

Greening the Pittsburgh Wet Weather Plan



Acknowledgements

The City of Pittsburgh and the Pittsburgh Water and Sewer Authority would first and foremost like to thank everyone who presented at and participated in the Greening the Wet Weather Plan Charrette Project. Your time, ideas, and energy have been invaluable in helping us to plan for green infrastructure.

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Executive Summary

Introduction

The City of Pittsburgh, like its neighboring municipalities and cities across the nation, is faced with a daunting challenge: how to address the overflow of sewage into its rivers during wet weather events. Traditional grey infrastructure has been the go-to solution to date. Increasingly though, cities are turning to the natural ability of environmental systems to help reduce the flow of stormwater, and thus combined sewer overflows. However, as with any new approach or technology, many challenges exist with understanding how to effectively implement green infrastructure in Pittsburgh. That is not to say that solutions to those challenges don't exist; rather, they are not currently embedded within the institutions traditionally tasked with dealing with our stormwater and wastewater systems.

Therefore, at the behest of Mayor Luke Ravenstahl and the Honorable Daniel Deasy, the City of Pittsburgh and the Pittsburgh Water and Sewer Authority decided to turn outwards, to ask the professors and researchers, architects and engineers, and environmental non-profit practitioners who live and work in the City of Pittsburgh for help. They also reached out to national experts and international colleagues to help inform the discussion.

The Greening the Pittsburgh Wet Weather Plan Charrette Project was developed with the primary objective to develop a consensus approach to reviewing, recommending and incorporating a plan for the implementation of green stormwater infrastructure technologies and policies into the PWSA Wet Weather Feasibility Study.

The Charrettes

The project was comprised of three charrettes designed to identify green infrastructure opportunities, associated benefits and concerns, and the legal, institutional, and financial issues. From February to April 2013, three charrettes were held to explore these various topics. Overall, 125 independent individuals participated, representing a diverse array of public, private, and non-profit organizations. In fact, each charrette had nearly equal representation from all three sectors. These individuals collectively donated over 1,000 hours of their time to assist PWSA in its effort to better understand the challenges and opportunities associated with green infrastructure.

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2 The first charrette featured presentations from PWSA and their partners on the wet weather planning process and how green infrastructure would be included in the plan, and from Kari Mackenbach, of the URS Corporation, who discussed how other cities have successfully implemented green infrastructure. These presentations served to ensure that participants were knowledgeable about the wet weather planning process and about what is possible, based on the experience of other cities. The presentations were followed by energetic small-group conversations about what green infrastructure technologies would be best suited for public, large-scale private, and residential land uses. Many participants reported afterwards that this was the first time that they were part of such diverse and solutions-oriented conversations about green infrastructure.

Due to participants' interest in the institutional challenges to green infrastructure, the second charrette featured a panel of regional leaders, moderated by Bill Flanagan of the Allegheny Conference on Community Development, and included:

- Bob Hutton, GIS Project Coordinator, Pittsburgh Water and Sewer Authority
- Jan Oliver, Director of Regional Conveyance, ALCOSAN
- Dan Sentz, Environmental Planner, City of Pittsburgh
- Rob Kaczorowski, Public Works Director, City of Pittsburgh
- Michelle Buys, Environmental Engineer, Allegheny County Health Department
- Cheryl Moon-Sirianni, P.E., Assistant District Executive for Design, PENNDOT District 11
- Brenda Smith, Executive Director, Nine Mile Run Watershed Association
- Todd Reidbord, President, Walnut Capital – Developers of Bakery Square

Panelists discussed their organization's role relative to green infrastructure, and what they saw as their main barriers and opportunities associated with implementing green infrastructure. PWSA's Bob Hutton concluded the panel discussion by saying that green infrastructure will be successful in Pittsburgh if there is collaboration and commitment; he said that we have to believe in it, identify opportunities, and make it happen! Following the panel, participants worked with panelists in small groups to discuss those barriers, and possible solutions, in greater detail. A second working group that afternoon focused on identifying possible early demonstration projects at specific locations in Pittsburgh. Equipped with several maps, participants discussed types of green infrastructure technologies, locations, and socio-political considerations for projects in several different watersheds.



Finally, the third charrette featured an in-depth presentation about the Green Infrastructure Section of PWSA's Wet Weather Feasibility Study, with some high-level suggestions of the types of short-term actions that would be taken to further inform PWSA's decision making process, such as the creation of a task force and implementation of early demonstration projects. The presentation also highlighted both the adaptive management approach, which focuses on monitoring and regular assessment/evaluation to inform future actions, and the Integrated Watershed Management & Planning approach, which would establish a process to provide flexibility to meet broader water quality requirements through the most cost-effective and beneficial means. Again, two working groups allowed participants to react to and expand upon what was presented. For the first working group, participants discussed what was exciting to them about the green infrastructure section and the adaptive management approach, as well as what was missing and what concerns they had. The second working group focused on how PWSA could partner with other organizations to implement what was outlined in the green infrastructure section. The charrette concluded with a presentation by Camille Grandet, from 2EI, a subsidiary of Veolia France, who spoke about his experience implementing green infrastructure in France.

Findings

Overall, the charrettes provided a forum for stakeholders to learn more about the wet weather planning process, to build new partnerships, and to share their knowledge about green infrastructure with PWSA. That knowledge is captured in the Findings section of this report, which outlines identified challenges and suggested recommendations relative to the general categories of Authority to Implement, Education and Outreach, Regulations, Financial Considerations, Maintenance, and Monitoring. Several of the challenges and recommendations were heard consistently throughout the charrette process by a wide array of stakeholders.



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Top Recommendations

- 1 Create a stormwater utility.
- 2 PWSA should lead efforts to implement green infrastructure, while partnering with the City, local NGOs, industry stakeholders, and universities.
- 3 Implement a comprehensive education and engagement campaign targeted at both residents and the building community.

Create a Stormwater Utility

4 Though certainly not a silver bullet, the creation of a stormwater utility was discussed as a possible solution to many green infrastructure challenges. The creation of a stormwater utility has the potential to consolidate responsibility for stormwater management and green infrastructure within one, or at least fewer, entities. It could provide a single entity to review stormwater management plans, thus easing the burden on developers and ensuring better coordination between city departments. And it could generate a revenue source to be used for maintenance and could even possibly be the lead entity in charge of green infrastructure maintenance. There was little consensus on the details of a utility (e.g. geographic scope, management, fee structure, etc.), though it was clear that additional exploration of how to create a utility would be welcomed by stakeholders in attendance.

PWSA: Leader and Partner

Whether it was Kari Mackenbach discussing Louisville, Kentucky or Camille Grandet discussing Paris, France, it was clear that successful implementation of green infrastructure requires both strong leadership and partnerships. Nearly every stakeholder who participated in the charrettes also expressed the need for a strong leader and partnerships in order to make green infrastructure successful.

Stakeholders felt that one entity would need to take the lead in fronting a green infrastructure initiative, bringing in new partners, facilitating new ways of working together, developing partnership agreements, and keeping partners engaged in the process. Given the leadership already shown through hosting these charrettes, PWSA was clearly seen as an organization to take on that role. However, no one expects the leader to be able to implement green infrastructure alone. Several recommendations pointed to the need for an integrated approach, involving many parties. These included streamlining the review of stormwater plans, identifying opportunities for cost-sharing, leveraging the expertise of local NGOs and landscape industry stakeholders to identify maintenance best practices and train city and private employees, and leveraging the expertise of universities to monitor green infrastructure early demonstration projects.





Education and Engagement

Another theme that was echoed by presenters and participants throughout the charrette process was that of community education and engagement. Green infrastructure can only be successful with the support of those who will pay for, build, and live with the results. Residents were one of the main groups discussed. While they potentially have the most to gain from green infrastructure, given its additional aesthetic and environmental benefits, those improvements can only be realized if the residents are informed and engaged in the process. Participants recommended a range of strategies for engaging residents, from a branded public outreach campaign, to providing training and support for community groups to help implement green infrastructure projects. Other key targets for education and engagement were those involved with construction, building operations, property management and development. Strategies for this group included a comprehensive design manual and partnering with organizations, such as the Builders Association or the Allegheny County Conservation District.

Moving Forward

The Pittsburgh Water and Sewer Authority is incredibly grateful for the time and knowledge contributed by stakeholders throughout this process. All of the information gathered during the charrette process is being used to inform the Green Infrastructure Section of PWSA's Wet Weather Feasibility Study. During the events, a number of the charrette participants pointed out that the USEPA had recently issued guidance on Integrated Watershed Management (IWM). One key element of the Study will be a detailed exploration of IWM, which reflects the fact that most stakeholders viewed green infrastructure as a tool for both improving water quality and decreasing the number of CSOs.

Even before the Study is approved by the Pennsylvania Department of Environmental Protection, PWSA is moving forward with implementing green infrastructure. At the conclusion of the final charrette, Jim Good, Interim Executive Director of PWSA, announced the creation of a Green Infrastructure Technical Advisory Committee and a partnership with the Pittsburgh Parks Conservancy, ALCOSAN, and the City of Pittsburgh DPW for an early demonstration project in Schenley Park. Furthermore, PWSA will continue to provide information and seek input on green infrastructure through their website, www.pittsburghgreeninfrastructure.com. PWSA looks forward to continuing to work with the stakeholders engaged through the charrettes on making green infrastructure an integral component of its Wet Weather Plan.

Introduction

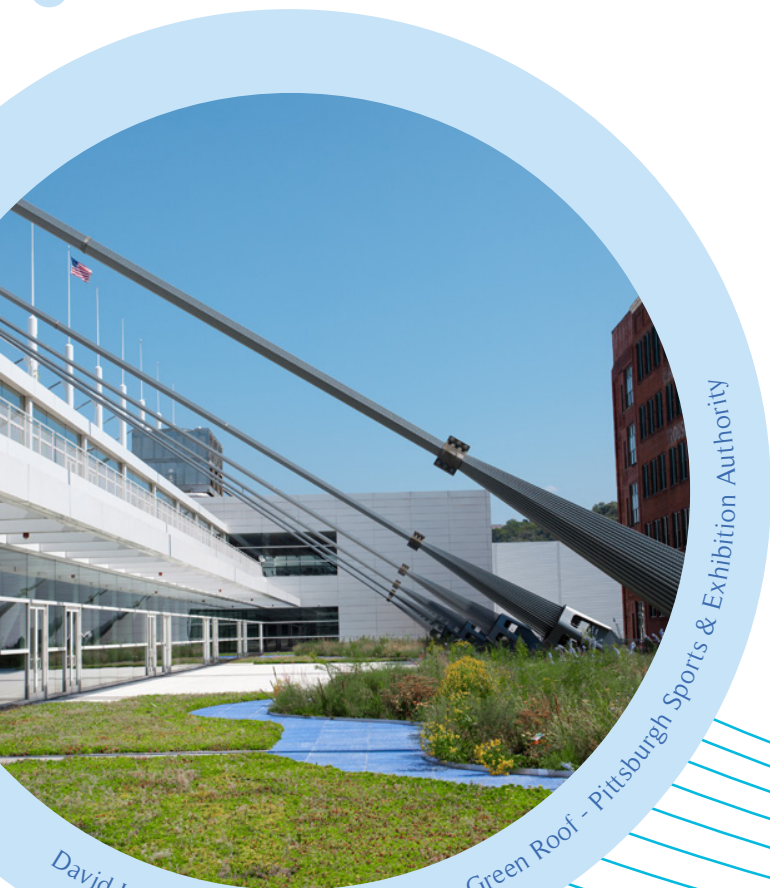
The City of Pittsburgh, like its neighboring municipalities and cities across the nation, is faced with a daunting challenge: how to address the overflow of sewage into its rivers during wet weather events. Traditional grey infrastructure has been the go-to solution to date. Increasingly though, cities are turning to the natural ability of environmental systems to help reduce the flow of stormwater, and thus combined sewer overflows. However, as with any new approach or technology, many challenges exist with understanding how to effectively implement green infrastructure in Pittsburgh. That is not to say that solutions to those challenges don't exist; rather, they are not currently embedded within the institutions traditionally tasked with dealing with our stormwater and wastewater systems.

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Therefore, at the behest of Mayor Luke Ravenstahl and the Honorable Daniel Deasy, the City of Pittsburgh and the Pittsburgh Water and Sewer Authority decided to turn outwards, to ask the professors and researchers, architects and engineers, and environmental non-profit practitioners who live and work in the City of Pittsburgh for help. They also reached out to national experts and international colleagues to help inform the discussion.

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From February to April 2013, three charrettes were held to explore these various topics. Overall, 125 independent individuals participated, representing a diverse array of public, private, and non-profit organizations. These individuals collectively donated over 1,000 hours of their time to assist PWSA in its effort to better understand the challenges and opportunities associated with green infrastructure. The following sections describe the content of each charrette as well as the resulting findings.



David L. Lawrence Convention Center Green Roof - Pittsburgh Sports & Exhibition Authority

Charrette 1

On Friday, February 15th, 2013, stakeholders from the public, private, and non-profit sectors gathered together to discuss how the City of Pittsburgh and the Pittsburgh Water and Sewer Authority can include green infrastructure as part of their Wet Weather Feasibility Study. In total, 86 participants attended, with 35 from the public sector, 23 from the private sector, and 29 from the non-profit sector.

Kari Mackenbach from URS Corporation began by showing the participants how San Francisco, Kansas City, and Louisville have implemented green infrastructure (GI). Highlights included:

- Using gardens/landscaping, porous pavement, pervious concrete, and rainwater capture devices – diversity of technologies is important
- Stair-step/cascading gardens with curb cuts were used in the ROW on sloped streets
- Curb extensions with below grade storage allowed for retention, infiltration, and controlled release to sewer while also providing traffic calming
- Pilot testing of porous materials led to improved performance, reduced costs, and simplified maintenance; learned the importance of knowing precise utility locations and flexibility for field adaptation
- Public education & emphasis on neighborhood improvements were important
- University partnerships helped with piloting design, operations and maintenance, and monitoring
- Found that in some cases, GI could address CSOs for less money and with less overall maintenance costs

Kari's presentation was followed by a presentation by Three Rivers Wet Weather and AECOM. The goal of this presentation was to explain Pittsburgh's Wet Weather Feasibility Studying process and how GI would be included in the plan. This included a discussion of the RainWays and SWMM tools and how they would be used to evaluate and prioritize green infrastructure.

For the remainder of the afternoon, the participants were split into working groups. Table groupings were designed to provide a diversity of perspectives and facilitators helped participants discuss what GI solutions were most appropriate for public, private, and residential property. Facilitators worked with each table to complete worksheets outlining specific technologies, where they were currently being used, benefits, and barriers to implementation. At the end of the working group session, participants reported out on their tables' finding.

Charrette 2

During the first charrette it was clear that the participants were more concerned about institutional barriers than technical barriers to implementing green infrastructure. Therefore, for the second charrette, held on March 21st, 2013, a panel of some of the key institutional leaders who would be responsible for implementing green infrastructure was convened. This panel included:

- Bob Hutton, GIS Project Coordinator, Pittsburgh Water and Sewer Authority
- Jan Oliver, Director of Regional Conveyance, ALCOSAN
- Dan Sentz, Environmental Planner, City of Pittsburgh
- Rob Kaczorowski, Public Works Director, City of Pittsburgh
- Michelle Buys, Environmental Engineer, Allegheny County Health Department
- Cheryl Moon-Sirianni, P.E., Assistant District Executive for Design, PENNDOT District 11
- Brenda Smith, Executive Director, Nine Mile Run Watershed Association
- Todd Reidbord, President, Walnut Capital – Developers of Bakery Square

Each participant discussed their organization's role relative to green infrastructure, and what they saw as their main barriers and opportunities associated with implementing green infrastructure. Bill Flanagan of the Allegheny Conference on Community Development then facilitated a dialogue amongst the participants, concluding with their thoughts on the key to successfully implementing green infrastructure in Pittsburgh.



The charrette then featured two working groups: the first engaged participants in addressing the barriers outlined by the panelists, and the second asked participants to identify the best sites for early demonstration projects. Tables for the first working group were organized into four general categories: Authority & Partnerships, Design & Implementation, Maintenance & Monitoring, and Rules & Regulations. Participants were assigned to the table which best matched their knowledge and expertise. Centered on the panel discussion, they identified the top three barriers relative to that category, as well as short- and long-term solutions.

For the second working group, tables were organized by watershed: Saw Mill Run, Nine Mile Run, and A-22 (Bloomfield, Friendship, Shadyside), as well as one for the entire city; participants self-selected a table based on their familiarity with that area. Participants were given an aerial map showing building footprints and the boundaries of combined and sanitary sewer watershed, a map of publicly owned properties, and a map showing potential GI locations based on a preliminary technical analysis by Three Rivers Wet Weather. Participants used the maps and worksheets to identify possible early demonstration project locations.

Overall, 79 people participated in the second charrette; 34 represented public organizations, 21 represented private-sector organizations, and 24 represented non-profit organizations.

Charrette 3

The third charrette, held on April 19th, 2013, began with a closer look at the green infrastructure section of PWSA's feasibility study. Ross Gordon, of AECOM, gave a presentation about the information to be included in the section, as well as some high-level suggestions of the types of short-term actions that would be taken to further inform PWSA's decision making process, such as the creation of a task force and implementation of early demonstration projects. The presentation highlighted the adaptive management approach, which focuses on monitoring and regular assessment/evaluation to inform future actions. Ross also discussed how the green infrastructure section supports and aligns with USEPA's Integrated Watershed Management Planning framework, defining PWSA's desire to address overall water quality issues above and beyond just those caused by CSOs.

Again, two working groups allowed participants to react to and expand upon what was presented. For the first working group, participants discussed what was exciting to them about the green infrastructure section and the adaptive management approach, as well as what was missing and what concerns they had. The second working group focused on how PWSA could partner with other organizations to implement what was outlined in the green infrastructure section. Participants discussed how PWSA could leverage existing related activities, how other organizations could collaborate with PWSA, and what PWSA could do to support the efforts of other organizations.

After the working groups, Camille Grandet, from 2EI, a subsidiary of Veolia France, gave a presentation about his experience implementing green infrastructure throughout various cities in France. His presentation covered their regulatory environment, the role of local municipalities, the perspective of public and private developers, and operations and maintenance. Mr. Grandet discussed:

- The importance of collaboration between the water department and city planning,
- The need to incorporate design review as early and often as possible during design and construction,
- The ability for green infrastructure to benefit architects and developers by improving design and decreasing cost, and
- The larger performance gap attributable to a lack of operations and maintenance.

Overall 68 stakeholders participated in the third charrette, 21 from the public sector, 23 from the private sector, and 22 from the non-profit sector.





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Findings

The following findings serve to summarize the comments received from participants during each of the charrettes. As such, they do not represent the opinion of any one person or organization. Furthermore, they do not represent the opinion of the City of Pittsburgh or the Pittsburgh Water and Sewer Authority. PWSA will be reviewing these findings to inform the green infrastructure section of their Wet Weather Feasibility Study. Recommendations are organized roughly according to short- and long-term implementation.

Authority to Implement

Challenges

Questions of authority and ownership surfaced at nearly every level of the discussion during the charrettes. At the highest level, the City of Pittsburgh is just one of 83 municipalities within the ALCOSAN service area, with each having to respond to its own Consent Order and Agreement, despite the fact that stormwater itself does not recognize those municipal boundaries. Next, within each of those municipalities, and for our purposes, Pittsburgh specifically, there are many different parties with authority over stormwater management in one way or another. During the second charrette, Dan Sentz, Environmental Planner for the City of Pittsburgh, mentioned that City Planning, the Bureau of Building Inspection, Public Works, and PWSA all review and approve stormwater plans. If a project involves a county or state owned road, or if it involves any other utilities, the number of responsible entities continues to multiply. And finally there is the issue of who actually owns the land that is responsible for creating the stormwater runoff and to what extent are they inclined to employ green infrastructure solutions. Agencies such as the Urban Redevelopment Authority, the Regional Industrial Development Corporation, and the Housing Authority of Pittsburgh all represent Public land owners with some authority to implement green infrastructure. Private land owners could also bear some responsibility for implementing green infrastructure, but have very different motives and incentives to do so.



Solutions

Recommendation: PWSA can be a leader in convening the various parties with some authority in the implementation of green infrastructure.

Intent: One entity needs to take the lead in fronting a green infrastructure initiative, bringing in new partners, facilitating new ways of working together, developing partnership agreements, and keeping partners engaged in the process.

Recommendation: Prioritize initial implementation of green infrastructure on publicly owned land. Research the use of Envista project management tool to track opportunities.

Intent: Implementing green infrastructure on publicly owned land, such as parks, right-of-ways, and public development, presents fewer barriers than on privately owned land. The use of Envista could help ensure that as improvements are made to roads, sidewalks, utilities, etc. that green infrastructure could be incorporated in an integrated fashion.

Recommendation: Create a stormwater utility. Such an action is a growing trend with large (Philadelphia) and small (Mt. Lebanon) municipalities taking this approach for investing in stormwater solutions. A feasibility study will need to be completed in order to identify the best entity within the region to manage a utility.

Intent: Ultimately, the creation of a stormwater utility has the potential to consolidate responsibility for stormwater management and green infrastructure within one, or at least fewer, entities.

Recommendation: Use an Integrated Watershed Management & Planning approach to unite municipalities in collectively addressing stormwater management based on watershed boundaries rather than political ones.

Intent: Water quality, which would be a focus under an IWM approach, is a common concern regardless of whether a community is addressing CSOs, SSOs, or MS4 and NPDES requirements.

Education and Outreach

Challenges

The charrettes uncovered a multitude of potential challenges based on a lack of education and understanding about green infrastructure. During the first charrette, Kari Mackenbach of URS Corporation explained how landscaping contractors, accustomed to compacting soils, were slow to adapt to new practices of keeping soils loose in green infrastructure projects. Brenda Smith, Executive Director of the Nine Mile Run Watershed, told participants during the second charrette how utility companies have compromised the integrity of green infrastructure elements due to improper construction techniques. And stakeholders throughout all of the charrettes spoke of how a lack of public understanding about how green infrastructure differs from traditional landscaping or how a stormwater utility works, for example, could derail support for a citywide initiative.

Solutions

Recommendation: Implement a public outreach campaign. This would be a multi-faceted campaign, with content ranging from the basics of stormwater and green infrastructure to the intricacies of a stormwater utility and whole watershed solutions. The core component however, would be around the benefits of green infrastructure, including water quality, beautification, and economic development. Partners could include non-profits, including large landowners and smaller community organizations, foundations, sports teams, and private companies. Creating a “cool” and “catchy” brand and marketing campaign would be essential to successfully reaching target audiences. Outreach methods could include community meetings, advertising, signage, competitions (especially among neighborhoods), and school projects.

Intent: Based on stakeholder input and case studies from other cities, public education and outreach will be necessary to ensure the success of a green infrastructure initiative and can help identify new interest and potential partnerships that can support the effort.

Recommendation: Partner with key environmental non-profits to provide training and support for community groups and schools that want to implement green infrastructure, either by themselves or in conjunction with a PWSA early demonstration project.

Intent: Involving community groups can provide education, buy-in, funding opportunities, and possibly the ability to leverage the work of others to reduce stormwater runoff.

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Recommendation: Partner with key organizations (e.g. Builders Association, Allegheny County Conservation District, etc.) to conduct targeted education and outreach to the construction, building operations, property management and development community.

Intent: Committed stakeholders will be crucial to the successful physical implementation of green infrastructure.

Regulations

Challenges

Within the City of Pittsburgh, numerous regulations exist that affect where and how green infrastructure could be implemented. Downtown open space requirements, parking minimums, building codes that dictate setbacks from HVAC systems, and allowances for curb cuts were just some of the codes mentioned during the charrettes that can negatively impact the implementation of green infrastructure. Some of these codes, such as requirements for green space in parking lots, create opportunities for green infrastructure, if properly enforced. Others create barriers for green infrastructure, such as the current street standards. And nearly all of the regulations are difficult to read and understand, especially for the general public.

There are currently four City departments (Planning, Buildings, Public Works, and PWSA) who have to review and sign off on stormwater plans. However, there is little cooperation between these departments related to stormwater management. Additionally, many green infrastructure solutions are not approved for use per these reviews. Allegheny County and all of the other municipalities in the ALCOSAN service area also have their own regulations related to stormwater management.

Ultimately, ordinance-based implementation of green infrastructure could be cost-effective. However, it will be a challenge to create ordinances that are unique to Pittsburgh, are based on data, are easy to understand, are consistent with neighboring municipalities, and are enforceable.

Solutions

Recommendation: Build upon the Pitt Law Clinic study and any research conducted by the Green Infrastructure Network to create a better understanding of what ordinances relate to the implementation of green infrastructure.

Intent: Knowing the full scope of ordinances and agencies involved will be the first step in crafting revised ordinances and increasing collaboration.

Recommendation: Amend existing codes to decrease barriers to green infrastructure, e.g. parking maximums instead of parking minimums, allowing for curb cuts, etc.

Intent: Many existing ordinances unintentionally contribute to increased stormwater runoff and/or make it difficult to effectively install green infrastructure. Amending these codes will be critical for effectively reducing stormwater runoff and installing green infrastructure.



Center for Sustainable Landscapes - Paul Wiegman, Phipps Conservatory, Pittsburgh

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Recommendation: Craft an ordinance (preferably county-wide) to require source reduction in new development, and potentially redevelopment, that:

- Uses simple and fact-based parameters (including peak controls, design standards, volume retention),
- Is not too strict in terms of a design standard, as that would increase costs,
- Minimizes impediments to a developer’s ability to get approval, and
- Dictate compliance versus the means to compliance.

Intent: While ordinances can be a cost-effective method of implementing green infrastructure, effectiveness and compliance will be enhanced by creating an ordinance that is realistic yet allows for flexibility and innovation.

Recommendation: Use codes and/or the permit application process to incentivize private sector implementation of green infrastructure.

Intent: Finding ways to incentivize the private implementation of green infrastructure reduces public costs and demonstrates to developers that the City is interested in a collaborative relationship.

Recommendation: Create a comprehensive design manual which will provide guidance and cover topics such as:

- Inventory existing design guidance (PWSA, PennDOT, Statewide BMP manual, etc.)
- Define vision of design manual – what do we want to look like in 25 years?
- Uniform performance standards, but flexible in design solutions to meet those standards
- Include BMPs for challenging sites
- Provide watershed-specific guidance
- Make it easy and accessible for different audiences
- Note where exceptions should be made and provide in-lieu-of options (e.g. fees)
- Include guidance on monitoring and verification
- Include guidance on maintenance and ongoing operation
- Should be supported by revised codes
- Build capacity to use the manual through education and outreach

Intent: In order to be truly effective, green infrastructure must be properly designed and maintained. However, it cannot be expected that developers will have the knowledge and expertise to implement green infrastructure, if incentivized or required. Therefore, a comprehensive manual, unique to our region, would help ensure that developers are equipped to support the City in its efforts to implement green infrastructure.

Recommendation: Identify a single entity to lead stormwater review. Suggestions from the charrette included a stormwater utility and the Allegheny County Conservation District.

Intent: A single review of stormwater requirements will ease the burden on developers and ensure better coordination between departments.

Financial Considerations

Challenges

Like most of the other topics addressed in this section, a lack of clarity and definitive information is the main challenge associated with financial considerations. Throughout the charrettes, participants expressed uncertainty around how much a gray-green solution would cost versus an all-gray solution. Kari Mackenbach presented data from Louisville during the first charrette that showed a 22% lower capital cost for green infrastructure than grey infrastructure, including maintenance. However, additional data is needed to really be able to make the financial case for how green can reduce the cost of compliance for Pittsburgh and surrounding communities. Most of the charrette participants agreed, though, that when measuring the costs and benefits of various solutions, that a triple bottom line approach be used.

In addition to better understanding how much green infrastructure will cost, participants also expressed concerns over who would be paying for green infrastructure and how. There is not currently a public funding source associated with stormwater mitigation and management. Some private developers are also concerned over the costs of green infrastructure.

Solutions

Recommendation: Implement a stormwater service fee.

Intent: The primary financial solution discussed during the charrettes was the creation of a stormwater utility, which would include a stormwater service fee. Though there was little consensus on the details of a fee (geography, structure, etc.), there was consensus that it would be an integral part of mitigating financial challenges associated with green infrastructure.

Recommendation: Identify partnership opportunities that would allow for cost-sharing.

Intent: Whether it's to compete for federal funding or to make the most efficient use of existing municipal allocations, partnerships with elected officials, NGOs and universities, state agencies (such as PENNDOT), and neighboring municipalities were suggested as critical elements.

Recommendation: Help private developers better understand potential savings, increased revenue, or additional costs that they would incur from green infrastructure and consider ways to decrease the additional costs, if applicable.

Intent: Private developers can be allies for green infrastructure if they are well-informed and supported by the City.

Recommendation: Explore an Integrated Watershed Management approach to allow for more cost-effective investments.

Intent: IWM enables a more comprehensive examination of water quality beyond just the pollutants contributed by CSOs (which may not be the main source of contamination); thereby providing flexibility and guiding investment toward projects with the most cost-effective impact in terms of compliance with the Clean Water Act's goals of producing fishable and swimmable waters.



Maintenance

Challenges

Just as deferred maintenance makes gray infrastructure less effective, it also makes green infrastructure less effective. And because green infrastructure is far more visible, poorly maintained green infrastructure has additional negative effects on the public. Therefore, ensuring that green infrastructure is properly maintained into the future was an area of concern for charrette participants. Their questions were straightforward: Who does it? How do we do it? How do we pay for it?

In other cities, the maintenance of public green infrastructure is generally either done “in-house” by city employees or contracted out to private companies. Of course some green infrastructure will be on private property, so property owners would need to maintain it themselves. Many saw the maintenance of green infrastructure as an opportunity to create new jobs. The role of NGOs and volunteers was also considered, though some were unsure about the ability of those groups to be relied upon for long-term engagement. It was uncertain what combination of these groups would play a role in maintaining green infrastructure in Pittsburgh. Of course the key challenge is whether they are city staff, private contractors, or NGOs, they most likely do not have the specialized training necessary to properly maintain green infrastructure.

The cost of maintaining green infrastructure, how it compares to gray infrastructure, and where that money would come from were other questions posed.

Solutions

Recommendation: Adopt design guidelines that minimize maintenance issues.

Intent: Many maintenance issues can be avoided by choosing appropriate plants, locations, and technologies, which can be documented for the region through a thoughtful set of design guidelines.

Recommendation: Plan and budget for the maintenance of green infrastructure while implementing projects.

Intent: Planning and budgeting for maintenance is critical to ensuring that it happens.

Recommendation: Partner with NGOs and landscape industry stakeholders to identify best practices and train city and private employees.

Intent: Organizations such as the Pittsburgh Parks Conservancy and GTECH are already developing guidance on best practices for maintaining green infrastructure. Furthermore, organizations such as Phipps and the Penn State Center are providing education and training to landscapers. Other organizations, such as Pittsburgh Pipeline and Pittsburgh Green Innovators, were suggested as partners for youth job training partners.

Recommendation: Consider how a stormwater fee could be used to pay for maintenance/ how a utility could assume responsibility for maintenance.

Intent: A utility could provide a consistent and centralized mechanism for overseeing and funding green infrastructure maintenance.



Monitoring

Challenges

In many ways, monitoring itself is less of a challenge and more the solution to other challenges, namely skepticism from community stakeholders about the effectiveness of green infrastructure and the need to demonstrate measurable results for regulators. Though regulators are mainly concerned about the ability of green infrastructure to decrease the number of CSOs, many stakeholders felt that monitoring could be a tool to demonstrate the ability of green infrastructure to improve water quality, as well. However, like maintenance, understanding who monitors, how it's done, and how it's funded remain key questions. There are several green infrastructure projects that have been implemented in the City but there is no standard or source for common reporting and verification of efficacy.

Solutions

Recommendation: Install and monitor early demonstration projects.

Intent: As suggested above, monitoring itself is the solution to addressing skepticism around the effectiveness of green infrastructure. Therefore, monitoring should be a required element of all early demonstration projects, with results being readily accessible by the public.

Recommendation: Gather and consolidate data from existing green infrastructure projects in Pittsburgh.

Intent: Organizations such as the Pittsburgh Parks Conservancy and Local 95 were mentioned as having collected data on their own green infrastructure projects. If this information were available through a central and easy-to-understand resource, it could bolster confidence in the effectiveness of green infrastructure.

Recommendation: Partner with universities to monitor green infrastructure early demonstration projects.

Intent: Universities have the expertise and resources to assist in monitoring.

Recommendation: Provide information and resources for monitoring to community groups and private developers who are implementing green infrastructure.

Intent: Given the public's general lack of knowledge of monitoring protocol and resources to monitoring, support will be needed if PWSA would like to collect data on non-public green infrastructure projects.

Early Demonstration Projects

During the second charrette, participants were asked to identify possible locations for early demonstration projects. The resulting discussion helped identify a number of criteria for what would make a good early demonstration project. According to participants, a successful early demonstration project will:

- Engage multiple sectors and types of stakeholders
- Engage citizens and provide opportunities for education
- Leverage other ongoing projects and initiatives
- Comply with the Urban Forest Master Plan
- Coordinate with utility companies, where applicable
- Identify regulatory barriers
- Be part of a marketing campaign
- Leverage additional funding
- Have a dedicated, long-term maintenance plan and fund
- Have a measurable impact on CSO reduction
- Be scalable or adaptable to other areas
- Engage higher-education partners in monitoring

The following are early demonstration projects that were suggested by participants. These suggestions have not been vetted for their feasibility or accuracy, but can be used as a starting point as PWSA and partners consider projects.

City-wide Catalytic Projects

Implement GI in City right-of-ways

- Great percentage of publicly owned space available for GI
- Streets carry enormous amount of run-off
- Streets = flow corridors
- Develop matrix of ROW sections and green infrastructure opportunities

Enhance existing development projects

- South Side Park
 - + Park is currently neglected and has surface water problems
 - + Planned ecological restoration of park
 - + Connect to plans for 21st Street ecological restoration and stormwater management
- Greenfield Ave and Irvine Street
 - + High visibility
 - + Connects to park
 - + Adjacent to ALMANO site
 - + ALCOSAN structure nearby
 - + Potential high yield
- Mellon Arena Site
 - + Even if they are already putting new storm sewers in, they could put GI in to address water quality
 - + High visibility
 - + Good opportunity to partner
 - + Implementing GI at beginning of project makes good opportunity for monitoring
- Daylight Four Mile Run
 - + Reference 3R2N Stream Restoration and Daylighting Report (2001)
 - + See examples in other cities, such as Cincinnati
- Heth's Run/Zoo Parking Lot
 - + PennDOT bridge reconstruction
 - + Opportunity to partner with various groups

A-22 Sewershed (Bloomfield, Friendship, Shadyside)

- Busway/Valley Floor
 - + The topography and soils could be good; could restore surface hydrology and neighboring areas could eventually tie in
 - + Possibility of daylighting stream to 33rd street
 - + Space limited by railroad
 - + Busway creates large impervious surface
 - + Could be severe event retention area
 - + No currently proposed projects
 - + Good opportunity for partnerships
- Shadyside Residential
 - + Residents may have high likelihood of participation
 - + Could implement downspout disconnects and route water to right-of-way project/common bioretention
 - + Could also install infiltration drains in backyards
- Larimer Consensus Group Green Plan
 - + Community driven plan; existing interest in green development
 - + Strong community partners (Kingsley Association, Larimer Green Team)
 - + Availability of publicly owned land

Saw Mill Run

- Plummer's Run Sewer Separation
 - + Stream restoration
 - + Runs length of Saw Mill Road
 - + Need to address flows in two directions
 - + Same cost as Nine Mile Run restoration
- Beechview Ave. Business Area
 - + Very wide street
 - + Need to provide aesthetic improvements for businesses and surrounding area
 - + Pretty Up Beechview could be partner
- Route 88 & 51 Intersection
 - + Intersection reconstruction planning phase
 - + Review ways reconstruction could be used to capture stormwater and to alleviate chronic flooding issues in this area
- Target large impervious areas
 - + Several large parking lots, school properties, auto dealerships
 - + Example: Route 51 & Bausman surface area lots surrounded by Moore Park
 - + Possible mix of porous pavement and community bio-retention zones





Nine-Mile Run

- Divert storm water into Frick Park
- Stormwater from Wilksburg and Swissvale could be channeled into Frick Park
- Enhance existing wetlands using existing outflows
 - + Would have to consider existing flooding in Frick Park and wetland management issues
 - + Could incorporate under-drain in Regent Square brick streets with Fern Hollow outlet
 - + Maybe have a user fee charged to municipalities producing the flow
 - + NMR residents are already well-informed, NMRWA is in place
- Green Streets and Alleys
 - + In Swisshelm Park neighborhood
 - + Some alleys currently barely paved, easy installation
 - + Neighborhood could be resistant to change
- Roundabout near Frick Museum
 - + Could include bio retention, surrounded by permeable pavement
 - + Could be an easy retrofit to the asphalt/ mounded curb if no underground utilities; would need extremely salt tolerant plants
 - + Museum currently maintains planter/has difficulty irrigating them, but would likely welcome a different solution and partner with other organizations
- Entrance to Frick Environmental Center & Beechwood Blvd.
 - + Bioswales, tree pits, bump outs, etc. could be incorporated
 - + Will be a hugely visible site when the new Environmental Center opens, and this would complement the theme of a living building
 - + Opportunity to partner with Parks Conservancy, DPW
- Bioswales along Forbes
 - + Between Homewood Cemetery and Frick Park
- Wilkins Traffic Island
 - + Change from a raised planter to depressed bio retention and storage tank—slowly release stormwater back to combined sewer

Conclusion

The Pittsburgh Water and Sewer Authority is incredibly grateful for the time and knowledge contributed by stakeholders throughout this process. All of the information gathered during the charrette process is being used to inform the Green Infrastructure Section of PWSA's Wet Weather Feasibility Study. During the events, a number of the charrette participants pointed out that the USEPA had recently issued guidance on Integrated Watershed Management (IWM). One key element of the Study will be a detailed exploration of IWM, which reflects the fact that most stakeholders viewed green infrastructure as a tool for both improving water quality and decreasing the number of CSOs.

Even before the Study is approved by the Pennsylvania Department of Environmental Protection, PWSA is moving forward with implementing green infrastructure. At the conclusion of the final charrette, Jim Good, Interim Executive Director of PWSA, announced the creation of a Green Infrastructure Technical Advisory Committee and a partnership with the Pittsburgh Parks Conservancy, ALCOSAN, and the City of Pittsburgh DPW for an early demonstration project in Schenley Park. Furthermore, PWSA will continue to provide information and seek input on green infrastructure through their website, www.pittsburghgreeninfrastructure.com. PWSA looks forward to continuing to work with the stakeholders engaged through the charrettes on making green infrastructure an integral component of its Wet Weather Feasibility Study.



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