Green Infrastructure Can Combat Combined Sewer Overflows in Buffalo, NY

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Research Project

December 4, 2007

Executive Summary

Every year millions of gallons of raw sewage are dumped directly into our local waterways here in Buffalo, NY.[1] Combined sewer overflows (or CSO's) are the cause of this environmental and human health hazard, and they occur an average of 68 times per year, whenever we have heavy rain or snow.[2]

Currently the Buffalo Sewer Authority (BSA) is negotiating with the New York State Department of Environmental Conservation (DEC) and the United States Environmental Protection Agency (EPA) to come up with a cost-effective means to prevent CSO's from occurring and thus bring our local waterways into compliance with water quality standards. BSA is required by law to develop and implement a CSO Long Term Control Plan (LTCP) that explores all viable options for remedying the situation.[3]

BSA has already spent millions of dollars in researching available technologies for the purpose of preparing the draft LTCP.[4] Unfortunately, the CSO control measures explored in the LTCP are limited to massive infrastructure improvements that could require billions of dollars and that treat stormwater as a waste product instead of a resource. These large scale capital improvements include slowly separating the combined sewer system into separate lines for sewage and stormwater, and building an enormous underground storage tank to hold excess waste water during rain events for treatment at a later time.[5]

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[1] Julie Barrett O'Neil, letter from Buffalo Niagara Riverkeeper to Buffalo Sewer Authority in response to the LTCP, July 3, 2007, p. 1.
[2] City of Buffalo Comprehensive Plan, Section 1.6.10 "Sewer System."
[3] Environmental Protection Agency, "National Pollutant Discharge Elimination System: Combined Sewer Overflows CSO Control Policy", 2002, EPA website.
[4] Buffalo Sewer Authority, System-wide Long Term Control Plan for CSO Abatement, "Executive Summary," Volume 1 of 3, 2004 [hereinafter LTCP].
[5] Buffalo Sewer Authority, System-wide Long Term Control Plan for CSO Abatement, Volume 1 of 3, 2004, at Section 6: "Screening of CSO Control Technologies."

The alternatives that were not given due consideration in the LTCP are those that prevent stormwater from entering the sewer system in the first place by controlling it at its source. The BSA admits that these "source controls" are much cheaper than capital improvements but claims that the calculation of their effectiveness is infeasible.[6] This paper will attempt to do the background work for Buffalo and show that source controls are extremely effective and low cost, and that their positive results have been proven and quantified in many other cities.

It is imperative for Buffalo's economy and the health of its residents, that the BSA and City use cost effective technologies to combat the CSO problem. Buffalo needs to use source controls, including green infrastructure, to supplement and therefore minimize the expensive capital improvements proposed. Examples of successful green infrastructure technologies include rain gardens, vegetative swales, rain barrels, permeable pavement, street trees, and disconnecting downspouts from storm sewers. These controls are being effectively implemented in many other cities, including Minneapolis, Chicago and Portland. If Buffalo follows their innovative lead, it will reduce the CSO's, save millions of dollars, and reap a multitude of environmental and health benefits.

Current Situation in Buffalo

Combined sewer overflows are a planned mechanism to prevent raw sewage from backing up into our basements - instead we allow it to back up into our local rivers,

[6] *Id.*

creeks and canals. A majority of Buffalo's combined sewer system was built before 1910.[7] Sewage and wastewater from our homes and businesses are diverted into the same piping system as snow and rainwater. This piping system feeds directly into the waste water treatment plant (WWTP) at Bird Island.[8] During rain and snow events, the amount of stormwater is too much for the WWTP to process all at once, and therefore the system backs up. Instead of allowing this backup of sewage and wastewater to go back into our homes, there are a series of sewer outfalls which allow the excess waste to release directly into our rivers and lakes.

Sewage and stormwater entering our local waterways through combined sewer overflows are considered point source pollution by the Clean Water Act. The City of Buffalo is therefore required to obtain a State Pollution Discharge Elimination (SPDES) permit that allows for the occurrence of a certain number of CSO's.[9]

Out of the 840 miles of sewers in Buffalo, 790 are combined sewer systems, resulting in about 68 combined sewer overflows occurring per year.[10] During each of these events, millions of gallons of untreated sewage and stormwater are dumped directly into Lake Erie, Niagara River, Buffalo River, Black Rock Canal, Scajaquada Creek, and Cazenovia Creek.[11]

Unfortunately, these are the same waterways that many low-income residents use for swimming and recreation, and even subsistence fishing.[12] Each combined sewer

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[7] Buffalo Sewer Authority, System-wide Long Term Control Plan for CSO Abatement, Volume 1 of 3, 2004, at "Section 2: Study Area Description."
[8] *Id.*
[9] *Id.* at Section 1.
[10] *Id.* at Section 2.
[11] *Id.* at "Section 2.1.5: Receiving Water Bodies."
[12] Barrett O'Neil at 2.

overflow releases multiple pollutants into the receiving waterway, including suspended solids, bacteria, nitrates, phosphorous, zinc and even antibiotics and hormones.[13]

The BSA explores multiple alternative control plans in its draft LTCP.[14] The first alternative consists of collection system improvements, as well as future WWTP improvements, and is estimated to cost $165 million over the next twenty years.[15] This is the most basic of the plan alternatives, and the one supported by the BSA. Construction is due to begin next year on some of the projects contained in Alternative 1.

The Long Term Control Plan alternative preferred by the DEC is estimated to cost $524 million, and includes Alternative 1 control technologies, as well as various alternatives for different districts.[16] If local stormwater storage facilities are added to Alternative 1, the estimated cost shoots up to $1.6 billion.[17]

One of the CSO control technologies "screened" in the BSA LTCP is the source control group.[18] The BSA did not touch upon green infrastructure controls and only mentioned litter control, public education on litter control, street cleaning, and catch basin cleaning.[19] The Plan admits that these controls have low capital cost associated with them, but dismisses them as being independently insufficient for total CSO control. The BSA also states that it is infeasible to calculate their results.[20]

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[13] Center for Neighborhood Technology, "Green Infrastructure Performance, Results of Monitoring Best Management Practices," 2007.
[14] LTCP at "Section 1."
[15] *Id.*
[16] *Id.*
[17] *Id.* at "Section 8: Development of System-wide Improvement Alternatives."
[18] *Id.* at "Section 6: Screening of CSO Control Technologies."
[19] *Id.*
[20] *Id.* at "Section 6: Screening of CSO Control Technologies."

The Plan also alleges a potential for street and yard flooding associated with local stormwater storage technologies.[21] Realistically, if the BSA had considered green infrastructure as a viable source control, it would have found that green infrastructure helps with flood *management* as opposed to actually causing floods.[22]

The City of Buffalo's Comprehensive Plan also fails to mention any source control alternatives for addressing the CSO problem. It merely states that eliminating the pollutants resulting from CSO's "will require separation of storm sewers from sanitary sewers."[23]

Sewer overflow events stemming from the City of Buffalo are not the only cause of substandard water quality in our local rivers and streams.[24] As the BSA points out in its draft LTCP, a huge part of the pollution is originating in municipalities upstream of the city.[25] According to the Plan, even a complete cessation of CSO's in the city of Buffalo will not bring our local waterways into compliance with water quality standards.[26] Instead the BSA proposes a watershed or regional approach to stormwater management, and states that they should not be required to employ any CSO prevention techniques until the outlying towns are required to do the same.[27]

Although a regional or watershed plan for stormwater management is an excellent idea, the City of Buffalo needs to immediately take ownership of the problem that does originate in our sewer system. It would not only alleviate the CSO's produced by our

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[21] *Id.*
[22] Center for Neighborhood Technology, "Water: From Trouble to Treasure, A Pocket Guide to 'Green' Solutions," 2006, p. 16. [hereinafter CNT pocket guide]
[23] Buffalo Comprehensive Plan, Section 1.6.10 "Sewer System."
[24] LTCP at "Executive Summary."
[25] *Id.*
[26] *Id.*
[27] *Id.*

waste and stormwater but would set an excellent example for the surrounding municipalities to follow.

Since 90% of the water entering the WWTP during CSO periods is rain or melted snow, stormwater management needs to be made a priority. Instead of focusing solely on enormously expensive retrofitting of the current combined sewer system, Buffalo needs to implement green infrastructure source controls.[28]

Green infrastructure is an extremely cost effective type of source control that can prevent up to 90% of stormwater from even entering the sewer system and has a multitude of secondary environmental and community benefits.

Types of Green Infrastructure Source Controls

The three goals that BSA has in developing and implementing CSO control technologies are to reduce the volume of CSO's, reduce flow to the WWTP, and reduce sewer back-ups and sewer flooding in resident homes and businesses. Green infrastructure effectively meets all these goals, and more.

The main issue behind CSO's is one of imperviousness. Over time green space, wetlands, and vegetative cover have been replaced with cement and pavement. This development has interrupted the natural cycle that slows down water movement and allows filtration of water into the ground, water table and consequently into local waterways.[29] In Buffalo and other cities with combined sewer systems, unfiltered stormwater moves rapidly into storm drains and then to the WWTP. But during rain and snow events this water moves untreated along with raw sewage and industrial wastewater

[28] Lynda H. Schneekloth, "Water: Infrastructure and Imagination", Buffalo, NY, p. 15, 2007 (draft).
[29] Schneekloth at 14.

directly into the waterways. A problem occurs even in cities with separate storm sewer systems, because untreated and often polluted stormwater always moves directly into water bodies.[30]

Green infrastructure methods look to stormwater as a resource and opportunity. These best management practices hold the water at its source to enable filtration and slow down the process of run-off into the sewer system.[31] The EPA has validated green solutions as acceptable practices for addressing the CSO problem.[32]

In this section I will briefly describe the components and attributes of some proven, effective green solutions such as rain gardens, vegetative swales, green streets, street trees, permeable pavement, rain barrels, downspout disconnection, and water conservation.

Rain Gardens

Rain gardens filled with native vegetation can capture and slow down the movement of runoff, giving it a chance to infiltrate into the ground instead of draining into the sewer system.[33] This process protects roads and stream banks from erosion, all while bringing native greenery into the yard and neighborhood.

Professional assistance is not needed to implement a rain garden; they are simple and low cost. Native plants need to be planted into a sunken area in the ground that directs water approximately 10 feet away from buildings. The depression will trap the

[30] *Id.*
[31] *Id.*
[32] *Id.* at 15.
[33] CNT pocket guide at 6.

water, and the long-rooted native plants will help soak it into the ground.[34] Not only does this slow down the speed of run-off, but it also naturally filters pollutants from the water.[35]

Native plants are more beneficial than turf grass because they form a spongy layer of roots and air spaces that goes up to 10 feet deep. These long roots infiltrate water into the soil more quickly than turf grass, which has short, dense roots.[36]

Various educational materials are available on the internet with directions on how to build a rain garden, native vegetation types in different areas, and numerous success stories in other cities.[37]

Vegetative Swales

A vegetative swale is "a broad, shallow channel with a dense stand of vegetation covering the side slopes and bottom."[38] Swales are designed to trap particulate pollutants, increase filtration of stormwater, and reduce the velocity of runoff. They can be used to replace curbs, gutters and storm sewer systems.[39]

Green Roofs

[34] CNT pocket guide, p. 6.
[35] CNT pocket guide, p. 6.
[36] CNT pocket guide, p. 7.
[37] Center for Neighborhood Technology website, www.cnt.org
[38] Environmental Protection Agency, "Stormwater Technology Fact Sheet: Vegetated Swales," 1999. [hereinafter EPA swales]
[39] EPA swales.

Green roofs are formed by covering the roof of a building either partially or completely with vegetation and soil planted over a waterproof membrane.[40] Green roofs reduce peak flows by 97% and retain up to 61% of the volume of a CSO-causing storm.

Street Trees

Preserving existing trees on city streets, as well as planting new ones, allows for a greater canopy of leaves to catch rainfall before it makes its way into the storm sewers.[41] Tree roots also increase water absorption by breaking up tightly packed soil.[42]

Permeable Pavement

Instead of repaving city streets, driveways, alleys and sidewalks, a city can use porous surfaces. Permeable pavement includes anything from pavers to gravel, and allows stormwater to soak into the ground instead of directing it into a storm sewer.[43]

Rain Barrels

Rain barrels keep stormwater from entering the sewer system, and also aid in water conservation. Water that runs off the roof and is then caught by the rain barrel can be used for future lawn or garden watering, car washing, etc.[44] This collected water reduces the need for municipal water, which in turn lowers water bills and saves energy.

Green Streets

Streets become "green" when they rely on street planters, curb extension vegetative swales, rain gardens, and permeable pavements to significantly reduce stormwater runoff into the sewer system.[45] This green design allows for stormwater

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[40] Mike Plumb, "Sustainable Raindrops," Riverkeeper, 2006, p. 17.
[41] CNT pocket guide, p. 4.
[42] *Id.*
[43] *Id.* at 5.
[44] *Id.*
[45] Center for Neighborhood Technology, "Green Infrastructure Community Profile: Portland, Oregon," 2007. [hereinafter CNT Portland]

runoff management at the source, the slow filtration of that runoff, and provides a more visually pleasing community.[46]

Downspout Disconnection

Currently in the City of Buffalo, it is legal to connect your gutters to the storm sewers (in fact, the City *required* connected downspouts until recently). Disconnecting the downspout of a roof or basement sump pump from the sewer helps keep the stormwater on site instead of overwhelming the sewer system.[47] To avoid flooding, downspouts can be directed into a rain garden or rain barrel.

Water Conservation

In addition to deflecting stormwater from entering into the sewer system, Buffalo should focus on residential and commercial water conservation practices. Distributing water-saving devices to city residents can cut water consumption by 18 to 20 percent.[48] In addition to reducing pressure on the combined sewer system during rain events, low-flow fixtures and high water efficiency appliances will reduce water treatment costs and chemical use.[49] The EPA also reminds us that efficient water use can also reduce the amount of energy needed to treat wastewater, resulting in less energy demand and fewer harmful byproducts from power plants.[50] The public water supply treatment facilities also would save enormously on electricity costs because of the lessened demand for water.[51]

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[46] CNT Portland.
[47] CNT pocket guide at 5.
[48] New York Times article, "Orlando to Distribute Water-Saving Devices," October 31, 1982.
[49] Barrett O'Neill at 3.
[50] Environmental Protection Agency, "WaterSense: Efficiency Made Easy, What are the Environmental Benefits of Water Efficiency?", 2007, EPA website.
[51] EPA Benefits of Water Efficiency.

The City Council in Orlando, Florida spent $564,000 back in 1982 to install water-saving devices in all 41,000 homes in the City.[52] These devices, which restrict water flow in taps, showers and toilets, cut water consumption by 18 to 20 percent.[53] This drastic decrease in water use leads to lower water bills for residents, lower bills for the City, as well as 20% less domestic waste water entering the sewer system.

Source Controls are Cheaper and More Effective than Capital Improvements Alone

Each of these green source controls would alleviate stress on the sewer system in Buffalo and save money for the city, its residents and businesses, as well as increase our quality of life. Buffalo faces a multitude of environmental issues, and considering its financial distress, being able to tackle many of these issues with one program is hugely beneficial.

In order for the BSA to include green source controls in the LTCP as a serious alternative, the feasibility and effectiveness of the technologies need to be quantified. Various sources exist to help evaluate the costs and benefits of green solutions against those of conventional infrastructure programs.[54]

The Center for Green Technology in Chicago, Illinois has developed a Green Values Stormwater Toolbox Calculator to compare the dollars spent on various green solutions and conventional systems, as well as the amount of runoff that can be reduced using each.[55] The user defines the conditions in a lot or neighborhood, and the calculator produces the dollars spent and saved over the life cycle of a conventional system versus

[52] NY Times article.
[53] NY Times article.
[54] CNT pocket guide, p. 18; see also http://greenvalues.cnt.org.
[55] CNT pocket guide at 18.

one improved with green solutions. It also shows the amount of runoff produced in the user-defined scenario, and how much that runoff can be reduced using specific green solutions.[56]

Green infrastructure is effective in a variety of soil, climate and development conditions similar to those of Buffalo. Both Portland, Oregon and Seattle, Washington have successfully implemented green infrastructure in a cold climate. Portland measured a 95% run-off flow reduction when using bioretention, and Seattle has experienced a 98% reduction in run-off in a neighborhood implementing extensive green infrastructure.[57] Additionally, in cold weather, permeable pavement can reduce freezing, salt use and associated road wear.[58]

According to the New York City Riverkeeper, $1,000 in construction costs of green infrastructure (source controls) is more effective in reducing CSO's than $1,000 in construction costs of end-of-pipe, conventional CSO controls.[59]

- Green streets can reduce the volume of stormwater entering the sewage system by 14,800 gallons per $1,000 in construction costs.[60]
- Street trees can reduce stormwater runoff to sewers by approximately 13,170 gallons per year, for every $1,000 invested in street trees.[61]
- Green roofs cost between $6.40 to $25.50 per square foot to install.[62] For every $1,000 invested in building a green roof, up to 810 gallons of stormwater can be

[56] *Id.*
[57] Center for Neighborhood Technology, "Stormwater Solutions that Hold Water: Envisioning Green Best Practices in the Metropolitan Water Reclamation District of Greater Chicago," 2007. [hereinafter CNT hold water]
[58] CNT hold water.
[59] Mike Plumb, "Sustainable Raindrops: Cleaning New York Harbor by Greening the Urban Landscape," Riverkeeper, p. 14, 2006.
[60] *Id.* at 16.
[61] *Id.*

removed from the sewers per year.[63] For every $1,000 invested in retrofitting a green roof, up to 575 gallons of stormwater can be removed from the sewers per year.[64]

- For every $1,000 invested in rain barrel installation, stormwater runoff can be decreased by over 9,000 gallons.[65]

Green infrastructure can prevent stormwater from reaching the sewer system in 90% of precipitation events, although usually it is not designed to prevent flood control benefits for the 5% of storms that exceed 1.5 inches.[66] Therefore, if implemented along with conventional stormwater management, green infrastructure can leave as little as 5% of run-off for the conventional sewer system to handle.

Stormwater pollution is still a major problem even in areas with separate storm sewer systems, and green source controls are the only way to combat this pollution. In these systems, instead of stormwater mixing with sewage and overflowing into waterways only during wet weather events, the untreated stormwater always flows directly into the waterways, never going to the WWTP. Not only are source controls more economically feasible, and arguably more effective, than capital improvements, but they prevent polluted stormwater from ever entering both types of sewer systems.

Lastly, green infrastructure serves to beautify the urban environment; it can even cause a reduction in violent crime.[67] The presence of rain gardens and street trees instead

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[62] *Id.* at 17.
[63] *Id.*
[64] *Id.*
[65] *Id.* at 19.
[66] CNT hold water.
[67] Kuo, F.E. and W.C. Sullivan. 2001. "Environment and Crime in the Inner city: Does Vegetation Reduce Crime**?".** *Environment and Behavior*, Vol. 33, No. 3. pp. 343-367.

of pavement also serves to engage residents in the process of protecting our waters.[68] By teaching people where their water comes from and where it goes to after they're done with it, green infrastructure places the responsibility for this problem on the residents in addition to the municipality.

The DEC states that "the best way of control is usually at the pollutant's source," and that "stormwater management, especially in urban areas, is becoming a necessary step in seeking further reductions in pollution in our waterways."[69]

Current Success Stories

Portland, Oregon

After ten years of moving towards citywide green infrastructure standards, the city of Portland has implemented its Sustainable Stormwater Program. This program has succeeded in reducing peak stormwater flows by at least 80-85%, retaining at least 60% volume of a CSO-causing storm.[70] Various monitored projects have shown cost-effective on-site capture of stormwater runoff, significant sewer overflow reductions, and removal of pollutants.[71]

Portland has disconnected over 49,000 downspouts, paying $53 per downspout, for a total cost of about $2.5 million. This project alone has reduced over 1.2 billion gallons of runoff from reaching sewers and reduced CSO's by 10 percent.[72]

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[68] Schneekloth at 20.
[69] New York State Department of Environmental Conservation, "Stormwater Information," 2007, DEC website.
[70] CNT Portland.
[71] CNT Portland.
[72] CNT Portland.

In addition to their downspout disconnection program, Portland has converted 340 linear feet of roadside ditches to vegetative swales, planted 105,996 new trees and shrubs, and employed public outreach involving 22,000 students and 10,000 community participants.[73]

Minneapolis

In March 2005, the City of Minneapolis began to charge residents for the percentage of impervious surfaces on their property and give credits for use of green infrastructure methods.[74] The previously used system combined stormwater and sewer fees based on water usage.[75] In the current system, residents can obtain stormwater fee reductions by implementing rain gardens, dry wells, pervious pavement, ponds and green roofs on their property.[76]

The implementing ordinance provides a system of stormwater charges for both single family residential properties as well as other uses. Single family residential properties are divided into large, medium and small properties, based on the number of square feet of impervious surface. Other property charges are based on nationwide estimates of impervious surfaces for similar land uses.[77]

Chicago

The City of Chicago has implemented various rain gardens including one at the Chicago Zoological Society/ Brookfield Zoo. This specific one was planted in a

[73] CNT Portland.
[74] Michael Krause, "Minneapolis Earns Stars and Scars by Charging for Hardscape," 2007.
[75] Krause at "Overview of Minneapolis System."
[76] Krause at "Credit System."
[77] Krause at "Overview of Minneapolis System."

depression that used to fill with rain water and overflow onto a busy sidewalk. With the help of four volunteers, the garden only took one day to build, and measures 8' by 15'.[78]

Recommendations for Buffalo

According to the International Joint Commission, the Niagara and Buffalo Rivers are two of the most toxic contributors to the Great Lakes.[79] We cannot continue to ignore the most effective and low-cost solution to this problem. Green Infrastructure source controls need to be implemented into the CSO Long Term Control Plan, at least as a supplement to the large scale capital improvements proposed.

Appoint Authority/ Manager

The BSA, or the City of Buffalo, needs to appoint a Stormwater Manager, as well as a small team comprising the Stormwater Authority. These positions will be necessary to coordinate the necessary implementation of legislative changes, incentive programs, community outreach, and green infrastructure installment.

Legislative Changes

Allowing the disconnection of downspouts is not sufficient. New legislation should be passed that *requires* the disconnection of downspouts from sewer drains. This requirement should be placed on both new building developments and existing homes and businesses.

Green stormwater source controls need to be required in all new developments in the City. Legislation can be modeled on that already implemented in the New York Phase II stormwater laws for municipal separate storm sewer systems (MS4's).

[78] CNT pocket guide at 8.
[79] Schneekloth at 19.

A stormwater fee structure (separate from sewer and water charges) should be implemented, and pro-rated based on area of impervious surfaces. This type of system is being successfully implemented in places like Florida, Seattle, Portland and Milwaukee.[80] Also, incentives should be provided (such as rebates on their stormwater fees or tax credits) to homeowners and businesses to encourage installation of rain gardens, vegetative swales, and other green infrastructure best management practices.

The current utility rate structure should be adjusted so that it encourages water efficiency, or at least does not discourage it. Incentives, such as rebates or tax credits, should be offered to homeowners and businesses to encourage replacement of plumbing fixtures and appliances with water-efficient models.[81]

Implement Green Infrastructure and Water Conservation

The city should be inventoried for depressions that fill with rain water and flood into walkways, basements, etc. Professionals should be contracted with to install rain gardens and plant trees on municipal properties. Curbing and medians should be replaced with vegetative swales, etc. Municipal parking lots should be retrofitted with landscaping to absorb run off.

City Hall can be used to showcase the new initiative by installing rain gardens and permeable pavement sidewalks surrounding it. Green roofs should be installed on any structurally eligible municipal buildings.

[80] CNT hold water.
[81] Environmental Protection Agency, "WaterSense: Efficiency Made Easy, Using Water Efficiently: Ideas for Communities," 2007, EPA website.

Municipal buildings should be installed or retrofitted with various water-saving devices. As municipal appliances or equipment wear out, they should be replaced with high-efficiency toilets, faucet aerators and low flow shower heads.[82]

Retrofit kits for residences and businesses should be created and distributed for free or at cost. These kits should include faucet aerators, high efficiency showerheads, leak detection tablets and replacement valves.[83]

Public Outreach

Buffalo should accompany any stormwater management plan with public participation and community outreach in order to gain widespread participation in green infrastruction practices.[84] Community partnerships should be formed with local universities, hospitals, primary and secondary schools, and non-profit organizations to help educate the public about where their water comes from and where it goes after it's used. Additionally, these outreach programs can explain any new legislative changes to municipal employees, residents and business people in Buffalo, so that they know about incentives for green infrastructure, new fee schedules, etc.

Urban Vacant Lot Management

Currently there are thousands of abandoned and derelict homes spread throughout the city. These vacant lots, aside from their obvious safety and aesthetic problems, also contribute to CSO's during rain events. Continuous gallons of stormwater runoff are being sent from these unoccupied, dilapidated homes, driveways and underutilized roads to the City's sewer system, therefore contributing to overflows.[85]

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[82] EPA Ideas for Communities.
[83] *Id.*
[84] CNT hold water.
[85] Barrett O'Neill at 3.

The City can include its current demolition schedule as part of its CSO LTCP, thereby utilizing one "pot" of resources to address two urgent problems. Additionally, the city-owned vacant lots can be aesthetically rejuvenated by filling them with rain gardens, vegetative swales, and street trees.

Conclusion

Buffalo cannot ignore source controls in developing its CSO Long Term Control Plan. Green infrastructure technologies have proven to be significantly cheaper than conventional system improvements and are extremely successful at preventing stormwater from entering our aging combined sewer system. Additionally, these green solutions will help lower energy costs for the city and increase the aesthetic quality of our neighborhoods.