

Safe Clean Water Program Workforce Development Literature Review

I. INTRODUCTION

LA County voters passed Measure W in November 2018 creating the Safe, Clean Water Program (SCWP). SCWP will generate up to \$285 million per year, providing ongoing funding for green stormwater infrastructure (GSI) that can reduce pollution, improve water resilience, and benefit disadvantaged communities, while also creating construction and permanent maintenance jobs. The SCWP's Implementation Ordinance states that SCWP will also provide funds for "local workforce job training, which will provide certification classes and vocational training at the community level for the construction, inspection, operation and maintenance of Stormwater or urban runoff management and multi-benefit projects, including instruction of applicable design concepts."

Conservation and Natural Resources Group (CNRG) asked Estolano Advisors (EA) to develop a memo of options to inform the Safe, Clean Water Program's workforce training program. As a part of this scope of work, EA has authored this literature review. It identifies training programs, workforce models, and GSI resources that can be leveraged to create the stable, qualified workforce needed to meet the upcoming demand for the construction, inspection, and operations and maintenance of SCWP projects. This memo is further informed by interviews with local and national workforce and GSI experts.

This literature review is organized as follows:

I. Introduction

- a. Includes an overview of EA's scope of work as well as our working definition of green stormwater infrastructure

II. Review of Green Stormwater Infrastructure Literature

- a. Lessons learned and best practices from municipal green stormwater infrastructure plans and their workforce elements
- b. Definitions and components of the green infrastructure workforce
- c. An overview of national and local workforce development programs related to green stormwater infrastructure

III. Potential Recommendations for the Safe, Clean Water Program

- a. Potential supply-side training options for the use of SCWP workforce development funds
- b. Exploring demand-side strategies to drive market demand for supply side recommendations

IV. Next Steps

- a. This section outlines EA's next steps in our scope of work

Defining Green Infrastructure

The National Green Infrastructure Certification Program (NGICP), defines green infrastructure as “an approach to stormwater management that combines a variety of different technologies and practices that use natural systems or engineered systems that mimic natural processes to filter and store stormwater to protect local water quality.”¹ Traditional green infrastructure practices can include parks, rain barrels, green roofs, bioswales, open space, wetlands, plantings, street trees, pervious pavement, downspout disconnections, shoreline restoration, and gardens.

For purposes of this report, we will use the term “green stormwater infrastructure” (GSI) to describe the types of projects that the SCWP aims to construct and support. Jobs for the Future, a national nonprofit, defines GSI as using “alternative approaches to stormwater management to improve water quality protection and flood control in the face of climate change and sea level rise.”² Our analysis will discuss the GSI workforce as “individuals who construct, inspect, operate and maintain green stormwater infrastructure.” This is based on the NGICP definition of the green infrastructure workforce as “individuals who install, inspect, and maintain green infrastructure systems.”³

II. REVIEW OF GSI WORKFORCE LITERATURE

EA has completed a comprehensive scan of municipal GSI plans, GSI training and workforce development programs, and GSI workforce research reports, as well as completed 11 interviews with local and national experts in GSI workforce training. The section below summarizes findings and lessons learned from the literature available.

Municipal Green Stormwater Infrastructure Plans and Workforce Elements: Lessons Learned

Municipalities across the country have adopted green stormwater infrastructure measures, ordinances, and plans (GSI plans) to address water quality, stormwater overflow, and other environmental issues. Most have pursued these GSI plans in the past decade. Many plans stem from local government’s difficulty in complying with the Clean Water Act (CWA) or other U.S. Environmental Protection Agency (EPA) requirements. However, many GSI plans have also intentionally acknowledged the critical importance of green stormwater infrastructure in mitigating challenges related to stormwater and climate change.

These GSI plans often focus on a “triple bottom line” – benefits that include economic (infrastructure cost savings, green job opportunities, property values), environmental (stormwater quality, groundwater recharge, carbon emission reduction, air quality), and social benefits (quality of life, crime rates, green space) for municipalities and their residents. In this literature review, we examine a number of these municipal and agency plans and the job opportunities associated with these initiatives.

¹ National Green Infrastructure Certification Program (NGICP). (2016). *Body of Knowledge*.

² Jobs for the Future. (2017). *Exploring the Green Infrastructure Workforce: A NatureWORKS Issue Brief*

³ NGICP. (2016). *Body of Knowledge*.

Most GSI plans refer to job opportunities for local residents as part of an effort to achieve cost-effective green infrastructure and community benefits. For example, Buffalo’s Rain Check 2.0 Opportunity Report highlights the importance of “intentionally expanding opportunities for more diverse populations to enter the green infrastructure workforce” and the need for “Buffalo Sewer and partners” to “encourage local industries to be more reflective of the communities they serve.”⁴ Milwaukee Metropolitan Sewerage District’s (MMSD) Regional Green Infrastructure Plan recommends developing “a jobs training program for green infrastructure installation and maintenance.” It proposes to partner with “existing local organizations that specialize in growing plants and training people, such as Growing Power and the Milwaukee Community Service Corps.”⁵

However, even with the expansion of green infrastructure investments across the country, the documentation of local GSI workforce needs and outcomes of green job creation initiatives is still limited in size and scope. This is due to two main factors, according to the national nonprofit Jobs for the Future: 1) the green infrastructure workforce is relatively new, and 2) green infrastructure projects have not yet spurred the amount of job creation hoped for in some areas across the U.S. In addition, green infrastructure jobs are often under the umbrella of traditional occupations such as construction workers, landscapers, and water utility workers. Companies who provide only green infrastructure services are small in number.

But as the investment in green stormwater infrastructure grows, skilled and certified workers will become more important. Municipalities across the country and local partner agencies have implemented a number of training and workforce development models with varied program structures, program lengths, and target populations. EA has reviewed a number of municipal GSI plans and summarized some of the top lessons learned from their workforce development approaches.

1. GSI workforce training must connect to full-time employment or continuing education opportunities

The SCWP has a stated goal of “promoting green jobs and career pathways,” with a focus on local job training and creation.⁶ A career pathway is a continuum of services, beginning with outreach to the targeted communities, enhancement of work readiness and soft skills development (e.g. how to dress for the job, show up to work on time, talk to an employer or customer, etc.), remedial skill building (e.g. literacy, basic math), specific skill building (e.g. training programs, apprenticeships, on-the-job training), and finally placement in a job with upward mobility. A job seeker may need to return to these services as he or she progresses up the career ladder. Any GSI-related training program should have a direct connection to full-time employment or continuing education, as well as access to the “wrap around” services needed to ensure a job seeker’s success.

In the GSI context, we found that many cities host certification trainings which require that job seekers pay a fee for participation but are not guaranteed a job at the end of

⁴ Buffalo Sewer Authority. (2019). *Rain Check 2.0 Opportunity Report: The Next Generation of Green Infrastructure in Buffalo*.

⁵ MMSD. (June 2013). *Regional Green Infrastructure Plan*.

⁶ Implementation Ordinance.

training. Outside of a few examples, few GSI training programs nationally result in high job placement successes.

The National Green Infrastructure Certification Program (NGICP) was founded to develop national certification standards for green infrastructure construction, inspection, and maintenance workers. The NGICP is a 35-hour, nationally-accredited program. A group of public, private, and nonprofit experts crafted the curriculum to provide quality, comprehensive education. However, while a variety of municipalities partner with the NGICP as sponsors or certification trainers, certified workers are not always directly connected to jobs, thereby limiting its impact.

Our research indicates that certification programs or GSI-specific workforce training and apprenticeships are most valuable when they directly connect to apprenticeships or public sector entry-level jobs. The case studies below describe examples of well-designed programs that have yielded strong outcomes. An effective, results-oriented Southern California-specific training program can draw on a variety of existing GSI curricula in the region while coordinating with Los Angeles-based service providers.

Case Study: Philadelphia

In 2011, the Philadelphia Water Department (PWD) and the Pennsylvania Department of Environmental Protection entered into a Consent Order and Agreement to address polluted sewer overflows. PWD launched Green City, Clean Waters, a 25-year plan supported by \$1.2 billion in public funding, to implement green stormwater installations.

In 2016, an economic impact report by the Sustainable Business Network of Greater Philadelphia estimated that in the first five years of Green City, Clean Waters, the City had completed almost 900 GSI projects. The local industry in Philadelphia had supported 430 local jobs (new and incumbent jobs) and generated nearly \$1 million in local tax revenues. At the time, the City had seven green stormwater management maintenance personnel, with infrastructure work completed by approximately 40 contractors including PowerCorpsPHL, a workforce development and job placement program that helps maintain Philadelphia's green infrastructure.⁷

The City launched PowerCorpsPHL, an AmeriCorps program, in 2013 to improve stormwater management, increase tree coverage, and revitalize public land. The PowerCorpsPHL model includes six months of full-time service as an AmeriCorps member with City departments and three months of intensive job placement support. From September 2013 to March 2016, 236 individuals served in the PowerCorpsPHL program. Ninety percent of graduates successfully transitioned to a next step, with 40-50 percent going directly into employment, 20-25 percent enrolling in post-secondary education, and 25-30 percent re-enrolling in national service.⁸

Case Study: Baltimore

Baltimore's Department of Public Works stormwater capital spending grew from \$1 million in 2016 to \$23 million in 2017. To deliver that much increased investment, the

⁷ Sustainable Business Network of Greater Philadelphia, Green Stormwater Infrastructure Partners, and Econsult Solutions. *The Economic Impact of Green City, Clean Water: The First Five Years*. February 2016.

⁸ Education Works. <https://educationworks.org/verticals/>

City needed a trained workforce to support its stormwater projects. As part of the Baltimore Center for Green Careers, Baltimore Civic Works implemented the inaugural Stormwater Management Technician Training program in 2017 to address the demand for qualified workers. The career training program is offered free of cost to residents, with both classroom and hands-on elements. Graduates receive a Clean Water Certificate from the Center for Watershed Protection. The program also provides on-the-job training and job placement into entry-level green careers with employers that offer a living wage.⁹

2. GSI workforce initiatives should leverage existing program resources

Even with the vast expansion of green infrastructure investments throughout the country, often little to no funding is allocated to workforce development programs or job skills training. This creates a barrier to entry for hard-to-employ job seekers who need additional supportive services to successfully enter the workforce. Even with limited funds, municipalities can leverage existing municipal resources (e.g. workforce development boards to provide case management) or partner with local organizations (e.g. AmeriCorps programs or landscaping nonprofits) who can assist in expanding training opportunities that can lead to further employment.

Case Study: Washington, DC

DC Water partnered with the Water Environment Federation to develop a green infrastructure certification program (now the National Green Infrastructure Certification Program) as a part of a legal agreement with several federal agencies to decrease sewer overflows and pollution in the District of Columbia. As part of the project, DC Water also set a goal to achieve a minimum of 51 percent of new jobs filled by GSI-certified District residents (this included both union and non-union openings, internal DC water positions and external contracting positions).¹⁰

While DC Water enjoyed significant funding to create a new workforce pathway, it still leveraged existing funding and services already provided by other public departments. While participants in the program are trained and certified using the National Green Infrastructure Certification Program's (NGICP) 35-hour curriculum, workers are also required to complete 72 supplementary hours of workforce training related to stormwater and construction, and to participate in case management and job readiness services from the workforce development department.

⁹ Baltimore Civic Works Stormwater Management Training. <http://baltimoregreencareers.civicworks.com/for-applicants/stormwater-management-training/>

¹⁰ Memorandum of Agreement Between DC Water and the Government of The District of Columbia. <https://www.dwater.com/sites/default/files/green-infrastructure-moa.pdf>

3. Quality Operations and Maintenance (O&M) is crucial to successful green stormwater infrastructure projects

Much of the literature reviewed emphasizes the need for the inspection, operation, and maintenance of GSI projects, and underscores the need for a qualified workforce to ensure that GSI infrastructure works properly. This was echoed in our interviews with stormwater experts (LAANE, Council for Watershed Health, NGICP). The U.S. EPA notes that quality operations and maintenance (O&M) ensures GSI function properly, yield water quality benefits, meet compliance standards, provide environmental benefits, and more. Because green infrastructure is often highly visible, municipalities should consider how positive project performance can also increase taxpayer confidence in GSI. Failing or under-maintained projects, which can require significant repairs, essentially eliminate the cost-effectiveness of green infrastructure and create unsightly projects that may undermine public support of GSI.

A 2014 EPA survey revealed that 79 percent of municipal respondents agreed or strongly agreed that operations and maintenance issues were barriers to the adoption of green infrastructure policies.¹¹ Common barriers to O&M best practices include lack of designated staff, poor design for easy maintenance, lack of enforcement, unawareness from owners, and insufficient funding. In a 2018 report by the National Cooperative Highway Research Program, 12 state Department of Transportation agencies all cited maintenance as the most important issue for the overall success of GSI practices.¹² While many agencies had funded GSI projects, their maintenance crews regarded GSI as low-priority assignments compared to their other work tasks, and lacked the knowledge to properly care for native vegetation that had been planted.

The occupations involved in O&M for GSI do not generally require much in the way of new training curricula. For the most part, the skills required to install various GSI practices are like those required generally in landscaping and construction. In most cases, some upskilling of incumbent workers would be enough to meet the needs of the industry. Compared to non-GSI occupations, Cornell University determined that GSI-related occupations require higher levels of the following skills, based on both technical skills and employability: Equipment maintenance, Repair, Operation and Control, Troubleshooting, Equipment Selection, Quality Control Analysis, and Installation.¹³

In their 2017 report, Jobs for the Future surveyed over 450 GSI contractors about their perspectives on hiring and training GSI workers. Sixty-seven percent of employers reported a need for GSI skill upgrades for first-line supervisors of landscaping workers, with 62 percent of employers willing to pay a premium for these selected workers. Almost 70 percent of employers reported difficulty hiring first-line supervisors for landscaping workers, landscaping and groundskeeping workers, first-line supervisors of horticultural workers, tree trimmers and pruners, and excavating and loading machine operators.

¹¹Driscoll, Charles & Eger, Caitlin & Chandler, David & kasae roodsari, Babak & Davidson, Cliff & Flynn, Carli. (2015). *Green Infrastructure: Lessons from Science and Practice*.

¹² *Leading Landscape Design Practices for Cost-Effective Roadside Water Management*.

¹³ Jobs for the Future

Case Study: Cary, NC¹⁴

The North Carolina State University (NCSU) Stormwater Inspection and Maintenance Certification program offers an example of the benefits of a local skilled and/or certified workforce. Harvard Law School reported that NCSU determined that in 2007, prior to NCSU worker certifications, 95 percent of 425 GSI projects implemented in Cary, North Carolina had failed inspections because they were not properly maintained. Most repairs were maintenance related that could have been avoided: erosion and clogging, trash and rubbish, and unwanted vegetation. However, after owners hired NCSU-certified workers, about 95 percent of GSI best management practices (BMPs) passed a second inspection.¹⁵

4. GSI maintenance jobs are an accessible pathway for hard-to-employ populations

Multiple reports acknowledge the accessibility of GSI jobs and their importance for offering pathways to workers who may not have advanced education, who are previously justice-involved, or otherwise part of under- or unemployed populations. Unlike the planning, design, and administrative positions related to green stormwater infrastructure, GSI maintenance tasks are similar to general landscape maintenance tasks with some supplemental knowledge that can be learned fairly easily without an advanced degree.

Nationally, construction jobs related to the installation of GSI projects pay higher than operations and maintenance jobs. O&M jobs are often near minimum-wage paying jobs, with public sector and union jobs often being higher-paying. However, O&M jobs are a crucial entry point for many workers who can then access advancement opportunities through additional experience and training.¹⁶

Case Study: Seattle

The Seattle Conservation Corps has employed over 800 workers experiencing homelessness in paid apprenticeships in the construction trades since 1986. Corps members commit to one year of employment, education, and life skills development. Participants work five days a week in addition to studying topics such as high school math and reading, job safety, money management, nutrition, job preparedness, resume writing, power tool usage, and more. The program also provides mental health counseling and drug and alcohol recovery services. In 2018, the Washington State

¹⁴ The NCSU program is not included in the list of workforce training programs on p. 11 of this report as it is a local certification program that only requires 1.5 days of curriculum and is intended for incumbent workers such as: Commercial Landscapers, Property Managers, Owners, Homeowner Associations, Professional Engineers, Land Surveyors, Professional Landscape Architects, Regulators, and Municipal and County Landscape Personnel. Its lack of job training and placement does not compare to the programs listed, though its curriculum could act a resource for the O&M of green stormwater infrastructure.

¹⁵ *Certifications for Green Infrastructure Professionals – The Current State, Recommended Best Practices, and What Governments Can Do to Help.*

¹⁶ American Rivers (April 2013); Jobs for the Future

Department of Labor and Industries officially recognized the Corps as an official pre-apprenticeship program, which provides a more direct path to union apprenticeships.

About 10 percent of applicants do not pass a screening interview, and about 30 percent who are accepted to the program drop out before graduating. However, of those that do graduate, more than 80 percent leave with stable housing and more than 90 percent leave with long-term employment paying an average wage of \$15.00 per hour.¹⁷

5. Municipalities are unable to confidently project the demand for GSI jobs

Green infrastructure remains an emerging field. We were unable to identify any specific job titles or classifications that focus exclusively on green infrastructure tasks. Few GSI workers complete solely green infrastructure work, which makes the workforce hard to isolate and characterize. Industries such as construction and landscaping often expand worker responsibilities to include GSI as it is easily learned, rather than hiring new, specialized workers. The rather slow adoption and implementation of GSI in some cities can be a result of the lack of knowledge about resources and jobs required to install and maintain green infrastructure projects.

The Green Stormwater Infrastructure Workforce

The current literature related to green infrastructure workforce needs is limited in size and scope. This is due to two main factors: 1) the green infrastructure workforce is relatively new, and 2) green infrastructure projects have not yet spurred the amount of job creation hoped for in some areas across the U.S.¹⁸ Green infrastructure jobs often fall under the umbrella of traditional occupations such as construction workers, landscapers, and water quality workers. Moreover, few companies provide only green infrastructure services.

As we consider the best strategies to invest SCWP workforce development funds, EA has reviewed the literature for an understanding of installation, inspection, and maintenance occupations related specifically to green stormwater infrastructure. The following table provides an overview of occupations related to stormwater management provided by the Pacific Institute, a nonprofit research institute.

¹⁷ Seattle Parks and Recreation. *Conservation Corps*. <http://www.seattle.gov/parks/about-us/special-initiatives-and-programs/seattle-conservation-corps>

¹⁸ Ibid.

TABLE 1. STORMWATER MANAGEMENT OCCUPATIONS
Pacific Institute – Sustainable Water Jobs Report (2013)

<p>RESEARCH AND DEVELOPMENT <i>e.g. development of stormwater management techniques</i></p>	<ul style="list-style-type: none"> • Civil Engineers • Conservation Scientists • Environmental Engineers 	<ul style="list-style-type: none"> • Environmental Scientists and Specialists, Including Hydrologists, Soil and Plant Scientists • Materials Scientists
<p>MANUFACTURING AND DISTRIBUTION <i>e.g. production of building materials and products</i></p>	<ul style="list-style-type: none"> • General and Operations Manager • Industrial Truck and Tractor Operators 	<ul style="list-style-type: none"> • Truck Drivers – Heavy and Tractor • Welders, Cutters, Solderers, Brazers
<p>WHOLESALE AND RETAIL SALES <i>e.g. sales of products</i></p>	<ul style="list-style-type: none"> • Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products 	
<p>DESIGN AND PLANNING <i>e.g. stormwater planning: analyze site, evaluate site context, lay out infrastructure, landscape design and cost estimates, permitting and stakeholder engagement</i></p>	<ul style="list-style-type: none"> • Architects • Architectural and Civil Drafters • Cartographers and Photogrammetrists • Civil Engineers • Environmental Engineers • Hydrologists 	<ul style="list-style-type: none"> • Landscape Architects Natural Sciences Managers • Surveyors • Surveying and Mapping Technicians • Urban and Regional Planners
<p>INSTALLATION <i>e.g. installation of subsurface systems and rooftop systems require knowledge of draining systems, excavation, piping, and native plantings for stormwater infiltration</i></p>	<ul style="list-style-type: none"> • Carpenters • Cement Masons and Concrete Finishers • Construction Managers • Construction & Building Inspectors • Construction Laborers • Construction Managers • Earth Drillers • Electricians • Extraction Workers • First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers 	<ul style="list-style-type: none"> • First-Line Supervisors/Managers of Construction Trades and Helper–Construction Trades, All Other Helpers—Carpenters • Landscaping & Groundskeeping Workers • Natural Sciences Managers • Pipelayers • Plumbers, Pipefitters, and Steamfitters
<p>OPERATIONS AND MAINTENANCE <i>e.g. landscape and drainage systems maintenance</i></p>	<ul style="list-style-type: none"> • Crop, Nursery and Greenhouse • Farmworkers and Laborers • General and Operations Managers • Landscaping and Groundskeeping Workers • Maintenance and Repair Workers, General Operating Engineers and Other Construction Equipment Operators 	<ul style="list-style-type: none"> • Pump Operators Septic Tank Servicers and Sewer Pipe Cleaners • Water and Liquid Waste Treatment Plant and System Operators

While the types of jobs related to GSI are fairly straightforward, the specific need for each type of occupation and its future growth remain unclear. In its 2017 report, Jobs for the Future (JFF) estimated a five percent growth for green infrastructure jobs nation-wide between 2015-2020. The stormwater-related jobs with the highest growth projection percentage included—pipelayers, plumbers, pipefitters, steamfitters (9%), environmental engineering technicians (9%), tree trimmers and pruners (8%), and landscaping and groundskeeping workers (7%). Stormwater-related jobs with the highest growth projection based on number of workers included laborers—freight, stock, and material (146,104), landscaping and groundskeeping workers (90,445), and maintenance and repair workers (80,096), followed by construction laborers (61,718).

Of additional note, both the literature and our expert interviews highlighted the difficulty in hiring landscape experts and arborists due to the need for specialized skills (Council for Watershed Health, Ecotrust, JFF, LAANE). While the number of positions related to arboriculture is low compared to other job classifications, demand for specialized skills is high.

Green Stormwater Infrastructure Workforce Programs – National and Local

Our literature review and interviews with workforce experts highlight the importance of creating pipelines to GSI-related jobs. These workforce programs, apprenticeships, and certification programs equip workers, especially youth, re-entry, under-employed communities, and communities of color, with the necessarily job skills and employability to acquire a GSI job or pursue continued education. As a considerable amount of GSI construction, installation, and O&M will be executed by the private sector, municipalities acknowledge a need for trained public sector workers as well as contracted, private-sector workers.

EA has developed a high-level summary of existing green infrastructure and stormwater workforce training programs that could potentially prepare workers for GSI jobs (Table 2). The list of programs includes:

- The region where the program is located
- The main organization or agency implementing the program
- The name of the specific workforce program and a link to the program site
- The program’s target population (if any)
- The duration of the program (if known)
- If the program provides utilizes the NGICP curriculum/certification

TABLE 2. SAMPLE OF EXISTING GSI WORKFORCE TRAINING PROGRAMS – NATIONAL

City/Region	Organization/Agency	Program	Target Population	Duration	NGICP
Baltimore, MD	Center for Watershed Protection and Baltimore Civic Works	Stormwater Management Technician Training	Low-income, under- and unemployed, re-entry	35 hours	
Bronx, NYC	HOPE Program	Sustainable South Bronx	Low-income, under- and unemployed, re-entry, homeless	12 weeks	
Buffalo, NY	PUSH Buffalo	PUSH Blue	General	35 hours	Yes
Chicago, IL	City of Chicago	GreenCorps Chicago	Local residents, Under- and unemployed, re-entry	9 months	
Columbus, OH	Columbus Public Utilities and Columbus State Community College	Blueprint Columbus Green Infrastructure Training Program	Under- and unemployed, low-income, people of color	72 hours	
District of Columbia	DC Water and Sewer Authority	DC Water Works Local Hiring Initiative	Local residents, under- and unemployed	106 hours	Yes
Duwamish, WA	Duwamish Infrastructure Restoration Training	DIRT Corps	Women, people of color, LGBTQ, veterans, under- and unemployed	12 weeks	
Kansas City, MO	Bridging the Gap and City of Kansas City	Green Stewards	At-risk communities	3 years	Yes
Louisiana	Louisiana Green Corps	Youth Construction and Conservation Corps	Young Adults 18-25	14 weeks	
Milwaukee, WI	City of Milwaukee, Milwaukee Metropolitan Sewer District	Walnut Way, Groundwork Milwaukee, Fresh Coast Guardians	Local residents, under- and unemployed, re-entry	35 hours+	Yes
Minnesota	Minnesota Pollution Control Agency	GreenCorps	General	11 months	
New Haven, CT	Urban Resources Initiative	GreenSkills	High school students and re-entry	-	
New Orleans, LA	Limitless Vistas	Environmental Tech and GulfCorps	Young Adults 18-24, Vets up to 35	5-6 months	
Syracuse, NY	Onondaga Earth Corps	Onondaga Earth Corps	Young Adults 18-25	9 months	
Peoria, IL	Peoria Stormwater	PeoriaCorps, Serve Illinois	Young Adults 18-24	6 months	Yes
Philadelphia, PA	Philadelphia Water Department and Philadelphia Parks and Recreation	PowerCorps PHL	Young Adults 18-26	4-18 months	Yes
Portland, OR	Verde and City of Portland	Verde Landscape	Local residents, low-income, people of color	3.5 years	
Rhode Island	Groundwork Rhode Island	Adult Job Training and GroundCorp	Local residents, re-entry, public housing residents	7 weeks	
Seattle, WA	Seattle Parks and Recreation	Seattle Conservation Corps	People experiencing homelessness	-	

We have also collected a list of current programs in the Los Angeles region applicable to green infrastructure, though not all are directly related to GSI specifically. We have organized these programs into three tables: GSI-Related Construction Training Programs (Table 3), GSI-Related Inspection Training Programs (Table 4), and GSI-Related Operations and Maintenance Training Programs (Table 5). Some programs overlap categories.

TABLE 3. GSI-RELATED CONSTRUCTION TRAINING PROGRAMS – LOS ANGELES

Organization/Agency	Program
Workforce Development/Apprenticeships	
Los Angeles/Orange Counties Building and Construction Trades Council	<ul style="list-style-type: none"> ➤ MC3 Pre-Apprenticeship Training Partners: <ul style="list-style-type: none"> • Antelope Valley College • Anti-Recidivism Coalition • Coalition for Responsible Community Development • Flintridge Center • Long Beach City College • Los Angeles Southwest College • Los Angeles Trade and Technical College • Los Angeles Unified School District • Los Angeles World Airports • PVJOBS • San Gabriel Valley Conservation Corps • YouthBuild Charter School of California • Women in Non-Traditional Employment Roles (WINTER)
Laborers Local 300 and Local 1309	<ul style="list-style-type: none"> ➤ Construction Apprenticeship ➤ Cement Mason Apprenticeship ➤ Landscape and Irrigation Apprenticeship ➤ Trainings for green construction awareness, pipe laying, abatement, and remediation
Los Angeles County (WDACS)	<ul style="list-style-type: none"> ➤ Construction Training pathways
Los Angeles and Long Beach Conservation Corps	<ul style="list-style-type: none"> ➤ Construction ➤ Land Management ➤ Community Beautification ➤ Habitat Restoration ➤ Parks and Trails Development and Maintenance
Los Angeles Metro	<ul style="list-style-type: none"> ➤ Workforce Initiative Now – Los Angeles (WIN-LA) Construction Program
Certification Trainings	
California Stormwater Quality Association	<ul style="list-style-type: none"> ➤ Qualified Stormwater Pollution Prevention Plan Practitioner (QSP) ➤ Qualified Stormwater Pollution Prevention Plan Developer (QSD) ➤ Qualified Industrial Stormwater Practitioner (QISP)
Envirocert International, Inc.	<ul style="list-style-type: none"> ➤ Certified Professional in Erosion and Sediment Control (CPESC) ➤ Certified Erosion Sediment, and Stormwater Inspector (CESSWI) ➤ Certified Professional in Stormwater Quality (CPSWQ) ➤ Certified Professional in Municipal Stormwater Management (CPMSM) ➤ Certified Professional in Industrial Stormwater Management (CPISM)
National Ready Mixed Concrete Association	<ul style="list-style-type: none"> ➤ Concrete Green Building Certification ➤ Concrete Sustainability Professional Certification ➤ Environmental Professional Certification ➤ Pervious Concrete Contractor Certification
Stormwater ONE	<ul style="list-style-type: none"> ➤ Stormwater Management for Construction Activities ➤ California Construction General Permit Training

Overall, the construction training pathway and need for construction jobs in the LA region is quite strong due to ongoing development and other investments in transportation and housing. Construction offers the most training programs out of all three GSI occupation areas we have examined. However, the literature and our expert interviews have cited the consistent need for additional resources that are valued and necessary to support harder-to-employ populations in construction jobs, including women, re-entry or justice-impacted individuals, and individuals experiencing homelessness. Multiple programs have tried to address this, including the LA County Office of Workforce Development, Aging, and Community Services (WDACS), LA Metro, and the Preparing Los Angeles County for County Employment Program (PLACE). WDACS' High-Road Partnership for Construction Careers is an example of combining job training with high-impact case management. The program utilizes the Building Trades' MC3 curriculum within the context of a supportive job training program for re-entry and justice-impacted individuals.

TABLE 4. GSI-RELATED INSPECTION TRAINING PROGRAMS

Organization/Agency	Program
Water Certification Trainings	
Certified Inspector of Sediment and Erosion Control, Inc.	➤ Certified Inspector of Sediment and Erosion Control (CISEC)
Envirocert International, Inc.	➤ Certified Erosion Sediment, and Stormwater Inspector (CESSWI)
National Stormwater Center	➤ Certified Stormwater Inspector MS4 – California
Stormwater ONE	➤ Qualified Compliance Inspector of Stormwater – California

In addition to the regular operations and maintenance that GSI projects require, inspection and enforcement of stormwater regulations and compliance are necessary for the quality and longevity of GSI projects. While the literature and experts have brought up this specific area of work less frequently, it is nonetheless important to note that inspection is a role within the GSI workforce. Related to SCWP, inspection positions would likely be filled by County workers.

There are also few training and certification programs specifically related to the inspection of GSI. Available programs are national in scale, and are often provided online. CISEC Inc., Envirocert, and Stormwater ONE largely focus on erosion and sediment control (ESC) related to construction inspections, while the National Stormwater Center offers a course targeted to municipal personnel and consultants who inspect municipal stormwater systems. The California State Water Resources Control Board does not recognize any of these certifications; however, some Envirocert programs are considered pre-requisites for Qualified Stormwater Pollution Plan Developer (QSD) and Qualified Stormwater Pollution Plan Practitioner (QSP) training.

TABLE 5. GSI-RELATED OPERATIONS & MAINTENANCE TRAINING PROGRAMS – LOS ANGELES

Organization/Agency	Program
Workforce Development/Apprenticeships	
Laborers Local 300 and Local 1309	<ul style="list-style-type: none"> ➤ Landscape and Irrigation Apprenticeship ➤ Trainings for green construction awareness, pipe laying, facility maintenance
Los Angeles City Sanitation	<ul style="list-style-type: none"> ➤ Green Stormwater Infrastructure Operations and Maintenance Certification at LATTC
Council for Watershed Health	<ul style="list-style-type: none"> ➤ Operations and Maintenance Training for LAUSD facilities workers
Los Angeles and Long Beach Conservation Corps	<ul style="list-style-type: none"> ➤ Land Management ➤ Community Beautification ➤ Habitat Restoration ➤ Parks and Trails Development and Maintenance
Los Angeles Metro	<ul style="list-style-type: none"> ➤ Workforce Initiative Now – Los Angeles (WIN-LA) Construction Program
Degrees/Certifications	
Citrus College	<ul style="list-style-type: none"> ➤ Water Efficiency Management ➤ Water Technology
College of the Canyons	<ul style="list-style-type: none"> ➤ Water Systems Technology Certificate ➤ Associate of Science in Water Systems Technology
Rio Hondo Community College	<ul style="list-style-type: none"> ➤ Associate of Science in Environmental Technology ➤ Water Management Certificate
Stormwater ONE	<ul style="list-style-type: none"> ➤ Post-Construction Stormwater Maintenance

The literature and local GSI experts have emphasized the importance of ongoing operations and maintenance (O&M) of GSI projects as crucial to their success and longevity. Jobs related to O&M may range from landscaping, to plumbers and pipefitters, to engineers, to horticulturalists. The spectrum of Los Angeles area training programs related to GSI O&M, including union, non-union, and local nonprofit training, do not all train participants in best management practices for GSI specifically. However, they focus on landscape maintenance work that GSI training could easily supplement. The curricula that specifically address green stormwater infrastructure are the Council for Watershed Health’s partnership with LAUSD and the LA City Sanitation O&M certification with LATTC.

III. Potential Recommendations

The success of any workforce development strategy depends on its meeting a demand in the marketplace. Simply funding a workforce program is insufficient if jobseekers have no options for gainful employment upon completing a program. Similarly, creating a GSI certification program is of little value to workers if it is not industry recognized and/or required for public sector work. For that reason, this section outlines both supply and demand recommendations. Supply-side recommendations refer to potential programs or practices that SCWP money can fund to create a diverse pool of workers. Demand-side recommendations refer to practices that public agencies can implement in their contracting and procurement processes to foster a demand for a skilled workforce.

Supply-Side – Options for SCWP workforce funds

Based on interviews and research on GSI training programs, the following strategies rise to the top as options for investment to create a stable, qualified workforce for the construction, inspection, and maintenance of SCWP/Measure W projects. The strategies described below are not formal recommendations. They are subject to further research and vetting with workforce development experts, Supervisorial Office staff, etc., as needed.

1. GSI entry-level job program

This potential strategy is based on workforce development programs that give individuals work experience and lead to a public sector or otherwise ensured job pathway. One example is the Worker Education and Resource Center's (WERC) Preparing Los Angeles for County Employment (PLACE) Program, which prepares county residents for positions within LA County's workforce. Another example is the Utility Pre-Craft Trainee (UPCT) program, developed by the International Brotherhood of Electrical Workers (IBEW) Local 18 in partnership with the Los Angeles Department of Water and Power (LADWP), which trains future utility workers for public sector jobs within LADWP. Some experts have surfaced a similar strategy for SCWP as a way to build a workforce pipeline for GSI projects, emphasizing the expectation that any program would ideally lead directly to County or other public sector jobs.

2. GSI training certification for County workers

If County green stormwater infrastructure projects will be maintained by County workers, those staff members should be equipped with the best, most current training to carry out their maintenance work properly. Therefore, another strategy that experts have presented, and that is supported by EA's research, is the potential for GSI training for existing County workers. This strategy does not envision an onerous program for workers; rather, it focuses on ensuring that incumbent workers have access to training to keep their skills current and provide them greater flexibility in their career advancement. The County could use a variety of curricula from across the country, as well as a National Green Infrastructure Certification Program (NGICP) model, to create a specialized GSI training tool that would enable existing staff to earn a professional certification. For example, Council for Watershed Health's GSI maintenance trainings for

Los Angeles Unified School District (LAUSD) trains facilities staff at schools that have green stormwater infrastructure elements on campus grounds.

3. GSI training certification for private contractors

Projects carried out under local return funding (municipal projects funded by 40% of the total revenue of SCWP) will likely be constructed, designed, and maintained by a private sector workforce, and managed by a variety of agencies (small cities, water districts, etc.). As such, it is harder to set consistent standards for privately contracted GSI project workers. While EA will explore this further, another potential strategy is a mandated GSI certification¹⁹ for privately contracted workers. Experts have suggested that if trained County workers do not maintain County GSI projects, one way to ensure expertise in maintaining GSI that meets the County's standards is to develop certification requirements for private contractors. The San Francisco Public Utilities Commission (SFPUC) has used this approach by requiring contractors to attend specific trainings in order to be qualified to bid or be listed to perform work related to green infrastructure built, owned, and operated by SFPUC.

4. High-Road Career Pipelines

In addition to workforce training programs or certification programs, the County should also consider career pathways that begin with high-school age youth. The increased investment in green infrastructure coupled with the turnover of public utility workers in the coming decade²⁰ will offer opportunities to train an incoming workforce. The LA River High School offers academic and career preparation focused on environmental science, sustainable agriculture, and visual arts. Linked learning curriculum also offers students real-world and project-based opportunities to explore career pathways into environmental and green jobs.

5. Ongoing case management support

Case management involves providing job seekers with the robust supportive services that have shown documented positive outcomes in enabling high-need individuals to be successful in the workplace. Interviewees consistently brought up case management as a persistent need, particularly for those that are hard to employ. EA recognizes that WDACS and other training programs often already offer case management services. These existing programs should be leveraged or coordinated with SCWP training in order to support job-seekers' success.

¹⁹ In stormwater and other related fields, "certificate" and "certification" are often used interchangeably. In this memo, a certification refers to a professional credential that is awarded to an individual based on passing a state- or nationally-recognized exam related to a specific area of technical expertise. Experts that have proposed any type of certification as a workforce strategy note that there must be a demand for the skills built through the certification training, otherwise, it is a useless tool.

²⁰ Los Angeles Business Council.

Demand-Side – Project and job quality

Any investments in the GSI workforce must also be coordinated with a set of “demand-side” strategies. These are public sector policies and practices that incentivize the hiring of workers with specified training or certifications. These incentives, whenever possible, should apply to not only a public agency’s direct hires, but also to the practices of their contractors and subcontractors. Below are some opportunities to help drive demand for a qualified GSI workforce. We will delve further into these concepts in the final memo.

1. Fund Transfer Agreement Language

Fund Transfer Agreements refer to the contracts between the LA County Flood Control District and a project developer or municipality to transfer SCWP funds. These agreements are an opportunity to codify standards for a qualified workforce. These agreements can contain clearly defined standards relating to contractor responsibility, such as applicable certifications, trained workforce, living wages and benefits, participation in the County’s Local and Targeted Hire Program, etc.

2. Pre-qualified list of contractors for private contracts

The County should consider creating a pre-qualified list of prime contractors who meet certain requirements for GSI O&M work. Local municipalities or project developers who elect to use private contractors for O&M can and should refer to the contractors on the pre-qualified list to ensure that they hire contractors that have the requisite experience to perform the work (e.g. applicable certifications) and are responsible employers (e.g. pay living wages and benefits). Creating a list of certified private employers also streamlines workforce development partnerships and opportunities for placing training program graduates into full-time jobs.

3. Coordinate Efforts between Measures W, A, and M

Considerable overlap exists in the knowledge, skills, and abilities required to design, construct, and maintain the projects funded under Measures W, A, and M – particularly W and A. Measure A’s Youth and Veteran Job Training program provides funds for jobs education and skills training, and certification and job placement services. Internally, LA County should explore how to manage its entry-level and skilled job classifications across multiple departments (Public Works, Parks and Recreation, Flood Control District, Regional Parks and Open Space District, etc.) to create multi-benefit projects. One possible idea is to develop a rotation program for entry-level workers where front-line staff gain experience working under various departments and projects. Such a model could similarly be adapted for technical and professional staff as well. Externally, LA County should explore how to coordinate its various workforce funds to ensure investments are complementary and not duplicative. We understand these conversations are already underway as part of the County’s W, A, M initiative.

IV. NEXT STEPS

In this literature review, EA has provided an overview of the workforce research, programs, and resources that currently exist nation-wide and regionally. We have further identified local gaps that must be filled to prepare a qualified workforce for SCWP projects. After gathering this data and interviewing workforce experts, our next step is to develop an enhanced memo with our final recommendations for the utilization of SCWP workforce funds. The final report will include potential roles, responsibilities, and partnerships related to the implementation of each investment option.

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APPENDIX B: EXPERT INTERVIEWS

September 26, 2019: Lauren Akhiam, Nichole Heil, LAANE

October 14, 2019: Regina Blasberg, College of the Canyons, Water Technology

October 15, 2019: Caroline Torosis, LA County WDACS

October 22, 2019: Chris Hannan, Anne McMonigle, Building Trades

October 22, 2019: Peter Santillan, Local 1309

October 23, 2019: Ernesto Pantoja, Francisco Arrizon, Mike Rubio, Local 300

October 23, 2019: Diane Factor, Steven Simon, WERC

October 28, 2019: Eileen Alduenda, Jason Casanova, Council for Watershed Health

November 1, 2019: Adriana Caldarelli, National Green Infrastructure Certification Program

November 1, 2019: Bo Savage, Alex Lopez, LA Conservation Corps

November 6, 2019: Kayla Kelly-Slatten, Long Beach Conservation Corps