Green Infrastructure: A Stormwater Pollution and Economic Solution for Buffalo, NY

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I. Introduction: What is Green Infrastructure?

Green infrastructure is an ambiguous term that encompasses different meanings for every individual. According to the Environmental Protection Agency (hereinafter EPA) green infrastructure "uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water."[1] Likewise, green infrastructure can also be considered "a strategically planned and locally managed network of protected green space with multiple purposes and benefits…includ[ing] a wide range of landscapes, such as natural areas, public and private conservation lands, and public and private working lands of conservation value. These landscape hubs can then be linked by a network of trails and greenways."[2] Clearly, the EPA version has a precise focus on environmental impacts, while the second definition has a focus on urban planning. The differing definition examples shows that green infrastructure can be used in a multitude of ways.

This paper will focus on a dual purpose for green infrastructure: stormwater pollution prevention and the local economy. Green infrastructure can be used for environmental purposes by reducing the pollution collected during stormwater runoff, and the havoc a combined sewer overflow system causes (combined sewer overflow allows the discharge of raw sewage and stormwater into local waterways when the system receives too much rain water or snowmelt). Green infrastructure can also be used as a tool to boost the local economy. The use of green space in the form of parks, pocket parks, community gardens, and greenway linkages raise property value and increase investment in neighborhoods devastated by shrinking population, and vacant/abandoned housing.[3]

[1] http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm
[2] *Joseph Schilling,* Blueprint Buffalo—Using Green Infrastructure to Reclaim America's Shrinking Cities
[3] Id

II. Statutory and Policy Overlay of Green Infrastructure.

The Federal Government's oversight for green infrastructure stormwater runoff comes from the Clean Water Act (hereinafter CWA), and requires implementation of different phases to reduce stormwater runoff.[4] Phase I of the EPA's stormwater program was promulgated in the 1990 amendments to the CWA.[5] The amendment requires a permit under the National Pollutant Discharge Elimination System (hereinafter NPDES) to address stormwater runoff from municipal storm sewer systems (hereinafter MS4s) serving populations of 100,000, construction activity disturbing 5 acres of land or greater, and lastly ten categories of industrial activity.[6] The Stormwater Phase II Final Rule expands the Phase I program by requiring "additional operators of MS4s in urbanized areas and operators of small construction sites, through the use of NPDES permits, to implement programs and practices to control polluted stormwater runoff."[7] The Federal Government works hand in hand with state environmental agencies to meet the goals of the CWA.

New York State takes part in the stormwater runoff permitting system. The New York State Department of Environmental Conservation (hereinafter DEC) regulates stormwater runoff under the authority of the Environmental Conservation Law (hereinafter ECL).[8] The DEC regulates runoff through a State Pollutant Discharge Elimination System (hereinafter SPDES) permits.[9] The program is similar to the NPDES permitting program, and the EPA has given the DEC permission to regulate in this manner.

The City of Buffalo and the Buffalo Sewer Authority (hereinafter BSA) in accordance with the EPA's Phase II requirements has created a management program. The program has six elements or minimum goals: public education and outreach, public involvement/participation, illicit discharge detection and elimination, construction site runoff control, post-construction stormwater management, and pollution prevention/good housekeeping for municipal operations.[10] The goals are to keep the stormwater in compliance with the standards required under the DEC's SPDES permit.[11]

Local municipality's laws and policies, such as zoning and planning, play one of the most vital roles in the implementation of green infrastructure. First, municipalities often have local laws requiring downspouts to be connected directly to the sewer system, but this can be easily changed to allow homeowners let the runoff onto their yard or collected in a rain barrel (Buffalo

[4] See, 33 U.S.C., §§1251 et sq.
[5] Id, 1990 amendment
[6] Id
[7] Environmental Protection Agency, Stormwater Phase II Final Rule An Overview, available at http://www.epa.gov/npdes/pubs/fact1-0.pdf
[8] N.Y. Envtl. Conservation Law Art. 17 §5.
[9] Id.
[10] Wendel Duchscherer, Stormwater Management Plan, (2007), available at http://www.city-buffalo.com/files/1_2_1/BSA/IntranetFiles/stormwater/BSA_SWMP.pdf.
[11] See, DEC General Permit (G02-02).

took this initial step a few years ago).[12] The disconnection of downspouts reduces runoff from homes, and is one of the easiest changes a municipality can make.

Second, municipal zoning laws play a significant part of green infrastructure. A municipality may change the zoning to allow the necessary space to implement green infrastructure such as swales and natural runoff filtering at the street level. Furthermore, a municipality can convert an industrial zone into green open space and then change the zoning to mixed use allowing homes or offices to be built adjacent to green space, thereby incentivizing the use of old "pre-used" land as opposed to virgin green land, and revitalizing sections or neighborhoods of a city.[13]

Lastly, municipalities must change planning policies to allow implementation of green infrastructure to achieve both purposes of improving stormwater runoff pollution and to improve the local economy. As in many rust belt cities, Buffalo has a shrinking population and economy leaving abandoned and vacant homes.[14] Municipalities tend to think they must grow or attract business to be successful; however, choosing the "right size" infrastructure can lead to population and economic stabilization and can be used as a stepping stone for growth.[15] Green infrastructure can be the catalyst for stabilization.[16] Providing open green space will improve housing values for the adjacent properties and be a driving force to stop abandonment of housing.[17] Open green space can attract other home buyers to the area as well. Likewise, the improvement in local waterways through green infrastructure will improve waterfront property values, and become a local attraction for tourism and investment.

III. Barriers to Green Infrastructure.

There are several barriers to green infrastructure: cost, lack of knowledge, and resistance from local and municipal officials (cost representing 30% of those surveyed, lack of knowledge 25%, and resistance from local officials 22%).[18] First, cost is the most cited barrier to implementing green infrastructure.[19] Nevertheless, there are federal funded grant programs through the EPA, Department of the Interior (hereinafter DOI), Department of Energy (hereinafter DOE), Housing and Urban Development (hereinafter HUD), and many others.[20] The EPA has several programs that a municipality or state can use to provide funding for green infrastructure. The CWA authorizes federally funded grants to assist in nonpoint source

[12] Tina Meyers, Green Infrastructure Can Combat Combined Sewer Overflows in Buffalo, NY, (2007), available at http://green-cities.wikispaces.com/file/view/green+infrastructure.pdf.
[13] Metropolitan Area Planning Council, Mixed Use Zoning A Planner's Guide, available at http://www.mapc.org/sites/default/files/Mixed_Use_Planners_Toolkit.pdf.
[14] Ouch! City's Population Down 10.7 Percent in Last Decade, Buffalo Rising, available at http://www.buffalorising.com/2011/03/ouch-citys-population-down-107-percent-in-last-decade.html.
[15] See, supra n. 2.
[16] Id.
[17] Id.
[18] Barriers to Green Infrastructure in the Hudson Valley: an electronic survey of implementers, available at http://www.dec.ny.gov/docs/remediation_hudson_pdf/giresults12.pdf.
[19] http://water.epa.gov/infrastructure/greeninfrastructure/gi_funding.cfm.
[20] Id.

management programs.[21] The Clean Water State Revolving Fund provides funds for water quality protection projects for wastewater treatment, stormwater management, nonpoint source pollution control, and watershed and estuary management.[22] The EPA's Community Action for a Renewed Environment is a cooperative agreement grant program that supports community-based partnerships to reduce pollution at the local level.[23] New York State has created the Green Innovation Grant Program that supports projects that utilize unique stormwater infrastructure design and create cutting-edge green technologies.[24] The Green Innovation Grant Program is funded under the American Recovery and Reinvestment Act of 2009.[25] Therefore, while cost is the greatest barrier to green infrastructure, a municipality or state as a plethora of grant programs that apply to green infrastructure projects.

Next, the lack of knowledge, and lastly the resistance of local and municipal officials to green infrastructure are simple barriers to overcome. Local non-profit groups can run educational campaigns to bring community awareness of the benefits of green infrastructure, both environmental benefits and positive local economic impacts. The resistance of local and municipality officials stem from a lack of knowledge of green infrastructure.[26] Again local non-profit organizations need to educate the local officials of the many benefits associated with green infrastructure. An emphasis on the revitalization of urban neighborhoods would attract the approval of many local and municipal officials.

IV. Green Infrastructure Programs in Buffalo.

Buffalo has begun implementing many aspects of green infrastructure in select neighborhoods, businesses, schools and universities across the city.[27] These projects include green space, rain gardens, rain barrels, swales, street trees, green roofs, bio-retention, and porous pavement.[28] Buffalo has rescinded local municipal laws requiring that homeowners connect downspouts to the sewer system, and allow the downspout to drain naturally through soil or collect in rain barrels.[29]

Cooperation between the Buffalo Niagara River Keeper and the BSA has led to a recent project in the Elmwood neighborhood of Buffalo.[30] The project incorporated many different techniques of green infrastructure to reduce stormwater runoff,[31] and incorporates combined

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[21] 33 U.S.C. §1329.
[22] See, supra n. 19.
[23] http://www.epa.gov/care/
[24] http://www.nysefc.org/Default.aspx?tabid=461
[25] American Recovery and Reinvestment Act of 2009, Pub. L 111-5
[26] See, supra n. 18.
[27] http://bnriverkeeper.org/projects/green-infrastructure/programsrain-barrelsabout-green-infrastructure/examples-of-green-infrastructure/
[28] Id.
[29] See, supra n. 12.
[30] Green Streets Come To Elmwood, Buffalo Rising, available at http://www.buffalorising.com/2011/05/green-streets-come-to-elmwood.html
[31] Proposed Commercial Green Infrastructure Retrofit t for Elmwood Ave, available at http://bnriverkeeper.org/wp-content/uploads/2012/08/CSO-60-Commercial-graphics.pdf.

sewer overflow sewer shed (known as CSO 60) that outfalls into Scajaquada Creek near Hoyt Lake at Delaware Park.[32] The project has been a viewed as a great success to abate stormwater runoff, but the project will be monitored for two years and an official report will highlight the amount of stormwater runoff that was reduced due to the implementation of green infrastructure.[33]

V. Conclusion.

Improvements in Buffalo's waterways and economy would be significantly facilitated if more green infrastructure projects were implemented in the city. Buffalo has a combined sewer overflow issue that causes pollutants collected from roofs, roadways, and other paved spaces, to flow into the sewer system. When significant rainfall or snow melt occurs the combined sewer overflow system allows the raw sewage and stormwater runoff to pour directly into the Niagara River. Green infrastructure can be used to divert the runoff and allow it to be naturally filtered through soil before entering the water table. Furthermore, Buffalo has a large amount of vacant/abandoned houses in several impoverished areas. This is an opportunity for Buffalo to demolish the vacant housing and create open green space that will increase the property values to adjacent property owners. Buffalo as many other shrinking rust belt cities is situated to benefit from the dual purposes of green infrastructure.

[32] http://bnriverkeeper.org/cso-60-demonstration-project/

[33] Buffalo Green Streets Demonstration Project, CSO Outfall No.060 - Green Infrastructure Project, Fact Sheet, available at http://bnriverkeeper.org/wp-content/uploads/2011/12/Bflo-Green-Streets-Demo-Project-Fact-Sheet_CSO60.pdf.