale gray infrastructure projects often require specialized skills. Construction firms performing these activities typically have these skill sets within their existing staff or contractor pool, and often these jobs can come from outside of the local region.[1] In contrast, GSI construction and maintenance require fewer highly trained and skilled employees, resulting in a greater number of entry level opportunities. When these jobs can be targeted to residents who are unemployed or underemployed (including disadvantaged youth), this creates social benefits and returns money and economic benefits to the local economy.[2]

Several studies have confirmed significant opportunities for entry-level GSI positions. In a 2017 study, Jobs for the Future (JFF) examined emerging workforce trends associated with increased implementation of GSI in several U.S. cities.[3] This research focused on occupations involved in the direct installation, maintenance, and inspection (IMI) of GSI. Of the 30 occupation categories the authors identified, 28 required high school completion or less, 8 required a high school diploma, and 10 did not require any formal educational credential.[4] Another study found that wide scale adoption of "smart surfaces" (including green roofs, permeable pavement, cool roofs, solar roofs) in Washington, D.C. would create job opportunities across a wide range of skill levels. The report states that 37% of these jobs would likely require little to no preparation, while 42% would require a moderate level, typically an associate degree or specialized training.[5] The remaining jobs required a bachelor's degree or higher.

A more recent study commissioned by the Green Stormwater Infrastructure Workforce Collaborative examined the GSI workforce in the Puget Sound Region across all phases of GSI implementation. A key finding of this study was that while GSI

Figure 1. Using GSI investments to create local employment and economic development benefits.



Credit: Greg Kahn

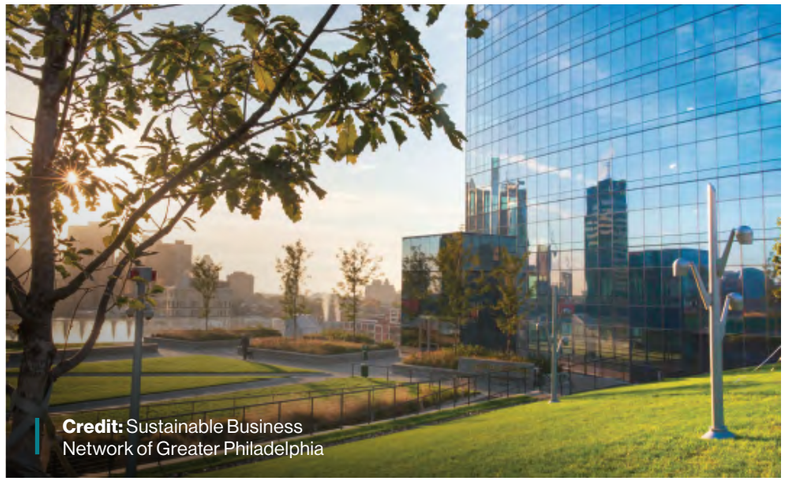
Wide-scale implementation of GSI has the potential to create more high-quality, entry-level jobs and generate greater local employment and economic activity than gray infrastructure.

implementation and maintenance jobs often have few educational requirements, these positions are seldom integrated into an established career pathway. Advancing to supervisory or more technical positions often requires workers to obtain a bachelor's or graduate degree. Additionally, most of these entry-level occupations do not provide a middle-wage job. The authors concluded that without programmatic change, opportunities for entry-level workers in the GSI sector are limited, at least in the Puget Sound region. Section 3 describes how several programs across the country have been working to reduce these barriers.[6]

In addition to potential benefits for entry-level workers, studies have confirmed that GSI investments can have greater positive economic impacts for local economies compared to gray infrastructure spending. A study for DC Water examined the local employment impacts associated with three alternatives for controlling combined sewer overflows (CSOs) in Rock Creek Watershed – a "gray-only" alternative and two hybrid alternatives that used a combination of green and gray infrastructure. Results showed that per dollar spent by DC Water, the hybrid alternatives would result in a 25% to 36% greater local employment impact.[7] Overall, economic output was also greater under the hybrid alternatives, in part due to the increased spending on local supplies for GSI implementation.

Policies or programs that deploy significant GSI implementation can also "incubate" specialized, local businesses. Small and "niche" business development associated with larger-scale GSI programs can create local employment and associated economic activity. In many areas contractors have begun to specialize in GSI in response to demand, including installing pervious pavement or green roofs.[8,9] As described in more detail in Section 3, the public-private partnership for GSI implementation in Prince Georges County, MD has successfully partnered with small businesses to achieve local employment targets.

2021 Best of Green City, Clean Waters Award for Private Projects & Innovation, Cira Green (Note: values are in 2019 USD)



Credit: Sustainable Business Network of Greater Philadelphia

GSI-Related Businesses Generate Significant Economic Impact in Philadelphia

To meet its combined sewer overflow reduction requirements, Philadelphia has committed to spending $4.5 billion on GSI projects between 2011 and 2036. A business organization within the city, the Sustainable Business Network of Greater Philadelphia (SBN), drew from its membership to form GSI Partners, a smaller collective of more than 60 local businesses in the region that design, engineer, construct, maintain, and provide supplies for GSI projects. Through a survey of fifty GSI Partners, SBN was able to estimate the total aggregate revenue of their member firms' GSI-related activities. The survey revealed that the direct economic output associated with work by GSI Partners amounts to more than $55 million per year, including $30 million per year in direct wages to 927 employees. In turn, this activity generates an additional $34 million per year in indirect and induced impacts for a total economic impact of $89 million per year (through the GSI Partners work alone). This economic impact reflects work that GSI Partners performed on both publicly funded projects and private developments that are required to comply with Philadelphia's stormwater regulations.

Source: Sustainable Business Network of Greater Philadelphia (2019)

Since the program's inception in 2015, 78% of the close to $240 million expended have been awarded to "target-class businesses," comprising of small, local, and minority-owned entities. In addition, 69% of hours worked have been by County residents.[10]

Other programs have seen similar economic benefits. The prior case study describes the economic impact of GSI-related businesses in Philadelphia that support the City's Green City Clean Waters Program for controlling combined sewer overflows (CSOs).

2.2 Economic benefits to businesses

GSI installations in the public right-of-way or on private property can directly benefit businesses and local economies. A keystone study from the early 2000s found that customers respond positively to shopping environments with more trees, expressing a willingness to pay more for products and services from businesses located in these areas.[11] More recently, this result has been affirmed by studies showing that GSI installations attract more customers, enhance customer experiences, and create reputational value for the business.[12] Several other studies looking at the effect of greening urban business districts and strip malls have concluded that consumers are willing to pay a premium on products, visit stores and restaurants more frequently, or travel farther to shop in areas with attractive landscaping, good tree cover, or green streets.[13,14] This was confirmed by a New York City Department of Transportation (NYCDOT) study that documented the positive effect on retail sales for businesses located on "complete streets." While the complete streets included pedestrian and safety improvements in addition to tree planting and GSI installations, in one example retail sales increased by more than 100% post-construction relative to comparison sites. These benefits accrued to "mom and pop" shops, as well as larger retail stores.[15]

Intentionally designed GSI and natural spaces can also fetch higher rents and reduce vacancy rates for commercial office space, retail locations, and multifamily buildings. A 2017 study by the Urban Land Institute (ULI) highlighted 17 real estate projects that have prioritized GSI installations with successful development outcomes, including increased market value and higher occupancy rates, among other benefits. ULI cites one example of a 200-unit apartment complex in Boston that garnered an additional $360 to $600 per month in rent for units that overlook a green roof. The green roof cost $134,000 to build and the extra rent nets $143,000 per year, according to ULI. It may not just be the aesthetic improvements associated with GSI that result in higher market values – a recent study documents a "sustainability premium" for LEED-certified multifamily buildings, finding that rental rates were 3.1% higher on average from 2000 to 2021 compared to non-certified counterparts.[16] Table 1 provides a summary of studies that have documented positive economic benefits associated with GSI and similar improvements.

> Greening multifamily residential buildings, shopping areas, and commercial corridors can increase neighborhood aesthetics, which in turn increases rental rates, retail sales, and employee satisfaction.

In addition to these measurable outcomes, GSI practices also have mental health benefits, which can help increase job satisfaction and productivity. Researchers in Texas conducted a survey of office workers and found that those with windows and views of plants and trees had higher job satisfaction, pointing toward increased productivity and employee retention.[17] In a review of studies on this subject, a team of researchers convened by the National Resources Defense Council (NRDC) reported findings that office workers expressed a preference for views or access to landscaping with native plants and rain gardens. Workers also expressed a desire to access areas with flowers or color, large trees, and especially nature-lined walking paths.[18] These attributes can typically be incorporated into GSI projects.

Table 1. Economic benefits of GSI to property owners and businesses

GSI Practice	Region	Metric(s)	Findings	
Green roofs	Washington, D.C.	Commercial rental rates	9% increase in average weighted rents for buildings with green roofs compared to those without, with rental increases up to 15% possible; green roofs also confer aesthetic and public health benefits to tenants with access to, or even a view of, their features[25]	Abbott and Lewis 2013
Green roofs	New York City	Multifamily residential rental rates	Rental premium of 16.2% for high-end multi-family buildings with green roofs compared to those without[26]	Ichihara and Cohen 2011
Green roofs	5 case studies in U.S. and Canada	Commercial property values	Recreational roof top gardens increase property values by 11%, and rooftop vegetable gardens increase values by 7%[27]	Tomalty and Komorowski 2010
Trees and landscaping	Cleveland, Ohio	Commercial rental rates	Compared 85 office buildings and 270 leases showed positive effects of landscaping and/or tree shade, conferring an additional 7% to average rental rate for office buildings[28]	Laverne and Winson-Geideman 2003
Native plant landscaping, trees	Various	Employee satisfaction	Access to nature, including trees, paths, native and flowering plants increases employee satisfaction[29]	Clements et al. 2013
Roadside landscape plantings	Seattle and Tacoma, WA and Portland, OR	Retail sales	Survey respondents reported positive retail behavior in response to landscaped roadsides, willing to pay 8.8% more for goods and services in well landscaped area[30]	Wolf 2009
Trees	New York City, New Jersey US Route 1 corridor	Tenant and customer attraction	Survey revealed consumers preferences for greener commercial establishments, management perception of the importance of trees and landscaping in competing with similar establishments for customers or tenants[31]	Bisco Werner et al. 2001
Complete streets (trees, GSI installations, pedestrian improvements)	New York City	Retail sales	Local businesses directly impacted by complete streets increased patronage, and in turn increased job opportunities, and reinvestment within neighborhoods. For example, businesses directly impacted by complete street design along Vanderbilt Avenue in Brooklyn saw an 102% increase in sales compared to control sites 3 years post construction.[32]	NYDOT 2013
GSI practices (greenways, rain gardens, trees, green roofs, bioswales, porous pavement, landscaping, cisterns)	Milwaukee, WI	Property values	Panel regression models demonstrated that the presence of green infrastructure improvements strongly impacted surrounding property values. Investments in GI were estimated to be paid off via increased property tax values within 3 years for area with largest property value increases.[33]	Madison 2013
GSI practices (rainwater recycling, stormwater retention/ detention, bioswales, wetlands, rain gardens)	Various	Property values, rental rates, leasing time, neighborhood revitalization, and worker satisfaction	Analysis of a series of case studies of real estate projects that incorporated GSI for successful development outcomes; projects were reported to receive higher rental rates and be leased out more quickly for commercial, residential and office buildings; catalyzed broader revitalization efforts; and increase holistic workplace health.[34]	Burgess et al. 2017

2.3 Community economic benefits

GSI projects can provide significant quality of life and neighborhood improvement benefits when specifically designed for this purpose. For example, programs that pair stormwater management opportunities with vacant lot revitalization, community gardens, safe routes to schools, or neighborhood green spaces can result in multiple benefits for residents, including human health benefits, social capital and community cohesion, and improved economic vitality.[19,20] Larger-scale GSI projects such as stream restoration or "stormwater parks" and wide-scale GSI adoption can attract new businesses, spur investments, and provide recreational opportunities that attract visitors.[21]

The value of these improvements is often reflected in increased property values, which in turn can increase local tax revenues.[22,23] However, this can trigger equity concerns related to affordable housing and green gentrification in underserved communities.[24] Utilities and municipalities continue to explore effective strategies for ensuring against these unintended consequences, including developing neighborhood appropriate programs and designs in response to identified needs from community members. For example, Seattle Public Utilities (SPU) has developed an extensive outreach process to ensure that community values are incorporated into GSI projects early in the planning phase (see Section 3.3). In Cleveland, Community Development Corporations (CDCs) have leveraged funding from the Northeast Ohio Regional Sewer District's GSI Grant Program to revitalize vacant lots and/or create green spaces in underserved communities (see case study on page 21).

In recent years, several cities across the U.S. have developed stormwater parks, which include larger-scale GSI solutions that capture and reuse or infiltrate stormwater, but also provide public open spaces and/or recreational amenities. For example, in Atlanta, the Old Fourth Ward Park is a major GSI installation that addresses local flooding and stormwater issues. The city had originally planned to implement a much more expensive gray infrastructure alternative, but in response to community feedback, found that it could solve the problem by creating a park with a pond reservoir for a much lower cost. Since its completion, the park has contributed to a 56% increase in median property tax revenue in the surrounding Census tract (from 2009 to 2016), compared to a 0.27% decrease in median property tax revenue for Fulton County overall. The park also catalyzed more than $2 billion worth of investment in the six blocks adjacent to it and contributed to a 60% increase in the number of occupied housing units in the area.[35]

Larger-scale GSI projects that focus on stream restoration, such as the Metropolitan Sewer District (MSD) of Greater Cincinnati's Lick Run Greenway project (which eliminates about 800 million gallons of CSOs annually), can also provide significant value to adjacent communities. In a review of floodplain restoration projects in urban areas, American Rivers found that incorporating public amenities is the best way to yield co-benefits from these projects. The study highlights floodplain restoration projects that have resulted in the attraction of value-added development and increased property values and associated tax revenues.[36]

Improvements do not need to reach this level of investment to provide significant benefit. For example, the former Commissioner of Parks and Recreation in New York City notes that many properly designed, constructed, and managed GSI installations can serve as parks.[37] He cites NYC's 2,000 Greenstreets (i.e., greened traffic islands), which were considered "parks" by the Parks Department (and therefore maintained by them). While these installations were mostly small, they included plants, trees, and often sidewalks and sitting areas or benches; they created community spaces where there had previously been bleak landscapes. These types of GSI installations have also resulted in the creation of small "pocket parks," which provide neighborhood open spaces and play areas.

Credit: Lyndon DeSalvo/TNC

3

Planning & Designing GSI for Green Job & Economic Development Benefits

Credit: Zoe van Duivenbode/TNC

PLANNING & DESIGNING GSI FOR GREEN JOB & ECONOMIC DEVELOPMENT BENEFITS

Fully realizing the employment and economic development benefits of GSI requires intentional program design and the adoption of policies and standards for achieving key outcomes.

This section provides an overview of strategies for successfully fostering GSI job creation and economic development benefits, including approaches related to workforce development, encouraging GSI at private development sites, and integrating community values into GSI planning.

3.1 Green job programs and workforce development efforts

Programs that create GSI-related green jobs can take many forms, ranging from GSI certification courses and requirements for local contractors to mentorships that pipeline local business leaders into GSI related fields. Likewise, there is a wide range of approaches to providing these opportunities, ranging from direct engagement by the local stormwater agency; to inter-municipal programs that align stormwater, economic development, parks, transportation, or corrections departments; to collaborations between public agencies and for-profit or nonprofit organizations.

In designing green jobs development efforts, focus on the opportunities GSI can create for entry level workers, particularly for disadvantaged members of the community. This has been most successfully done through partnerships with local workforce development programs. As highlighted in the following case studies, these programs have the capacity and skills necessary to recruit and mentor participants, provide training across a range of skill sets, and successfully foster career pathways (e.g., through connections to apprenticeships and employers). Successful programs such as Groundwork Ohio River Valley (highlighted on page 22) and Groundwork Denver reduce barriers to entry for participants to ensure success. For example, Groundworks Denver provides participants free public transportation passes and covers participant costs for trainings and certifications undertaken as part of the program.[38]

The Green Stormwater Infrastructure Workforce Collaborative (GSIWC) underscores the importance of creating opportunities for individuals to leverage experience with GSI in entry-level occupations to more advanced positions. Potential pathways include advancing construction laborers or maintenance workers to technicians or design and policy professionals. Alternatively, GSIWC notes that engineering and landscape architecture offer a rarely used pathway in which one can apply experience working in

Restored Industrial Mill Site. Morgana Bluff Nature Preserve Learning Center in Slavic Village, Cleveland, Ohio

Credit: NEORSD Green Infrastructure Grants Programs Storymap

NEORSD Provides Neighborhood-Scale Benefits by Partnering with Community Development Corporations

The Northeast Ohio Regional Sewer District (NEORSD) has long had a successful GSI Grant Program. Frequent participants in the program are neighborhood Community Development Corporations (CDCs), nonprofit organizations that strive to attract infrastructure investment, promote civic engagement, and provide social and business development services at neighborhood scales. One CDC, Slavic Village, has used NEORSD's grant program to convert blighted vacant lots to parks that provide stormwater infiltration services. The parks restore value and dignity to the neighborhood while contributing to NEORSD's CSO reduction program. Slavic Village is a historically underserved community, known for having more foreclosures than any other neighborhood in the U.S. during the housing crisis of 2008.

Another important note about NEORSD's grant program, and the Slavic Village example, is that it successfully leverages the capacity and reputations of local community-based organizations (like the CDCs) to implement GSI projects. Slavic Village CDC also brought additional funding to the project, which they received from various grants targeting neighborhood revitalization efforts. This reduces NEORSD's project costs and demands and enables grassroots programs that can specifically target neighborhood needs and opportunities.

Credit: GroundworkORV

Groundwork Ohio River Valley in Cincinnati, OH

Sanitation District No. 1 of Northern Kentucky (SD1) manages wastewater from communities across the Ohio River from Cincinnati, OH. The district has embarked on an ambitious plan to reduce combined sewer overflows through a range of gray infrastructure projects as well as a commitment to GSI, including the installation of publicly funded green roofs, rain gardens, and trees. For several years, SD1 has had a partnership with Groundwork Ohio River Valley, a regional nonprofit that focuses on workforce development through soft skills education and on-the-job training in GSI implementation and other restoration and sustainability-based practices. Groundwork's Green Corps designs, builds and maintains local GSI projects, including several implemented by SD1. The two entities are partnering on a new GSI project, funded through a private foundation, that will combine financial incentives, outreach and education, stakeholder engagement, and direct installations of GSI projects in Dayton, KY. Groundwork's Green Corps and Green Team programs will leverage the partnership to develop career pathways for young adults and train local youth, helping to build a GSI workforce. Groundwork ORV has a similar partnership with the Metropolitan Sewer District of Greater Cincinnati, including efforts to maintain the Lick Run Greenway and to provide part-time seasonal youth employment through the Cincinnati Recreation Commission.

The program provides participants with real world experience, including developing project bids, managing projects, and connecting to employers. Groundworks reduces barriers for participants by helping to cover transportation costs and providing training opportunities, such as through the National Green Infrastructure Certification Program.

Credit: Kahlil Kettering/TNC

the field under the supervision of a licensed professional in place of completing an accredited degree program to meet the requirements of sitting for the licensure exams. These opportunities will require collaboration with colleges and universities as more advanced positions typically require degrees and/or certifications. It will also require employer support and engagement.[39]

Consider certification programs that match the demand for GSI in your local community. For example, the National Green Infrastructure Certification Program (NGICP) provides the base-level skill set needed for entry-level workers to properly construct, inspect, and maintain GSI. Designed to meet international best practice standards, NGICP can meet a wide range of needs, including professional development for existing GSI professionals and as part of a larger workforce development effort to provide candidates with the technical skills necessary to enter the green workforce and earn a livable wage.[40] Chesapeake Bay Landscape Professional (CBLP) Program is a similar program that provides consistent instruction and professional stormwater certification across the Chesapeake Bay region. To encourage certification, municipalities can prioritize or require individuals who inspect post construction practices or who install GSI practices on private property (e.g., for incentive programs) to be NGICP-certified.

Other programs have developed their own training programs targeted to specific needs. For example, in Montgomery County, MD the Montgomery County Department of Environmental Protection (MCDEP) developed a comprehensive contractor training program in support of its larger GSI-based RainScapes program. Through the program, the county has trained more than 400 landscapers; landscape architects, designers, stone masons, and garden center staff on GSI design, implementation, and maintenance. The training program not only ensures that there are contractors available to implement RainScapes projects but has also helped to create a "sales force" for the County's

Focusing on providing small business support can ensure that public investments in GSI projects create enduring local employment and business benefits.

RainScapes rebate program for residential and commercial properties. Landscapers and others that have gone through the training often "sell" the program to their clients. MCDEP provides guidance to rebate program participants on how to select a contractor to perform the work and publishes a list of contractors that have completed the program online to help connect RainScapes Rewards applicants to landscape professionals. The list is ordered based on how many projects the contractor has completed through RainScapes Rewards, and then alphabetically.[41]

Focusing on providing small business support can ensure that public investments in GSI projects create enduring local employment and business benefits. As highlighted in the following case study, the Clean Water Partnership in Prince Georges County, MD, has developed several assistance programs to help foster small businesses to be able to successfully implement GSI. These programs have been an essential part of the partnership meeting its local and small business development goals. In Seattle, SPU initiated a program that provided low-interest loans to landscape contractors through a community development bank to implement projects through the Seattle RainWise rebate program. Through this program, the landscape contractors were able to receive up front funding that allows them to implement multiple projects for private property clients, rather than having to wait for a rebate. While this program was intended to reduce a huge barrier to entry for small contractors, it was underutilized and eventually rolled back, in part due to the perceived cost of borrowing and businesses' concerns about taking on debt.

3.2 Economic incentives for GSI

Incentives or requirements will help property owners or developers benefit from GSI features that enhance business performance and provide community benefits. Incentives can provide financial or technical assistance to property owners, project developers, or non-profit organizations, while stormwater management ordinances can create compliance drivers for GSI implementation on commercial property. Other approaches that confer financial assistance to developers, without cash outlays from a municipality, include zoning flexibility such as floor area ratio (FAR) bonuses or property tax discounts. Approaches such as Tax Increment Financing (TIF, see Section 5) can also be used to leverage comprehensive GSI improvements at the neighborhood- or business district-scale that result in significant community and economic development benefits.

Incentive programs, such as grants and rebates, can be designed to encourage the provision of community benefits, as demonstrated in the example provided earlier on NEORSD's GI Grant Program. This could be done formally, through requirements for project criteria or by incorporating economic development benefits into the program's application scoring criteria. Providing design guides also enables municipal stormwater staff to ensure consistent design standards are met across multiple property developments and encourage the adoption of designs that maximize aesthetics, provide recreational and other community benefits, optimize stormwater reductions. For more information on successful incentive programs, including NEORSD's grant program, see the 2018 Water Research Foundation Report, Incentives for Green Infrastructure Implementation on Private Property: Lessons Learned.

3.3 Community planning efforts

The location of a GSI project within the urban environment also affects its performance and value. Studies show that the property value benefits associated with GSI can be greater when targeted in commercial corridors within lower-income communities or communities that have a paucity of public green space (which are often correlated). At an individual site level, the level of existing vegetation influences the value of additional trees and greenery; there are diminishing economic

Credit: The Clean Water Partnership

Clean Water Partnership in Prince George's County, MD Fosters Small, Local Business Development

The Clean Water Partnership is a public-private partnership between Prince George's County and Corvias. The outcomes-based payment structure includes attainment of community benefits. This 30-year partnership, initiated in 2015, taps into revenues from the County's stormwater fee to pay Corvias for the design, installation, and maintenance of GSI projects that meet the County's MS4 permit compliance requirements and deliver meaningful, measurable economic benefits to County residents and businesses. The contract between the County and Corvias spells out local employment and local business participation goals to ensure that the economic benefits of the $100 million program are realized by the local community. To date, nearly 80% of project funds have been awarded to local businesses, and nearly 70% of labor hours contributed to the project have been worked by county residents. Through these approaches, the $350 million program is expected to have a local economic benefit of $655 million.

To achieve these outcomes, the CWP has created several programs to expand the local GSI workforce and provide support to small businesses and business owners within the county. The Emerging Landscapers Program provide trainings, coaching, and certifications to develop firms' GSI installation and maintenance skill levels and improve their ability to compete for work on CWP (and other GSI) projects. The CWP Mentor Protégé program focuses on developing the capacity of local, small and minority firms related to stormwater management and green infrastructure projects. The Program provides, coaching, training, access to bid opportunities, capital, bonding, certification, and other supportive services.

Credit: John Hinkson/TNC

returns on investments in areas with high levels of existing vegetation.

As noted earlier, GSI projects that provide neighborhood amenities by improving public green spaces can result in unintended consequences by attracting new residents, displacing established communities, and escalating property tax burdens on fixed or low-income residents. The stormwater community continues to learn and adopt approaches for ensuring equitable distribution of GSI projects, engaging with local partners and stakeholders to ensure GSI projects are designed to meet community priorities (adopting a responsive vs. prescriptive approach), designing culturally appropriate GSI, and addressing other equity concerns. For more information on incorporating equity considerations into GSI planning, see the Green Infrastructure Leadership Exchange's Equity Guide for Green Stormwater Infrastructure Practitioners. The text box on the following page offers several additional resources on incorporating equity into GSI planning and implementation.

Seattle Public Utilities (SPU) serves as a model for ensuring equity objectives and engaging local communities in participatory planning efforts. The agency has developed a multi-objective decision analysis (MODA) framework for reviewing alternative stormwater/infrastructure projects. The purpose of MODA is to evaluate and rank how individual projects contribute to key SPU performance categories and values that SPU is aiming to achieve as it implements community-based projects. The MODA includes values associated with providing benefits to historically underserved neighborhoods and protecting against potential displacement impacts in these neighborhoods.

SPU's MODA and project planning process is informed by extensive community engagement and outreach. This is exemplified by an ongoing project in the city's Longfellow Creek Watershed, an important creek for salmon habitat that flows through a lower income area of the city. During the planning process, SPU worked with the community to identify priorities for GSI projects, in addition to stormwater benefits. The community identified needs for pedestrian improvements along a residential corridor, as well as the enhancement of a neglected pocket park located on the creek that served as an important connector to other neighborhoods. In response to these identified needs, SPU worked with several agencies to ensure that the Longfellow Creek projects provide multiple benefits. The project incorporates pedestrian safety and mobility improvements implemented by the Seattle Department of Transportation, along with streetside bioretention. It also includes significant renovation of the pocket park, including art installations designed by a local artist. The WRF GSI TBL Tool estimates that the project will result in close to $9 million in benefits (present value 2020 USD) over 50 years, including $1.275 million in property value benefits and close to $3.0 million in recreational benefits. The project also leveraged multiple funding sources, including from SDOT, the City's Office of Arts and Culture, the King County Flood Control District, and the Levy to Move Seattle.

GSI Equity Resources

Green Infrastructure Leadership Exchange published an Equity Guide for Green Stormwater Infrastructure Practitioners which provides checklists for considerations when planning for infrastructure improvements.

"Is Green Infrastructure a Universal Good?" is a research project led by the Cary Institute of Ecosystem Studies and the Urban Systems Lab to understand how green infrastructure urban planning in US cities consider issues of equity and environmental and social justice.

Chesapeake Stormwater Network Webinar Incorporating Equity into Green Infrastructure Planning highlights the Green Infrastructure Equity Index.

University of Minnesota developed A Policy Toolkit in Pursuit of Economic, Environmental, and Racial Justice, Sharing in the Benefits of a Greening City:

Environmental Law Institute also has a Step-by-Step Guide to Integrating Community Input into Green Infrastructure Planning.

4

Quantifying and Monetizing Green Jobs and Economic Benefits

Credit: Lyndon DeSalvo/TNC

QUANTIFYING AND MONETIZING GREEN JOBS AND ECONOMIC BENEFITS

Estimating the number of jobs and local economic development benefits information can help make the case for specific interventions, estimate demand and opportunities for workforce development efforts, leverage additional funding sources, and/or track performance post-project.

This section offers methodologies and provides guidance on quantifying and monetizing the green job and economic development benefits associated with GSI.

4.1 Measuring the number and value of jobs created by GSI

Several studies and tools have estimated the jobs generated by GSI investments. As shown in Table 2, in general, studies have found that every $1 million spent on GSI projects creates between 4 and 6 implementation jobs. The same level of spending supports 3 to 16 maintenance positions. The number of jobs created varies based on several factors, including the type of infrastructure, location, and modeling assumptions.

The Water Research Foundation's (WRF's) BMP and LID Whole Life Cost Models[48] document a range of labor requirements associated with the maintenance of eight different stormwater control measures. Table 3 shows labor requirements in hours per year from the WRF model spreadsheets. Labor hours are determined based on a specific practice area, drainage area, or storage capacity, depending on the practice. The models do not report labor requirements associated with the installation of GSI practices.

WaterNow Alliance recently published the Water Infrastructure Jobs Calculator to help water resource planners estimate the number of jobs created by investments in sustainable, localized water infrastructure solutions. Practices include green roofs, bioswales, raingardens, permeable pavement, and urban forests as well as leak detection programs, installation of high efficiency appliances, and other water conservation practices. As shown in Figure 2, the tool produces estimates for direct, indirect, and induced jobs (see section 4.3) created per $1 million of investment (2020 USD). The tool also provides a comparison of jobs created by investment in other types of infrastructure industries, including oil and gas extraction and water treatment plants. This allows users to compare differences in job creation across industries. As of the publication of this report, the tool is still in draft form and the values published are subject to change.

Another tool that provides information on green job creation is the Water Research Foundation's

Table 2. Studies summarizing GSI job creation estimates per $1 million in spending (2022 USD)

GSI Practice(s)	Location	Construction jobs created	O&M jobs created	Source
Permeable pavement	Washington D.C.	3.99	9.73	Clements et al. 2020[42]
Bioretention	Washington D.C.	5.24	15.74	Clements et al. 2020[43]
General mix of GI practices	Philadelphia	3.36	2.95	Stratus Consulting 2009[44]
Bioretention and rainwater harvesting	Washington D.C.	6.02	—	Kats & Glassbrook 2016[45]
Green roofs	Washington D.C.	12.14	—	Louis Berger Group 2008[46]
Bioretention ponds	Northeast Ohio	—	7.38	Piazza Clouse 2013[47]

Table 3. Operations and Maintenance Job Estimates by Stormwater Control Measure, WRF Whole Life Cost Model (2009)

Practice	Size	Hours per year			Equivalent FTEs per year		
		Low	Med	High	Low	Med	High
Green roof	10,000 ft^2	35	120	472	0.017	0.060	0.236
Rain gardens	200 ft^2	1	5	57	0.001	0.002	0.029
Permeable pavement	21,780 ft^2	2	4	40	0.001	0.002	0.020
Retention ponds	90,750 ft^3 (capacity)	5	12	736	0.002	0.006	0.368
Swales	34,848 ft^2 (drainage area)	7	17	116	0.003	0.008	0.058
Bioretention (curb contained)	34,848 ft^2 (drainage area)	8	14	90	0.004	0.007	0.045
Cisterns	842 ft^3	20	31	211	0.010	0.016	0.106
Extended detention	18,150 ft^3 (capacity)	5	13	463	0.003	0.006	0.232

Figure 2. Sample results for a $1 million investment in Colorado from the Water Infrastructure Jobs Calculator (results subject to change)

Tool for Quantifying and Monetizing the Triple Bottom Line Benefits and Costs of GSI, which includes a module on green jobs. The TBL GSI Tool calculates both construction and annual maintenance jobs supported by GSI investments. GSI practices in this tool include rain gardens, bioretention facilities, green roofs, street trees, permeable pavement, rainwater harvesting, wetlands, and biofiltration. The tool currently assumes that an average of 5.5 construction jobs are created per $1 million of capital spending (2020 USD), based on current literature. Maintenance job estimates are based on WRF's Whole life Cost Model.

The aforementioned tools and studies provide screening level estimates of the number of jobs created by GSI investments. However, most of these estimates rely on modeling or pre-construction bids, rather than data collected post-construction. In addition, as accounted for in the WaterNow Alliance tool, some studies are limited by a lack of baseline that compares green job benefits to other alternatives. Knowing total employment from a project does not provide the nuance of the additional employment benefits of green or hybrid alternatives when compared with traditional infrastructure projects.

It is for this reason that benefit cost analyses of large infrastructure projects often do not include job creation benefits – based on the rationale that the labor retained would otherwise be employed in other ventures, and if the project was not built, the associated investment would be spent in other sectors. However, as described in Section 2, evidence suggests that compared to gray infrastructure, wide-scale implementation of GSI has the potential to generate greater local employment and more entry-level opportunities. There are different approaches to valuing the employment effects of infrastructure investments in this context, with a focus on the benefits gained from employing individuals who are currently unemployed or underemployed. For example:

- The **representative wage approach** quantifies the benefit of reduced unemployment as equal to the market wage associated with the new job minus the unemployed persons reservation wages. A reservation wage is the lowest wage rate at which a worker would be willing to accept a specific job (as determined by economic theory for different markets and skill sets). For an aggregate benefit, the difference between the market wage and the reservation wage is multiplied by the number of unemployed individuals expected to find work in the project. This approach assumes that the worker would otherwise be hired in the future at the reservation wage, so economic gains derive from the difference between the wages.
- The **avoided social cost approach** values job creation benefits based on the poverty- and unemployment-related social costs that new GSI jobs can help avoid. This approach is based on the expectation that some portion of new jobs will provide opportunities for unemployed low-skilled workers, helping to create a pathway out of poverty and reliance on welfare programs that otherwise would not exist. Communities spend large amounts to cope with the effects of poverty through social welfare programs. The benefits of GSI-related jobs can be estimated by multiplying per person poverty-related costs by the number of newly created positions that would be filled by previously unemployed workers (usually assumed to be some portion of total employment).

Figure 3. WRF GSI TBL Tool Green Jobs inputs and outputs

Jobs - Construction and O&M

		Construction jobs	Jobs per $1 million of capital spending
17	job-years	Construction job-years	5.5
		Annual maintenance jobs	
-	jobs	Green roofs	
-	jobs	Rain gardens	
-	jobs	Permeable pavement	
-	jobs	Retention ponds	
-	jobs	Swales	
0.841	jobs	Bioretention	
-	jobs	Cisterns	
-	jobs	Trees	
0.84	jobs	Annual maintenance jobs (at full implementation)	
20%	percent	Percent of construction jobs filled by unemployed/underemployed persons	
30%	percent	Percent of maintenance jobs filled by unemployed/underemployed persons	

Valuation Method 1 - Reservation Wage Approach

20.00	$ per hour	Market wage for construction workers
11.00	$ per hour	Reservation wage for construction workers
17.00	$ per hour	Market wage for maintenance workers
9.35	$ per hour	Reservation wage for maintenance workers
59,671	$ per year	Total value of **construction** jobs using representative wage approach
3,862	$ per year	Annual value of **O&M** jobs using representative wage approach

Valuation Method 2 - Avoided Social Cost Approach

11,900	$ per year	Avoided social cost of a job per year
39,449	$ per year	Total value of **construction** jobs using avoided social cost approach
3,004	$ per year	Annual value of **O&M** jobs using avoided social cost approach

As shown in Figure 3, the WRF GSI TBL tool applies both methodologies to calculate the monetary benefits of job creation. Users enter the percentage of jobs that might be filled by unemployed or underemployed residents. For the reservation wage approach, the market wage for construction workers is $20 per hour and $17 per hour for maintenance jobs (2020 USD). The reservation wages are 55% of the market wage, based on the average amount that individuals typically receive in unemployment insurance. For the avoided cost approach, social costs of $11,900 (2020 USD) per unemployed person are applied. Figure 3 shows the inputs and outputs for the Tool.

Total job creation benefits and valuation approaches can be useful for accounting for the full

Image Credit: PowerCorpsPHL

Proof In Numbers: PowerCorps PHL

PowerCorpsPHL – Providing Career Pathways for Young Adults in Philadelphia, PA

The Philadelphia Water Department (PWD) has a successful partnership with PowerCorpsPHL, a City of Philadelphia workforce development initiative. Since 2013, the PowerCorpsPHL program has leveraged partnerships with City departments, the federally sponsored AmeriCorps program, and support from the State of Pennsylvania and private foundations to train and employ disadvantaged youth in GSI, urban forestry, and other skills. PWD regularly hosts PowerCorps participants, who in turn provide routine surface and aesthetic maintenance for GSI projects throughout the city. The partnership provides cost-effective maintenance services for PWD while creating a skilled workforce with established pathways for career advancement.

The program starts members in the foundation phase for four months where they serve on crews and enhance their work readiness skills. Following the foundations phase members apply into career pathway tracks that range from 6 to 18 months. Career pathway tracks include Green Infrastructure, Electrical, and Urban Forestry, among others. In both phases, members are paid a bi-weekly stipend. PowerCorpsPHL facilitates connections to employment or post-secondary education for about 92% percent of its members and offers lifelong access to support services for all alumni.

PowerCorpsPHL addresses more than job preparedness and education. A full-time social worker counsels members on their mental health needs and can refer them to medical clinics or for additional support. Staff also help members access resources such as SNAP benefits, childcare, and tuition benefits.

PHENND (2019); Press (2020); PowerCorpsPHL (2023)

range of benefits associated with GSI investments. However, meaningful metrics also include percentage of jobs filled by local residents and/or MWBE participation in GSI programs. Workforce development programs track additional metrics, such as percentage of participants that successfully transition to meaningful employment. PowerCorps PHL, a program targeting disadvantaged youth in Philadelphia for GSI jobs, also tracks the percent of participants that remain crime-free for one year or more (see case study on preceding page).

4.2 Direct benefits to businesses and neighborhoods

Direct economic benefits that can accrue to businesses as a result of GSI-related improvements include increased property values or rents and increased foot traffic and retail sales. When intentionally designed, GSI installations can also provide benefits for neighborhood residents, including recreational benefits, social cohesion, and other quality of life improvements. This section describes the methodologies used by economists to assess these difficult-to-quantify benefits and provides guidance for estimating the value of GSI installations in this context.

The value of aesthetic planter boxes, street trees, green streets, and other GSI improvements for local businesses and residents are often reflected in increased property values or rental rates. Simply put, people are willing to pay more to live or work near areas that provide GSI-related amenities. Typically, economists use hedonic pricing models to estimate these values. **Hedonic pricing models** use statistical analysis to isolate the effect of a specific characteristic, such as proximity to GSI, on a property's market value by controlling for all other factors. This same approach can be used to estimate the effect of GSI improvements on retail sales. Economists also use surveys to better understand how individuals value non-market goods and services, such as increased green space or other GSI-related amenities. These surveys use stated preference or revealed preference methods to elicit **willingness-to-pay estimates**, typically per household per year, to estimate total value.

An original valuation study typically requires a significant amount of time, expertise, and financial resources. For this reason, researchers often use the **benefits transfer** approach to estimate non-market values. The benefit transfer approach applies findings from existing, well-executed studies on the economic benefits of different types and scales of GSI. These estimates can be used to develop basic estimates for the value of GSI to commercial properties and neighborhoods.

For example, a study published by the NRDC estimates the following benefits from GSI retrofits to office buildings, multi-family residential buildings, and retail centers based on the following estimates from the literature:

- Multi-family residential property values increase from 2-5%
- Shade & landscaping increase rental rates for office buildings by 7%
- Rents in multifamily residential buildings with green roofs can be upwards of 16%, but typically within the range of 7 – 10%
- Office building occupancy rates are 8% higher in LEED certified buildings
- Shoppers willing to pay 8-12% higher prices for shopping in areas with tree canopy[49]

Figure 4 presents the results of this assessment, as applied to a hypothetical retail center. Results from similar studies can be used to estimate high-level business and community benefits associated with GSI in different contexts.

4.3 Economic impacts of GSI investments

GSI investments can result in positive economic impacts for local economies, including direct, indirect, and induced effects. *Direct* impacts include economic activity and jobs that result from utility or municipal spending, including jobs and materials purchased to design, construct, or maintain GSI installations. *Indirect* impacts occur when local firms locally source GSI project materials, such as plants and soils. These purchases support additional employment and spending from businesses such as landscaping supply stores and nurseries. When residents are hired to fill

Figure 4. Application of benefits transfer to estimate benefits of GSI installation for hypothetical retail center (2013 USD).

Source: NRDC 2013.

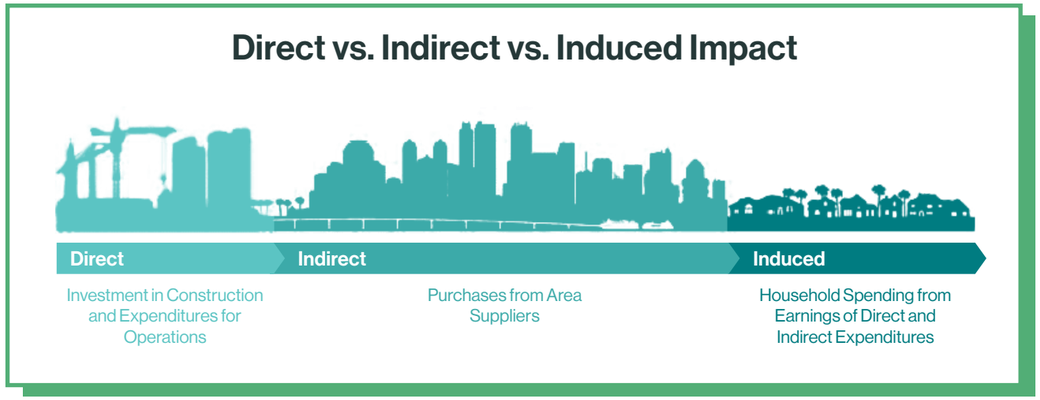
GSI-related positions or businesses that support the local GSI supply chain, they spend the money they earn in the local economy at restaurants, health care establishments, retail stores, and other local businesses, resulting in what is referred to as *induced* employment and economic activity. Together, these account for the total economic impact of a GSI project or program (Figure 5). Projects that result in increased retail sales or economic activity in neighborhoods benefiting from GSI installations also create similar economic impacts.

Practitioners often use economic impact assessments to quantify the effects of a project or policy on the amount and type of economic activity in a region, as well as the distribution of that activity using economic models and/or multipliers. **Economic Impact Analyses (EIAs)** trace the flow of spending in an economy to calculate direct, indirect, and induced effects of policies and programs.

EIAs can be important tools for helping to make the case for increased investments in GSI (e.g., to businesses or decision makers) and understanding potential impacts for local neighborhoods. However, when conducting and communicating the results of EIAs, it is important to understand how GSI generates new economic activity. As a simplified example, within the context of stormwater the alternative to GSI is often not to "do nothing." An alternative may be to address stormwater issues through a gray infrastructure alternative with the same level of spending. EIAs should be careful to examine the additional local impacts that a GSI alternative might produce, for example, due to the ability to purchase more local supplies or hire more local residents. This also applies for neighborhood level examples. For example, if new green street installations generate additional sales at the expense of existing restaurants and retail shops located elsewhere in the city, this can represent a transfer rather than a real net gain, although it does result in significant benefits for that neighborhood and perhaps a more equitable distribution of benefits. Economic impact assessments require regional economic models/software and or the application of economic multipliers. These studies should be conducted by individuals with the technical understanding to apply appropriate methods and correctly interpret results.

> Every $1 million spent on GSI projects creates between 4 to 6 construction jobs and 3 to 16 maintenance jobs on average.

Figure 5. Difference between direct, indirect, and induced labor impacts.



Source: IMPLAN

5

Funding, Financing, and Partnership Opportunities

Credit: Kat Kendon

FUNDING, FINANCING, AND PARTNERSHIP OPPORTUNITIES

Effectively realizing the workforce development and positive economic outcomes associated with GSI requires investments by local stormwater agencies and community and regional partners.

As with many other co-benefits, there are a range of potential funding sources, project delivery models, and partner organizations that target these goals. This section provides examples of relevant funding, financing, and partnership opportunities.

5.1 Funding workforce development

Public agencies responsible for managing stormwater are not likely to have specialized budgets or staff resources to support an 'in house' green jobs program. Rather, it is more likely that bringing workforce development assets to a GSI program can best be accomplished through a partnership with other municipal departments such as parks or community development, and local or regional community-based organizations. In addition to having the necessary skills and experience, these programs also are potentially able to leverage funding resources to complement any investment by the stormwater agency. Partnerships between stormwater agencies and workforce oriented non-profit organizations can serve the interests of both – as in the examples cited previously.

Non-profit and public workforce development programs have access to a range of federal and state grant programs to support GSI skills trainings and other support services. The U.S. Department of Labor hosts several grant programs tailored to move youth and young adults into the workforce. The Department of Housing and Urban Development's Community Development Block Grants can be tapped for similar purposes, and potentially to support GSI projects that improve the resiliency of public housing.[50,51] The Environmental Protection Agency's Brownfields Job Training Grant program supports "nonprofits, local governments, and other organizations to recruit, train, and place unemployed and underemployed residents of areas affected by the presence of brownfield sites." In many states, federal programs are administered by state agencies who also manage state-funded programs. Private, philanthropic foundations can also be interested in funding local green job training programs. Partnerships between public stormwater agencies and community-based non-profit organizations leverage this opportunity.

While this guide includes a few examples of funding resources that can support GSI-related green workforce development programs, having local partners who specialize in this line of work can enable public stormwater program staff to identify and pursue funding for collaborative approaches to GSI design, installation, and maintenance.

5.2 Funding private property incentives

Incentives can be useful strategies to encourage private property owners and developers to incorporate GSI into new development and redevelopment projects, and to retrofit existing impervious areas in ways that reduce runoff. The benefit of these strategies, from an economic and workforce development perspective, is a larger, more widespread pool of GSI projects providing commercial and economic activity benefits while also creating employment opportunities for a green job workforce. Directly funding GSI incentive strategies can be viewed as an investment pathway to achieve these outcomes.

GSI incentive programs are widespread across the country.[52] There are four primary ways that public stormwater agencies can provide financial support for these programs: (1) pay for them out of municipal general fund budgets; (2) pay for them using sewer, water, or stormwater rate revenue; (3) use debt financing supported by a general or enterprise budgets; or (4) take advantage of public or private grant programs. Local or state law may affect the ability of a public agency to use water and sewer rate revenues to support stormwater programs, although there are examples where this approach has worked. An ideal source of support for an incentive program is the revenue collected through a dedicated stormwater fee, or utility. This revenue can be budgeted in a "pay-go" fashion in each annual cycle or used as a means of repayment in a bond financing approach to funding incentives.

5.3 Federal Funding opportunities

The federal government supports a wide range of programs that either predominantly focus on funding job training or that allow job training as part of infrastructure projects. The Bipartisan Infrastructure Law has directed significant funding to both categories of federal infrastructure investments. A recent publication by the Brookings Institution details the programs benefitting from BIL investments and suggest pathways for local and state infrastructure managers to follow in order to track, understand, and access these funds. Examples of federal agency grants that can specifically support job training programs include:

- The Environmental Protection Agency's Brownfields Job Training Grants program, which provides funding to nonprofits, local governments, and other organizations to recruit, train, and place unemployed and under-employed residents of areas affected by the presence of brownfield sites. GSI strategies can often be a component of brownfields redevelopment; this program provides support that can turn blighted area remediation into green jobs opportunities.
- In Newark, NJ the Ironbound Community Corporation (ICC) has leveraged EPA Brownfields Grant funding to provide training tied to the National Green Infrastructure Certification Program (NGICP). ICC provides GSI installation and maintenance classroom training as well as hands-on training in installing and maintaining GSI on several local projects.
- Created by the Bipartisan Infrastructure Law, the Department of Labor's Building Pathways to Infrastructure Jobs Grant Program will public-private partnerships to develop, strengthen, and scale jobs training programs within the industries and occupations critical to meeting the goals of the BIL.
- While administered by state economic development agencies, the Department of Housing and Urban Development's Community Development Block Grant program frequently supports job training activities. Municipal stormwater agencies should connect with the local HUD field office in each state.
- YouthBuild, a U.S. Department of Labor program focused on providing counseling, job preparation, skills training, and apprenticeship pathways to at risk teenagers and young adults.

5.4 State and local job training support

There are a wide range of state and municipal programs that fund or provide job training. Some of these state and municipal agencies and educational institutions, using locally derived budgets or with matching funds from federal programs, also support GSI related job training programs. A best practice may be to investigate local options for funding and partnership opportunities. Some promising connections in many states are Conservation Corps or AmeriCorps programs that provide participants with experience installing and maintaining GSI projects. The Long Beach Conservation Corps partnered with the City of Long Beach to implement the Direct Install Gardens program which converted residential lawns to water efficient native landscaping. The Montgomery County (MD) Conservation Corps has worked with local governments as part of its program of GSI training. Conservation Corps of Minnesota and Iowa runs a field crew program that works with municipalities, state and federal agencies on a range of habitat restoration and urban ecology projects. A significant portion of the entity's funding comes from an appropriation by the Minnesota Legislature.

5.5 Partnerships with non-profit organizations

As detailed in Section 3.1, there is tremendous potential for funding GSI green job training through partnerships between public stormwater agencies and local workforce and economic development NGOs. As evidenced by the Groundwork Ohio River Valley/SD1 experience, these partnerships can be a "win-win" for both entities. Other programs like Louisiana Green Corps have a deep history of working with philanthropic funders and local agencies to provide GSI related trainings and life skills to disadvantaged youth and young adults. NGOs have access to government and private foundation grants that can support job training activities related to GSI design, installation and maintenance. Stormwater agencies can provide both matching funding and GSI project opportunities that create important 'on the job' training. In addition, many NGO programs and public funding focus on teenagers and young adults who have been incarcerated or are at risk of crime association. Steering these people into green jobs provides multiple benefits that ripple across the community.

5.6 Leveraging existing incentives and resources

Many communities have existing programs that can incentivize GSI installations that create positive economic benefits or support the development of a GSI workforce. Tax Increment Financing (TIF) and similar strategies, for example, can be deployed to motivate incorporating GSI in private redevelopment projects. There are at least two approaches to using TIF programs as GSI implementation drivers. The first approach leverages private redevelopments seeking TIF support. Where allowed by state law, local governments can include requirements for GSI and other resiliency measures for TIF funded projects.

A second approach harnesses TIF revenues to directly fund and implement resiliency measures using GSI solutions to provide public benefits such as parks and trees. Funding stormwater infrastructure with TIFs can provide critical water infrastructure to reduce flooding and improve water quality and support development by reducing infrastructure cost for property owners. Additionally, in some states, it is permissible to use TIF revenues to support job training programs associated with TIF districts and projects.

Incorporating GSI into other municipal incentive programs may not directly fund job creation or training but can provide other economic benefits to businesses and neighborhoods identified in Section 4. Tax credits offered to incentivize redevelopment of under-served or blighted areas, such as the New Market Tax Credit program, can include GSI measures within the program eligibility criteria.

For municipalities that have access to stormwater fee revenues, these funds can be used to fund GSI installation programs that also deliver reinvestment into the community in the form of job training and contracts with local businesses. The Prince George's County/Corvias Clean Water Partnership model explored in Section 3.3 has been adopted by other municipal stormwater programs in Milwaukee, Seattle, and elsewhere. Density bonus programs that provide zoning flexibility in exchange for contributions to municipal re-development funds, such as the City of Chicago's Neighborhood Opportunity Fund, could provide funding to, or conditional approval upon, incorporation of GSI in recipient projects.

Credit: WEF 2019

Operation Stream Shield: A Successful Job Development Program Partnership with Homeless Shelters and Fairfax County, VA

In 2019, the Fairfax County Department of Public Works and Environmental Services partnered with the Office to Prevent and End Homelessness to develop a program called Operation Stream Shield. This program provides part-time temporary work to clients of local homeless shelters to clean up local streams. The experience allows unemployed individuals to earn a nominal stipend ($12/hour in 2022, $15/hour for site leaders) and develop skills necessary for modern employment while simultaneously helping the county meet mandates for water quality and removal of invasive species. In the first two months, nearly 60 individuals signed on to participate in Operation Stream Shield. The program's popularity and success led to its' permanent establishment program after a year of piloting; it also led to expansion into other work areas including maintaining trails and assisting the County Solid Waste Division in maintaining their grounds. The program is funded by the stormwater service district fee that supports environmental mandates.

Partnerships with four shelters, a non-profit organization, and other government agencies are key to the program's success. Each shelter works at various sites twice per week for shifts. The non-profit organization pays participants at end of each workday. They also vet clients, provide transportation, and track work completed each day. A goal of the program is to provide career pathways. Since the program's inception, 11 individuals have gained part-time or full-time employment with the County. Numerous others have obtained employment elsewhere.

Source: Fairfax County 2023, U.S. EPA (2022), WEF (2019)

6 Conclusion

Credit: Rick Triana

CONCLUSION

When implemented at scale, GSI projects and programs have the potential to support positive community outcomes by providing local jobs and economic activity. At the same time, having a trained, mobilized workforce capable of designing, installing, and maintaining GSI can enable more rapid and widespread implementation of GSI projects, while turning stormwater compliance programs into economic development engines.

At the block or neighborhood level, intentionally designed GSI installations can create community amenities, resulting in a range of social and economic benefits. Evidence from real world experience indicates that these benefits can be significant. As highlighted throughout this guide, partnerships are key to success. Municipal stormwater staff can foster positive changes through partnerships with other municipal departments, workforce development programs, community development organizations, neighborhood groups, botanical gardens, and/or civic-minded property developers.

With respect to workforce development, there are still uncertainties related to targeting and developing effective career pathways for entry-level workers. While still relatively limited, examples throughout the country demonstrate proven success. The implementation of GSI projects at the scale of a neighborhood, business corridor, or residential block can result in financial and economic returns, redistribute development benefits, and leverage existing programs, expertise, and funding sources. With a multi-faceted approach, GSI projects can be part of a larger community vision that meets multiple community objectives. The stormwater community continues to learn and adopt innovative approaches for ensuring that GSI projects are implemented in an equitable way that minimizes unintended consequences.

Estimating the number and value of jobs and local economic development benefits offered by GSI projects can be important across all phases of implementation. This information can help make the case for specific interventions, estimate demand and opportunities for workforce development efforts, leverage additional funding sources, and/or track performance post-project.

> The implementation of GSI projects at the scale of a neighborhood, business corridor, or residential block can result in financial and economic returns, redistribute development benefits, and leverage existing programs, expertise, and funding sources.

Credit: Green Infrastructure Leadership Exchange

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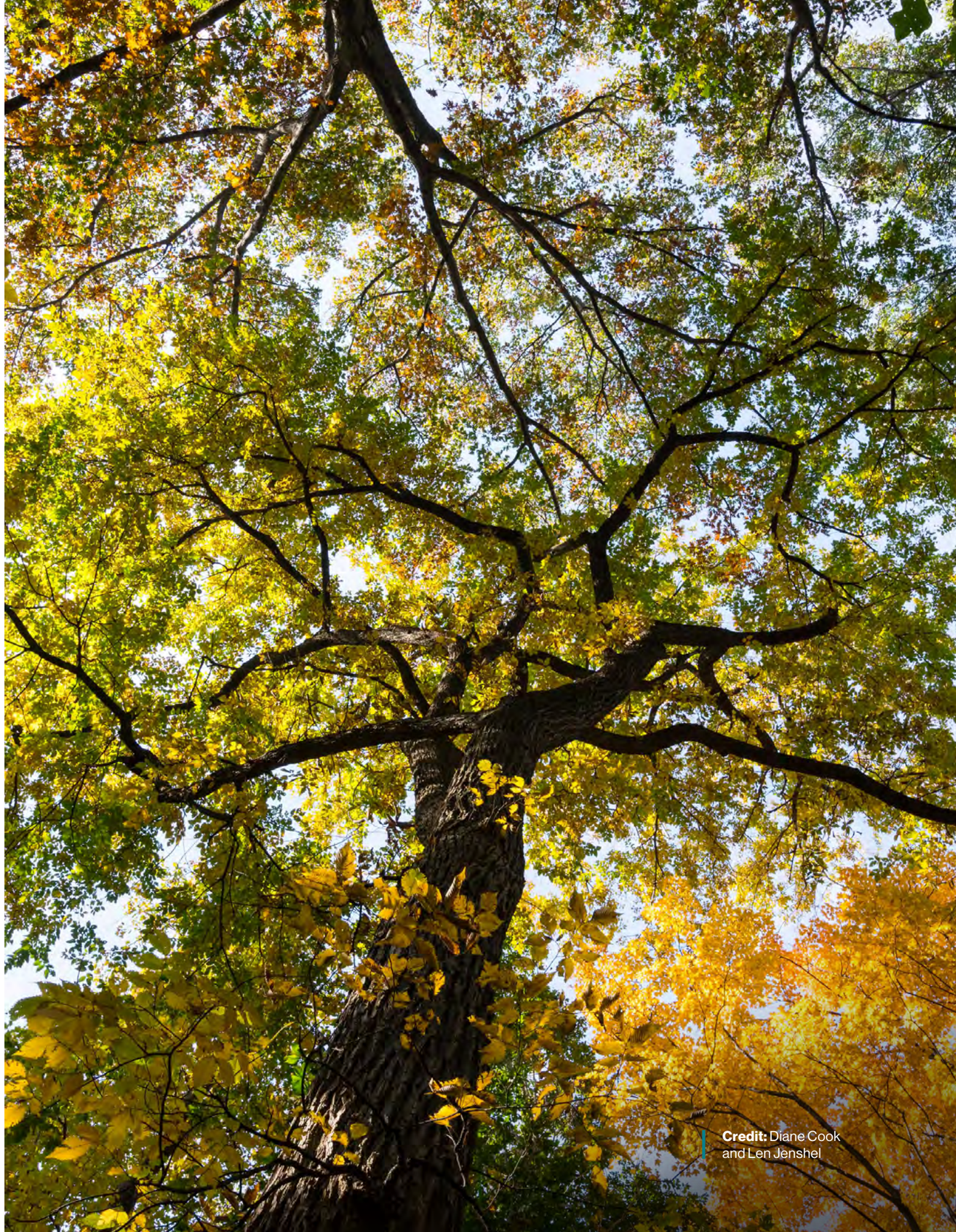

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