Unlocking the Value of Green Infrastructure Incentive Programs for Urban Agriculture by Leveraging Public and Private Investment

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GREENPRINT PARTNERS

CNT

Quantified® Ventures

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Project Summary

As landowners in cities across the U.S seek to innovatively reimagine portions of their sites, nature-based solutions like green stormwater infrastructure (GSI) and urban agriculture (urban ag) present an opportunity to improve community well-being while addressing critical issues such as flooding and food insecurity. Through this project, Greenprint Partners (Greenprint), the Center for Neighborhood Technology (CNT), and Quantified Ventures (QV) sought to pilot a model for co-locating GSI and urban ag practices on urban lands. Working closely with an Urban Agriculture Advisory Group (UAAG) comprised of producers across the country, the project team developed an approach for a holistic edible rainscapes program - particularly for schoolyards - that designs and implements urban ag and GSI in tandem via funding through a stacked incentive model, vetted that model with stakeholders and potential payors, and quantified impacts of implementing such a program at a national scale. If implemented at scale, there is potential to prevent 39 billion gallons of stormwater runoff each year in schoolyards across the country all while supporting improved academic performance and community resilience. The four pilot projects developed as part of this project demonstrate what this impact would look like at the site-level.

Project Goal & Objectives

The goal of this project was to pilot a GSI program that co-located urban ag and GSI practices and increased the adoption of both in urban communities while maximizing desired outcomes for stormwater utilities and urban ag practitioners.

The project team aimed to achieve this through the four following project objectives:

1. **Align GSI with urban agriculture priorities and goals.**
2. **Review active GSI programs and their applicability for urban agriculture property holders.**
3. **Create enhanced financial models for urban agriculture by identifying and securing additional GSI payors.**
4. **Translate findings into a portfolio of pilot GSI projects on urban agriculture land through existing GSI programs.**

Project Background

Many large landowners in cities across the U.S. are seeking ways to innovatively reimagine underutilized portions of their sites to improve community well-being. Nature-based solutions, like GSI and urban ag, can contribute to improved well-being while addressing critical issues such as flooding and food insecurity. GSI is a cost-effective and multi-benefit solution that uses natural systems to manage rainwater where it falls. It reduces flooding, runoff, and water pollution and provides additional economic, community, and environmental benefits (referred to as co-benefits), including: site beautification, enhanced biodiversity, increased sense of community belonging and pride, and improved physical and mental health. Urban ag refers to practices encompassing hydroponic and vertical farming, rooftop farming and rooftop greenhouse farming, edible wall and landscaping, peri-urban farming, community gardens, and traditional garden urban farms. Like GSI, it is also a multi-benefit, nature-based solution that provides many co-benefits, including: increased food security, improved health and wellness, enhanced environmental awareness, and expanded space for exercise and socialization. Through community gathering and programming, urban farms and gardens also build social infrastructure, making communities more resilient to environmental and social shocks.

In many cities, municipal program administrators seeking to meet stormwater management goals have implemented programs that incentivize private actors to implement GSI on their property. Increasingly, through these investments in GSI, water utilities are seeking ways to integrate additional nature-based elements alongside GSI to achieve community health and well-being outcomes such as those listed above. Private property owners participating in utility GSI incentive programs have the potential to benefit from co-locating GSI with urban ag practices due to their potential to contribute to these outcomes.

Project Methods

A detailed description of project methods can be found in **Appendix A:** Project Description. Our initial pilot program design was based on a few key assumptions, but learnings and new insights (described in **Appendix B:** Program Design Memo) led us to reconsider our initial project hypothesis and propose an adjustment in program design. As a result, the team reoriented toward a holistic edible rainscapes program - particularly for schoolyards - that designed and implemented urban ag and GSI in tandem and was funded through a stacked incentive model. As part of this reorientation, CNT conducted a national green schoolyards analysis (see **Appendix C**) that imagines scaling up edible schoolyards with GSI nationwide and models potential outcomes and interviewed edible schoolyard experts and implementers about equity successes and challenges existing programs have faced. This important research alongside QV interviews with potential funders and stakeholders (see **Appendix D**) following the shift in program direction provide a basis for what similar work would look like at the national scale.

Project Results

Objective 1: Align GSI with urban agriculture priorities and goals.

Input from the UAAG and findings from initial pilot development in St. Louis found:

1. That the assumed benefits from co-location (enhanced pollinator habitat, reduced crop loss from excessive rainfall, protection from urban rights of way, and reduced operational costs) are not necessarily top priorities for urban agriculture practitioners;
2. Existing sites with urban crop production tend to already be innovatively using their space, making it difficult to cost-effectively site GSI on urban agricultural land;
3. Outcomes typically leveraged for GSI projects (reduced flooding, cost savings, etc.) are small at the site-scale level for urban farms.

These insights indicated that a program targeted towards existing urban ag landowners may not be ideally structured to maximize the desired outcomes for urban ag practitioners and stormwater utilities. Instead, outreach with these stakeholder groups showed that they prioritize and wish to achieve key health and well-being outcomes for their communities. These outcomes vary but may include property beautification, improved student performance at schools, a better sense of community pride and belonging, and improved physical and mental health from the addition of more green space to their property.

Additionally, several landowners (many of them schools) without urban ag on their properties expressed interest in including raised beds alongside their GSI project, indicating a demand for offering GSI and raised beds together as a single 'edible rainscapes' package. The integration of GSI and urban ag into edible rainscapes could also have the potential to create efficiencies in maintenance planning and workforce development, another priority area for both the GSI and urban ag communities. Rather than trying to weave GSI into existing urban ag sites, starting with GSI and working in an urban ag component may be a more effective approach.

As such, there is a particular opportunity to incorporate GSI and edible gardens holistically into schoolyards across the U.S. Doing so has the potential to benefit students, schools, and communities in many ways, including but not limited to: supporting climate change resilience, bolstering academics, broadening nutrition, and sustaining biodiversity. The Center for Neighborhood Technology (CNT) modeled the potential impact of widespread implementation for GSI and edible school gardens nationwide. The research found that incorporating GSI and edible gardens into schoolyards at the national scale has the potential to prevent 39 billion gallons of stormwater runoff each year all while supporting improved academic performance and community resilience, particularly when implemented with equity best practices in mind (see **Appendix C** for more details). CNT also created schoolyard and urban garden templates for its Green Values Stormwater Management Calculator tool to allow users to see the stormwater impacts transformation a space in their area could have at https://greenvalues.cnt.org/.

Objective 2: Review active GSI programs and their applicability for urban agriculture property holders.

A market scan of 17 stormwater utilities and water departments across the U.S. showed that barriers like minimum impervious area requirements, organizational capacity and longevity, maintenance commitments, and liability concerns limit urban ag practitioners' ability to participate in GSI incentive programs.

Given the significant area of impervious surface in urban areas, many urban stormwater utilities incentivize landowners to manage stormwater runoff from impervious surfaces by setting minimum impervious area requirements or preferences as part of their program design. In the scan conducted, nine out of 17 utilities/water department programs had impervious area requirements (four) or priorities (five). Such requirements can be a limiting factor given that most urban ag operations have little to no impervious area on their site. Exacerbating this issue is the fact that urban ag sites are also typically very small with few being larger than one acre. This means that they may not have the space available to manage an incentive program's required area.

Additionally, urban ag organizations are frequently small in size - with a typical staff size being between two and five full-time employees - and often rely heavily on support from volunteers. This limits their capacity to take on new projects and ongoing GSI maintenance tasks. An advisory group of nine urban ag practitioners from across the United States supporting this research, for example, emphasized maintenance as a concern and key barrier to participation.

Urban ag organizations also face barriers to organizational longevity and land tenure. Urban ag practitioners compete for land with many other users. Pressures to develop often mean that urban farms and gardens end up leasing or borrowing a piece of 'surplus land' - such as tax delinquent property, vacant land held by speculators, or brownfields - until it can be sold for development. This often means many organizations struggle to maintain control of their land for more than five years, a period of time shorter than most utility GSI maintenance agreements with private landowners which can range from 10 to 45 years.

Finally, another concern for urban ag practitioners centers around liability issues. For example, an advisory group member expressed concern about including GSI interventions that extend into the street or public right-of-way. Including such features extends the area an organization is responsible for into public space, which may be a liability concern for some landowners.

Utilities could potentially reduce these barriers by emphasizing co-benefits in project evaluation to boost urban ag competitiveness during review, implementing policies to preserve urban open space, and funding land acquisition as an eligible incentive program cost. However, our research has indicated that the funding and capacity costs to implement these changes may not significantly outweigh their benefits enough to incentivize utilities. Thus, a program that designs and implements urban ag and GSI in tandem may be a more appropriate approach for co-locating urban ag and GSI.

Hersh, "Taking Root: Land Tenure and Community Gardens in Providence, Rhode Island"

Objective 3: Create enhanced financial models for urban agriculture by identifying and securing additional GSI payors.

A key question then is how such an approach as described above might be funded if stormwater management organizations are not typically incentivized or, in some cases, restricted from directly supporting urban agriculture. Analysis conducted by QV examines models for using existing funding sources to complement potential outcomes-based financing for a financially viable, scalable solution (see **Appendix D** for more details). Quantified Ventures found this approach resonated well with potential funders and stakeholders (e.g. Great Lakes Commission, Greater Milwaukee Foundation, Builders Initiative and others) and that leveraging funds from multiple sources would make projects more competitive when pursuing funding.

Additionally, discussion with the UAAG surfaced **several recommendations for how USDA might support a stacked incentives approach:**

1. Host informational sessions and provide resources at local, urban-based NRCS Offices to both urban producers and local schools on how to leverage funds from other entities, such as local stormwater management organizations or the U.S. Department of Education.

2. More actively promote NRCS office connections in urban areas for USDA grant application support.

3. Build relationships between NRCS offices and stormwater agencies to enable joint education sessions and to explore streamlining funding requirements for combined GSI and urban ag projects.

4. Make securing USDA grant funding easier to access for small, urban producers and small-scale projects with turnkey/pre-defined project “check-the-box” applications.

Objective 4: Translate findings into a portfolio of pilot GSI projects on urban agriculture land through existing GSI programs.

Building off the findings detailed above, the following four projects were developed through this program:

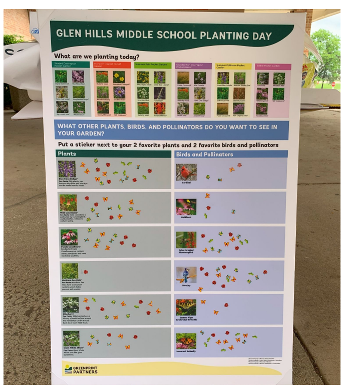
St. Luke's Episcopal Church: St. Luke's is a vibrant Episcopal parish in the Germantown neighborhood of Philadelphia that has been serving the community for over 200 years. They serve their community in a number of ways including by serving meals and distributing food to those in need, offering free legal advice on non-criminal matters, and hosting social justice retreats at their Episcopal Mission Center. Greenprint worked with the church to depave much of the site's impervious area and install one large rain garden that will provide a gathering space for reflection and prayer for church members as well as trees to provide shade for volunteers working at the church, including those that maintain their community garden. These improvements will also help the church to manage approximately 145,483 gallons of stormwater each year.

The new raised garden beds at St. Luke's Episcopal Church, which are used to supplement a food pantry program, will also attract useful pollinators.

Horace Mann Elementary School: Horace Mann Elementary School is a public school located in West Allis, WI, teaching Kindergarten through 5th grade. They are part of the West Allis-West Milwaukee School District, a district focused on equity through deeper learning, fostering a sense of belonging, and educating the whole child so every learner achieves success and employ, support, retain, and continually develop a workforce of racially conscious and culturally competent administrative, instruction, and support personnel. Greenprint is constructing a bioretention basin, depaving impervious area, and incorporating new raised urban ag beds and native landscaping onto their site. These features will manage 6,068 gallons of stormwater each year while providing increased pollinator habitat, students' interactions with nature, and holistic educational opportunities.

Glen Hills Middle School: Glen Hills Middle School is a fourth-eighth grade public middle school in the Glendale-River Hills School District serving 542 students. Working closely with the school, Greenprint installed two bioretention basins, native plantings, two rain barrels, stormwater trees, and an outdoor classroom area that includes raised urban agriculture beds on their site. These features manage 45,864 gallons of stormwater annually while providing students the opportunity to interact with nature and learn holistically.

Many plants used in the newly excavated green schoolyard space were donated by community members



Interactive poster displaying students' preferences for various plants, pollinators, and birds

> *"Gardening and garden education will be a cornerstone of the Green Schoolyard Project. There are several planned garden spaces and students have identified future plans for a food forest, add[ed] foodscaping in existing gardens, along with an orchard and berry patches. Green Team also plans to run their club year round to help maintain gardens. Summer academy students will also participate in learning opportunities and harvesting of food to take home to families. As the gardens grow and our experience in maintaining them builds stronger, our goal is to grow fresh food for not only our students, but also our community. In the future, we envision expanding the gardens, exploring hydroponic methods for growing food, and plan on using food harvested from our gardens for: school lunches & snacks, donating fresh food to the Senior Center and senior citizens in our community, hosting community garden and harvest events, and partnering with experts to continue learning more and devising ways to enhance the future of our growing spaces."*
>
> - *Jennifer Clark (STEAM Teacher at Glen Hills)*

Shorewood High School: Shorewood High School is a comprehensive public high school located in the village of Shorewood, WI serving over 600 students. Part of the Shorewood School District, Shorewood High School is on a mission to educate students, to cultivate a desire for life-long improvement, and to nurture a sense of responsibility, integrity, and good citizenship, within the framework of a challenging curriculum. In close collaboration with students and staff, Greenprint is installing two bioretention basins and native landscaping onto the school grounds, including an outdoor classroom space located alongside the community garden comprising 22 community-maintained raised beds on the schools property. These features will help the school manage 17,451 gallons of stormwater annually while also connecting students to new educational opportunities and spaces for community building with local gardeners.

Project Outputs

- A market scan matrix of 17 stormwater utilities and water departments across the U.S. detailing successes, challenges, barriers, and opportunities for urban ag participation in their GSI incentive programs.

- Attended and presented poster in CIG showcase at the 2021 SWCS International Annual Conference. See abstract.

- Four case studies of projects co-locating urban ag and GSI practices that demonstrate how, with creative community collaboration and technical support as well as thoughtful design and implementation, such work can result in meaningful, community-based projects.

- Whitepaper detailing lessons learned about co-locating urban ag and GSI from early program and project pilot development.

- Schoolyard and urban ag templates for CNT's Green Values Stormwater Management Calculator tool to allow users to see the stormwater impacts a transformation their space could have.

- Report by CNT quantifying benefits of GSI and edible gardens in U.S schoolyards as well as documenting best practices and lessons learned for equity. (Appendix C)

- Report by QV describing their analysis and recommendations for financing co-located GSI and urban ag projects. (Appendix D).

- The following links are to projects concept and design plans for each pilot project:
    - St. Luke's Episcopal Church
    - Horace Mann Elementary School
    - Glen Hills Middle School
    - Shorewood High School

Project Impacts

Project Impact Summary

Project Name	Project Partners	Practices Implemented	Acres Impacted	Co-Benefits Provided	Project Beneficiaries
St. Luke's Episcopal Church	St. Luke's Episcopal Church, PWD	1 rain garden and depaving	0.19 greened acres	Pollinator habitat, depaving under raised beds for proper drainage, shade for volunteers	Church members, volunteers, neighbors, food pantry clients
Horace Mann Elementary School	Learning Landscapes Design, MMSD, Horace Mann Elementary School, Bloom Companies LLC, City of West Allis	1 bioretention basin, depaving, native landscaping	0.35 greened acres	Holistic educational opportunities, pollinator habitat, increased green space for play & increased interactions with nature	Students, teachers, neighbors
Glen Hills Middle School	Glen Hills Middle School, MMSD, City of Glendale	2 bioretention basins, native plantings, 2 rain barrels, stormwater trees	2.56 greened acres	Holistic educational opportunities, pollinator habitat, increased green space for play & increased interactions with nature	Students, teachers, neighbors
Shorewood High School	Shorewood High School, MMSD, Learning Landscapes Design	Native planting, 1 bioretention basin, 1 rain garden	0.51 greened acres	Holistic educational opportunities, pollinator habitat, increased green space for increased interactions with nature	Students, teachers, neighbors, community gardeners

*Greened acres: acres retrofitted to drain into green infrastructure installations, reducing stormwater runoff. (In Philadelphia, calculated at 1.5 X acres impervious surface managed. In Milwaukee, calculated as 1 X acres impervious and pervious surface managed.)

Appendix

- Appendix A - Project Description
- Appendix B - Program Design Memo
- Appendix C - Quantified Benefits of Green Stormwater Infrastructure and Edible Gardens in U.S. Schoolyards
- Appendix D - Urban Agriculture and Green Stormwater Infrastructure

Thank you to our UAAG for providing guidance and feedback on program design.