

Nine Mile Run Rain Barrel Initiative

FINAL REPORT



MAY 2005

NINE MILE RUN RAIN BARREL INITIATIVE

Conducted By

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NINE MILE RUN WATERSHED ASSOCIATION

RIVERSIDES STEWARDSHIP ALLIANCE

THE STUDENT CONSERVATION ASSOCIATION

CDM, INC.

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Nine Mile Run Rain Barrel Initiative

Final Report

Overview

3 Rivers Wet Weather produced a stormwater management demonstration project testing the efficacy of a rain barrel program to reduce wet weather impacts and educating and engaging citizens around the issues of urban water quality, quantity and flow management.

The project scope was to install 500 rain barrels at selected residential properties throughout the Nine Mile Run watershed to illustrate how they can be integrated into a comprehensive program to reduce extraneous flow in the municipal sewer system, reduce wet weather discharges into a stream, and improve urban watershed hydrology. Most significantly, this program created a public outreach effort that makes the connection between individuals and the health of our waterways. The goals of the program were:

- Demonstrate the relationship between stormwater Best Management Practices (BMPs) and wet weather flow management in combined and sanitary sewer areas.
- Determine optimal configurations for rain barrels, overflow piping, and barrel emptying piping to prevent roof runoff from entering municipal sewer systems or private service lateral pipes, or becoming a nuisance to property owners.
- Quantify and characterize the benefits of implementing the rain barrel program.
- Develop a public education program to inform the public of the goals and objectives of the rain barrel program, and the potential public benefits from a successfully implemented rain barrel program and how to operate and maintain the rain barrel systems
- Gauge the effectiveness of a variety of outreach approaches.
- Use the rain barrel demonstration to develop a model program that can be replicated in watersheds throughout Allegheny County.

Background

3 Rivers Wet Weather, Inc.

3 Rivers Wet Weather Inc. (3RWW) is the lead organization in the Rain Barrel Initiative. 3RWW was formed in 1998 as a cooperative effort by the Allegheny County Health Department and the Allegheny County Sanitary Authority (ALCOSAN) in response to the anticipated actions by U.S. Environmental Protection Agency (EPA) regarding the elimination of sanitary sewer overflows in Allegheny County. No other region in the United States today has a large-scale sewer system designed and constructed specifically to rely on the existence of combined sewer and sanitary sewer overflow structures as integral parts of its operation.

The mission of the 3RWW is to establish and to promote the technical means, the institutional structures and the financial mechanisms needed to control existing sewer overloading within the municipalities of Allegheny County and to demonstrate the best wet weather flow management practices to control overflows at the least possible cost and impact. Public awareness and inter-municipal cooperation are fundamental to the success of the program.

After five years of work primarily on demonstration projects focused on one aspect of the wet weather problem, the deteriorated sewage collection system, 3RWW shifted its focus to the next challenge in wet weather control—managing stormwater. This initiative came at a critical time for the region—at the same time the communities began the work required by the Administrative Consent Orders (2004), Phase II stormwater regulations went into effect (March 2003). Virtually every community of Allegheny County was required to submit permits under these new regulations. The two efforts are running concurrently—addressing sanitary sewer overflows, and developing a program for managing the stormwater that is contributing to the overflows. Clearly, they are integrally tied together.

Stormwater demonstration projects

Addressing the wet weather problems in this region involves a variety of approaches and systems, ranging from where the rain (or snow) hits the ground, buildings and streets, to the collection systems that convey stormwater and sewage, to the outfalls that discharge the stormwater into streams and rivers. 3RWWDP sought to advance demonstration projects that address the relationship between stormwater Best Management Practices (BMPs) and wet weather flow management in combined and sanitary sewer areas. Urban stormwater management is inexorably linked to combined sewer overflow control and sanitary sewer overflow elimination.

In combined sewer areas, creative stormwater management practices can reduce the volume, duration and magnitude of combined sewer overflow events. Municipalities can use non-structural or minimally structural BMPs towards the successful implementation of the Nine Minimum Controls (NMCs) that are included in the municipal NPDES permits and also towards municipal and inter-municipal long-term control plan implementation. Stormwater management BMPs are particularly applicable to NMC 2 (maximize use of collection system for storage), NMC 3 (maximize flow to the treatment plant), NMC 6 (control of solids and floatables) and NMC 7 (pollution prevention programs). For example, by attenuating peak discharge rates into a combined sewer system, the use of rain barrels to capture, store and bleed back roof runoff has been demonstrated as a cost-effective alternative to increased conveyance capacity or storage. Cities from Philadelphia, Pennsylvania to Portland, Oregon are including on-lot storage through rain barrels in their CSO control programs.

In sanitary sewer areas, innovative stormwater management practices can be a critical factor in the success of inflow source reduction efforts including but not limited to the removal of down spouts, yard drains and foundation drains from the sanitary collection system. Particularly in older areas with smaller lots, the removal of downspouts and the redirection of the roof runoff away from the building can cause runoff problems with neighboring properties. Yards that slope away from the street can pose challenges to getting roof and foundation drainage out to the street where it can flow to the catch basins. Such conditions can require pumping and complex plumbing at considerable expense. In short, “the water has to go someplace.” 3RWWDP wants to assist combined and sanitary sewered municipalities in developing innovative stormwater management practices that balance the I/I source reduction equation.

In addition to water quality benefits derived by the reduction in CSOs and SSOs, stormwater BMPs can also reduce stormwater runoff pollutant loading and storm flow velocities in receiving streams.

Such demonstration projects will directly benefit communities that are currently facing wet weather compliance and stormwater management issues such as those in the Nine Mile Run watershed and others and will indirectly benefit all municipalities in the 3RWWDP area and beyond by demonstrating the benefits of an integrated approach to wet weather management. All municipalities are facing the regulatory mandates of the Phase I or II Stormwater Rule, the forthcoming SSO Rule and/or the CSO Policy.

3RWW began researching well-developed stormwater management programs, which included an emphasis on public engagement, (which has been a key element of our success to date) and focused on lot-level solutions. Working with our partners at ALCOSAN and our stakeholders, we determined that a rain barrel program would be an appropriate first step.

The goals for the project would be both testing the rain barrel as a stormwater management tool, and as a method to educate the public about stormwater. The Nine Mile Run watershed was selected as the project area for a number of reasons: it was a small watershed with only four municipalities; significant data had already been collected about the watershed; a large investment was being made to restore the stream in the lower part of the watershed; the Nine Mile Run municipalities were under a Consent Order from the State of Pennsylvania to eliminate sanitary sewer overflows and reduce combined sewer overflows; and there was an active watershed organization.

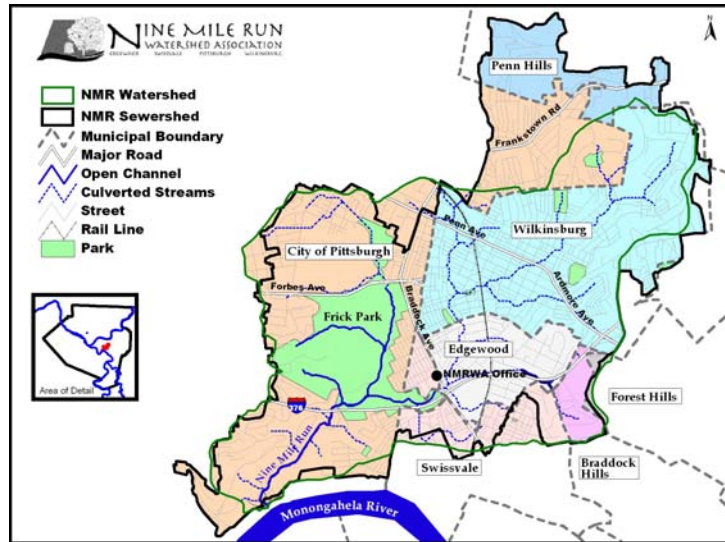
Based on the project criteria, research was conducted which showed that most rain barrel programs were developed and implemented by government or municipal authority staff for their particular region, and therefore were not easily transferable since the watershed municipalities did not have the capacity to implement such a program. 3RWW staff attended the first annual StormCon conference (North American Surface Water Quality Conference and Exhibition) in August 2002, where a presentation by RiverSides Stewardship Alliance described a rain barrel program implemented by the non-profit in two urban areas in Canada. The RiverSides program was uniquely suitable for the 3RWW initiative because it is owned by the non-profit rather than a government entity, and was available to be adapted to other cities. The program was successfully implemented in two metropolitan regions very similar to Pittsburgh—Toronto and Ottawa. Because the program structure and materials had already been produced, it would be more cost effective than developing a program from scratch.

Nine Mile Run watershed

Nine Mile Run is a natural drainage basin into the Monongahela River and is the one of the last “visible” streams of the original Pittsburgh watershed. This stream valley, which was once identified for its beauty and potential as a public park, today is dominated by slag left by the steel industry. Beginning in the early 20th century, many tributaries and portions of the main stem of Nine Mile Run were put in underground pipes or culverts. However, because the stream runs through one of the region’s major city parks—Frick Park—about a third of the

main stem was left above ground. Today the stream first emerges from its culverts in Frick Park near the I-376 on ramp off Braddock Avenue in the Regent Square community. It then flows through the park for just over 2 miles to the Monongahela River.

Approximately 34 percent of the watershed is classified as undeveloped land, much of this consisting of Frick Park in the middle of the watershed, a cemetery upstream along Fern Hollow Run, and the former Duquesne slag disposal area along the downstream reach. The remaining portion of the watershed is largely located within urbanized areas of the adjacent boroughs and has a significant percentage of impervious surfaces. The watershed is very hilly with steep slopes down to the river.



The lower Nine Mile Run stream valley was a dumping ground for 17 million cubic yards of slag beginning in the early 1900's. Most of the dump site was



exposed slag terraces and slopes. Nine Mile Run, in a deep ravine created by the steep angle of repose of the dumped slag, cuts the tract into two distinct parts. In some places the slopes loom above the

stream valley as much as 150 feet. The slag material is structurally stable and relatively inert, but is a very poor medium because of its extreme dryness and high alkalinity. The lack of moisture retention results in very sparse and impermanent vegetation.

This former riverside slag dump is currently being transformed into Pittsburgh's largest and most noteworthy residential development since World War II. "Summerset at Frick Park" is a 238-acre phased project which will include a total

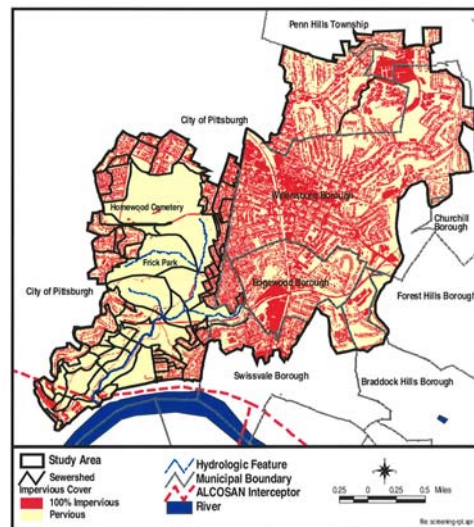


of 713 housing units comprising 336 single-family homes, 121 townhouses, and 256 apartment units. The project is a public/ private effort that develops existing urban space and a former brownfield while reclaiming, restoring, and beautifying lost park lands and critical environmental areas along the stream corridor.

The 6.5 square mile Nine Mile Run watershed includes the boroughs of Edgewood, Swissvale, Wilkinsburg, and several City of Pittsburgh neighborhoods including Point Breeze, Regent Square, Swisshelm Park, Squirrel Hill and South Homewood. It is home to approximately 47,000 people and reflects a diverse socioeconomic climate. According to 2000 census data, the watershed population is 55.8% white, 39.6% black, and 4.7% identifying as another race or 2 or more races. However, these populations are often segregated by community, with some census tracts reporting well over 90% of one or another race.

There are just over 22,000 total households in the watershed. There is increasing home vacancy in several of the communities (most notably Wilkinsburg and Homewood) and only 89.5% of the total households are occupied. The occupied homes are nearly equally divided between owner- and renter-occupied. Home values range from over \$500,000 to under \$10,000.

The watershed is covered with impermeable surfaces such as blacktop, concrete, roofs, and sidewalks throughout its residential communities. Approximately 27% of the total Nine Mile Run watershed which includes the 600-acre Frick Park is impervious; this figure increases to 37% if only the residential communities are evaluated.



As is true throughout Allegheny County, the Nine Mile Run watershed faces two primary sources of water pollution: sewage overflows and non-point source

pollution. It also suffers from excessive stormwater during wet weather, which causes stream bank erosion and degrades animal habitat.

The sewage overflows are a result of inadequate storm and sanitary sewer systems in the watershed. There are two basic systems in place: a combined sewer system (CSO) and a sanitary sewer system (SSO). Non-point source pollution is largely due to water traveling over impermeable surfaces and carrying dirt, litter, road salt, pesticides, oil, and other pollutants into storm drains and ultimately the stream.

Most of the City of Pittsburgh uses a combined sewer system, meaning that both sewage and stormwater flow through the same pipes. This system was installed in the late 1800's to the early 1900's and is designed to overflow during heavy rains. In reality, as little as a tenth of an inch of rain can cause untreated sewage to overflow directly in Nine Mile Run. Due to the inability of a combined sewer system to handle large amounts of water and the resulting frequent sewage overflows, no permits for this type of sewer system have been issued since the mid-1930's. However, most of the city still utilizes this antiquated system.

The smaller boroughs of Wilkinsburg, Swissvale, and Edgewood have a sanitary sewer system. This system uses two pipes—one to carry sewage and one to carry stormwater. However, over time approximately 1,500 watershed homes have connected their rain downspouts to the sewer lines instead of the stormwater lines. The sewer pipes cannot handle this extra volume of water and overflow, which results in untreated sewage flowing into Nine Mile Run. Many of the sewer pipes are also in disrepair, which compounds this problem. These old lines are often made of terracotta and there are even some brick manholes that are not watertight. Some of these pipes run right along the banks of Nine Mile Run, which means that any cracked pipe puts sewage directly into waterways.

Beginning in 1999, watershed municipalities were issued consent orders from the PA Department of Environmental Protection (DEP) requiring them to identify the sources of sewage overflows and develop plans to fix their sewage infrastructure. (All municipalities in Allegheny County are now under these same consent orders). Municipalities are also faced with new DEP NPDES permits to manage stormwater and non-point source pollution.

Nine Mile Run restoration project

The City of Pittsburgh, in partnership with the U.S. Army Corps of Engineers, is in the process of implementing an ambitious plan to restore the Nine Mile Run stream and surrounding valley in conjunction with the development of a new neighborhood and the expansion of a public park. The goal of the project is to improve the health and quality of



the aquatic ecosystem in the lower reaches of Nine Mile Run and to develop and expand wetlands to provide water quality and stream flow control to protect downstream habitat. The project will create a public open space that is safe and healthy, return an industrial wasteland to its former state as a riparian corridor, and restore the stream to a public amenity. Wetland acreage will be increased to protect and improve habitat, filter pollutants, and regulate stream flow. Nine Mile Run will be restored using fluvial geomorphologic principles, hydraulic engineering, fisheries science, and native revegetation techniques. Restoration measures will include realignment of the channel and reconnection to an active



floodplain, adjustments to its cross section and profile, and stabilization of banks and bed using soil bioengineering techniques. Barren slag slopes, riparian areas and non-tidal wetlands will be revegetated with native plant communities, and an invasive species management plan will be implemented to manage competitive pressures on desirable native species and accelerate natural succession.

Partners

Nine Mile Run Watershed Association

The Nine Mile Run Watershed Association (NMRWA), incorporated in 2001, is a non-profit whose mission is to involve citizens in the restoration and protection of the Nine Mile Run Watershed through education, advocacy, and stewardship programs. In the few years since incorporation, NMRWA has had impressive successes in increasing public awareness of watershed issues and supporting

direct citizen efforts to improve the local environment. Because of its mission to work with citizens and previous successful efforts, NMRWA was a logical program partner to manage the public interface portion of the Rain Barrel Initiative.

NMRWA was the lead partner in the initiative and was responsible for implementing the program in the watershed, including team recruitment logistics, training and management, canvass and installation management. The association served as the visible face of the effort.

RiverSides Stewardship Alliance

RiverSides Stewardship Alliance (RSA), based in Toronto Canada, acts to facilitate behavioral changes in residents, institutions and businesses throughout Ontario for the protection of water quality. Through direct social outreach, educational programs, issues advocacy and policy initiatives, they seek to address, eliminate and prevent sources of urban non-point source pollution from invading aquatic habitats. RiverSides Stewardship Alliance advocates for, educates in support of, and develops programs designed to achieve urban water quality, quantity and flow management for the purposes of ensuring a livable and sustainable city.

RiverSides adapted its existing program *5 Things You Can Do For Your River* for the Nine Mile Run Rain Barrel Initiative. The modified *5 Things* consists of a social marketing tool kit to facilitate installing low impact lot level retrofits for residential and institutional properties throughout the Nine Mile watershed. The *5 Things* toolkit helps establish community low- impact solutions to chronic storm water degradation. The theme of the program is to reach out to and enlist property owners as solution-oriented partners in lot-level stormwater management infrastructure and practices. Installation of the RiverSides RainBarrel is the cornerstone of the *5 Things* program although the underlying rationale for the program is to establish the watershed education partnership by directly engaging community members.

Student Conservation Association

The Student Conservation Association (SCA) is the nation's leading provider of conservation service opportunities, outdoor skills and leadership training for young women and men. SCA recruits and fields college students and other adults for positions ranging from three months to one year. Projects can range from traditional resource management projects to restoration, GIS and computer-related work, wildlife research, environmental education, and interpretation and visitor center staffing.

SCA interns and crews have been assisting natural and cultural resource managers since 1957. SCA provides high-quality, low-cost assistance that enables conservation professionals to meet their important conservation objectives. SCA is used by a number of federal agencies, including the National Park Service.

The SCA's Three Rivers Region office coordinates all of the Student Conservation Association's activities in the region, which ranges from Pennsylvania to the Dakotas. SCA strives to engage young adults in conservation and environmental education activities, provide internships with agency partners and work with volunteers to strengthen our communities and enhance environmental awareness.

The Student Conservation Association was responsible for advertising and recommending student interns, contracting with the interns, leasing housing and vehicles for the interns and working with the project team to develop and deliver training components.

Allegheny County Sanitary Authority

The Allegheny County Sanitary Authority (ALCOSAN) is a primary partner in the 3RWW program. The Authority's service area is made up of the City of Pittsburgh and 82 neighboring municipalities in Allegheny County and parts of communities in Washington and Westmoreland Counties. The Authority serves an area of approximately 225 square miles with a population of about 900,000. ALCOSAN provided engineering support to the Rain Barrel Initiative through Camp Dresser McKee, Inc. (CDM). In addition, ALCOSAN provided storage for the rain barrels and accessory equipment.

City of Pittsburgh Department of Public Works

The East Pittsburgh/Frick Park office and yard of the Pittsburgh Department of Public Works provided secure space to store the barrels.

Funding Partners

Funding for the project was provided by grants from the Heinz Endowments, and Pennsylvania Department of Environmental Protection's Growing Greener program. Additional funding was provided by 3RWW's US EPA grants.

Preparation Phase

The RiverSafe Rain Barrel

The barrel is an enclosed one-piece rotary-molded, high-density polyethylene (HDPE) container with a storage capacity of 132 gallons coupled to an integrated diverter valve for two-stage filtering and flow management, draining through one of two ¾" faucet bibs to a ¼ turn solid brass ball cock valve with a ½" garden hose screw fitting.

The RiverSafe Rain Barrel was custom designed for the City of Edmonton, Alberta, Canada for its combined sewer system downspout disconnection program in 1989. It is an octahedral (eight-sided) flat side barrel with a flattened domed top. The barrel dimensions are 48" tall and 24" wide. Weight, without diverter valve is 17.6 lbs., and with diverter valve is 22 lbs.



The integrated diverter valve attaches to the barrel by means of four internal screws. The valve contains a two-stage filtering process for flows from roof downspouts. A major debris filter of 2-cm. mesh removes leaves, large grit, and roofing debris, while a 400-micro mesh filter bag captures fine debris.

The benefits of a filter system is that it keeps roof run-off sediment from accumulating in the barrel. Without a filter system, the rain barrel would require yearly cleaning through a process of dismantling, washing out with a pressure hose and reinstallation.

The integrated diverter valve acts as a flow manager by directing flows either into the barrel or bypassing the barrel to the overflow line. The bypass valve assembly allows the barrel to stay in place year around. Flows are bypassed around the filter bag system to the overflow during seasons when water collection is not required such as winter.

The barrel, having been produced for the City of Edmonton where winter temperatures average -4°F, is designed with flat sides to allow for the complete freezing of the contents. In the event this occurs, the barrel is designed to perform storage without cracking or bulging. Because its design has no

indentations or shape inconsistencies, the barrel allows the water to freeze and rise uniformly.

The polymers used in construction of the barrel are UV treated to prevent warping, fading or degradation from ultra-violet light rays (sunshine). The integrated diverter valve consists of a 4" round valve that fits snugly into the rain barrel's diverter housing. In addition, at the end of the diverter valve, water flows through a 400-micron mesh filter bag. These two elements combine to make the RiverSafe Rain Barrel vector-safe since mosquitoes require at least 100 micron sizing to exit or enter the barrel. The barrel is produced as a one-piece, rotationally molded structure, providing a child-proof seal that cannot be opened.

The 132 U.S. gallon size of the barrel provides greater storage than the average rain barrel. Most urban rain harvesting and downspout disconnection barrels are built by converting used food, detergent or oil barrels averaging 50 gallons. These have a hole punched in the top to receive water, a drain bib at the bottom, and an overflow hole punched in the side near the top. Other barrels require the diverter valve, separate drain valve, and overflows.

Technical analysis

CDM performed the technical analysis for this initiative. They utilized the information from the existing rainfall analysis and applied the long-term historic record frequency-duration-depth data to the NMR rain barrel project to predict the frequency, volume and duration of runoff from the roofs in the project area. The data will be used to evaluate the potential level of control provided by the 132-gallon (20 ft³) capacity rain barrels, the number of barrels needed to control roof runoff for the "typical" home, and the number of storms exceeding the capacity of the barrels and overflowing. (*Appendix 2—Is my rain barrel the right size for my roof?*)

Statutory and regulatory impediments to the installation of rain barrels in the NMR municipalities were identified, e.g. local or state building codes, plumbing codes, etc.

CDM used existing GIS database information to quantify and characterize the range of roof area sizes for residential and commercial structures within the NMR basin and develop a corresponding cumulative distribution function (CDF) curve. Also utilized was the sewer and structure footprint layers in the GIS database to identify and characterize the location of service lateral connections in

the various neighborhoods, so roof runoff from rain barrel discharge and overflow hoses can be directed elsewhere on the property.

On-site inspection data was collected to assess site topography and determine where rain barrel and downspout overflow discharges would be directed. The site inspection data was assessed to quantify and characterize the percent of structures in the basin that are optimal, marginal, and unsuitable for installation of rain barrel systems.

Canvass process

Watershed grid maps, based on the GIS data, were prepared, dividing the area in canvass blocks. An analysis of each grid yielded the number of residences and evaluated whether the grid contained a critical number of highly suitable properties for rain barrel installation, based on lot area, topography and roof area. (*Appendix 3 – Sample grid maps*)

Telephone survey

Oraclepoll Research of Toronto, Ontario conducted the telephone survey for the project. A total of 600 randomly selected residents of Allegheny County, 18 years of age and older were interviewed from the watershed zip codes. Initial calls were made between the hours of 6:00 p.m. and 9:00 p.m. Subsequent callbacks of no-answers and busy numbers were made until contact was made.

Survey results showed that water-related issues, including the quality of water and the health of local waterways is the leading group of environmental issues of concern to residents. They also have concern with respect to the quality of their tap water. While there is moderate awareness as to what in fact a watershed is, only a low number of respondents are aware that they live in a watershed. Moreover, there is not a good understanding as to what the current health of the Nine Mile Run Watershed is, and a high number are also unaware if the environmental quality has improved over the past five years.

Despite this, only a small number of residents are not currently concerned about the health of the Nine Mile Run Watershed. While 7 in 10 area residents feel that runoff from properties has a negative impact on local waterways, only half take ownership with the view that their property is a contributor. Rather runoff from roads and public properties and industrial pollution are seen as the main offenders. However, over half the respondents feel that they can take action to reduce runoff from their property and agreed it would be their responsibility to help fix the problem of sewage in their neighborhood causing backups. While

most respondents had no opinion about the importance of rain barrels, they were likely to use a free barrel. Most would not pay \$75 for a barrel. Only half of the residents would support door-to-door outreach, stating that they prefer to be notified about the Nine Mile Run Rain Barrel Initiative by a flyer in the mail. (*Appendix 4 – Survey*)

Outreach materials development

Outreach materials were developed by *Adhawk Communications Inc.* for the project based on graphics and materials that had been developed for RSA and the Ottawa rain barrel project. The materials had two purposes—to raise awareness throughout the community about the project and to provide rain barrel recipients with greater detail regarding the maintenance and use of the barrels. Community awareness pieces included a letter mailed to all residents, a poster advertising the coming project, a door knocker to inform residents of a potential home visit and a brochure describing measures that residents could take to improve the watershed. Pieces given to rain barrel recipients included a maintenance guide and a simple fridge magnet. Examples of all materials are included in *Appendix 5*.

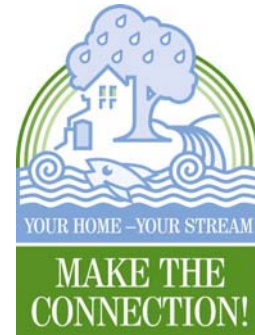
All outreach materials were designed to explain the wet weather issue, which is complex and little understood, in an engaging, straightforward, and relevant way. Two slogans were adopted to express the main themes of the campaign. The first, *Your Home-Your Stream—Make the Connection*, highlights the link between individual properties, the stream, and the overall health of the watershed. The second, *After Each Rain, It's Time to Drain!*, is a reminder that the rain barrels are primarily tools for capturing stormwater and need to be empty to do this job during the next storm. This was particularly important to emphasize since gardeners, who were early adopters of the effort, often viewed the barrels as storage units to hold water in until times of little rain. These two slogans were used throughout the outreach materials.

The first outreach effort was a letter sent out to 14,000 homes in the watershed to inform them about the upcoming campaign. This was done in response to survey results that indicated that people were generally averse to door-to-door solicitation. The two-page letter explained the main environmental problems in the Nine Mile Run Watershed and emphasized the potential for residents to have a positive impact by installing a rain barrel. It also let residents know that student volunteers, called Rain Barrel Teams, would be conducting door-to-door education in the coming months. This was done to encourage residents to be

more open to this type of contact. A direct mail company was employed to develop the mailing list and produce the labels.

This letter was reinforced through the placement of tabloid-sized posters in business districts and other public venues, such as libraries, throughout the watershed communities. The purpose of the posters was to remind residents of the coming education campaign so that they would be prepared for student volunteers to come to their homes.

Student volunteers in the field used two additional community awareness pieces—a door knocker and a brochure— during the door-to-door education. The door knocker is a 4" x 11" two-sided promotional piece designed to alert residents that a student volunteer had come by their house and to offer them the opportunity to participate in the program by calling the Nine Mile Run Watershed Association.



If the student did make direct contact with a homeowner, a brochure outlining “5 Things” they could do to help the Nine Mile Run Watershed was discussed and left with them. The “5 Things” brochure emphasized the benefits of a rain barrel and also encouraged residents to naturalize their property, decrease use of toxic materials at home, increase water efficiency, and get involved. There was additional information about the Nine Mile Run Watershed Association and the 3 Rivers Wet Weather Demonstration Program as well as other regional programs that offer support for residents to help clean watersheds and waterways.

Once a rain barrel was installed, residents received a guide that outlined basic annual and seasonal maintenance requirements (Maintenance Brochure). This also included reminders to regularly drain the barrel and to direct the water away from foundations. Recipients also received a refrigerator magnet with the *After Each Rain, It's Time to Drain!* slogan and contact information for the Nine Mile Run Watershed Association and the 3 Rivers Wet Weather Demonstration Program.


Municipal interaction

Interaction with the watershed municipalities was critical to the success of the Rain Barrel Initiative. Municipalities were able to offer ideological support for the initiative as well as information and in-kind services that made the program

run more smoothly. Because the watershed falls into several municipalities with different infrastructure conditions and population types, it was necessary to address each municipality separately.

Municipal outreach primarily focused on the boroughs of Edgewood, Swissvale, and Wilkinsburg. The majority of watershed residents live in these three municipalities, which combined contribute the largest portion of the sewage and stormwater pollution to the stream. A presentation was given to each borough council explaining the program and asking for their support. Letters were also sent to local police departments so that they would be aware of the door-to-door education campaign.

These boroughs had already begun to address the 1999 DEP consent orders to reduce sewage overflows prior to this initiative. Each community went through a process of dye-testing homes to identify sources of additional stormwater in sewer lines that causes sewage overflows. Combined there were 1,500 homes identified as having illegal connections. Of these, approximately half of the homes had disconnected while the other half had not. Each borough was asked to provide a list of the identified compliant and non-compliant homes so that they could be targeted during the rain barrel installation phase. Swissvale and Wilkinsburg provided these lists from their records. Edgewood chose to send a letter directly to their residents informing them of the campaign and asking for people to indicate if they were interested in participating. They then provided the list of interested residents.

Outreach was also done to leadership within the City of Pittsburgh through the City Council district. The City was able to provide critical in-kind support for the initiative through their Department of Public Works, which stored the barrels prior to installation. 

Rain Barrel Team

3RWWDP and NMRWA looked to the Student Conservation Association's (SCA) Three Rivers regional office as a means of procuring applicants for the Initiative. The goal was to secure eight student volunteers to undertake the canvass and installation of the 500 rain barrels. While the SCA is typically associated with wilderness projects, the organization is beginning to focus on urban programs. Through a flat per-student rate, SCA is responsible for managing most administrative aspects of the program related to the students, including advertising the position, pre-screening applicants, covering student health fees, accident insurance, and living stipends. Another advantage to using SCA is the

national scope of their programming. While Pittsburgh's many universities hold a large pool of potential interns, the prospect of having students from across the country was attractive to the initiative partners. A position description was written and submitted to SCA for posting in early February 2004 by NMRWA, which was responsible for interviewing, hiring, and supervising the team. SCA was responsible for sending packets of pre-screened applications.

In conjunction with the SCA posting, NMRWA submitted position descriptions to academic departments at Carnegie Mellon University, the University of Pittsburgh, Duquesne University, and the Regional Internship Center based at the CORO Center for Civic Leadership. Combined, the SCA and local postings garnered many applicants but it was more of a challenge than expected to fill the eight positions. Students tend to "shop around" for positions. Two applicants who accepted the positions pulled out at the last minute. In the end, the team consisted of five student volunteers. Four were recruited locally by NMRWA, and one was recruited through SCA from Eastern Pennsylvania. One speculation was that the recruiting process would have been more successful if the students had been paid an hourly wage as opposed to a very modest stipend. Students were able to earn credits toward their degree through this program, and the stipends were supplemented by *Americorps* grants.

The SCA stipulates that housing be provided for the student volunteers. NMRWA sought housing within the watershed as a means of helping to connect the students to the community as well as to provide a base of operations for the project. A five-bedroom house was rented in Wilkinsburg through a property management company from May through August 2004. The landlord was supportive of the Nine Mile Run Rain Barrel Initiative, which was helpful in securing a short-term lease. Several members of the Nine Mile Run Watershed Association donated some furniture and supplies for the house. Other furniture needed to be leased.

Student training and education

Training for the team took place over two weeks at the Jane Holmes Residence and Gardens (JHR)—a senior living facility located within the Nine Mile Run Watershed Association. JHR was looking for opportunities to get more involved in the wider community, so the donation of classroom space was beneficial to both the Rain Barrel Initiative and to JHR. Having the training at JHR was also very convenient because of its proximity to the student's housing, and because they were able to provide meals in-house for a nominal price.

The first week of the training comprised of introductions to each other, the watershed, and the project through presentations, team-building exercises, readings, and tours. The second week comprised more experiential learning through canvass script training, rain barrel installations, assessment training, and CPR/First Aid certification. (*Appendix 6* – Training Schedule)



3RWWDP gave a presentation on their mission and work with wet weather issues in Allegheny County. SCA provided First Aid and CPR training and certification, diversity awareness training, and did driver's tests for the student volunteers who would be driving the project vehicle. They also provided bicycles for the bike tour of the watershed. NMRWA did a presentation on the Nine Mile Run Watershed, guided the readings, provided an overview of the summer's activities, and arranged for the training space at JHR. RSA provided the canvass script and training exercises, the team-building exercises, as well as demonstrations on barrel installation.

It would have been possible to undertake the training in one week, but the two-week session worked very well. The pace of the training allowed the team time to become well acquainted with urban watershed issues and to become familiar with one another prior to working in the field together.

Rain barrel production and storage

The rain barrels were produced in batches of 125 in Canada through RSA and then shipped to Pittsburgh. Finding locations to store barrels for free within the watershed presented some challenges. The deliveries were staggered so that all 500 barrels would not have to be stored at one time. It was not necessary to have the barrels stored indoors, but they did need to be in a secured area. The East Pittsburgh/Frick Park office and yard of the Pittsburgh Department of Public Works offered outdoor, gated space to store the barrels. The DPW yard is located within the watershed and the rain barrel team was able to access the barrels during the DPW work hours. A total of 375 barrels were stored in the DPW yard over the course of the project. The other 125 barrels were stored at ALCOSAN, about 10 miles outside of the watershed on the North Side of Pittsburgh. Again,

the barrels were stored outdoors in a gated and locked enclosure. These barrels were accessed last because of the logistics involved in getting them to the watershed.

Once the 375 barrels from the DPW yard had been installed, it was necessary to retrieve barrels from ALCOSAN. Because of the travel time to ALCOSAN and the high level of security for the facility, it would have been inefficient to make more than one trip per day. During this latter phase of the project a fifteen-foot box truck was used to maximize the number of barrels that could be transported per trip.

Installation supplies and tools

Installation of the barrels required the use of both hand and power tools including:

- Socket wrench for tightening the bolts that attached the intake trough to the barrel.
- Pliers for tightening the brass release valve and plug.
- Hack saw for cutting the downspouts.
- Reciprocating saw for cutting downspouts made of heavier metals than the typical aluminum.
- Drill for connecting the flexible spout to downspout and barrel and overflow spout to barrel.
- Level for leveling the ground where the barrel was installed.
- Tin snips to aid in cutting downspouts.
- Three-pronged cultivator for leveling ground.

Additional supplies included:

- Paving stones—48" concrete.
- 10' sections of downspout for overflow.
- Flexible spouts (expandable, plastic).
- Hexagonal head self-tapping screws
- Hexagonal head masonry screws
- Hexagonal drill bit
- Iron strapping to secure loose downspouts
- Blue masking tape for marking downspouts at assessments
- Pens
- Clipboards
- Street atlas
- Five-gallon buckets for carrying and organizing tools
- Bungee cords for securing the rain barrels during transport
- Cement for filling in drain stump

Publicity

The Nine Mile Run Rain Barrel Initiative was featured in articles in both the Pittsburgh Post-Gazette and the Tribune Review, beginning in 2003. The Initiative was also featured on the *Allegheny Front* radio program on WYEP 91.3 FM in June 2004. The student volunteers distributed posters throughout the watershed including the business districts in Swissvale, Regent Square, and Wilkinsburg. Additionally, an information table was set up for the Wilkinsburg Community Days.

Implementation Phase

Canvass process

The initiative partners outlined a canvass schedule and daily routine for the project during the planning phase with the understanding that flexibility during implementation would be necessary. As mentioned above, the thorough training and orientation period provided the students with an opportunity to develop a productive group dynamic. Because of this, the team felt confident in communicating concerns to the supervisor, offering input on procedure, and initiating solutions to problems as they arose.

One important goal for the canvass was to reach homes in all of the watershed communities and across socio-economic levels. Based on the map grid system, the team chose an initial canvass route that essentially cut through the heart of the watershed, encompassed the four main municipalities, and included the desired demographic variability.

The team was given the prerogative to adjust the daily schedule to maximize their productivity. Changes to the plan and canvass are detailed below:

Original Canvass Plan	Actual Canvass
8 student volunteers to concentrate on canvassing and assessments during the first 3 weeks of the project. The first week the student volunteers were to work in pairs at the door, followed by two weeks of approaching the door solo with a partner working the opposite side of street.	5 student volunteers canvassed the first week in two pairs and with one solo. Solo canvassing continued until the second to last week of the project.
Canvass 5 to 8:30pm	Canvass 5:30 to 8:30pm (6 to 8pm was the best time to canvass)
Beginning the fourth week and continuing through installation completion—1 team of 4 continues canvass & assessment (solo at door), other team of 4 begins installation (in pairs). Teams rotate job by the week once 500 homes are identified for RB installation (assessment & owner agreement secured), all interns install RB until 500 in place. If 500 barrels are installed before 8/6, teams return to door-to-door education & outreach	By week 2: Install early, Canvass late Tuesday, Wednesday, Thursday. Install all day Friday from signed agreements, assessments all day Saturday from call-ins. Reached 500 agreements one week before the end of the project.

Original Plan for Daily Schedule	Actual Daily Schedule
Tuesday-Friday noon-8:30 pm/Saturday 9am-5:30pm	No change.
Noon -3 pm—Pre-canvass prep, includes: rain barrel prep (valves & stickers), load vehicles, data entry questions on canvass from day before, daily route review, check in on progress towards goal of 500.	Noon to 12:30—Load vehicles, calls to homeowners for assessments and installations, data entry from previous day's work. Install 12:30 - 3:45pm
3-345 pm--Break	4-4:45pm-- Break
4-8 pm—Canvass/assessments	4:45-5:15pm—Calls to homeowners for assessments and installs, review canvass route, data entry.
	5:30 to 8:30 Canvass/Assessments
	Friday—Install all day 9am to 5pm
	Saturday—Assessments all day 9am to 5pm

Assessment process

The RSA consultant conducted the assessment training during the second week of the training period. RSA wanted the students' main focus during the assessment to be on calculating which downspout carried the most runoff by measuring roof size. RSA also recommended bypassing homes where the downspouts were already disconnected. An assessment form included the date of the assessment, the owner's contact information, an area to draw the footprint of the house and mark barrel and overflow locations, and spaces to indicate whether a paving stone was needed, if there were any special instructions for installation, and whether the overflow was tied back into the drain stump or directed into a permeable area. After slight modification during the first week of the project, the assessments forms were very useful and served their intended purpose. (*Appendix 7—Assessment Form and Checklists*)

Some conclusions on the assessment process from the student volunteers included:

- The homeowners tended to guide the process of determining barrel placement while the team members acted more in a consultative capacity.
- It was recognized by the team that this was a public awareness and public relations effort more than anything.
- The team avoided trying to persuade homeowners to place a barrel at the downspout with the most runoff if the homeowner did not want the barrel placed there.
- Considering the challenge of installing 500 barrels over the course of the project, the team was also more lenient on assessment criteria. For example, homeowners could still get a barrel even if they had already disconnected their downspouts from the sewer/storm drains.

While the assessment was one of the most important parts of the project, the student volunteers found that they could do an assessment in just 5 to 10 minutes.

Agreements

The agreement form was the legal document allowing the barrel to be installed on the homeowner's property. It needed to be signed by both the homeowner and a witness—usually the student volunteer present at the assessment. There were some problems with the agreement form. Several homeowners found the legal language to be too restrictive regarding what the homeowner could and could not do with the barrel. Some also did not like the photo release. In general however, the student volunteers found that most homeowners would skim the

agreement or not read it at all but would sign regardless. (*Appendix 8 – Homeowners Agreement*)

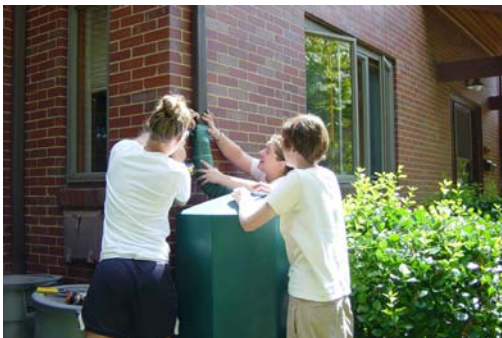
Installation process



As mentioned above, barrels were being installed by the second week. NMRWA received calls on a daily basis from homeowners interested in the initiative—either from the PR campaign prior to the beginning of the initiative or from the literature distributed by the canvassers. To expedite the installation process, the team would keep a record of these interested residents and schedule them for assessments. This allowed



the team to conduct full workdays of assessments one day a week from the outset of the project. This also allowed for one full day a week of installs, in addition to the half-days of installations occurring Tuesdays through Thursdays. Homeowners would receive a phone call from the student volunteers at least one day prior to installation. The homeowner would have the opportunity to ask questions or make special requests at this time. The assessment forms and agreements would be pulled for the next day's installations.



At the beginning of the work day two members of the team would go to DPW to load barrels in the leased work truck. The truck was a double cab pick up that could hold all five team members and five barrels. In most cases, the team would go to DPW at least twice daily. While the barrels were being retrieved, the remaining team members



would cut downspouts for overflow, call homeowners, enter data on the database, and organize the installation and canvass schedule for the day. The team split into two teams for installations.

After the official end of the project, the team stayed on, paid by the hour, to do installs for another week. The barrels were stored close by at DPW and the program coordinator helped

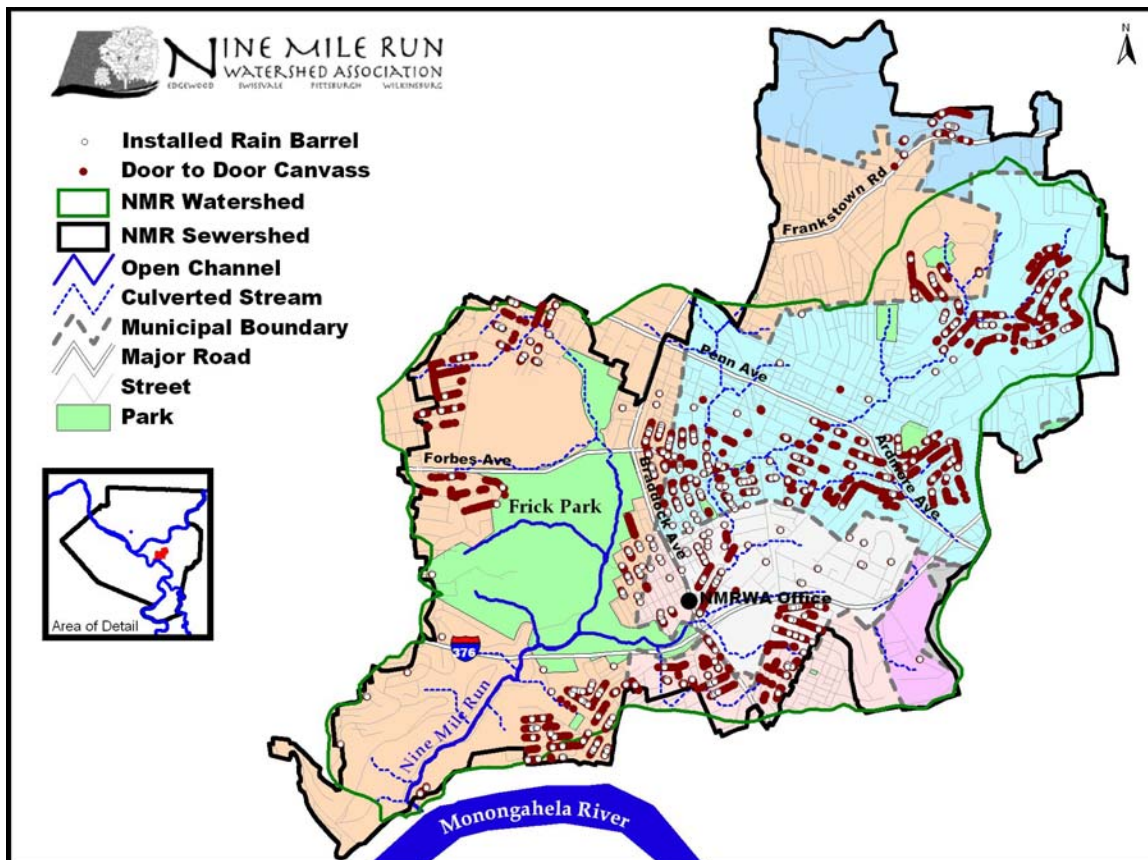
distribute barrels to expedite the installations during this week. Four of the five team members returned for one more full week to continue doing installations. The initiative officially wrapped in August at which time about 400 barrels had been installed. The remaining installations continued through October with a reduced staff and work schedule.

Documentation/database

The team developed the filing system for the paperwork. There was a folder for each grid of the watershed map containing the agreements and assessment forms. Once installations were complete, the paperwork moved to a completed file, where forms were organized alphabetically by street name. This system was simple and effective.

Students developed the master database for the project. The database was created with MS Access and included the following fields: First & last names, addresses, grid numbers, municipality, phone, check boxes for assessments, agreements, installations, and complaints. A comment box was also included. The students did not have regular access to the computer and would enter data when they had time. The students initiated the documentation systems and did an excellent job of keeping track of the paperwork and entering data.

(*Appendix 9*—Sample Database Page)



Evaluation Phase

Rain barrel team evaluation

The five-member SCA student team was able to get the work done despite the inevitable problems that arise on a large-scale project and developed work procedures that were effective and productive. In the planning phase, a rotating “team captain” system was discussed wherein each day one person would be the team leader for the day and manage the group on things like tool and head counts. This system never took hold. The team organized themselves. Two natural leaders emerged who guided the workday. One thing that was evident was that the entire team disliked doing the canvassing. They were successful in securing the 500 agreements for rain barrels regardless of this fact. Another fact was that the students were personally invested in the project and worked hard to make it succeed. This was essential to the overall success of the project.

(Appendix 10—Team comments)

Follow-up mail survey

A follow-up survey was mailed in February 2005 to all participants of the initiative, including everyone who received or purchased a rain barrel, and anyone whose property was assessed but elected not to receive a rain barrel. The mailing included a stamped and addressed return envelope. Of the 671 surveys mailed, 273 were returned—over 40% response. The most significant findings of the survey include:

- While initial letters were sent to every residence in the watershed, only 25% of respondents said they heard about the initiative that way. Most heard directly from the canvas.
- Most people are aware of what a watershed is, but a smaller percentage believe they live in one—an obvious disconnect.
- Vast majority feel that rain and snow from their property contributes to pollution of the waterways, and most recognize that stormwater pollution is a higher contributor to water quality problems than industrial waste. A similar majority stated that there was a relationship between their home and property and the health of Nine Mile Run Watershed. The Team did a very good job of conveying the key issues of the program; using rain barrels to reduce sewer overflows, protect the stream from stormwater damage, and participate in an effort to raise awareness of environmental issues.
- Most respondents felt confident about the Team’s ability to assess their property and install a rain barrel.

- While only 25-30 % of the respondents implemented other measures to improve the watershed, including naturalizing their property, reducing use of toxins on their lawn or getting involved in the watershed group, double that number took measures to improve their water efficiency.
- Residents of nearly 100 properties that were assessed and deemed suitable for a rain barrel elected not to accept a barrel. Most cited concerns about water damage or concern about operating the barrel as reasons.
- Of those who had a barrel installed, improving the watershed and conserving water were the primary reasons stated. Over 90% felt that they were contributing to the health of the watershed by installing a rain barrel by reducing flows into the storm and sewer system, and reducing the pollution picked up on streets and yards. Other reasons included reducing water consumption and preserving the stream corridor.
- Barrel Operation: Two-thirds of the respondents stated that they drained their barrel once a week or more frequently, and within one week of a rain event. About half used a hose to release to an open area, and the balance used a container or soaker hose. The uses of the water were evenly divided between ground water recharge, garden uses, houseplants, and watershed protection. Only 20% of the respondents stated that they were having either problems with water in their basement, or ponding in the yard. Very few were having problems with their downspouts since the installation. 95% said that they would recommend a barrel to others.
- When asked about an acceptable price for a barrel, 75% said between \$50 and \$100. 13% said they would not pay for a barrel.
- Demographic information shows that nearly three-quarters of the respondents are over 45 years of age, and have at least some college education.

Full results are included in [*Appendix 11*](#).

Technical analysis—volume reduction, economic benefits

The completed analyses utilizing a basin-wide hydrologic/hydraulic simulation model showed that a comprehensive rain barrel program can be effective in reducing the impacts of urban runoff and to educate and engage citizens about the issues of urban water quality, quantity and flow management. The study showed that with a typical home and business owner participation rate of 40%, rain barrels could be an effective Best Management Practice to control urban stormwater runoff within the Nine Mile Run (NMR) watershed.

Benefits from the Control of Impervious Areas: The study concluded that for a typical basin-wide participation rate of 40 percent (40% of the suitable structure roof areas have installed rain barrels) a rain barrel BMP program limited to

residential structures, approximately 80 acres of roof area representing 11 percent of the total impervious areas within the NMR watershed would be effectively controlled. If the rain barrel program were to expand to include both residential and non-residential structures, the total area of controlled roof area would increase to 118 acres or 16 percent of the total impervious area within the watershed. If the program were to be implemented more aggressively with a 60% participation rate, the impervious area controlled by rain barrel BMP measures would increase by 50% to 177 acres.

The upper limit of control associated with a 100% implementation rate for a residential BMP program would be 200 acres or 26% of the watershed impervious area. The upper limit of control if rain barrels were to be installed at 100% of the residential and non-residential structures would be 295 acres of roof area, or approximately 39% of the impervious area within the watershed.

Benefits from the Control of Stormwater Runoff: The study results indicated that for an average implementation rate of 40%, a rain barrel program focusing on residential structures would capture and control an average annual volume of stormwater runoff within the NMR basin of 67 million gallons and overflow an additional 4 million gallons per year, resulting in a basin-wide reduction of 11%. If the BMP program were to be expanded to include both residential and non-residential structures, the capture volume would increase to 97 million gallons in an average year, overflows would increase to 8 million gallons per year, and the overall reduction in volume would be 16%. If the program were to be implemented more aggressively with a 60% participation rate, the stormwater runoff volume controlled by rain barrel BMP measures would increase by 48% to 144 million gallons per year and the average annual basin-wide reduction of runoff volume would increase to from 16% to 24%.

The upper limit of capture and control associated with a theoretical 100% program participation rate by all homeowners would be 168 million gallons per year and the annual overflow volume would be 9 million gallons, resulting in a 27% reduction basin-wide. If the BMP program were to be expanded to include non-residential buildings, the upper limit of capture and control by the installed rain barrels would increase to 239 million gallons per year and annual overflow volume would increase to 20 million gallons, providing a 40% reduction in impervious runoff volume.

Benefits from the Reduction of CSO Discharges: The analyses concluded that for a typical residential homeowner participation rate of 40%, a comprehensive

rain barrel program would reduce the volume of CSO discharges to Nine Mile Run by 18 million gallons in an average year or a reduction of 4.9 % over existing conditions. If the rain barrel program were to expand to include both residential and non-residential structures, the reduction in annual CSO discharge volume would be 24 million gallons or an approximately 6.6% reduction from existing conditions. If the rain barrel BMP program were to be implemented more aggressively with a 60% participation rate, the volume reduction of annual CSO discharges would increase to 29 million gallons, a 10.3% reduction from baseline conditions.

The upper limit of control associated with a 100% implementation rate for a residential BMP program would be a reduction in average annual CSO discharge volume of 47 million gallons or a reduction of 12.8% from existing conditions. The upper limit of potential benefit if rain barrels were to be installed at 100% of both the residential and non-residential structures would be a 61 million gallon reduction in annual CSO discharge volume, or a 16.6% reduction from existing conditions within the watershed.

Economic Analysis: The analysis compared the costs of implementing the barrel program with the costs of storing or removing a proportionate quantity of extraneous flow in the collection system, based upon estimated reductions in peak flows in the municipal collection systems resulting from the barrel detention. The cost of implementing a rain barrel program, with a 40% level of participation, would range from 27% to 60% of the cost of building storage for a comparable volume. (*Appendix 12 – Technical Analysis Report*)

Rain barrel workshops

3RWW purchased 135 rain barrels a year in advance of the Initiative to test the functioning of the barrels, to build interest, and to satisfy “early adopters” who wanted to participate in the program but were not in the pilot watershed. Approximately 50 barrels were sold (at cost) or distributed during 2004. It was decided in 2005 to hold “Rain Barrel Workshops” (similar to training workshops conducted by the Pennsylvania Resources Council for composting bins) to sell off the remaining barrels. Four workshops were conducted by the Pennsylvania Resources Council and the Nine Mile Run Watershed Association. Cost of the workshop was \$50; each participant was trained on watershed issues, the barrel installation and maintenance, and given a barrel to take home. The workshops were very popular, and the potential exists to have future sessions, if additional barrels are purchased.

Next Steps

3RWW has received four inquiries from local watershed and community organizations requesting to participate in future phases of the project. In addition, a number of organizations outside the Pittsburgh area have requested copies of the final report of this project to use as a model for rain barrel projects.

Future implementation of this project will depend on research conducted to determine:

- Can a less expensive barrel be manufactured locally?
- What is the cost for creating a new mold for a rain barrel, incorporating design changes that have been recommended throughout the process?
- Is there a market to sell barrels directly to the public, as well as an outlet?
- Is there a local manufacturer with rotational molding capabilities?
- Is there a source for recycled industrial plastic to use for the manufacture of barrels?
- What can community and watershed organizations afford to subsidize in a rain barrel program to reduce the cost to the participants?
- Is there a way to streamline the installation process?

Based on the results of this research, and the level of interest by local communities to partner on a rain barrel program, 3RWW will consider additional projects. However, with the guidance contained in this report, and an alternate source of barrels, any organization would be able to implement such an initiative.

Lessons Learned

The Nine Mile Run Rain Barrel Initiative was a success by all measures. It introduced a new stormwater management practice to a region that had very little experience in that area. It engaged all segments of a watershed community in an effort to understand and be proactive in resolving a long-standing environmental issue. It provided a high-profile project for a fairly new watershed organization to use to increase its presence and credibility in its home area. It made available a documented process that can be replicated in other watersheds of the region. It documented the fact that a comprehensive rain barrel program can be effective in reducing the impacts of urban runoff and demonstrated the cost-effectiveness of a rain barrel program as a viable alternative to storing extraneous flow. And most notably, it gave five college students the opportunity to put into practice the environmental science studies they had been pursuing.

This was a significant undertaking for the two lead implementing organizations—3 Rivers Wet Weather and the Nine Mile Run Watershed Association. It required a full-time commitment by one program staff member of the watershed association for the duration of the implementation phase, and a substantial time commitment throughout the venture by the project manager at 3RWW. While the program had the advantage of being based on an existing effort, it was difficult converting it from one where the barrels were installed by municipal public works staff versus one implemented by students. A very low baseline of public awareness of watershed and stormwater management issues made the education component challenging. The decision to go to the homeowners through a door-to-door canvass, rather than inviting interested parties to a workshop or allow them to simply purchase a barrel, made the outreach process more time consuming and stressful for the team. Working with a lead consultant based in another city made coordination and meetings difficult and expensive.

However, the commitment of the participants, especially the rain barrel team, overcame the challenges. The team learned new skills, adjusted their methods and recruited help (from a roofing contractor) when needed. They organized their daily schedule and process to adapt to a timeframe that had been designed for eight students to carry out. When the deadline could not be met, they worked additional days and weekends until they had reached the goal of 500 barrels installed. The canvassing remained a stressful component of the summer, especially traveling on foot through a variety of neighborhoods and the expected negative reaction to anyone knocking on one's door. But they were powerfully motivated by the positive response they received at many of the doors during the canvass, and the real-world application of theories they had studied in college. In the end, the lessons learned by the students about the force of community activism, and the impact that individual actions can have on large-scale environmental problems, was the most profound outcome of the effort.

The reaction of the community was very positive. We had estimated that the team would have to make contact with potentially 9,000 households in order to get 500 commitments for rain barrels. In fact, there were 500 commitments after only 4,000 contacts had been made—either by the team speaking directly to a homeowner during the canvass, or having the homeowner respond to the “door knocker” outreach piece and contact the watershed association to request an assessment. In addition, the 40% return on the follow-up survey emphasizes the fact that the participants have a high level of commitment to the initiative.

The initial survey documented that half of those surveyed did not want to be contacted through a door-to-door canvass. However, the decision to go directly to the homeowners through the canvass provided the opportunity to engage citizens who would not have likely enrolled for a rain barrel workshop, or responded to a publicized offer of free rain barrels. In fact, the team had a higher response rate in the less affluent areas of the watershed. The reasons stated when a barrel was refused in the more prosperous neighborhoods included concern about the appearance of the barrel in their yards, reluctance to sign the agreement, and concerns about their neighbors' impressions.

The initiative demonstrated how a lot-level effort to manage stormwater could contribute to the improvement of the local watershed. It is a financially feasible alternative to centralized storage, and has the added advantage of providing residents with the means to participate in watershed regeneration by retrofitting their home and making a connection to their river.



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