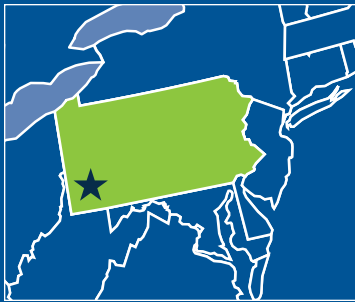


# PITTSBURGH, PENNSYLVANIA

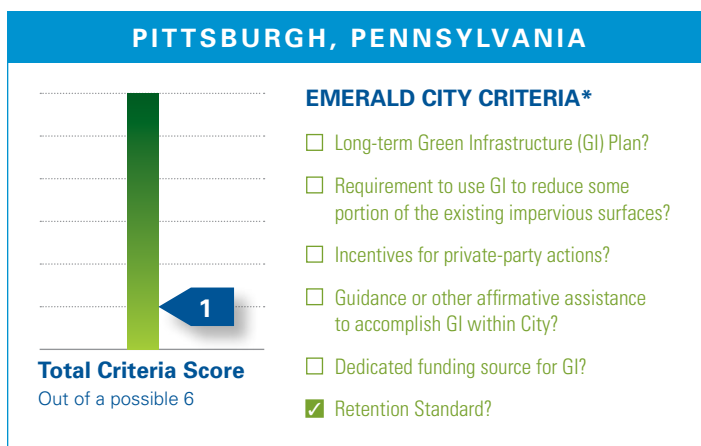
A CASE STUDY OF HOW GREEN INFRASTRUCTURE IS HELPING MANAGE URBAN STORMWATER CHALLENGES

**TYPES OF GREEN INFRASTRUCTURE USED:** Green roofs, rain barrels/cisterns, permeable pavement, rain gardens, infiltration trenches or vaults, vegetated swales, street trees, downspout disconnection, open space preservation



Pittsburgh has attempted to incorporate green infrastructure projects and practices into its stormwater management program and its efforts to reduce CSOs in the region. However, its most tangible accomplishment toward full-scale green infrastructure implementation is the passage of a stormwater ordinance that establishes stormwater volume reduction standards, including a requirement that developments larger than 10,000 square feet retain the first inch of rainfall on-site. Pittsburgh lacks a long-term green infrastructure plan, although it has enacted a number of programs aimed at creating permanent green spaces

or at greening vacant or abandoned lots throughout the city. It has also made an effort to encourage community participation in green infrastructure projects, particularly through use of Community Development Block Grants and support for individual greening projects. Yet the city has only a limited array of incentive programs or guidance available to the public or developers for incorporating green infrastructure, and does not have a dedicated funding source for green infrastructure. Pittsburgh's work to promote green building practices and remove hurdles to green infrastructure (for instance, by changing city codes to allow for downspout disconnections) have fared well. But the city could benefit from a more integrated approach to incorporate green infrastructure in its long-term planning.



## BACKGROUND

Pittsburgh is an older, post-industrial city struggling to repair years of environmental degradation wrought by its manufacturing past. The city, which lies at the confluence of three rivers—the Allegheny, the Monongahela, and the Ohio—has seen its population decline over the past several decades, due in part to the collapse of the steel industry. Left behind are pollution nuisances such as brownfields and slag heaps, as well as a shrinking urban center. Rather than leave abandoned properties sitting unused, Pittsburgh has redeveloped and reclaimed large parcels of land for greenways and parks.<sup>1</sup> Today it is experiencing a rebirth as a technology industry hub, with nearly 2,400 high-tech firms employing more than 90,000 people.<sup>2</sup>



The city's Green Up Pittsburgh Initiative, which started with a \$50,000 Community Development Block Grant, supports projects to transform city-owned vacant land into community gardens, parks and green spaces. It provides resources such as plants, pots, soil, and water, and covers liability, while residents are responsible for maintenance.

From late 1800s to the early 1900s, combined sewers were put in place throughout the Pittsburgh region. Today, the larger metropolitan area's 4,000 miles of sewer pipes and at least 450 combined and separate sewer overflow structures<sup>3,4</sup> release about 22 billion gallons of untreated municipal waste directly into receiving waters each year.<sup>5</sup> As little as one-tenth of an inch of rainfall can cause overflows, and during the boating season (May 15 to September 30), river advisories are issued on an average of 70 days, or about 50 percent of the season.<sup>6</sup> Complicating matters is that Pittsburgh is one of 83 separate municipalities serviced by the Allegheny County Sanitary Sewer Authority (ALCOSAN), with each municipality responsible for its own collection system. Under a 2007 federal court consent decree, ALCOSAN must submit a detailed wet weather plan (addressing both SSOs and long-term control of CSOs) by 2013, and must complete implementation of that plan by 2026.<sup>7</sup> ALCOSAN has estimated that to repair and expand the system using traditional stormwater management practices would cost more than \$3 billion.<sup>8</sup> More recently, city and county officials placed the cost at \$10 billion to \$50 billion.<sup>9</sup>

Water and sewer services for the city of Pittsburgh and the surrounding area are provided by the Pittsburgh Water and Sewer Authority (PWSA). Overall, PWSA is responsible for a combined collection system that serves approximately

80 square miles, includes 194 permitted CSO outfalls along the system's approximately 1,230 miles of pipes, and discharges into a system of interceptors owned and operated by ALCOSAN.<sup>10</sup> In 2004, the city of Pittsburgh and PWSA entered into a consent order and agreement with the Pennsylvania Department of Environmental Protection and the Allegheny County Health Department. The order required that the city and the sewer authority: inventory the collection system; assess the sewers and the performance of repairs; monitor the flow within the sewers and the implementation of an operation and maintenance plan for SSOs and Nine Minimum Controls for CSOs; and, collaborate with ALCOSAN to develop a long-term control plan.<sup>11,12</sup>

Since the first *Rooftops to Rivers* report, Pittsburgh has added several programs and incentives to revitalize the city with a strong green undercurrent. Some programs and policies, which were pilot projects in the past, have been incorporated into the city's operations. Pittsburgh encourages participation by individuals and the private sector by providing various incentives and by creatively engaging the public. However, CSO and stormwater issues are still prevalent, and local nonprofit organizations are working with the city and PWSA to encourage them to make greater use of green infrastructure practices for stormwater management.

## GREEN INFRASTRUCTURE IN PITTSBURGH

Since 2006, the city has enacted several new ordinances to enhance efforts to reduce CSOs and better prevent stormwater from entering sanitary sewer lines in separately sewer areas. First, in separately sewer areas, a local law requires that all illegal surface stormwater connections to city sanitary sewers be disconnected, allowing for dye testing of surface stormwater connections. Evidence of compliance is required as a condition of the sale of property and the issuance of city lien verification letters.<sup>13</sup>

Second, in 2007, Pittsburgh enacted a citywide stormwater ordinance establishing stormwater volume reduction standards for properties greater than 10,000 square feet in size, including on-site retention of the first inch of rainfall through any combination of infiltration, evapotranspiration, and rainwater harvesting. The local law also promotes practices such as preserving natural drainage systems, maintaining or extending riparian buffers, minimizing soil disturbance and compaction, and disconnecting impervious surfaces by directing runoff to pervious areas.<sup>14</sup> In 2010, the city expanded its ordinance to apply a more protective standard to publicly subsidized projects, citing the performance standard Congress has adopted for federal facilities as a model. These projects must use green infrastructure techniques to retain, to the maximum extent technically feasible, all runoff produced by rainfall events less than or equal to the 95th-percentile storm (1.5 inches).<sup>15</sup>

In addition, the Green Infrastructure Network, which is coordinated by the Pennsylvania Environmental Council and a nonprofit organization called 3 Rivers Wet Weather (3RWW), was formed as a voluntary partnership in 1998. It comprises more than 35 organizations, businesses, universities, authorities, and government entities (including the city of Pittsburgh and PWSA) that recognize the benefits of using green infrastructure in managing Allegheny County's stormwater. The network encourages the use of green infrastructure over gray where feasible, by cataloging existing green infrastructure in the region (available at [www.pag4g.org](http://www.pag4g.org)) and developing standardized monitoring protocols to document its effectiveness.<sup>16</sup> By early 2012, 3RWW expects to have an online database that identifies existing projects, in order to help identify locations where green infrastructure has the highest potential to reduce CSOs, and provide property owners with site-specific options and cost estimates.<sup>17</sup>

Further, in 2010, Allegheny County—working with environmental groups including the Pennsylvania Environmental Council and 3RWW—modified its plumbing code to allow downspout disconnections. Property owners

can now direct rooftop runoff to pervious areas so it will infiltrate into the ground, or to rain barrels or other capture devices so it can be stored and reused.<sup>18</sup> Prior to the code revision, all downspouts were required to be connected to either a separate or a combined sewer system.

## UTILIZING “GREEN” TO PROVIDE MULTIPLE BENEFITS

The city has also begun utilizing green infrastructure in other ways. In 2007, Mayor Luke Ravenstahl began a Green Up Pittsburgh initiative to reduce blight and public safety hazards, inspire community pride, and promote environmental values. The initiative, which started as a pilot project with a \$50,000 Community Development Block Grant,<sup>19</sup> consisted of three parts: support for individual greening projects; post-demolition greening; and community-wide strategic greening. To support individual projects, the city provides resources such as plants, pots, soil and water, and covers liability, while residents are responsible for conducting maintenance. For buildings being torn down, the city invests Green Up resources into specific parcels and works with the contractor to provide clean fill and low-maintenance grass. For community-wide efforts, the city works with community leaders to prioritize demolitions, identify potential garden sites, and create community-wide projects.

In the pilot phase, the city successfully transformed 40 city-owned vacant lots while engaging hundreds of volunteers. On the basis of the project's success, it was expanded in 2008, doubling its demolition budget. It was also boosted by a \$500,000 grant from the state's Department of Community and Economic Development. To date, the program has transformed more than 120 vacant lots into functioning green spaces. Information on the application process and on existing and past projects (as well as an interactive map showing locations) is maintained online.<sup>20</sup> The city also encourages individuals to plant gardens in vacant city-owned lots through its Garden Waiver Program, which allows residents to maintain the land while the city maintains legal liability for the parcel.

Taking these efforts one step further, in 2010 a team of experts and neighborhood stakeholders helped the East Liberty Development Corporation finalize the nation's first green overlay plan for a distressed urban district. The East Liberty Green Vision comprehensively inventories the environmental systems within the East Liberty community, creates guidelines and indicators for a sustainable neighborhood, and recommends strategies for currently blighted public spaces. Such strategies include the use of

green infrastructure practices such as street trees with larger tree pits, porous pavement, green roofs, and curb cutouts for better stormwater management. With this program, East Liberty is serving as a pilot site for green strategies within the city of Pittsburgh.<sup>21</sup>

## GREEN BUILDINGS

Pittsburgh is ranked eighth in the nation in the number of LEED® certified buildings. In 2003, its David L. Lawrence Center was built as the world's first LEED® Gold certified green convention center. By incorporating rainwater harvesting features, the building also uses 60 percent less potable water than other similar, non-LEED® buildings. In 2005, the Phipps Conservatory and Botanical Gardens underwent a major expansion and installed the nation's first LEED® certified visitor center, which included a rain garden, a 15,000-square-foot green roof, and a cistern to store rainwater for use in ornamental ponds.<sup>22</sup> To encourage more green buildings, the city enacted a 20 percent height and floor density bonus for LEED® certified buildings in 2007. It also instituted a requirement that publicly financed development projects costing more than \$2 million or measuring more than 10,000 square feet attain LEED® Silver certification. With these incentives, the city now has 39 LEED® certified buildings, and an additional 60 new city projects are pursuing certification.<sup>23</sup> The city has not, however, taken the extra step to specifically incentivize green infrastructure stormwater controls as part of its green building program.

## GREENWAYS, OPEN SPACE, URBAN TREE ASSESSMENTS, AND TREE VITALIZE

Pittsburgh's topography is dramatic, with hills adding beauty to the urban landscape. In total, hillsides account for nearly 20 percent of Pittsburgh's land area. Development in these areas, however, is less desirable due to the high cost of city services and potential slope instability. As a result, there are a high number of small tax-delinquent parcels in these areas. To provide a strategy for their use, Pittsburgh started the Greenways for Pittsburgh program in 1979 to designate select vacant parcels as permanent green space.<sup>24</sup> Working with the city's Real Estate Department, the Department of City Planning acquires designated properties as greenways and continues to expand the program to include contiguous parcels that are either tax delinquent or vacant.<sup>25</sup>

The city views the Greenways program not just as a means of protecting natural, cultural, and scenic resources, but also as a way to enhance quality of life and stimulate economic development.<sup>26</sup> Additionally, the city's Department of City

Planning is currently developing an Open Space, Parks, and Recreation Plan to address issues of connectivity, ownership, management, and maintenance. This plan will be one of 12 components of PLANPGH, the city's first-ever comprehensive plan, and will encompass the city's vision and policy recommendations for future land use, infrastructure, and public services.<sup>27</sup>

In order to strategically identify areas with tree canopy needs, Tree Pittsburgh, in partnership with various city departments, performed a street tree inventory in 2005. With this information, the city completed a cost-benefit analysis that showed for every dollar spent on a municipal forestry program, three dollars in benefits are received in the form of stormwater control, reduced energy costs for cooling, increased property values, and more. In total, Pittsburgh's street trees were estimated to provide \$1.6 million in net annual benefits. In 2010 Tree Pittsburgh began creating an urban forest master plan. Information gathered in the master planning process is being used to develop a coordinated approach between public and private stakeholders to protect, maintain, and restore the city's tree canopy.<sup>28</sup> One result of this work has been the establishment of TreeVitalize Pittsburgh, a joint project of Allegheny County, the city of Pittsburgh, Tree Pittsburgh, the Pennsylvania Department of Conservation and Natural Resources, and the Western Pennsylvania Conservancy. TreeVitalize Pittsburgh has set a target to plant 20,000 trees by 2012 throughout the Pittsburgh region.<sup>29</sup>

## NINE MILE RUN AND PANTHER HOLLOW WATERSHED

In 2006, the city of Pittsburgh and the Army Corps of Engineers were near the completion of a \$7.7 million restoration of Nine Mile Run, a highly degraded stream that runs through a 455-acre park and recreation area. (The city and the Three Rivers Wet Weather Demonstration Program contributed \$2.7 million, while \$5 million came from the Corps.) The stream is one of the few in the city that have not been encased in concrete. Now complete, the restoration involved not just the repair of the stream itself but reductions in sources of wet weather pollution to Nine Mile Run.<sup>30</sup>

The Nine Mile Run Watershed Association (NMRWA) continues to ensure the protection of the restored stream, and in 2009, after a severe storm impacted a number of hydraulic features constructed during the 2006 restoration, the association secured funding for repairs.<sup>31</sup> In addition, NMRWA has installed more than 1,320 rain barrels since 2004 and is currently gathering data to measure their impact on runoff.<sup>32,33</sup>

One ecologically significant component of Nine Mile Run is the 384-acre Panther Hollow Watershed, an important natural and recreational area that encompasses the Panther Hollow Run and Phipps Run streams, which join above Panther Hollow Lake.<sup>34</sup> In the fall of 2010, the Pittsburgh Parks Conservancy secured a \$1 million grant from the Richard King Mellon Foundation to partly fund the restoration of the watershed by reducing stormwater runoff and preventing further degradation of the hollow and its man-made lake. The Pittsburgh Parks Conservancy, in partnership with the City of Pittsburgh, is considering green stormwater approaches such as residential rain gardens, street trees, and bioswales as part of the solution.<sup>35</sup>

## FINANCING STRATEGY

The ways in which Pittsburgh encourages participation in city greening programs, such as converting vacant lots into garden areas, is unique, allowing community members to actively engage in turning public eyesores—rundown, vacant lots—into public goods. The city has also used other incentives to encourage investment in green infrastructure.<sup>36</sup>

Capital improvement programs such as distribution, sewer conveyance, water supply and filtration projects, dye tests, and the repair of aging infrastructure is the responsibility of PWSA. PWSA's work is partly covered by a service charge, which increased 7.7 percent at the beginning of 2011. At the end of 2009, PWSA implemented a 5 percent Distribution Infrastructure System Charge on all water bills to cover a major investment in infrastructure upgrades.<sup>37</sup> For 2011, the fund's budget was projected to be \$6.3 million. In addition, the PWSA doubled its capital improvement budget from \$20 million in 2009 to \$41.7 million in 2010.<sup>38</sup>

## \*EMERALD CITY RATING SYSTEM

Each of the cities profiled in *Rooftops to Rivers II* is a leader in green infrastructure investment—rethinking the design of municipal services and infrastructure. These cities leverage funding in creative ways. They provide tools to residential and commercial land owners to retrofit private properties and realize the multiple benefits provided by green infrastructure. In short, they are changing how cities look and function.

NRDC's Emerald City Rating System identifies six actions cities should undertake to maximize their green infrastructure investment. Our metric does not directly compare one city to another, due to geographical, population, budgetary and other differences. Instead, it identifies the presence or absence of common factors of success that NRDC believes are essential elements of a robust green infrastructure commitment. Only one city profiled, Philadelphia, is undertaking each of the actions identified, although each city is undertaking at least one.

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