Re-Evaluating Stormwater

The Nine Mile Run Model for Restorative Redevelopment

Technical Appendix

Materials from the Nine Mile Run Design Charrette, October 1998

Re-Evaluating Stormwater:
The Nine Mile Run Model for Restorative Redevelopment
TECHNICAL APPENDIX

October, 1999

This volume contains materials associated with a design charrette held October 14-17, 1998 in Wilkinsburg, Pennsylvania. That event examined possibilities for small-scale, site-specific retrofit and redevelopment activities that could simultaneously restore the hydrology of urban watersheds, contribute to management of stormwater runoff and sewer overflows, and revitalize the economic and cultural life of urban places. The charrette focused on the Nine Mile Run Watershed of Edgewood, Pittsburgh, Swissvale, and Wilkinsburg, as a model for development of physical and policy measures which could be replicated throughout the greater Pittsburgh region and beyond.

The main report: *Re-Evaluating Stormwater: The Nine Mile Run Model for Restorative Redevelopment*
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This appendix was compiled and edited by Richard Pinkham, Rocky Mountain Institute.
Attribution of specific materials is given in each section of the appendix.

Acknowledgments

The project organizers gratefully acknowledge the generous funding provided to this project by The Heinz Endowments.

The following organizations provided considerable information and other assistance:

Allegheny County Sanitary Authority (ALCOSAN)
Allegheny County Health Department
Borough of Wilkinsburg
Borough of Edgewood
Borough of Swissvale
City of Pittsburgh
Pittsburgh Sewer and Water
Three Rivers Wet Weather Demonstration Program

Individuals who assisted development of the charrette with special perspectives and time include: Melisa Crawford, David French, Jan Oliver, Andrew McElwaine, Raymond Reaves, and John Schombert. Special thanks to the staff of the Hosanna House of Wilkinsburg for their assistance in hosting the charrette, and to Chris Leininger of Sustainable Home Design for preparation of site base maps.

We are grateful to EDAW, Inc. for providing staff experts for the charrette and design services for the main report.

We also acknowledge the inspiration and guidance of TreePeople, and its contractor, ReThink, Inc. Tree People has developed a similar model for urban restoration and water management in Los Angeles, beginning with the T. R. E. E. S. (Transagency Resources for Environmental and Economic Sustainability) charrette in Los Angeles, May 1997.

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Table of Contents

The following pages are a copy of the "briefing book" distributed to charrette participants prior to the October 1998 event. The brief provided background information and instructions to the teams.

ECOSYSTEMS AND INFRASTRUCTURE

NINE MILE RUN

Site-Specific Stormwater Management Options Charrette
October 14-17

Nine Mile Run Watershed
Pittsburgh PA

The Briefing Book

Rocky Mountain Institute
STUDIO for Creative Inquiry

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This charrette briefing book was written and edited by Richard Pinkham of Rocky Mountain Institute, and Tim Collins and John Stephen of the STUDIO for Creative Inquiry at Carnegie Mellon University, with assistance from Bruce Ferguson of the University of Georgia School of Environmental Design. Graphic design by Ema Tibbetts of Rocky Mountain Institute. Colleagues offering additional support at the sponsoring organizations included Bill Browning, Alexis Karolides, Michelle Sinsel, and Jen Uncapher at Rocky Mountain Institute, and Bob Bingham, Reiko Goto, Georgina King, Choli Lightfoot, Richard Pell, and Karin Tuxen at the STUDIO for Creative Inquiry.

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Charrette Schedule

Wednesday, October 14

8:00 PM

Informal reception, Holiday Inn Parkway West, 915 Brinton Road, Braddock Hills, Pennsylvania.

Thursday, October 15

8:00 AM

Arrive at Hosanna House, 807 Wallace Avenue, Wilkinsburg. Coffee served.

8:30 AM

Opening plenary session. Overview of charrette approach, objectives, and sites.

9:45 AM

Depart for sites by van. Four design teams go to respective sites; policy team tours all sites and key watershed features.

NOON

Brown-bag lunch provided at sites. Groups keep momentum going with discussions on-site over and after lunch.

EARLY PM

Return to Hosanna House. Team work time.

5:00 PM

Buffet dinner at Hosanna House.

6:30 PM

Plenary session: public invited.

7:15 PM

Break-out public "round-table" sessions. Teams discuss and exchange ideas, questions, and concerns with local citizens and officials.

8:30 PM

Round tables wrap-up. Teams continue discussions/design as desired. Hosanna House is open until 11:00 PM.

Friday, October 16

8:00 AM

Coffee served at Hosanna House.

8:30 AM

Team work time.

NOON

Working lunch. Teams prepare for reporting out.

Friday, October 16, continued

1:00 PM

Plenary session—reporting out. Each team has 5 minutes to present core ideas, 5 minutes for Q & A.

2:00 PM

Plenary discussion of policy and institutional barriers and opportunities.

3:00 PM

Team work time.

7:00 PM

Buffet dinner at Hosanna House.

8:00 PM

Team meetings to assess progress towards required products. Continue design efforts as needed. Hosanna House is open until 11:00 PM.

Saturday, October 17

8:00 AM

Coffee served at Hosanna House.

8:30 AM

Team work time.

NOON

Working lunch.

1:00 PM

Final team work session. Finish products and develop presentation.

2:30 PM

Plenary session. Practice presentation sessions (5 minutes each plus 5 minutes critiques/suggestions).

3:30 PM

Closing plenary session: public invited. Overview of the charrette effort and brief team presentations.

5:30 PM

Reconvene and close.

5:45 PM

Reception at Hosanna House. Refreshments served.

Charrette Teams

* Invited but not confirmed as of publication.
Team assignments are subject to change.

Charrette Facilitator: Bruce Ferguson. Landscape Architect; University of Georgia; Athens, GA.
Assistant: Jen Uncapher; Green Development Specialist; Rocky Mountain Institute; Snowmass, CO.

Edgewood Transit Crossings

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Larry Ridenour. Landscape Planning and Trails Consultant; Pittsburgh, PA.

Hunter Park

Bob Bingham. Artist; STUDIO for Creative Inquiry; Pittsburgh, PA.
AB Carl. Planner; Pittsburgh, PA.
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Additional graphics support provided by students from Carnegie Mellon University Department of Art, Carnegie Mellon University Department of Architecture, Slippery Rock University Sustainable Systems Program, and Pennsylvania State University Department of Landscape Architecture.

About this Charrette Briefing Book

This document is your guide to the topics, approach, objectives, and required products of this charrette. Following sections of this brief introduce the purposes and objectives of the charrette, and describe the region and the watershed in more detail, including the problems being experienced, current efforts to address those problems, and the broader context of regional policies and programs that should inform the work of charrette participants. The overall design objectives and guidelines for the teams are described next, followed by the specific work products required of the teams. Each site is then described in detail, and some directives specific to individual teams given.

A storm sewer outfall along the channelized portion of Nine Mile Run.

Introduction

The greater Pittsburgh region faces a host of problems attributed to wet weather events: combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), and erosion and pollution of stream channels and rivers from stormwater flows. Sewer separations, new detention facilities, and new or expanded treatment facilities to reduce sewer overflows and stormwater runoff problems could run up a huge bill for the region.

The organizers of this charrette believe that wet weather solutions are an opportunity to reconsider the form and function of infrastructure within the context of urban ecosystems. Over the long term, the built environment has replaced much of the natural environment in form while subsuming natural hydrologic function. Short-term problem solving has created an urban infrastructure which has been the focus of iterative single-purpose approaches which traditionally address the downstream effect rather than the upstream cause of problems. Municipal managers are now faced with two issues regarding the existing sewer and stormwater infrastructure: it often no longer functions to its original design specifications, and it is unable to meet contemporary regulatory guidelines and societal needs.

Our thesis is simple: rather than just retrofit the conventional system of conveyance and treatment, retrofit to mitigate the quantity and quality of material being conveyed. To achieve this, a whole-systems perspective is required—one that examines and manages flows throughout the entire urban system. It is essential, then, to embrace two points: a) manage precipitation as close to where it falls as is physically and economically feasible, and b) use natural processes to advantage. Urban infrastructures can reclaim eco-system functionality by utilizing the water purification services offered by vegetation and microorganisms, and the water storage capacities of soils and subsoils. To do so, society can use a range of measures to minimize, use, re-use, infiltrate, treat, or detain precipitation at the level of individual sites and neighborhoods. The techniques for doing so have been proven in new development applications in the U.S., and are being aggressively explored for urban retrofit of stormwater systems in Europe and Japan. Since there are few models of similar urban programs in the U.S., the goal of site-based, adaptive urban design for Allegheny County communities may provide an important model for the region and maybe the country.

We hypothesize that:

- site-based retrofits and urban redevelopment for improved wet weather management can be technically and economically feasible, and
- site-based retrofit strategies can improve the value and livability of the built environment.

We will test this hypothesis in an intensive, three-day design charrette by focusing teams on different sites in the Nine Mile Run watershed, a 6.5 square mile, highly urbanized watershed tributary to the Monongahela River. Nine Mile Run suffers from CSOs, SSOs, runoff problems, localized flooding from drainage difficulties, and depleted stream base flow due to reduced ground water recharge. The watershed is a typical older urban area, with both positive and negative attributes. It has its share of traffic congestion, automobile dependency, air quality problems, solidly built homes, strong neighborhood character and identify, and mosaics of neighborhoods that are rich and poor. How improved wet weather management can integrate with and improve the larger urban fabric is an important topic for this charrette.

Charrette Purposes

- To expand the ideas informing decision-making on wet weather management in the Nine Mile Run Watershed specifically and Allegheny County generally.
- To encourage a long-term shift in values, connecting ecosystems to infrastructure within a new paradigm of sustainability defined in terms of quality of life, and long-term environmental-economic benefit for cities.

Charrette Focus

- This charrette focuses on retrofit and redevelopment opportunities at the scale of individual properties and city blocks, illustrating possibilities for solving watershed problems at the source, in the urban landscape where the rain falls.

Charrette Objectives

- To develop conceptual designs and water management practices illustrating specific, effective techniques for local sites.
- To outline the economics of mitigating stormwater quantity and quality close to the source.
- To show how site-based stormwater management techniques can assist achievement of other local and regional objectives for improved urban function and quality of life.
- To enable communities to move towards implementing these measures by identifying information needs and essential subsequent design steps.
- To outline policies, management structures, and programmatic opportunities to take advantage of site-based strategies.
- To educate the public and decision makers about site-based wet weather management options, and generate interest and excitement for these ideas.

Charrette Structure

Innovative solutions to wet weather problems require integration of multiple perspectives and types of expertise, including art, landscape architecture, architecture, engineering, soils and hydrology, public works, planning, and more. By pulling together persons with diverse knowledge into design and policy teams in an intensive, results-oriented forum, this charrette hopes to encourage whole-systems thinking and quickly turn that thinking into design ideas. The teams include local individuals with relevant expertise or responsibilities, nationally recognized experts in site-based stormwater management, and design students to help illustrate concepts generated by each group. This mix serves several purposes: introducing new ideas and perspectives into the community, grounding design in knowledge of local conditions, and validating good ideas already present in the community.

Four teams will address four different sites representative of typical land uses and geographic conditions in the watershed and region. Each team will be given specific design guidelines to meet for improved water management and ancillary benefits.

"Regent Square Gateway." Public rights-of-way and a former supermarket on cut and fill lying at the junction between the developed portion of the watershed and the open space of the lower watershed.

"Sterrett School." A middle school building and associated grounds, in a block with several single-family residences, on alluvial substrates at mid-elevation in the watershed.

"Edgewood Transit Crossings." A busy street intersection, associated small storefront buildings and residences and a church, bounded by a railroad bed soon to become a busway. Lies on deep alluvial substrates typical of the middle portion of the watershed.

"Hunter Park." Municipal playing fields surrounded by low-income homes, on shallow soils and hillsides of the upper watershed.

A fifth "policy" team will address implementation opportunities and barriers in relevant local codes, regulations, plans, policies, infrastructure programs, etc. This team is charged with outlining an effective integrated watershed management framework, and with identifying ways to improve implementation prospects for the sorts of physical approaches identified by the site teams.

Facilitation and "reporting out" from the teams will encourage cross-fertilization between the design teams and inform the policy team of measures and issues identified by the designers. All teams will participate in an open house on the first evening, which includes plenary and break-out sessions to give local citizens an opportunity to express issues and concerns to any of the teams, and a chance for each team to get feedback on initial designs and concepts. A second open house late Saturday afternoon includes brief presentations from each team, followed by break-outs for evaluation and discussion between each team and community members.

"When Patrick Geddes coined the word Eutopia, meaning "good place," in his address to the Sociological Society in July 1904, and compared it with the commonly understood Utopia coined by Thomas More, a word derived from the Greek "no place," he summed up a fundamental tenet of the regional imperative: that it makes sense to design with the forms and cultural and ecological processes already present in a location rather than to force an idealized, preconceived plan upon a site. Eutopia is assured when culture and ecology become part of design. Utopia is the consequence of ignoring them."

—Michael Hough. Out of Place, Restoring Identity to the Regional Landscape.

Issues and Efforts

Regional Wet Weather Problems

Western Pennsylvania faces significant wet weather management problems. During 1997, the Allegheny County Health Department issued health advisories on 45 days of the recreational boating season urging residents to avoid contact with river water. The need for these warnings traces to wet weather sewage overflows and sewage system bypassing occurring in combined sewer systems and in sanitary sewer systems. Besides the health threats posed by such discharges, they compromise attainment of "fishable and swimmable" objectives of the federal Water Pollution Control Act of 1972 and subsequent standards of the federal Clean Water Act Amendments.

Combined sewer overflows (CSOs) occur at structures designed to release mixed sewer and stormwater when flows in combined sewer lines exceed system capacity. They are legally permitable under the National Pollution Discharge Elimination System, but must be reduced. The regional sanitation provider, Allegheny County Sanitary Authority (ALCOSAN), is due to release its Long Term CSO Control Plan in late 1998 or early 1999.

Sanitary sewer overflows can result from illegal connections of roof and basement drains and infiltration into cracked or disjointed sanitary sewer lines. Excess flows leak out through cracks or by pushing off manhole covers as pressures mount during wet weather. In addition, when the ALCOSAN regional system was designed in the 1940s, dedicated overflow structures were built into sanitary as well as combined sewer lines, because older urban sanitary sewers were known and expected to include many roof and basement drain connections. Federal and state regulatory agencies now consider SSOs illegal. The EPA and the U.S. Department of Justice are currently considering litigation or administrative actions against 51 communities and ALCOSAN to eliminate SSOs. These agencies may level penalties in excess of $275 million against the targeted entities.[1] Corrective actions to eliminate the overflows will cost much more.

Responses to the SSO problem have been many. A number of communities have built or are considering water storage tanks and detention basins to hold excess wet weather flows. Projects to rehabilitate cracked sanitary sewer lines or replace those lines altogether are underway or in the works in several municipalities.

Recently the Allegheny County Sanitary Authority and the Allegheny County Health Department joined forces to establish the Three Rivers Wet Weather Demonstration Program. Using federal, local, and in kind funding, this eight-year program will emphasize watershed-based approaches, establish a wet weather management planning process, and award funds to competitively selected projects demonstrating innovative technical, institutional, and financial mechanisms to control sanitary sewer overflows. The program will soon issue RFPs to local municipalities for the first round of competitive demonstration grants. Source reduction techniques will be an important emphasis of the program.

As in many urban regions, surface runoff from storms is also a local problem, causing localized flooding and erosion of stream channels. Pennsylvania's Storm Water Management Act of 1978 (Act 167) requires all counties to develop stormwater management plans for the watersheds in their boundaries. These plans must set forth provisions to ensure that development does not alter stormwater runoff quantities in ways that adversely affect health, safety, and property. At the current time, plans have been developed and adopted by Allegheny County for most but not all of the watersheds in the county. Act 167 plans only regulate new development and redevelopment; they do not address remediation of problems from the existing pattern of development.

A frequent corollary in urban areas to increased wet weather runoff is reduced dry weather stream flow. As impervious surfaces speed the flow of precipitation toward stream channels, they prevent the infiltration of water into the soil, reducing recharge of the ground water that supports the base flow of streams long after the most recent rains. Thus, the urban landscape produces both "higher highs" and "lower lows" compared to pre-development hydrology. Lower base flows reduce the quantity of instream habitat, and often result in elevated stream temperatures and reduced oxygenation of the water. These problems have been noted in several Pittsburgh area streams.

Recently, federal regulatory interest in nonpoint source pollution from urban runoff has increased. Urban stormwater runoff carries pet feces, lawn fertilizer and pesticides, oils and greases, trash, particles sloughed from automobile brakes, and pollutants deposited on the city from the air. The U.S. Environmental Protection Agency considers this nonpoint source pollution problem an important national priority, and has recently promulgated new stormwater quality regulations for smaller communities and properties to augment requirements already on the books for larger communities and developments. Sustainability and regulatory actions demand that the Pittsburgh area address the quality as well as the quantity of its stormwater runoff.

Nine Mile Run

The Nine Mile Run Watershed and Its Issues

Nine Mile Run (NMR) is an urban stream draining a 6.5 square mile watershed. The upper portions of the watershed are highly urbanized, while the lower portions are undeveloped. The lower, open portion of the Run is under 1.8 miles. It is a third order creek, which in turn drains into the Monogahela River. The larger of the two second order tributaries has been culverted. It winds underneath three municipalities to emerge in an open channel in Frick Park (400 acres) before meeting the other major tributary which drains Frick Park, the Homewood cemetery and surrounding streets. The watershed's topography is characterized by a lower ravine, a mid-level plateau, and surrounding small hills above.

The Nine Mile Run stream ecosystem is plagued by two water quantity issues: scouring and erosive flows during storm events, and diminished flow during the dry season. The watershed is 34 percent open space. Runoff and springs within Frick Park and Homewood Cemetery produce three small (first order) creeks that exhibit good water quality and a diversity of aquatic organisms. Despite this fact, Frick Park and Homewood Cemetery place a significant amount of surface flow into storm sewers to protect trails and lawns. A study of Frick park during construction of the sewers in 1947 indicated a significant drop in the ground water levels and a cause and effect on the plant life.[2] NMR has lost its floodplain and wetlands to industry, highway construction, and pressing recreational uses. Because of this, NMR digs into its streambed with a powerful erosive force. The effect of this includes a sediment load that is detrimental to life in the stream; it also has an obvious effect on the Monongahela, as illustrated by the sandbar that has developed at the mouth of NMR. The ecosystem is further stressed by low flows in mid-summer, resulting in lower oxygen content and significant increases in water temperature.

Water quality in Nine Mile Run is negatively impacted by inputs of domestic sewage from unauthorized sewer discharges to the culverted section of NMR. Sources include sewer leakage or unauthorized sewer discharges to stormwater sewers, and sanitary sewer overflows

(SSOs) and combined sewer overflows (CSOs) to NMR along its length. These sewage inputs are contributed by all four watershed communities and have been occurring for many years. The sewage inputs cause high levels of fecal coliform bacteria in the stream during both dry and wet weather conditions, indicating the water is unsafe for human contact. This is recognized as a significant human health hazard by the Allegheny County Health Department.

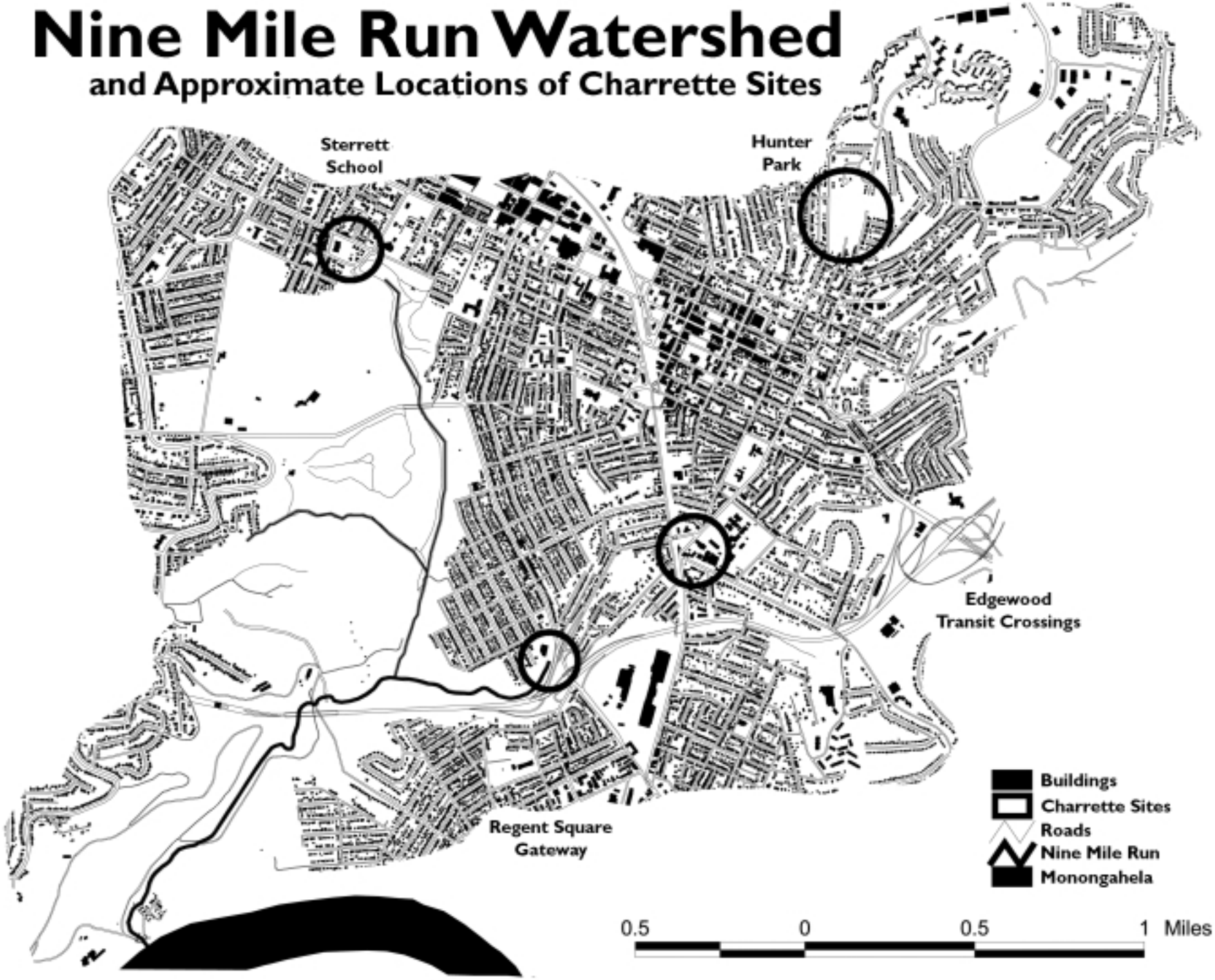
The NMR streambed will soon be surrounded by a contiguous public space from where its first tributary emerges from the culvert at old Braddock Road right to its mouth at the Monongahela. Stream access will be provided to users of an expanding regional greenway system. There are three tiers of problems that need to be addressed: (1) the value of NMR is lost to most viewers upon seeing the trash, smelling the SSO/CSO discharge points, and observing the detritus of sewer, highway, and urban neglect which defines the stream and floodplain; (2) fecal counts in excess of EPA/Pennsylvania Department of Environmental Protection standards for human access and use occur on this stream 365 days a year; (3) stormwater events are extremely dynamic resulting in a torrent minutes after a major rain event. This can present a potential danger to anyone in the stream channel. Storm events are also laden with fecal matter, a problem which is illustrated by chronically discharging manholes.

The outfall of the Wilkinsburg culvert at old Braddock Road at low flow.

…and after a rainstorm.

Nine Mile Run Watershed

and Approximate Locations of Charrette Sites



Current and Proposed Nine Mile Run Improvement Projects

A number of recent, current, and proposed efforts are designed to improve the value of the Nine Mile Run greenway corridor:

- A River Conservation Management Plan, funded through the Pennsylvania Department of Conservation and Natural Resources and organized by the Pittsburgh Department of City Planning with the STUDIO for Creative Inquiry acting as a consultant, recommends a course of action for the restoration and enhancement of the watershed; analyzes the stream and its corridor, including flow, chemical composition, assessment of existing data on wastewater and stormwater, fauna and floral diversity; and evaluates management options that encourage watershed-based approaches for Nine Mile Run and the greenway.[3]
- An ecological assessment and alternative planning program for the ecosystem restoration of the lower watershed, managed by the STUDIO for Creative Inquiry and funded by the Heinz Endowments, includes landscape design alternatives informed by interdisciplinary analysis. The process relies on the expertise of an affiliated team of experts, and the design options are refined by watershed stakeholders during community meetings.[4]
- The City of Pittsburgh has submitted a letter of intent to the U.S. Army Corps of Engineers and has developed a preliminary habitat restoration plan, seeking funding under Section 206 of the Water Resources Development Act of 1996 for aquatic ecosystem restoration. The habitat restoration approach for this project could include: in-channel physical restoration of the aquatic habitat that has been damaged by storm flows; reductions in storm flow velocities and treatment of stormwater through diversion/detention and wetland development; and restoration of dry weather water quality.[5]
- The City of Pittsburgh has secured funding through the U.S. EPA's Sustainable Development Challenge Grant program to investigate techniques for revegetating a steel slag dump site in the lower watershed that is being developed as a sustainable urban community and public open space. This project seeks to find innovative solutions to a range of site remediation challenges on steep slopes, and to develop a protocol for creating an economically viable and aesthetically pleasing succession-based revegetation program for slag slopes.
- The watershed sewer system needs a thorough inspection to identify broken and blocked piping, sewer system leaks and illicit connections, and sanitary sewer connections to the stream culverts. This maintenance could be accomplished with flow monitoring, video inspection, and mapping. Local municipalities have begun some of this work, which could lead to rehabilitation programs and joint use agreements to abandon older, parallel trunk lines in favor of those in better condition.

There is an emerging recognition that the ultimate success of efforts in the lower watershed depends substantially on reduction of storm flows and sewer overflows that emanate from the urbanized upper watershed. Nine Mile Run restoration proponents increasingly believe integration of infrastructures and ecosystems is required not just in the open space of the lower watershed, but in and among the buildings, parking lots, streets, parks, and yards of the headwaters.

Context: Regional Efforts for Sustainability

Between 1980 and 1990, the population density of the Pittsburgh region (excluding Butler County) decreased by 7.3 percent, but the urban/suburban portion of the region actually increased in area by 9.1%, absorbing farmland and open space.[6] The trend is similar throughout Pennsylvania. In Pennsylvania's ten largest metropolitan regions the population grew by only 13% between 1970 and 1990, whereas land area consumed grew by 80%.[7]

The 21st Century Commission[8] has identified that land use decisions and infrastructure are interrelated. The Report states that "Pennsylvania must maintain and expand, where appropriate, an infrastructure that promotes and enhances the efficient use of land."[9] . A number of environmental efforts in Pittsburgh relate to the effort to counteract this dispersionary trend by designing a more attractive urban fabric.

The Department of City Planning is undertaking a master planning process for its four regional parks, including Frick Park. The planning initiative is assisted by a newly created private sector non-profit, the Pittsburgh Parks Conservancy. The Conservancy, modeled after New York City's Central Park Conservancy, is intended to facilitate private sector funding and enable volunteer stewards for the City's four regional parks. Another open space planning and visioning effort, focused on neighbor parks and greenways, was recently administered by the Pittsburgh Community Design Center. A Vision Paper, developed through a series of public meetings and a design charrette, will be used to define potential demonstration projects, build a broader constituency, and market concepts to a wider audience.

Trails and bikeways are playing an important role in reconnecting citizens to the natural environment that surrounds them. The past ten years have seen an exponential growth in bicycle and walking trail development in the region, resulting in large part from the interest in the conversion of rails to trails. The Allegheny Trail Alliance, a coalition of the seven volunteer trail groups, is working to bring about a motor-free connection between Pittsburgh and Washington D.C. Locally, the plans for the link include a trail on the North Shore of the Monongahela River, across the mouth of Nine Mile Run, with connections through the Nine Mile Run Greenway, adjacent to the stream, to the Old Braddock Road site. The Port Authority of Allegheny County's preparations to provide new mass transit infrastructure for Pittsburgh's eastern suburbs provide another linear transportation opportunity. The Port Authority is designing to extend an existing busway along a rail line through Wilkinsburg, Edgewood, and Swissvale. The communities are not entirely pleased with the design and the planning process. Regardless, the project is mass transit that could reduce auto use and could provide bike lanes along the right-of-way.

Collaborative efforts are also advancing regional watershed agendas. For instance, the Allegheny Watershed Network, a project of the Pennsylvania Environmental Council, was formed to allow citizen groups and government agencies active within the Allegheny River watershed an opportunity to exchange information and ideas about the protection and enhancement of their local water resources. The Pennsylvania Department of Conservation and Natural Resources is using its River Conservation Program to encourage greater collaboration on a watershed basis. In addition to the Nine Mile Run Greenway Project, the DCNR has funded a plan for the thirty-five miles of riverbank within the City of Pittsburgh, planning for the Monongahela River upstream from Nine Mile Run, and planning for the Montour Run watershed in western Allegheny County.

The Montour Run plan is for a watershed impacted by large scale office park, big box retail development, and the large regional airport. The Airport Corridor was the subject of an

extensive charrette process led by the Pittsburgh Chapter of the American Institute of Architects. The resulting report, *Reshaping the Region*, reveals large scale plans which integrate ecology with commercial and residential development. The integrated examples strive for a high quality of living. The community-informed design process led to a set of recommended principles, including:

- Design streets, pedestrian paths and bike paths as a continuous network of fully connected systems that connect housing to workplaces to shopping districts to parks and public places;
- Include sustainable water management, plant habitat and wildlife habitat management as part of any overall community infrastructure plans.[10]

Efforts to encourage community dialogue about land use, infrastructure, and the environment on a regional basis are being encouraged by the Environmental City Network through the Sustainable Pittsburgh Campaign. Sustainable Pittsburgh was created in part as a response to the President's Council on Sustainable Development and their September 1998 visit to Pittsburgh. Leaders in this effort hope that through community action, the region will emerge as a model or demonstration site for initiatives on sustainable development, community action, and multi-sector partnerships.

"What does this land help us to do, require us to do, permit us to do?"
—Wendell Berry

Toward increasing public awareness to environmental and quality of life issues, the Environmental City Network is facilitating development of the Pittsburgh Green Map to visually represent the region's landscape and environmental indicators. The mapping project will depict environmentally relevant information for publication and dissemination to the general public through computer networks and hard copy publications.

Western Pennsylvania's industrial heritage, with life in the region still dominated by industry, ethnic tradition, and communities, is the subject of regional development efforts as well. Individual projects are being pulled together by the Rivers of Steel Management Plan, coordinated by the Steel Industry Heritage Corporation, which seeks to preserve and celebrate the story of Big Steel and its related industries. The Management Action Plan served as the basis for the establishment of the Rivers of Steel National Heritage Area in 1996 (Public Law 104-333).

The Green Building Alliance is a local non-profit formed to facilitate the cost-effective and integrated use of environmentally responsible and technologically advanced site development and building design, construction and operation practices. This organization is implementing education, technical assistance, research, and development projects in the greater Pittsburgh region to help create more livable places for current and future generations.

Energy reduction and green practices are also brought out to the Pittsburgh community through the Green Neighborhood Initiative, a project of Conservation Consultants, Inc. The Initiative and its partners, the Western Pennsylvania Conservancy and the Pennsylvania Environmental Council, provide residential and commercial energy audits, community greening, and environmental education opportunities to targeted urban neighborhoods. The underlying mission is to work with community groups and volunteers to integrate intensive environmental services into existing neighborhood traditions.

Design Guidelines

I. General Approach

This section of the brief specifically directs the site design teams, and also orients and informs the policy team. Your focus throughout the charrette should be on site-based retrofit strategies to infiltrate, detain, and treat stormwater. While off-site approaches exist, the charrette organizers believe that on-site retrofit technologies and practices should be a major focus of solutions to wet weather problems in the region. Our premise is that broad application of on-site strategies to other sites throughout the watershed and region can produce significant cumulative stormwater management benefits. Your job is to identify and illustrate the possibilities and benefits of on-site approaches.

The sites in this charrette are roughly a city block in size. We have defined sites at this scale to allow and encourage consideration of measures that can be taken at the level of individual properties *and* measures that are best integrated with neighboring properties or local public streets and rights-of-way.

It is possible to look at wet weather management two ways: as just a water management activity, or as part and parcel of the multifaceted, multi-functional urban fabric—a function deeply embedded in that fabric, simultaneously affecting and affected by many other urban activities. We challenge you to adopt and illustrate in this charrette the latter, broader approach—to identify on-site techniques to manage stormwater while simultaneously maintaining and improving other urban functions and the livability and sustainability of these sites and the region.

Stormwater management is but one function of urban infrastructure, but it touches on multiple other functions, for better or for worse depending on how it is done. "End of the pipe" solutions are not problematic per se. Rather, they often fail to attack a problem at its source, or they are single solutions to single problems. We believe that sustainability, long-term effectiveness, and optimal economic performance require approaches that go to the root of problems *and* satisfy more than one objective at a time.

Some site-based stormwater management retrofits may be justified within the narrow economics of cost comparisons between conventional and alternative projects. They can be chosen and implemented now, on those terms alone. Other retrofits may be justified by pointing to broader economic or non-economic benefits besides stormwater management. Many can and should be included in redevelopment projects and the myriad small adjustments to public and private properties that will over the long term transform the urban fabric into a better functioning, more sustainable, and more liveable landscape if adequately and holistically conceived and implemented.

II. Runoff Management

A. *Aim to infiltrate or detain (in that order of preference) the runoff from a two year, 24 hour storm (2.50 inches) on-site.*

Rationale: The two year, 24 hour storm is one of the design storm thresholds specified in the Monongahela River Watershed Stormwater Management Plan.[11] While this plan focuses on new development and the goals and hydrology of retrofits are rather different, the two year, 24 hour storm is a commonly understood yardstick for stormwater management. Meeting this performance threshold will allow others to easily understand the wet weather performance of your designs. It is an ambitious goal for retrofitting these highly urban sites. Larger storms are rare events: they constitute only a small percentage of total urban runoff, and most hydrologists agree that precipitation

events of lesser quantity and greater frequency cause most of the water quality and channel degradation problems associated with urban runoff. Placing the priority on infiltration is consistent with the Monongahela River Watershed Stormwater Management Plan, with the need to reduce the volume as well as the peak flow of runoff to sewers and stream channels, and with restoration of a more natural watershed hydrologic regime, including recharge of ground water to support base flows.

B. *If you cannot infiltrate or detain the 2 year design storm on-site, design as much hydraulic capacity as the site allows, and indicate in your narrative the site-specific constraints that limit on-site hydraulic capacity.*
Rationale: In retrofit situations such as Nine Mile Run, with its many wet weather problems, any water removed from immediate runoff into combined or sanitary sewer lines, stormwater lines, or stream channels is a benefit. Retrofits should be encouraged even when they do not meet thresholds based on pre-development hydrology—any improvement is better than none. A comprehensive retrofit strategy for the watershed and the region should allow and enable any level of improvement a specific site allows, consistent with cost-effectiveness guidelines.


Typical charrette activities.

C. *Treat stormwater on-site for improved water quality as needed per your judgment of need and efficacy.*
Rationale: Some runoff sources (e.g. rooftop runoff) have less need for water quality treatment than others (e.g. parking lots). Some infiltration techniques may have sufficient treatment "built-in." The soil and subsoil is often a very effective treatment system.

D. *Provide for overflow to combined sewer lines or stormwater lines or stream channels when the capacity of your on-site management system is exceeded.*
Rationale: This is standard and necessary practice for on-site measures. The conveyance infrastructure is largely in place (albeit in need of rehabilitation in many locations).

E. *Address local drainage problems as appropriate and possible, and exercise care that your retrofits do not create other problems, such as flooding basements or undermining road base.*
Rationale: Like many urban sites, some of the sites identified for this charrette exemplify additional urban runoff problems beyond CSOs, SSOs, and stream channel degradation. These include localized street flooding (in part caused by off-site runoff) and basement flooding. Clearly, on-site strategies should not exacerbate these problems, and should contribute to their solution or mitigation wherever possible.

F. *Assume that whatever is physically possible is or will be institutionally possible.*
Rationale: It is very easy to point to institutional reasons why on-site approaches "cannot be done." There are barriers in codes, regulations, and policies at many levels of government. Programs and authorities to fund, implement, and maintain these measures are lacking. And so on. The job of the design teams is to illustrate what is physically possible. The policy team will address the institutional barriers and recommend

solutions and opportunities to enable on-site strategies. Design teams should make note of potential institutional barriers and opportunities and pass these notes on to the policy team. We have scheduled a plenary discussion at the charrette mid-point as one opportunity to share concerns and ideas on policy and institutional issues.

III. Integration of Functions and Benefits

A. *As you retrofit your site for improved stormwater management, maintain or improve other urban infrastructures, functions and amenities. Look for synergies in the following areas (this list is illustrative; you are not bound by or limited to it):*

- *Water supply*. Harvest runoff for watering of landscapes, car washing, or other purposes.
- *Green waste management*. Utilize chipped or composted vegetative waste for soil amendments to improve infiltration, or as filter media.
- *Pedestrian access*. Reduce dependence on automobiles and replace automobile "habitat" with softer, more permeable spaces by rehabilitating sidewalks, creating buffers from moving cars, etc. Add new pedestrian connections along "desire lines" to unify the site and related parts of the community without the need for motor vehicles. Improve foot and bicycle access to transit systems.
- *Traffic calming*. Narrow neighborhood streets and create permeable parking lanes or bays.
- *Energy Use*. Shade buildings and capture/evaporate precipitation with increased tree canopy cover. Reduce the site-specific and regional urban heat island effect by minimizing paved surfaces.
- *Air quality*. Reduce air pollution by decreasing automotive dependence, and capture/filter pollutants with vegetative cover.
- *Employment*. Use the multiple benefit streams of dispersed stormwater management measures to create and sustain jobs in their construction and maintenance.
- *Habitat protection and creation*. Install vegetated swales, daylight previously culverted drainages, create water gardens and bioretention zones, and otherwise increase the diversity and abundance of ecological niches in the urban environment.
- *Recreation and leisure*. Create trails, pocket parks and other amenities that increase perviousness and provide for active or contemplative diversions on-site, or improve access to nearby amenities.
- *Beautification*. Use the "softer, greener" nature of many on-site stormwater management measures to aesthetic advantage.
- *Economic and social development*. Improve neighborhood vitality and property values through the above approaches and other interrelated strategies.

  Rationale: As stated above, we believe that sustainability, long-term effectiveness, and optimal economic performance require approaches that satisfy more than one objective at a time. At the present time and for the foreseeable future, the affordability of single-function infrastructures is in doubt. Broad benefits imply broad constituencies, thereby increasing the fundability of construction, and the motivations and potential funding sources for maintenance.

IV. Budget

A. *Retrofit your site to manage stormwater on-site within a budget of $2.00 per gallon ($15.00 per cubic foot) of hydraulic capacity for on-site infiltration, detention, or treatment.*
Rationale: Water removed from immediate runoff into combined or sanitary sewer lines, stormwater lines, or stream channels is water that does not have to be detained downstream, and may not require treatment as well. Costs for conventional detention tanks and basins recently built or proposed for sewage system bypass reduction in the greater Pittsburgh region have ranged from $0.88 to $3.31 per gallon of total capacity, for construction costs only, with most facilities costing between $1.00 and $2.00 per gallon.[12] Design, land acquisition, legal, maintenance, and replacement costs, operational capacities, and many other considerations would have to be figured into a rigorous avoided cost analysis. Costs of treating the detained runoff to the applicable water quality standards would also have to be included. Additional "hard" or "conventional" infrastructure approaches are also available and may have greater or lesser costs. Nonetheless, these figures provide an initial, rough guide to the potential value of managing stormwater on-site. We suggest that $2.00 per gallon of hydraulic capacity is a reasonable "ballpark" figure for the value of water managed on-site. If society is prepared to fund downstream wet weather management at this level, it should be willing to invest similarly in alternative approaches accomplishing similar or complementary results on-site.

A combined sewer overflow structure along Nine Mile Run.

We realize that precise costing of your retrofits is not possible in the available time. We trust that your experience and judgment as designers will allow you to assess the rough magnitude of potential costs and calibrate your designs accordingly. Successful design processes usually involve an iterative exchange between physical possibilities and economic realities. We offer this budget as a guide to the "first iteration" this charrette aims to illustrate.

Note that this "budget" can be applied in different ways: as a total budget for one or a combination of retrofits, or as an incremental budget above costs that would be covered for other reasons. Some retrofits can or must "pay their own way" based on their runoff mitigation benefits alone. Others may be cost-shared with other projects and functions. As an example of cost-sharing, when property owners or municipalities replace pavements that are deteriorated or torn up for utility work, the cost of this replacement is borne by the owner for reasons other than stormwater management. Your budget can fund the incremental cost of simultaneously installing measures that increase on-site hydraulic capacity or water quality treatment—your budget in this case does not have to fund the entire cost of the pavement replacement project. Please identify and take advantage of cost-sharing opportunities. Make note of these opportunities in your narrative report, and indicate if they are likely to occur in the near term or long term.

B. *Should you find it necessary or desirable to exceed this hydraulic capacity budget, indicate in your narrative your reasons for doing so.*
Rationale: Some of the potential benefits of on-site stormwater management measures are difficult to quantify and capture. Over the long-run, we believe that qualitative costs and benefits of urban infrastructure elements will continue to be recognized and will significantly affect decisions on programs, policies, and investments.

V. Approaches and Measures

You may apply a wide range of measures to your sites. As a reminder, not a limitation, consider the following potential strategies:

- *Tree plantings*. Tree foliage can hold and absorb or evaporate a significant portion of the rain falling annually on the diameter of the tree canopy.
- *Soil rehabilitation*. Aeration, soil amendments and other techniques can increase the infiltration rate of lawns. Certain grass species, by virtue of denser, deeper roots, can further improve infiltration.
- *Surface* infiltration basins. In some yards and many commercial landscapes, ponds, temporal "water gardens," and other basins can be designed to gather site runoff and hold/infiltrate it over varying periods of time.
- *Vegetated swales*. These features can infiltrate, attenuate, and treat runoff.
- *Disconnection of impervious surfaces*. Pitch drainage from driveways, sidewalks, and other pavements onto adjacent vegetated soil where it can infiltrate, not directly into street gutters. Divert low gutter flows similarly.
- *Street narrowing*. Common now in new developments, narrow streets calm traffic, increase green space, improve property values, and reduce impervious area.
- *Parking lot redesign*. Creative layout can incorporate "infiltration islands," filter strips, and other stormwater management features with no or little impact on the number of parking spaces.
- *Porous pavements*. Selectively apply porous concrete, porous asphalt, unit pavers (stone, brick, and concrete masonry), open-celled pavers, reinforced turf, gravel, organic mulch, decks, and grates to appropriate locations and uses.
- *Subsurface detention/infiltration chambers*. Made of gravel or manufactured components, varying depths and capacities of chambers can be installed under lawns and pavements to hold large volumes of site runoff during a storm and infiltrate that water to the subsoil in the following hours or days.
- *Roof leader disconnections*. Appropriate redirection of the leaders, re-grading of the landscape around a building, use of dry wells, and other techniques can infiltrate roof runoff without flooding basements.
- *Cisterns*. Some roof runoff can be captured in rain barrels or other cisterns and either used for yard and garden watering, car washing, etc., or released to dry wells or other infiltration systems once the storm passes.
- *Eco-roofs*. A modern variant on the sod roof, with lower weight and easier handling and maintenance, has been created and installed widely in Europe. Eco-roofs absorb water and evaporate it back to the air or grow incorporated plants, greening and cooling the building and cityscape.
- *Culvert daylighting*. Reopened stream corridors can include space in the cross-section for flood spreading and attenuation, permeable surfaces for infiltration, and diverse riparian plantings.
- *Site reconfigurations*. In the redevelopment context sites can be redesigned to reduce the quantity of pavement, or density can be increased to reduce the need for automotive transportation and the pavements it requires.
- *Interior water-use efficiency*. Many technologies to improve interior end-use efficiency are available that can, without sacrificing fixture or appliance performance, cut base sewer flows from buildings. Focus your efforts on exterior/landscape measures, but you may include interior recommendations in your write-ups if you wish.

Required Charrette Products

Completion of certain work products is essential to the success of this charrette. The products specified below for the site teams will be incorporated into a final report to be distributed to area decision makers. The objective of this report is to inform and interest public officials, local professionals, and citizens in site-based stormwater management strategies. Our ultimate aim is to add to the local dialogue on wet weather management and urban redevelopment and rehabilitation, in order to improve choices on management strategies and produce multiple benefits.

The report will consist of a 14-16 page "high impact" color glossy summary, and a longer supplement. The summary will include the very best graphics from the charrette teams, short summaries of the site plans and selected elements, key policy recommendations, and a concise narrative tying together the charrette results. Its purpose is to pique interest and generate dialogue. The black and white supplement will include additional graphics, and more detailed descriptive text and policy findings. It will provide further information to enable communities to take the next steps in exploring and eventually implementing the strategies this charrette will outline.

Required Products: Site Teams

Site Plan Color Rendering

Each team must produce an illustrative color site plan at the scale of the base map provided. This plan will likely be reproduced in the color summary document. Provide a simple north arrow and simple reducible bar scale. Do not title the plan; a title will be provided in the final report.

Additional Graphics

As appropriate, elaborate on your plan and its elements with additional drawings and renderings. We ask you to produce at least 6 additional graphics; we hope you will be able to produce more. These should include a mix of detail plans, elevations, cross sections, and perspective sketches, and may include bird's eye views or other formats. Indicate materials and construction technique where this is considered significant. Choose scales as appropriate, keeping in mind any graphics may be considerably reduced in the final report. These graphics may be published in either the color summary or the black and white supplement, so choose ink line and color techniques appropriately. Obviously, focus most of your graphics on elements that have significant water quantity, water quality, or related urban community implications. Emphasize production of graphics that will communicate the look and feel of your recommended strategies to officials and citizens who are not design professionals and may not be familiar with interpreting technical drawings. Each additional graphic should be accompanied by a written description of approximately 100 words in addition to your overall project description.

Explanatory Narrative

Each team should develop a narrative of 800-1500 words describing your overall plan and recommendations. Explain the main strategies employed and briefly touch on key elements. Describe the water quantity and quality performance and the implications for the urban environment and urban quality of life. Indicate your suggestions for phasing of implementation over time and cost-sharing of measures between wet weather functions and other urban functions and agendas. Also identify any site-specific constraints to meeting the hydraulic performance or budget guidelines.

Matrix of Benefits and Tradeoffs

Develop a simple table or matrix that concisely outlines (quantitatively or qualitatively) the benefits, and the costs or tradeoffs, of your retrofit recommendations across a range of functions and values: e.g., runoff quantity management, water quality, water supply, green waste management, mobility and access, energy use, air quality, employment, habitat protection and creation, recreation and leisure, beautification, economic and social development. You may delete, modify, and add to these categories as applicable to your site and recommendations. We suggest that you beginning recording potential benefits and tradeoffs early in your discussions to facilitate production of this matrix.

Outline/List of Implementation Issues and Suggestions

As in most charrettes, your designs and descriptions will be largely conceptual. We encourage you to develop as much detail as time allows. Aim to enable others to take up your ideas and run with them. Please keep and provide a list identifying: a) missing data and information, and design issues, that must be addressed to bring your ideas to fruition, b) known policy barriers to implementation of your designs, c) any suggestions you have for project finance, management, phasing, construction, etc., and d) key maintenance requirements for your designs. This document will be reproduced in the report supplement for the use of those who wish to pursue your concepts further.

Required Products: Policy Team

Products required of the policy team are described in the policy team brief later in this report. We expect the policy team to present many of its findings and recommendations as narratives, lists, and other text; however, we encourage the policy team to consider creative ways to communicate its results visually, with diagrams, flow charts, tables, graphs, drawings, or other means.

Additional Considerations

We prefer you minimize text added to plans, elevations, and other drawings. Err on the side of avoiding clutter. Keep in mind that any drawings may be substantially reduced in size in the final report, and text can be added to graphics later by the report editors if needed.

Each team will be provided a computer, disks, and access to a printer. Provide written materials in hard copy and on floppy disk. Electronic files should be in Word 5.1 or higher for Macintosh. You may use tables, bullets, different fonts and font sizes, the drawing function, and so on, but avoid stylistic choices that will lose content or format if changed to other styles for the final report (e.g. table or drawing formatting highly dependent on specific fonts or font sizes).

Edgewood Transit Crossings

Location

This site lies at the center of Edgewood, a predominantly white collar community. A portion of an elevated railway bed running along the west side of the site will soon be developed as a busway by the Port Authority of Allegheny County (there is also some community interest in light rail here). Freight trains will continue to use the remaining railroad right-of-way. Swissvale Avenue is cut off by the railway bed, but nonetheless serves as an important local arterial that runs into the site from the northeast and then shunts south along the rail line. The site is surrounded by homes, schools, and small businesses. The Edgewood town hall is adjacent on the east side of the tracks, and a community building with a public library, swimming pool, and bowling alley lies just across the west side of the tracks. The Edgewood Town Center shopping center is located a few blocks south.

Structures and Landscape

Physical diversity and neighborhood activity are key features of this site. The defined site includes the elevated railway and a historic train station building designed by Furness, plus a small park adjacent to the station. Continuing across Swissvale Avenue, the site takes in a small commercial building (once a community grocery; now an architect's office with other small businesses), a small one-story dental office building, a multi-story apartment building, a large house, and a Presbyterian church. The closely spaced buildings mostly date from the early to middle decades of this century, and range in condition from fair to excellent. The site has a high proportion of impervious surface, but also has some gravel parking areas and small turf areas around several of the buildings. Race Street crosses under the tracks, as does a pedestrian walkway. Separate sanitary and storm sewers run underneath the major streets of this site, as well as water lines.

Drainage and Watershed Issues

Impervious surfaces are directly connected to separated stormwater sewers via street drain inlets and roof leaders. Rainfall carried off by the conveyance infrastructure contributes to high peak flows in Nine Mile Run, and carries oils, debris and other urban pollutants. Ground water recharge and downstream base flow are reduced. While the surface and fill of the elevated railway reportedly infiltrates water rapidly, the proposed busway could increase imperviousness of the site still further.

The street intersection here is at an artificial topographic low point. During intense storms street runoff enters the intersection from all directions, especially from Maple Street where fast-moving runoff on the steep slope bypasses drainage inlets. During intense rain events runoff ponds up in the intersection to the extent that it enters the door of the architect's office (a rise of at least one foot), and probably also the antique store in the basement of the train station. The latest ponding incident was in late August.

The old Edgewood train station, with the railway bed to the left.

Soils and Geology

Alluvial deposits of the Carmichaels Formation (an alluvial terrace deposited by the ancient Monongahela River) may be 10 feet or more over most of the site. The underlying Casselman Formation bedrock consists of alternating layers of shale, siltstone, and sandstone, with some red beds and thin limestone and coal. The natural Culleoka soil was a moderately deep, well-drained soil on uplands. The texture was loam to clay loam throughout the profile. Permeability and water-holding capacity were moderate. The natural Rainsboro soil was a deep, moderately well drained soil with a fragipan. The natural geology, soil and topography have been strongly modified by urban cut and fill and by artificial drainage. Urban fill has been used especially to build up the railroad bed.

Social Issues

Edgewood residents consider the two sides of the track to be a single community unit, from the town hall on the northeast, to the community building on the southwest. This is the public center of Edgewood. There is considerable pedestrian traffic through the railroad underpass. A common route is from Maple Street, through the underpass, to the community building. The sidewalks along Swissvale Avenue and Edgewood Avenue are well-used, in part as a route to the shopping center 1/4 mile to the south. Because of the nearby schools and the community facilities, many of the pedestrians are children.

The development of the busway is a major issue affecting Edgewood. In response to community concerns, the Port Authority (the regional transit agency) has eliminated the historic train station as a busway stop, instead moving the stop to the shopping center, and proposed a high noise barrier wall. Some town and regional residents are promoting a light rail alternative. The busway proposal includes a "linear park," which is essentially a sidewalk.

Looking up Swissvale Avenue from the train station.

Design Considerations

Please refer to the design guidelines earlier in this brief for your general instructions. Among the possibilities for this site, we suggest you consider:

- Porous pavements for sidewalks, streets, driveways, parking lots.
- Trees along the busway for interception of precipitation, moderation of microclimate, moderation of bus emissions, and neighborhood beautification.
- Using subsurface of streets, sidewalks, driveways, & parking lots to detain or infiltrate runoff.
- Diverting some runoff from impervious surfaces into the busway for treatment in vegetated swales and subsurface infiltration and detention basins.
- Enhancing convenient and safe pedestrian access within and through the site, including concerns of universal accessibility.
- Enhancing the community focus of the locale by programming the reuse of the historic train station as a service-oriented public or commercial facility.
- Please give special attention to varied possibilities for disconnecting roof leaders from the conveyance infrastructure—this is likely to be an important technique for sewer and storm line flow reduction throughout the region.

Hunter Park

Location

This site is in the upper reaches of the watershed, in a small valley surrounded by housing on slopes and hilltops. The Penn Avenue commercial district of Wilkinsburg lies approximately six blocks south. A number of neighborhood streets circle the park. Swissvale Avenue provides a straight shot up to the site; however, it changes from a major arterial at Penn Avenue to a neighborhood street and dead ends along the east side of the park. The former East Hills shopping center, scheduled for mixed use redevelopment, is located further upslope, but vehicle access to this area from the site is currently difficult, and pedestrian access is not provided. The boundary between Pittsburgh and Wilkinsburg lies at the upper (northern) reach of the park.

Structures and Landscape

Hunter Park is terraced up its headwater valley in four levels. The lowest level includes a small grassy area and a water play pool and fountain with a dolphin sculpture. This feature is relatively new but the water valve is broken and the water turned off by the city. Slightly higher is a larger open space and a basketball court in moderate to poor condition. The next level includes a baseball field and a set of tennis courts. These courts are in disrepair and are now used for municipal yard waste composting. The highest level consists of some smaller terraces and access points from the roads surrounding the park.

The site includes several row houses at the lower side of the park. These houses, and many in the surrounding neighborhood, are in very poor condition. Hunter Street extends part way up into the park. Its surface is asphalt overlaid over old masonry pavement. There is a vacant lot at the lowest end of the park, the corner of Hunter Street and James Street. Sidewalks in the area are in poor condition, and do not extend up to the park as one might expect.

Drainage and Watershed Issues

The park itself has a high proportion of pervious surface, mainly turf. The surrounding neighborhood is very dense—streets, sidewalks, and houses comprise most of the space. These impervious surfaces are directly connected to storm sewers via downspouts and drainage inlets. They contribute to stormwater pulses, sewer overflows, reduced base flow, and water pollution in the watershed below.

The stream through the park and downstream residential areas is culverted, as is all tributary drainage. A spring still exists in the slope above the highest park terrace. The lower density residential area above the park drains to the culvert running through the park. There is something of a swale currently around upper edge of the lowest level of the park. This drains to an inlet to the stormwater culvert, which then runs from the park across the James Street alley and between the residences below. This culvert backs up from time to time and the inlet grates are covered with debris.

The lowest terrace of Hunter Park, and surrounding houses.

Soils and Geology

Bedrock here is the Casselman Formation—alternating layers of shale, siltstone, and sandstone, with some red beds and thin limestone and coal. These layers are locally prone to landsliding on steep slopes, particularly at seeps and springs and where natural slopes are steepened by cut or fill. Soils here lack the underlying alluvium of the other sites. The natural Culleoka soil was a moderately deep, well-drained soil on uplands. The texture was loam to clay loam throughout the profile. Permeability and water-holding capacity were moderate. Bedrock was 20 to 40 inches deep. A water table was not present in the soil. The natural geology, soil and topography have been strongly modified by urban cut and fill and by artificial drainage.

Social Issues

Wilkinsburg is a predominantly African-American community. Hunter Park is located in a less affluent area where housing conditions are often sub-standard, access to public transport is several blocks away, and there are practically no shops in the immediate vicinity.

All park facilities—baseball, basketball and dolphin fountain—are heavily used in season. The users come from residences mainly within a four-block radius. Many children congregated at the water feature when it was functional. Hunter Park needs more access from the upper level down. Except for one or two unofficial trails, the only access to the park is from below. The borough of Wilkinsburg has identified this park for potential redevelopment, in the hopes of creating a better amenity for a larger area, and of spurring revitalization of the neighborhood.

Design Considerations

Please refer to the design guidelines earlier in this brief for your general instructions.

Looking down on the upper terrace.

Among the possibilities for this site, we suggest you consider:

- Reinforcing a sense of continuity between the neighborhood and the park, through convenient pedestrian circulation and visibility.
- Rehabilitating all sidewalk pavements and the general streetscape.
- Porous pavements for rehabilitated sidewalks, park roads and walks, rehabilitated basketball courts, etc.
- Restoring permeable masonry street pavements by removing the asphalt layer. Rehabilitate the masonry surface, where necessary, by releveling and resetting in sand.
- Increasing street and park tree cover for interception of precipitation, moderation of microclimate, and neighborhood beautification.
- Providing additional parking in Hunter Park without increasing runoff.
- Rehabilitating and possibly realigning the basketball courts and playing fields. Reprograming the area now covered by the tennis courts/compost facility.
- Routing a daylighted stream segment or swales around the playing field edges.
- Diverting some runoff from surrounding houses and impervious surfaces into the park for treatment in vegetated swales.
- Celebrating the hillside spring in some manner.
- Creating or accommodating future links to areas below (Penn Avenue commercial area) and above (East Hills shopping center site).
- Please give special attention to ways of enhancing the economic and social fabric of the neighborhood.

Regent Square Gateway

Location

This site sits at an important juncture—the boundary between Edgewood, Swissvale and Pittsburgh. It is also the site of the outfall of the Wilkinsburg Culvert, marking the transition from the developed upper watershed to the open portion of Nine Mile Run through and beyond Frick Park. Braddock Avenue, a key north/south arterial, runs by the site, and an interchange of the Penn Lincoln Parkway is adjacent. The Regent Square commercial district is located just uphill, and the Edgewood Town Center, a sub-regional shopping center, lies across the Parkway from the site.

Structures and Landscape

The site encompasses the building and parking areas of the former Foodland supermarket, plus the public right-of-way of old Braddock Road, and associated vacant space adjacent to the Parkway and around the culvert outfall and into adjacent Frick Park. The supermarket space on the main floor of the building is now vacant. A few offices in the lower floors are occupied. Potential uses which have been publicly discussed for the building include a used car dealership and a drug store. A terraced parking lot extends from the main level, supported by a retaining wall that joins to the east facade of the building, and cut into a steep hillside to the west. The remnant of old Braddock Road, cut off when the Parkway was built in the early 1950s, shows the cobble street and trolley tracks of the old urban pattern, before automobile dependence became so strong.

Looking down old Braddock Road at the former Foodland.

Nine Mile Run was culverted through the property in the 1930s. The Pennsylvania Department of Transportation later redesigned the infrastructure to accommodate the Parkway. Gas, water, and sewer lines run through the site, approximately along the grass edge of old Braddock Road. There is also a Bell Atlantic phone manhole just above the culvert outlet.

Drainage and Watershed Issues

This is the point where all of upper Nine Mile Run's stormwater culverts discharge to the surface. Flow in the Nine Mile Run channel here is a reflection of everything good and bad in the watershed: booming flood pulses, low base flow, poor water quality from urban pollutants and combined sewer overflows. The first several hundred feet of the channel is artificially straight, simple, impervious, and rigid, and contains little habitat structure.

There is considerable direct runoff through the site from the Braddock Avenue direction, reportedly flowing several inches deep during intense storms. The sewer manhole at Charleston and Braddock (one block up the hill) has been know to blow off during heavy rain events. Sheet runoff down old Braddock Road is actively eroding the slope where it falls into the Nine Mile Run channel, and contributes trash and other pollutants to the stream. The archway of the culvert is also in bad shape. The last 70 feet or so of the culvert appears to be constructed around the bridge over which Old Braddock Road used to cross the stream.

Soils and Geology

The Glenshaw Formation bedrock here—alternating layers of shale, sandstone, siltstone, limestone, claystone, and coal—is overlain by unconsolidated alluvium deposits consisting of loam, silt, sand, gravel and clay in varying proportions deposited by Nine Mile Run before urbanization. Bedrock porosity and permeability vary locally with rock fracturing. Drainage through the alluvium is excellent above the water table. The natural Culleoka soil was a moderately deep, well-drained soil on uplands. The texture was loam to clay loam throughout the profile. The natural geology, soil and topography have been strongly modified by urban cut and fill and by artificial drainage. Fill for road and highway construction is significant in the original stream valley, overlying both the Glenshaw Formation and the stream alluvium. In depth, the fill extends approximately from the stream bed to the present-day ground surface. Laterally, the fill is confined to the original stream valley and does not extend under adjacent buildings or slopes.

Social Issues

Prior to the Parkway and constriction of the open stream channel, this area was an entrance to Frick Park. A chain link fence now prevents access to the trail leading to the park. A blazed path around the fence reveals that bicyclists, runners and walkers bypass the fence and trek to the park anyway. Erosion is cutting back the slope on which the unofficial trail passes.

Local municipalities are interested in redeveloping a safe entrance to the park here. This would be the functional entrance to the Nine Mile Run greenway through Frick Park, which will carry bike and foot traffic, and may generate its own demand for trail head parking. This would provide an important and highly visible entrance to the park for the Regent Square and Swissvale communities, as well as commuters entering the highway. It would also be the symbolic entrance to the greenway and the free-flowing portion of Nine Mile Run.

This area is now an unfriendly place for pedestrians. The sidewalk in the block immediately uphill of the site, coming down to the site from Regent Square, is encroached on by vegetation, and the street is entirely given over to cars.

The Jewish 'eruv' line runs alongside the right-of-way beneath the telephone lines on the Edgewood side of old Braddock Road. The eruv is a traditional Jewish means of marking the neighborhood. The eruv marks the boundary of the Squirrel Hill neighborhood for orthodox Jews.

Design Considerations

Please refer to the design guidelines earlier in this brief for your general instructions. Among the possibilities for this site, we suggest you consider:

- Porous pavements for sidewalks, streets, driveways, parking lots.
- Trees for interception of precipitation, moderation of microclimate, and moderation of vehicular emissions.
- Maintaining or restoring permeable masonry street and sidewalk pavements.
- Public or commercial, watershed-oriented or service-oriented programming for reuse of the building.
- Enhancing the convenience of pedestrian accessibility from surrounding neighborhoods.
- Using the subsurface of street, sidewalks, driveways, & parking areas to detain or infiltrate runoff.

- Resolving sheet flow down old Braddock Road, and erosion around the culvert outfall.
- Creating foot, bicycle, and restricted vehicular access to Frick Park.
- Symbolically enhancing the discharge of Nine Mile Run's culverted flow into the open channel. Prominent visibility would be justified. It may be possible to daylight the channel further into the present culvert so that it pools where it currently leaves the culvert.

The site from the Penn Lincoln Parkway.

Sterrett School

Location

Bounded by Edgerton Avenue, Reynolds Street, and Lang Avenue, this site is located in the South Point Breeze neighborhood of Pittsburgh, a middle-class, predominantly residential area. Traffic on the surrounding streets is light. A small market and an auto repair shop are located across Reynolds. Entrances to the upper Fern Hollow portion of Frick Park and to the Homewood Cemetery are nearby, as is the Frick Museum. Penn Avenue, a major arterial and commercial street, runs east/west roughly two blocks north of the site.

Structures and Landscape

Sterrett School is a three-story middle school built in the early part of this century. Grounds around the west and north sides are landscaped with turf, trees, and hedges. A new parking lot is located on the south side of the building, and a large paved play area lies adjacent to the east facade. East of this pavement, and a few feet lower, a ball field stretches across the middle portion of the block. The east-most portion of the block encompasses 7 homes (two are duplex units) and their associated yards and garages. The ages of these structure range from approximately 30 to 100 years. A short alley runs between these houses.

Water lines and combined sewer lines run along the center or far side of surrounding streets. Gas lines run along the near side of Reynolds Street. A 36" combined sewer line cuts diagonally under this block from the Reynolds/Le Roi Road intersection southeast toward Frick Park.

Drainage and Watershed Issues

The main stream of the Fern Hollow headwater once ran through the site where the low alley between the houses now lies. It is now culverted, along with all tributary drainages, in combined sewer lines.

Impervious cover is high for much of this site: roofs, streets, sidewalks, driveways, and parking lots. Runoff from these surfaces is directly connected to combined sewer lines via street drain inlets and roof gutter leaders, contributing to downstream CSOs. Diversion of rain water across impervious surfaces and to combined sewers also reduces ground water recharge and downstream base flow.

The Sterrett School field is a notable exception to the high impervious cover in the area. Other existing exceptions are the yards of residences and the school. The school field surface is compacted and drains toward the residences. Runoff from the field flows into the low area between residences, and contributes to flooding of the alley and some of the house basements. Drain pipes in the playing field and a wood barrier along the low side of the field have not proved effective.

Playing fields and some of the houses on the east side of the block.

Soils and Geology

Bedrock here is the Casselman Formation—alternating layers of shale, siltstone, and sandstone, with some red beds and thin limestone and coal. The bedrock is at or near the surface at the uppermost corner of the site, but is overlain in the downhill parts of the site by an increasing depth of alluvial terrace deposits from the Monongahela River's pre-glacial channel. These unconsolidated deposits consist of interstratified sand and gravel, boulders, silt and clay, and are easily excavated and well-drained above the water table. The alluvium is shallow at the upper (southwest) corner of the site and gets progressively deeper down-slope towards the east end of the site. The natural Guernsey soil was a deep, moderately well drained soil on uplands. The texture was silt loam to clay and silty clay throughout the profile. Permeability and water-holding capacity were moderate. The natural soil has been strongly modified by urban cut and fill and by artificial drainage.

Sterrett School from across Reynolds Street.

Social Issues

Pedestrian use of sidewalks is generally active, safe and convenient throughout the neighborhood. The school's field is used as a neighborhood resource, with games scheduled frequently throughout the week. The small exercise equipment area towards the southeast corner of the playing field is soon to be replaced with a "tot lot" area, in exchange for the loss of a tot lot previously located in the area recently paved for additional parking on the south side of the building. Staff and students have been replanting the west and north grounds over the years.

Design Considerations

Please refer to the design guidelines earlier in this brief for your general instructions. Among the possibilities for this site, we suggest you consider:

- Realigning, re-grading, and re-landscaping the field sports facilities, school yards and surroundings for infiltration and other functionality improvements.
- Porous pavements for streets, sidewalks, driveways, and parking areas. Streets may have an old permeable masonry pavement under the asphalt overlay; if so the masonry could be uncovered by milling off the asphalt.
- Street narrowing.
- Diverting some runoff from the school's impervious surfaces into the field area for surface or subsurface detention, infiltration and treatment.
- Reconfiguring the gutter below the playing court.
- Rehabilitating the playing field surface to loosen soil, improve infiltration, reduce runoff, and combat further compaction.
- Reconfiguring some components of the residences to escape flooding and prevent direct contribution of on-site runoff to storm sewer flow.
- Please give special attention to varied possibilities for disconnecting roof leaders (at the school and the residences) from the conveyance infrastructure—this is likely to be an important technique for sewer and storm line flow reduction throughout the region.

Policy Team

Developing Policy Options for Nine Mile Run: Integrating Infrastructure, Ecology, and Urban Agendas

This section of the brief outlines an approach and specific tasks for the policy team. We are asking you to outline an integrated policy framework, evaluate existing policies, and suggest institutional forms and programmatic linkages. You are asked to consider municipal, county, state, and perhaps federal policies and institutions. Your recommendations on policies and institutional structures should resonate in the particular context of the Nine Mile Run Watershed and apply well beyond. Your work will necessarily be broad in scope, but you should pay special attention to enabling implementation of the site-scale retrofit techniques under consideration by the design teams. We expect that the designers will note policy barriers and opportunities as their work proceeds, so we have scheduled a plenary session on Friday afternoon for sharing of ideas between the design teams and the policy team.

Below we propose a philosophical approach and general goals for integrated urban watershed management, and then lay out the policy and institutional topics we would like you to address.

Principles

Principle 1: Urban stormwater policy and its attendant retrofits involve different issues, opportunities and constraints than greenfield development policy.

Retrofitting century old urban stormwater/sewer systems requires creativity and strategic intervention to achieve the long-term goals of water quality as described in the Federal Clean Water Act. Policy crafted for use in the urban context should encourage innovation and experimentation within specific standards for monitoring and institutional programs for long-term efficacy analyses. Existing ordinances and other policies should be analyzed for potential constraints on urban innovation.

Principle 2: Policies and institutions should enable effective feedback between receiving water conditions and actions in the contributing watershed.

Urban watersheds have traditionally been managed as infrastructure systems, ignoring the underlying ecosystems which are often displaced and always affected. Monitoring is often a regulatory agency reaction to suspected problems rather than an integrated tool of infrastructure management and maintenance. This process has been inefficient and is perceived to be politically motivated (external) rather than a responsibility for local governments (internal) to find the best means of managing infrastructure systems. Better ways of achieving feedback between ecosystem conditions in receiving waters and effective upstream infrastructure management are sorely needed.

Principle 3: Policies should promote the management of storm sewer systems as infrastructure extensions of the natural ecosystem and its related phenomena.

Hydrologic and ecological processes do not just occur downstream. Infiltration and bio-filtration are elements of natural ecosystem function which can be used to manage wet weather at each property and site in a watershed. Policies for infrastructure, and institutions should enable the use of the natural capacity of soils, vegetation, and microorganisms to regulate water flows and remediate pollutants. Society must identify and remove barriers to using the remediative capacities that exist in and under urban landscapes, streets, and buildings.

Principle 4: Urban stormwater policies should communicate the ideas of limits, citizen participation and program coordination as part of the agenda of urban retrofit.

Stormwater has been viewed as an ever-expanding byproduct of urban development and growth. Expecting century old systems with a history of narrowly-focused retrofits to meet contemporary regulations and societal needs mixes best intentions with difficult realities. Policies should encourage local understanding of the limits of existing systems and foster implementation of alternatives which can mitigate source flow. Wet weather management does not occur in a vacuum. The continual process of building and rebuilding the cityscape includes multiple other functions and agendas: housing, transportation, economic development, beautification, recreation, social justice, energy management, solid waste management, and much more. Resolving a history of hydraulic expansion, poor maintenance and little "big picture" oversight is a long-term goal which must be integrated into other programs and efforts to improve the physical, economic, and social elements of urban environments. This coordination can and should include citizen participation, cost-sharing, innovative funding strategies and potentially, new institutions. If we see stormwater as an opportunity rather than a problem, funding sources for coordinated infrastructure intervention may be found.

Goals for Integrated Urban Watershed Management

Successful policies and institutions are motivated by clear yet ambitious goals. We suggest the following baseline goals for policies and institutions directed towards integrated urban watershed management:

1. Equitably eliminate existing water quality and water quantity problems.
2. Restore and steward the ecosystem functions in the watershed.
3. Manage the infrastructure and ecosystem to maximize benefits and minimize costs.
4. Enable alternatives and experimentation in the pursuit of the above.
5. See infiltration and bioremediation as a cost-effective watershed management method, process and resource.
6. Enable the potential evaluation and rehabilitation of any site in the watershed.
7. Create synergies between water quantity and quality objectives and accomplishment of other urban agendas.

Tasks for the Policy Team

Take as the audience for your findings and recommendations the decision makers and public officials who may be asked to buy into a new approach and develop, approve, implement, and enforce its specifics. Make your work clear and meaningful to this audience. Tasks I and II are general and preparatory; tasks III and IV should be the meat of your work.

I. Elaborate a Philosophy

Spend an early and small portion of your time considering the principles mentioned above. Please elaborate briefly on these principles and suggest any others you feel are fundamental to establishing a holistic approach to urban watershed wet weather management (in particular, an approach that incorporates site-based multi-functional retrofit opportunities).

II. Construct a Comprehensive Policy Framework

Policies and institutions are typically developed piecemeal, as responses to very particular needs and the crises of the day. The result is often a mishmash of laws, codes, regulations, departments, special districts, and so on that may not work together well and often conflict. Rarely do we step back and look at how the various issues we are trying to address may be related.

The Pittsburgh region currently faces a sanitary sewer overflow "crisis." Regulatory pressures on local communities to eliminate SSOs are rapidly mounting. At the same time, ALCOSAN and local authorities are planning combined sewer overflow reduction strategies. And local streams such as Nine Mile Run exhibit significant damage from stormwater runoff. At this juncture, we suggest it is imperative to step back and examine how we can be sure that:

The current status of Nine Mile Run in Frick Park.

- policies and institutions to address these and other problems do not conflict,
- potential solutions are not disallowed by existing or new regulations, and
- approaches to these issues are sufficiently comprehensive and efficiently integrated.

This charrette's policy team can advance the regional dialog on wet weather management by outlining a comprehensive framework for evaluating policies and institutions relative to these three standards. We ask you to do the following:

A) Identify *goals* that any code, legislation, program, management authority, or other policy or institution could potentially adopt, and at a minimum should not oppose. These may include the general goals mentioned above and other general and specific objectives.

B) Identify *functions* that must be achieved for successful, comprehensive watershed management. Broadly, these could include review and approval of development and retrofit proposals, coordination, funding, construction, monitoring, evaluation, education and promotion, maintenance, and much more. Please elaborate.

C) Identify *criteria* for evaluating policies and institutions. For instance, these could include political acceptability, stakeholder involvement, ease of implementation, enforceability, flexibility, ability to charge user fees, ability to attract inter-governmental financial transfers, and much more. Please elaborate.

As you address these tasks, pay particular attention to the goals, functions, and criteria relevant to enabling implementation of site-based retrofit technologies for infiltrating, bioretaining, detaining, or treating stormwater runoff.

III. Evaluate Policies and Institutions Against the Comprehensive Framework

Please evaluate a range of existing and potential policies and institutions against the goals, functions, and criteria you outline, and:

A) Identify where there are conflicts with an integrated urban watershed approach, missed opportunities, or inefficiencies in application or integration.

B) Suggest positive changes to reduce conflicts and improve integration.

A number of documents presenting important policies and institutions will be available to the team, including:

- Codes and regulations: building codes, plumbing codes, drainage regulations, sewer regulations, zoning ordinances, road design standards, etc.
- Laws and policies governing water quality, health administration, stormwater management, sewer facilities, etc.

- Proposals for new institutional forms such as watershed authorities, special sewer or stormwater districts, etc.

You will not have time to review all these documents, so the team must determine which of these items are most important to evaluate. Pay particular attention to provisions that could preclude or enable site-based retrofit opportunities.

IV. Suggest Linkages with Other Urban Agendas and Programs

As noted throughout this brief, site-based techniques to infiltrate, bioretain, detain, and treat stormwater runoff can produce many non-stormwater benefits. This suggests that implementation of these techniques could be spurred or assisted through linkages with programs aimed at economic development, traffic management, transit, recreation, habitat creation, solid waste management, employment, and more. Thinking through how to foster these linkages is one of your most significant tasks. At a minimum, please:

A) Outline likely areas of municipal and multi-institutional cooperation.
B) Suggest specific programmatic linkages that could be made.
C) Recommend communication targets and tools to increase awareness of the multi-benefit potential of site-based retrofit techniques.
D) Recommend specific actions to further outline, investigate, and develop collaborations between officials and citizens interested in sewer and stormwater management and those with other interests and agendas.

As you address linkages and programs, we also ask you to give some consideration to this potentially radical thought: in this day and age, and in the context of urban watersheds, it may be appropriate to de-emphasize highly detailed ordinances and standards for the built environment, and to instead focus more energy on general goals and programmatic approaches to their achievement. Ordinances and standards may be most appropriate for the blank slate of new development. In the city, each site comes burdened and enriched with history and elaborate context. Sustainable design and urban management requires that we be responsive to the particular constraints and opportunities of each site, and adapt our techniques in many ways that may be precluded by a too-strict regulatory approach. On the other hand, precise regulations are an antidote to incompetence and disregard of the effects of one's actions on others. How can we best enable adaptive design and free ourselves to expect the best from urban retrofits and redevelopment, without creating an opening for sloppiness and greed?

Required Products

We expect the policy team to present many of its findings and recommendations as narratives, outlines, lists, and other text; however, we encourage you to consider creative ways to communicate your results visually, with diagrams, flow charts, tables, graphs, drawings, or other means.

Narrative Summary

Prepare an 800-1500 word summary of your findings and recommendations. This should concisely present your ideas on integrated urban watershed policies and institutions, and note some specific findings and recommendations that will be of greatest interest and import to local decision makers. This piece will likely be published in the summary document.

Findings/Recommendations on Tasks I to IV

Develop documents to present your general and specific findings and recommendations on the tasks indicated above. You may use whatever approaches—narratives, outlines, lists, matrices, spreadsheets, graphics—you determine to most efficiently capture and convey your work. These materials will most likely be published in the supplementary document, but may be excerpted for the summary.

Your team must cover a lot of ground. You may wish to split the team into subgroups to address some of the tasks given above. Please keep in mind the available time, and do not get bogged down in any one area. Where you have disagreements, note these and move on. Your job is to identify issues and outline approaches and potential solutions. Your recommendations will be suggestive. Others can take up and refine your ideas.

"The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations to come. As trustees of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people."

—Constitution of the Commonwealth of Pennsylvania, Article 1, Section 27.

Participant Biographies

Hugh Archer, Ph.D., P.E., DEE, is Deputy Secretary for Water Management, Pennsylvania Department of Environmental Protection. He has extensive experience in the areas of water quality, water resources, drinking water, sewage facilities, stormwater, dam safety, flood control projects and wetlands. Dr. Archer has also served as the regional water quality manager in the Southwest Regional Office, where he gained much experience dealing with permits for wastewater discharges, sewage planning, and grant administration. *Pennsylvania Dept of Environmental Protection, P.O. Box 2063, Harrisburg, PA 17105-2063. (717) 772-5996.*

Lucia Athens is Senior Resource Conservation Planner for Seattle Public Utilities, where she is responsible for sustainable design and construction programs for the city of Seattle. She holds degrees in landscape architecture and architectural studies, and has taught design in the University of Georgia School of Environmental Design and the University of Washington Department of Landscape Architecture. She helped develop the Green Builder Program of the city of Austin, Texas, and has consulted on many site and community design projects. *Seattle Public Utilities, Community Services Division, 710 Second Avenue, Seattle, WA 98104. (206) 684-4643.*

Bob Bingham is an Associate Professor of Art at Carnegie Mellon University. He is also a Research Fellow in the STUDIO for Creative Inquiry and a Co-Director of the Nine Mile Run Greenway Project. Mr. Bingham's current research focuses on the landscape within the cityscape environment. His work explores the creation of site-specific installations for public places such as the urban built environment. His research also includes developing strategies for a dialogue between personal and public identity and beautifying public spaces for aesthetic inquiry. *STUDIO for Creative Inquiry, Carnegie Mellon University, Pittsburgh, PA 15213-3890. (412) 268-3673.*

Fred Bonci is a founder of the firm LaQuatra Bonci Associates, which provides landscape architectural and planning services for residential, commercial, institutional, and environmental projects. He has experience in urban design, especially the planning and design of urban neighborhoods, community planning, and public open space projects. Mr. Bonci is currently leading the Pittsburgh Strategic Parks Initiative. He received his Bachelor of Science in Landscape Architecture from Pennsylvania State University in 1973. *LaQuatra Bonci Associates, 95 South 10th St., Pittsburgh, PA 15203. (412) 488-8822.*

Bill Browning is the founder of Rocky Mountain Institute's Green Development Services. He has a Master's degree in real estate development from the Massachusetts Institute of Technology, and received MIT's Charles H. Spaulding Award for distinguished alumni in the real estate profession. His Green Development consulting projects include new towns, many building renovations, Wal-Mart's Eco-Mart, the Sydney 2000 Olympic Village, Monsanto's corporate headquarters, Greening the White House, and the Pentagon Renovation. *Rocky Mountain Institute, 1739 Snowmass Creek Road, Snowmass, CO 81654. (970) 927-3807.*

Thomas Cahill is a Professional Engineer and President of Cahill Associates, a firm specializing in water resources management, environmental planning, and sustainable site development. He has conducted or directed numerous watershed management studies, including development of three dimensional models of ground water movement and pollutant migra-

tion, and ground water base flow models. Cahill Associates is a national leader in the application of porous pavements, underground storage and infiltration beds, and other innovative stormwater management systems. *Cahill Associates, 104 South High Street, West Chester, PA 19132. (610) 696-4150.*

AB Carl is a Wilkinsburg resident who has recently retired from the Allegheny County Planning Department with twenty years of experience. He currently is the Economic Development Chair for the Wilkinsburg Economic Development Group – East. Mr. Carl is also treasurer for the Turtle Creek Watershed Authority and chair of Penn's Corner, a Resource Conservation and Development organization for the nine county area of Southwestern Pennsylvania. *901 William Penn Court, Pittsburgh, PA 15221 (412) 371-1614.*

Tim Collins is a Research Fellow in the STUDIO for Creative Inquiry, and Co-Director of the Nine Mile Run Greenway Project. Mr. Collins' creative practice and research interests are based in aquatic infrastructure (utilitarian and ecological) and the attendant cultural responses. Natural systems and the notion of ecologically defined community inform his approach. He has explored and created work and studies for a variety of waterfronts (with co-director Reiko Goto and others). *STUDIO for Creative Inquiry, Carnegie Mellon University, Pittsburgh, PA 15213-3890. (412) 268-3673.*

Patrick Condon holds the James Taylor Chair in Landscapes and Liveable Environments in the Landscape Architecture Department of the University of British Columbia. In that capacity he has organized a series of international design charrettes for urban sustainability. He also facilitated the 1997 Second Nature charrette for urban site retrofits in Los Angeles. From 1981 to 1983 he was the Director of Community Development for the City of Westfield, Massachusetts and from 1984-1991 he taught landscape architecture at the University of Minnesota. He is a partner in the design and planning firm of Moriarty/Condon Ltd. *Moriarty/Condon Landscape Architects & Planners Ltd., 1661 West 2nd Ave., Suite 102, Vancouver, British Columbia V6J 1H3. (604) 730-6987.*

Bruce Ferguson is a Professor of Landscape Architecture and Director of the Master of Landscape Architecture program at the University of Georgia. He is the author of *Stormwater Infiltration*, the standard professional reference in its field, *Introduction to Stormwater*, and 130 scientific and professional papers on environmental management of urban watersheds. He has participated in the setting of urban design guidelines to protect runoff quality through the International Life Science Institute's stream restoration program in Atlanta, the Second Nature charrette in Los Angeles, the Start at the Source manual for San Francisco, and additional projects in Florida, Georgia and New York. Mr. Ferguson is a recipient of the Council of Educators in Landscape Architecture's Outstanding Educator Award, the highest career award for landscape architectural education in North America. He is a Pittsburgh native who received the MLA degree at the University of Pennsylvania and practiced in the Allegheny County region for several years before commencing his academic career. *School of Environmental Design, University of Georgia, Caldwell Hall, Athens, GA 30602-1845. (706) 542-4720.*

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Rocky Mountain Institute is an independent, nonprofit research and educational foundation established to foster the efficient and sustainable use of resources as a path to global security. RMI believes that understanding interconnections between resource issues can often solve many problems at once. The institute focuses its work in several main areas: corporate practices, community economic development, energy, real-estate development, security, transportation, and water. RMI's water program develops and disseminates information on water-efficient technologies, integrated resources planning, and stormwater management through research, public outreach, and consulting. Through its Green Development Services group, RMI assists real estate professionals in integrating energy-efficient and environmentally responsive design into projects in the private and public sectors.

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The **STUDIO for Creative Inquiry** is an interdisciplinary center in the College of Fine Arts at Carnegie Mellon University. Founded in 1989, this center serves as a focus for experimental activities in the arts at Carnegie Mellon. The mission of the STUDIO is to facilitate work in two major areas: artistic creation and the development of educational tools. Within those two categories all work at the STUDIO strives to:

- Bond creative activity with intellectual inquiry,
- Reflect and engage the comprehensive contemporary environment,
- Become manifest through public gestures, and
- Communicate and collaborate with creative inquiry worldwide.

STUDIO for Creative Inquiry, Room 111, College of Fine Arts, Carnegie Mellon University, Pittsburgh PA 15213-3890, (412) 268-3454, FAX (412) 268-2829; http://noumenon.cfa.cmu.edu

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7 21st Century Environment Commission, "Redefining Progress: Recommendations from the 21st Century Environment Commission to Governor Tom Ridge," Draft Report, (Harrisburg: 21st Century Environment Commission, June 1998).

8 The 21st Century Environment Commission was formed on July 1, 1997 by Executive Order of Governor Ridge to "recommend methods and policies to improve the environmental qualities of the Commonwealth and measure the results, while allowing for enhanced economic and social progress." The final report was presented to the Governor on September 15, 1998.

9 Ibid., page 19

10 "Reshaping the Region: Planning for a Sustainable Future," (Pittsburgh: American Institute of Architects, Pittsburgh's Committee on the Environment, 1996), page 14. Seven additional principles apply more closely to the greenfield development occurring in western Allegheny County.

11 Chester Environmental, "Monongahela River Watershed Act 167 Stormwater Management Plan, Volume 2, Executive Summary," (Pittsburgh: Chester Environmental, prepared for the Allegheny County Department of Planning, adopted by Allegheny County November 1993), page 15.

12 Six flow equalization tanks built in Penn Hills from 1992 to 1994 ranged in construction cost from $1.05 to $3.31 per gallon of capacity, with a combined mean of $1.57 per gallon, in 1998 dollars (tanks ranged in size from 0.35 to 2.0 million gallons, with smaller tanks being more expensive), and a 3.0 million gallon tank built in 1996 in Bethel Park had construction costs of $1.30 (all figures based on documents provided to RMI in 1996 dollars by David M. Meredith, Chester Engineers, September 1998, inflated by use of the *Engineering News Record Magazine* national Construction Cost Index, July 1996 to July 1998). Construction bids for 5 million gallon and 3 million gallon tanks in Girty's Run recently came in at $1.10 per gallon and $1.57 per gallon, respectively (David M. Meredith, Chester Engineers, personal communication, September 1998) Construction costs for a 2.1 million gallon tank built in 1996 in Abers Creek of Plum Borough came to $1.30 in 1998 dollars, and a 2.2 million gallon facility in Plum Creek of Plum Borough was recently bid at $0.88 per gallon (Richard Stewart, NIRA Consulting Engineers, personal communication with Richard Pinkham,

September 1998; same inflator used for the 1996 projects costs). A 1996/97 study of options to eliminate sewage system bypassing in Painters Run in Township of Scott used $2.50 per gallon as a construction cost estimating figure for underground detention structures (Lennon, Smith, Souleret Engineering, "Painters Run Sanitary Sewershed Corrective Action Plan, Wards 3 and 4, Volume 1: Final Report," (Coraopolis, Pennsylvania: Lennon, Smith, Souleret Engineering, prepared for Township of Scott, October 1997), page 4-20). This option was not chosen for Painters Run. None of these figures include engineering, land acquisition, and legal costs.

Printed on Recycled Paper.

Introduction to the Charrette

by Bruce Ferguson

This was the introductory "sendoff" speech for the charrette's participants on the first morning of the event. Bruce Ferguson and Richard Pinkham edited this material to eliminate references to specific visual images (the presentation used many 35mm slides).

Welcome to our people

I can't tell you how happy I am to see these faces here. Some of the people here I know from your work in various parts of the country. Some people are familiar faces from when I used to live and work in the Pittsburgh area some time ago. And for most of the remainder, I am at least familiar with your work from a distance; I have been admiring your work, and that is part of the reason you are here. We have a terrific bunch of people here. I want you to feel very comfortable that you are among a very competent bunch of people.

The nature of the problem of an old urban watershed

We are here to look at an old urban watershed. That is the nature of this problem. It is old, it is urban, and it is a watershed.

The Nine Mile Run watershed is about six and a half square miles in area. In the lower reaches of the watershed, it is occupied almost entirely by Frick Park, so it is an open space. That open space has allowed Nine Mile Run to remain the only free-flowing stream in the City of Pittsburgh. That alone has been enough to allow it to attract a lot of attention, care, and concern for its health.

In its very lowest section, just before it drains into the Monongahela River, the stream drains through an industrial slag dump, very big and visible, right next to an interstate highway. And that has attracted some extraordinary attention. In recent years, that has been the subject of a lot of scientific studies and design proposals. So there is a lot of attention and knowledge about the lower portions of this watershed. There's a lot of thought being given to the possibilities for the future of the lower segment of the watershed.

We are here, in this project, to look at the upper two thirds or three quarters of this watershed. This is the urban portion of it. We are here for the first time to look at the urban portion of this stream, before it discharges and becomes a visible flowing stream on the surface of the soil.

This is a much more complex problem because it is much more than a stream. It is also a system of sewers, and infrastructure, and streets, and houses, and land uses, and economics that are involved with these land uses.

This is an interdisciplinary kind of problem. That explains the different kinds of people who are here. There are physical designer of various kinds — landscape architects, architects, engineers. There are also urban planners; there are also ecological kinds of people; there are also cultural kinds of people here. We are here together to see if we can figure out what are the possibilities for the future for the urban portion of this old urban watershed.

There could not be a more challenging situation. This is a new kind of question. We have spent a lot of time, during my lifetime at least, looking outward to the suburbs, developing new land and extending highways out to it. We've been conscientious at setting standards for what the water quality and so on should be in every new development. But it's so easy to do in new development: it's all on pristine land; all you have to do is set the new standard, and away you go.

Here, we are turning out eyes back to the old urban watershed, where everything is already in place. The systems are already established. This is a technical problem: it involves hydrology and engineering. It is also a problem of human community: the people are already there. When we lay our hands on this watershed, the people are part of the problem, and they have to be part of the solution.

Our objective

Our objective is to illustrate the possibilities for the future, the possibilities for what could be done in this watershed. That is going to take skill and competence and aggressiveness in design, and ingenuity. It is also going to take sympathy and restraint and care in dealing with the human and environmental things that already exist in this watershed.

Our approach to illustrate these possibilities is by designing them. We have people who we know can help us with this kind of problem.

We have four sample sites, which are representative of mixtures of things that happen in this watershed and in old urban watersheds in general. There are different kinds of land uses, but the sites were not selected as samples of exclusive land uses. Every one of them is a mixture of things. It's like turning a kaleidoscope: every time you turn it, you see the same things in a new mosaic.

We have a fifth team, our policy team, which will look at what are the constraints to and opportunities for implementing the kinds of things our designers would like to deal with in old urban watersheds.

We are here to look a hundred years in the future. We are not limited by short-term political feasibility — this is very important. We want to do what is right and what is possible in these places. You competent, ingenious people need to tell us what is right and what is possible, so that policies and laws and initiatives can go in that direction. Laws and policies need to follow what is right and what is possible, not vice-versa. You need to show us what is right and possible so that we know which way to go in the future.

Redevelopment will happen in this watershed. This is one of the few things that we can confidently predict about the future. Times will continue to change, as they have always changed in

the past. There will be new economic contexts, there will be new populations moving through, there will be new insights that people will have, there will new public initiatives getting old sewers to be dug up and replaced, there will be new kinds of energy sources — long after we are all gone, but it will be happening.

To guide redevelopment, we need to illustrate to future generations what the possibilities are. It will take many human generations to do this. There are thousands of residences in this place; there are thousands of cars moving through it; there are thousands of miles of utilities in here. The process will depend on diverse, incremental, public and private initiatives. You need to show what kinds of possibilities there are for redevelopment for a better old urban watershed in every respect.

Our procedure

We are asking the designers to produce certain kinds of products. The designers are accustomed to what those are. But we have put certain kinds of constraints on them, foreseeing the kind of publication that will be coming out of all this when it is done. These are all listed in the briefing book. Please do refer to the book to remind yourselves as to where this is headed. In the next 24 to 36 hours you're going to be very involved with all the substantive issues on your site: how you are going to solve certain kinds of problems; what are the problems anyway. Just remind yourself of what the implications of this are going to be.

The procedure we're following includes some reporting out to other teams. This whole group will be meeting from time to time so we can inform each other about insights we're having, problems we're having, questions we have, and what some of the possibilities seem to be. We will also be meeting with the public from time to time to inform them about what is going on, and to receive some of their input to what some of their possibilities are, and perhaps what some of their fears are about these things.

We are not left with a lot of design time. The word "charrette" means a short and intense design event. That is certainly what this is. With the amount of time that we have, we will be asking everyone to use the briefing book. A lot of thought was given here as to interpreting the sites: what are the social and watershed issues that exist on your site, what are some of the landscape features that exist there, what are some of the possibilities for design, what are the soil conditions, and so on. These things are all outlined to some degree here.

Use the other kinds of support systems that are around. We have a large library of publications in the other room, which covers a lot of the policy-related things, the ordinances and plumbing codes and so on, that apply to this area, and some of the geology that exists in this area, and the standards and design formulas that apply to stormwater. It's a pretty good library.

One resource that we need to be aware of is the people in this group. Ultimately, every person, on every team, is fair game to be borrowed by another team for an hour or so to answer some technical questions. And we do have, in this room, an expert on local botany and native ecology. We do have a plumbing inspector from one of the local municipalities. We do have an expert on porous pavement. And so on. So when you come up with a specific question, start asking around with me, or Jen, or Tim Collins, or Richard, and we'll try to locate who the people are who might be able to answer your specific questions. They'll be drawn out of the other team for a while, and then they'll have to get back.

Please make decisions fast and aim at the products that we're asking for. We have people we trust to have insight into this and we will certainly be in a very good position for presenting these things on Saturday.

My role is to help make sure people are headed toward the right place, and continue to have the right attitude toward their project. The sort of question like, "is such and such really a part of the problem," or "should we really be considering such and such," or "should we really be headed in such and such a direction." I think the RMI and STUDIO people are relying on me to answer most of that kind of question. Jen will be able to handle all the resource and logistical types of questions.

Each team has a base map which has been drawn. And you have the normal kinds of drafting equipment, for manual drafting. We also have some computers which have GIS and PhotoShop and CAD capability, and a number of computers with word processing capability. We are asking for a narrative summary of what you are producing, in addition to the graphic work.

We have some students, graphic assistants, from some of the universities in the region. Each team will need to assign a notetaker, or perhaps a volunteer can appear. We have not assigned team leaders. There is no designated person at the beginning. Each team might end up with its own dynamic. Perhaps some of them will end up with their leaders; some of them may end up in more of a consensus type of organization. We'll allow that to evolve, each team in its own way.

We're going to take field trips to see your sites rather shortly. Do take with you a copy of the base map. Each team, in going to its site, will have a tour leader. This is not the same thing as a team leader. But each team has a person who is familiar with that specific site, and you should expect that person to introduce you to this place as you are walking around. The policy team will be rotating among all four of the sites.

The nature of the problem of Pittsburgh's Nine Mile Run

Now I want to tell you about Pittsburgh, because people have come from all over the country for this.

The Pittsburgh region

The three rivers meet where the city of Pittsburgh is. Geological studies show where rivers were flowing before the glaciers came along north of here twenty thousand years ago. The Monongahela river was flowing across our watershed, and in those days it was 200 feet higher in elevation than the rivers

are today. The glaciation knocked the rivers out through the Ohio River, where the rivers go out today, and 200 feet lower. It was a pretty catastrophic event that blasted out the whole watershed, leaving behind the terraces of old rivers which perhaps a third of our watershed is located on. So that is a peculiarity that does not occur elsewhere in the region.

The region is underlain by sedimentary rocks in general. It is full of coal, limestone, sandstone, and shale. Throughout history this has been a center for movement and for the convergence of things. The geography of the rivers and the region they're located in determined that. Most of the people moving west came through this place and got onto their flatboats here to go down the Ohio and up the Missouri. It was very easy to build the railroads along these river valleys, and huge barges were able to move along here. This has been the place where terrific industrial resources, in the rocks and the water and the geography of the place, were converging.

And this is the brilliant aspect of Pittsburgh's history. If you add up all of the industrial mills that are or were in these river valleys, this is one of the greatest industrial complexes in the world. This has been happening during the nineteenth and early twentieth centuries, and is central to what our country has been doing. Pittsburgh is not only a symbol; it is the central physical place where these things have been happening. Many of the mills now are physically gone. The most amazing thing I've ever seen in my life was to see a big Pittsburgh mill torn down, leaving nothing but a flat plain of soil. Pittsburgh needs a new economy now. Some people think that it is going to come from research and development, because the old technical skills that were developed, around the universities and so on that grew up around the industrial mills, are able to keep going in this form. But the times are continuing to change, as they have changed in the past.

The region here has more than a million people. Having lived and grown up in this area I am certain that the people who have lived here and who continue to live here are a generous and hard-working people. They are very proud to be part of this place and of what it is able to accomplish and what it is able to build.

Recent development and its outcomes

The Parkway East going over the Nine Mile Run valley exemplifies the form that we have given development in Pittsburgh and other cities around the United States in recent decades. The interstate highway is taking commuters from downtown and elsewhere, past the old houses and streets, and sending them out to the suburbs. We are turning our backs on the evolution and the care of these old places and getting in our cars and sending people elsewhere.

I know, because I contributed to this in my practice here back in the seventies. People like me have been digging up the old pristine watersheds out in the suburbs and eroding the soil and installing new infrastructure there. And we have been convincing people to move out to these places, in their cars, out to these new, homogeneous widespread places, with the emissions that come out of cars, distant from any kind of resources to support themselves on a daily basis. Pavements are connecting everything together, because we're all automobile-dependent.

And in the downtown areas, our approach has been (at least from time to time; we seem be over most of this stage now) that the old, diverse, human-scale kinds of places needed to be torn down and bulldozed. That was what you should do with old places. And upon their rubble would appear shining new towers, like some of the buildings downtown. It is homogeneous. From all of these buildings people get in their cars and go out to their homes in the suburbs, and the city is no longer functioning as a city.

And Nine Mile Run is left in its culverts and its sewers. At one point, the stream is in a chamber, basically an above-ground culvert. We are driving on top of that thing, we have built right up to it, and it's no longer alive as a stream. The Nine Mile Run watershed has been basically in place, in terms of its urban pattern, for a hundred years and more. I don't think we need to look down on the people who built it the way they did. I think that they solved the problems of their time. They, like we in our daily work, were following the standards of their time. But it is normal for standards to change over time, and for knowledge to increase and for more demands to be placed upon things.

Where Nine Mile Run discharges to an open channel, it suffers from every problem that an older urban watershed could have. When the rain falls, abrupt pulses of floods come through, eroding as they go and bringing sediment. The flood flows get into the combined and sanitary sewers, and they overflow, and raw sewage becomes a large part of the flow. Every rain fall brings oils and so on off of the automobiles, and other kind of pollutants, because this is an old urban watershed — metals and bacteria and so on. Then when the rain is not falling, the base flow is almost nonexistent.

At the bottom of the watershed is the Monongahela River, where Nine Mile Run discharges. The slag pile is nearby. Frick Park is a large open area. The impervious surfaces signify the urban area that we are looking at. What we are looking at is the larger part of the watershed. Nine Mile Run is completely representative of old urban watersheds in Pittsburgh, and in other old cities in the United States. It overlaps four different municipalities. Our sites are in different parts of the watershed. We've got Hunter Park in Wilkinsburg, the Edgewood train station in the center, what we're calling the Gateway site near the edge of Frick Park, and the Sterrett School in the northwest. We are hitting all four municipalities. The watershed area as a whole is over forty percent impervious. There are places in the watershed that are close to a hundred percent impervious.

We know the kind of solution that we have out in the suburbs: large stormwater detention and treatment ponds and wetlands. They can work really well, and look really good, when properly designed and constructed, where there is the space. This is not an option in an old urban watershed, because everything has already been established. Bulldozing and replacing things to install stuff like this is not part of the issue.

The potential for a redevelopment approach

You can see what they did in the Nine Mile Run watershed, though, a hundred years ago. They took care. They took care of the details where they lived. There are different lanes in the old streets, and different kinds of pavement that occur, with still other pavement surfaces on the sidewalk. The way we take care of an old urban watershed now is going to have to be very careful about details. Everything that is happening in this place is fair game; it is part of the problem. You're going to have to pay great attention to where you are, and what the possibilities are for urban design, and integrating ecology and hydraulics with the way people live in this place, and how to build a city. We need to be addressing all of the folks who live in the houses over all these hillsides. They are part of the issue.

There is a terrific regenerative power in this place. The gray skies that you've been seeing are not just gray skies. They are bringing an awful lot of moisture here, year-round. I'm always struck, whenever I fly in to the Pittsburgh airport, how green this place is. It is trying to regrow; it knows how to make itself healthy. If we would let nature work on our side, and let natural processes of the soil and vegetation and gravity work for us, then we will be able to come up with a healthy city, as healthy perhaps as were the hills before they were developed.

Sterrett School

One of our sites is the Sterrett School, in the City of Pittsburgh. There are impervious roofs and impervious parking lots. One of the strikingly nonimpervious places is the open ground for a small athletic field. There are some streets and houses alongside.

In fact some of the houses are part of our site. The school drains right toward these things, and they all have one culvert in common, where they all discharge. It is one connected place, inside one city block. The school and the houses together are the site. It is a very beautiful neighborhood, very walkable, very safe, with some diverse land uses.

Edgewood Crossroads

At the Edgewood Crossroads site, for those of you who have studied architectural history, the old train station is supposed to be the only station that Furness designed, back in the nineteenth century, this side of the Allegheny Mountains. So it does of course have historic significance. The site has public transportation of sorts going by. There is a lot of traffic on the main road, going a lot of places. A lot of things are converging.

There is a proposal for a new busway along the old tracks, and what they are calling some sort of greenway. I hope that the designers for this site will be inclined to deal with this in a sympathetic way. Residential streets converge from various directions. Farther out there are shopping centers. There is abundant pedestrian traffic. In the minds of the local Edgewood people, there is an extremely unified community, right over top of those old train tracks, and it goes over to the other side. Dealing with the sense of community here, the central intersection in the community of Edgewood, is the urban design problem. And this has impervious surfaces and drainage problems, just like anywhere else. There are all kinds of things that occur here, and every square inch is part of the problem.

Hunter Park

Hunter Park is a local neighborhood park, surrounded by low-income houses. It has not been very well kept. I think that it deserves more public investment. The local politicians are aware that a re-building of the park is probably necessary, and it could very well be done in the foreseeable future. We have some streetscape that can be brought together with the park, so the park and the neighborhood can work together. There is a headwater stream that is passing through. It is in a culvert at the moment. Perhaps there is an opportunity for daylighting.

The local neighborhood park ends up depending on humble kinds of facilities. The little "dolphin" fountain has a great reputation among little kids. When they turn this thing on, the kids are climbing all over it. There is a lot of real community that exists in this place.

Regent Square Gateway

The Regent Square Gateway site is down at the bottom of the urban part of the watershed. The hills are all draining down toward it; Nine Mile Run is down in the valley bottom. The old building on the site, which is now unused, used to be a supermarket. You entered the supermarket from the upper side, or you could get down to the lower part too. This is what we're calling the Foodland site, because Foodland was the name of the old supermarket, but we're also calling it the Gateway site because this old, seemingly abandoned place deserves to have quite a prominent future.

Just on the downhill side of the site is where the discharge from the urban portion of Nine Mile Run happens. All the various culverts are discharging here, including the huge main one. Erosion is occurring. Everything that goes on in this watershed, good and bad, is reflected in this discharge right here.

Down the center of the site is an old city street which was replaced by a new one, when the parkway went through. Tens of thousands of cars are going by here on the new roads every day, in the new system of doing things. The bottom of the old street deserves to be the gateway, because right there starts Frick Park and the open portion of Nine Mile Run and a possible greenway that would connect people not in automobiles but on foot and on bicycles through the park alongside the stream.

Conclusion

Every square inch is a part of the problem and the solution. And everything that happens on each one of these sites is part of the problem and the solution. We want to know: what are the possibilities for the future?

Hunter Park Team Narrative Summary

Charrette Team:

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Following is the main written material handed in by the team at the conclusion of the charrette. Rocky Mountain Institute and the STUDIO for Creative Inquiry are grateful to Ken Tamminga for his helpful revisions to portions of this material subsequent to the charrette. The material has been lightly edited and reformatted for consistency with other sections of this appendix.

"What holds people together long enough to discover their power as citizens is their common inhabiting of a single place."
—Gary Snyder, poet

Introduction

As our charrette team broke free from the tight residential matrix, we confronted a surprisingly large and unlikely space. Hunter Park stood mottled in the weak sun of the season, deserted and seemingly unprepared for visitors. Yet it imparted an air of expectancy, as if it were, like a once-gracious tenement, only too ready for re-investment and care.

Hunter Park serves as a major spatial counterpoint to its built context. Hollow and concave in form, it claims the geographical center of its diminutive watershed. Like its surroundings, it is gritty and embattled. On this October day, life is scarce. The scrappy vegetation on its side slopes and its strangely elegant terraces hint at an industrial lineage and resultant "survival ecology" similar to the slag-filled Nine Mile Run far downstream.

From a park designer's perspective Hunter Park is a cache of richly ambiguous potential. Nestled deep in the earthy community of north Wilkinsburg, it tilts deferentially toward the Monongahela River. Despite the impression that this space was formed by the forces of post-glacial hydrology, the presence of water is suppressed, almost questionable. The park's grottoed terraces and tangle of stormwater artifacts at its upper and lower extremities suggest a long history of conflict between indigenous, natural processes and human aspirations.

Clearly, this was once a riparian landscape, bisected by a first order and free-flowing stream. *Hunter Run*? Buried and unmarked conduits, now in disrepair, have long shunted the water away. We trudge past the infamous concrete dolphins, cute repositories of water—controlled, now dry. Toward the park's upper end we rejoice at the discovery of a wetland seep and a few hardy sedges and other wetland obligates.

The *sense* of Hunter Park is that of a place with stories to tell, with anecdotes and allegories that speak of the essence of this patch of Wilkinsburg, and with allusions to distant market, social and political forces. The echoes of those who've used this remarkable landscape resonate back in time—kids' laughter astride the gratuitous squirting dolphins; the crowd cheering a late-inning ball game; the labored breath of miners wrenching fresh coal from the rich seam near the head of Hunter Street. In the more distant past, spring-fed waters trickle clear and light through viburnum and elderberry and sweet birch, bowered above by oaks and the looming, now-extinguished American chestnut.

As much as any locale in the Nine Mile Run watershed, this place has stories to tell.

Historical Overview

Attaining a holistic view of Hunter Park begins by uncovering its chronological layers. In building an understanding of the present makeup of the park—its form and patterns, its uses and problems—the charrette team felt better equipped to create the best possible plan for its future.

Prior to initial settlement, the area was defined by the headwater stream of the Hunter Run sub-watershed situated high in the Nine Nile Run watershed, itself a small part of the vast Monongahela River basin.

As noted in the Chronology below, the lands now known as Hunter Park were transformed over the last 200 years by the clearing of vegetation on the surface and coal mining below grade. A post-industrial culverting of the stream occurred, followed by gradual transformation into a park through the creation of a baseball field and a children's playground. Presently, it serves the neighborhood of north-central Wilkinsburg as a recreational space with still-existing playground, basketball courts, baseball field, and compost piles sitting upon former tennis courts, bracketed by the revegetated side slopes and traditional Pittsburgh-style worker housing beyond.

The pre-industrial landform of the park area was originally a sharply incised headwater stream valley. Like much of the Allegheny physiography, according to Henry Prellwitz, University of Pittsburgh geologist, the landscape was transformed by the industrial development of the Weiman coal mining company. The valley was flattened into several terraces through its use as a dumping ground for tailings, thus diverting the stream around its periphery. What is now Hunter Park was then part of the urban fabric with Coal Street as one of the main access routes to the mining site. The mining industry then brought in a larger working population, evident in observation of maps of this period, showing housing at the base of the site and other surrounding areas. Since this period, the Borough of Wilkinsburg has had a viable Black community and the park area serviced this community in various means such as a playing field for the Negro baseball league in the 1920s and 30s. Plans for future develop-

ment of the park should relate to the existing Black community and their contemporary relationships to the present site.

A series of post-industrial implementations added recreational facilities and gradually transformed the site into a more developed park facility. This began in the late fifties with the installation of a children's playground and later basketball courts, tennis courts, and a baseball field. It is bordered by a light successional side-slope vegetation fringe, which contains some slope wetland areas toward the upgradient portion of the park. At present, the park is not widely used/visited and is in some disrepair. Stormwater management, ecological and social design issues are numerous.

Chronology

300 million years B.P.—

- Pennsylvanian Period; era of sedimentary bedrock formation, including shale, sandstone and coal
- hot, steamy climate; build-up of swamp material in delta muds forms coal seams over time

100,000 to 12,000 years B.P.—

- lengthy periods of erosion of hardened sediment
- temperate climate vegetation communities form

Post-glacial Era, to late 1700s—

- V-shaped valley of Hunter Park area formed through erosion from melt water runoff from last glacier
- in-migration and inhabitation of native Indian peoples

Pre-Industrial Era, to 1820s—

- larger fauna present: bear, wolves, deer, and beaver
- initial Euro-American settlement: Samuel and Sutia Rippey establish log tavern on nearby Penn Avenue in 1788
- Colonel Dunning McNair lays out first lots, forms McNairsville
- James Kelly becomes major landowner, circa 1800

Agri-Industrial Era, 1825 to ca.1925—

- increasing land clearance for settlers' farmsteads, followed by wholesale deforestation for charcoal production to fuel Pittsburgh's iron and steel industries
- establishment of three main mining companies by the 1860s: Duquesne, Crabtree, and Hampton
- establishment of industrial and land tycoon estates scattered across Wilkinsburg/east Pittsburgh area (Dumpling Hall, Homewood mansion)
- 1887 village incorporated as the Borough of Wilkinsburg
- Coal Street formed initial pathway between coal mines and iron industries lining Monongahela and Allegheny Rivers; site of former homes of miners' families of various ethnicity, becoming predominantly African-American through the early 1900s
- Houston Street serves as original entrance to the mines, skewed from the regular street grid to angle into tailings yard; shanties conform to this peculiar orientation
- "dog mines" developed, so-called because of the dog-and-cart system of transporting loosened coal from the cramped quarters of the Weiman coal seam
- sequence of tailings yards, hillside cartways and related mining works developed in and around site; palimpsest (tracings) still evident on site

Early Recreational Era, mid-1920s to 1940s—

- coal mines largely depleted by the 1920s, with remnant activities extinguished by the Depression
- previously denuded hillsides undergo successional revegetation (benign neglect)
- semi-pro Negro Baseball League—an outgrowth of the Depression and war efforts—adopts the upper terrace for exhibition ball games and practice sessions
- remainder of site relegated to informal open space status

Municipal Park Era, 1950s to early 1990s—

- Wilkinsburg Park System Study (1959) includes Hunter playground and stimulates early park development
- Little League ball field developed in 1970s through sponsorship by the American Legion
- swings installed at mowed area in lower part of park
- Wilkinsburg Recreation Department cited in 1980 for "responsibility for four ball fields" in the area: Whitney, Hunter, upper Hunter, and Green fields
- five-year development plan implemented, 1983-87; generic concrete dolphin fountains installed as part of park renovation
- local but seasonally important activities now include basketball, baseball, and children's play associated with water spouts and play equipment; investment in infrastructure and programming continues to be minimal
- abandoned tennis courts create de facto facility for leaf stockpiling and composting
- informal and illicit activities noted as concerns

Post-Modern Park Era, mid-1990s to present—

- increased interest by surrounding residents in park status (cultural and ecological)
- community leaders, academics and agency representatives begin to see potential for restoration, enhancement, and programming based on principles of identity and legibility, safety, sustainability, ecological integrity and participatory decision-making
- Borough of Wilkinsburg includes Hunter Park in a district redevelopment study
- Nine Mile Run Ecosystem and Infrastructure Charrette represents first major effort to bring together many disciplines and community representatives in seeking common solutions to opportunities and issues of the park and throughout the watershed.

Ecology and Landscape

Characteristics

Park Terraces. Considered in ecological terms, Hunter Park comprises several distinct ecosystems, all of which can be considered anthropogenic (human disturbed). The largest portion of the park is covered with turfgrass, probably Kentucky bluegrass (Poa pratensis). Soil profiles were not investigated by the charrette, but are likely to be non-original. Almost certainly, much of the leveled area of the park is fill, with sufficient topsoil imported to grow turf.

Original mesic (moist) topsoils in the lower, previously riparian, sector of the site would have to have been stripped during mining operations. Then, to accommodate the tailings yard terraced flats were created, necessitating the burial of Hunter Run. Thus, although spatially reminiscent of a riparian environment, there is no functional riparian ecosystem remaining on site.

Wooded Side Slope Ecosystem. The side slopes, too, have been subject to disturbance since the early 1800s. It is very likely that land clearance, logging, and other activities completely denuded the side slopes and adjacent tablelands. Erosion of topsoil and siltation (and destruction) of aquatic habitat would certainly have followed. Present conditions would seem to support this premise. Species common to stressed and thin-soiled conditions predominate, including black locust (Robinia psuedoacacia), boxelder (Acer negundo) and young Norway maple (Acer platanus). Besides several ornamental trees planted in the playground area, sizable native hardwoods are not present; the larger existing successional trees would appear to be from 40 to 60 years old, coinciding with the closure of the coal mines and the beginning of the current phase of benign neglect. Undergrowth is dominated by non-indigenous, invasive species: privet (Ligustrum spp.), garlic mustard (Alliaria officinalis) and along open edges, multiflora rose (Rosa multiflora) and honeysuckle (Lonicera spp.). Conditions are also appropriate to the aggressive native wild grape vine (Vitis spp.).

Wetland Ecosystem. The other significant ecosystem on site is a small area of wetland just upgradient from the abandoned tennis courts. Using the hydrogeomorphic (HGM) classification system employed by researchers for reference wetlands in the lower Nine Mile Run results in a classification of "slope" wetland, supplied by a mix of ground water seepage and surface water from the valley walls. Soils on this slightly terraced area are continually saturated, and appear to be hydric. Emergent wetland obligate species include sedges (Carex spp.), as well as a healthy stand of introduced teasel (Dipsacus sylvestris). Further investigation is needed to determine if this is a remnant natural wetland, or an unintentional "created" wetland resulting from grading activities associated with mining operations.

The Park as Space. Spatially, the park is quite remarkable. First impressions are that careful consideration must have been given to forming a multi-terraced and generous grotto specifically for park activities. Once one understands the forces of landscape change over the past century or so, it is clear that the park program evolved within the spatial framework carved out through mining operations. The park is, then, a fascinating example of adaptive reuse for recreational purposes, and an early example of the transformation from industrial brownfield to post-industrial civic landscape. Spatial definition and the feeling of being in an immersive, protected landscape is heightened by the openness of the well-connected terraces bracketed by the steeply-wooded side slopes. Visually, the urban residential fabric of the borough is only readily discernible toward the south end. The north, east and west side slopes contain sight lines and effectively block visual access to the adjacent streets and homes.

Issues

Lack of Design. For all of its special qualities and its fascinating heritage, Hunter Park has its share of environmental, programming and design problems, very much a microcosm of its post-industrial urban context. It should be pointed out that the present facilities fairly represent conventional approaches to municipal park installations from the 1940s to the present. Unlike the larger, comparatively well-endowed parks in Pittsburgh such as Frick and Schenley, this park was never designed in a comprehensive manner by a professional landscape architect. It was, rather, fabricated incrementally as demand and recreational fads dictated; the happy marriage of industrial valley form and recreational play fields was not so much preconceived as opportunistic.

Functionality. Functionally, the park has some serious weak points. The edges are ambiguous, lacking clear demarcation and thus sending mixed messages to its various constituencies. There are no formal entry points, although there is some sign of past pedestrian gateways along the east and west brims of the valley. The south end of the park demands the most attention as the socio-cultural focus of the park, but lacks even rudimentary design gestures that might reinforce this as a vital, humane place. Peripheral sidewalks come and go with no apparent logic. Structural maintenance of sidewalks, curbs and gutters is dismal, and weeds and litter line the east and west boundaries. Parking is provided in informal fashion on a graveled lot along the lower west boundary of the park, with ambiguous pedestrian entry in. Internal circulation in the park, again, is informal; pedestrians utilize the asphalt-and-gravel access lane or walk on the turf. Shade tree plantings for human comfort do exist—of particular note are several sycamores—but there is generally very little logic to plantings on site.

Social conditions. Paralleling the physical issues of the park are its social characteristics. Although baseball, basketball and playground activities do take place during the summer season, the park on the whole is underutilized. Past illicit activities have, for the most part, been brought under control, but there is likely some lasting stigma that will take a concerted effort to reverse. Certainly, attention to safety concerns could be heightened as the community begins to re-discover the park. The general level of maintenance and equipment investment is an ongoing concern, indicative of Wilkinsburg's very modest tax base. As such, Hunter Park is not nearly at its full potential in serving

as the central recreational and civic open space for the residents of Wilkinsburg.

Ecology. As implied above, Hunter Park embraces a fairly typical, and quite dysfunctional, ecology. Invasive species are a major concern, and the overall health of the "forest" is, at best, moderate. From a landscape ecology perspective, a number of park elements—access lanes, grade changes, excess turf, redundant recreational facilities—contribute to landscape fragmentation, resulting in loss of precious interior habitat. Persistent groundwater seeps at mid-terraces points and along the toe of the valley slope have created small pockets of wetlands. These should be protected as locations of high biodiversity, and emulated wherever feasible throughout the site.

Water Resources

Characteristics

Drainage Areas. The Hunter Park Watershed has a drainage area of approximately 60 acres upstream of Maple Street. The watershed (longitudinal) slope is approximately 9% along the main drainage system. Lateral slopes are steep ranging from 20 to 25 percent.

The watershed was subdivided into four (4) sub-watersheds to better define the hydrologic characteristics of the area, as shown on the GIS map in the Hunter Park section of the main report. These sub-watersheds also provided information for locating and sizing stormwater control facilities and features, as described in the Hydrologic Strategies section. Below is an illustration of the impervious areas in the watershed (streets and rooftop areas, as determined by GIS analysis; sidewalks and parking lots not included):

Sub-watershed 1
- Area: 6.0 Ac
- Impervious Area : 1.8 Ac (29.8%)

Sub-watershed 2
- Area: 23.0 Ac
- Impervious Area: 3.4 Ac (14.5%)

Sub-watershed 3
- Area: 6.7 Ac
- Impervious Area: 1.2 Ac (18.6%)

Sub-watershed 4
- Area: 23.5 Ac
- Impervious Area: 2.9 Ac (12.3%)

Hunter Park Watershed (total)
- Area: 59.3 Ac
- Impervious Area: 9.3 Ac (15.6%)

Land Use. The land use in the watershed is entirely residential. The upper portion of the watershed has multifamily dwellings and the rest of the watershed has largely detached single-family dwellings. There are scattered examples of architecturally notable and well-maintained structures near the park, but much of the nearby housing stock is in need of repair. The impervious area (roads and rooftops) cover approximately 9.3 acres or 16% of the watershed.

Issues

Erosion. The impervious areas produce concentrated runoff that has caused some erosion in the upper reaches of the Park and along the steep side slopes.

Drainage. There is no defined channel because most of the area is currently drained by pipes (stormwater and CSO) or by inadequate grass swales that convey the water, but provide no water quality benefit. Most of the drainage system is in need of maintenance. All of the drainage inlets are clogged with sediment and some pipes are broken.

There are inadequate outflow pipes at the base of the watershed. Therefore, there is a need to control the runoff in the park to prevent flooding or erosion downstream. There are cracked concrete sidewalks and curbs at James Street. Several inlets and catch basins in the watershed are full of sediment and debris and the concrete around them is broken. There are several dilapidated housing units built on buried or culverted streams.

Water Quality. There are no water quality BMPs implemented in the watershed. Most of the runoff drains through inadequate sewers or goes into the CSO system, which itself is the subject of agency scrutiny. Even though the imperviousness in the watershed is low, in comparison with other tributaries, the park can provide areas for "treating" stormwater from the residential areas and reduce the amount of runoff. The stream in the lower part of the watershed has been piped, creating flooding problems and destroying the habitat value of this area. Several houses just downstream of the park show signs of water-damaged foundations and related subsidence.

Data Needs. Information is needed on the size and capacity of the combined sewer system. Several assumptions, based on observation, were made regarding this CSO system. In order to finalize the preliminary design illustrated in the hydrological strategies, the impact of an infiltration and detention strategy in the "entire" Nine Mile Run Watershed needs to be evaluated.

There is a need to know the level of pollution that the watershed can "handle" to define the Best Management Practices (BMPs) and policies that are needed. Also, there is a need to understand the hydraulic capacity of the stream (or pipes in the sewered areas) to define the flooding problems and levels-of-service that can be achieved.

Hydrologic, hydraulic, and water quality models of the entire watershed will be useful to understand the contributions of each tributary, as well as the combined impact of the alternative solutions at the sub-watershed scale. These models can also be used to identified areas with significant erosion and flooding problems and to evaluate alternative solutions to these problems. In addition, models can be used to understand the relative pollutant load contributions and target BMPs in specific sub-watersheds. These models can also be used to design BMPs and

make sure that their interactions are beneficial for the watershed.

In order to prioritize problem identification and evaluation of solutions, watershed goals need to be developed. These goals should reflect public values and should be based on sound science. Implementation will be successful if the relationship between public values, science, and policy is understood and integrated under a watershed management framework.

Strategies

The overall strategy for the Hunter Park watershed considers the area's natural and cultural history as a framework for identifying opportunities to resolve drainage and erosion problems, improve water quality in the watershed and, as importantly, provide new life for Hunter Park as a civic open space. The following strategies are used to illuminate these environmental and historical features and to improve the health and social vitality of both the park and the watershed as a whole.

Improve Runoff Quality

Filter, detain, and infiltrate runoff to remove pollutants, recharge the aquifer, and reduce combined sewer contributions. The components of this strategy include:

- **Created Wetlands.** Create wetlands that collect water at the toe of the slope in the upper terraces of the site. Plant with native emergent and scrub-shrub plants, varying microtopography using 6-8" undulations to enable an intermixing of obligate and facultative species. The wetland is used to filter pollutants (i.e. suspended solids, nutrients, metals), reduce peak flow rates, stabilize the flow of water into the grass swales described below, and provide a modicum of habitat. Created wetlands are located at the bottom of sub-watershed 4, treat runoff from approximately 30.2 acres, and have a hydraulic treatment capacity of 25,000 cubic feet.
- **Woodland Bioretention.** Create a woodland bioretention area consisting of sand and soil mixtures planted with native plants. A pretreatment / sediment decanting area is provided in the upper part of the bioretention area to dissipate energy and collect the coarser sediments, thus enhancing water quality through to Nine Mile Run. The bioretention area is located in the outlet of subwatershed 3 and treats approximately 6.7 acres. It has a hydraulic treatment capacity of 10,000 cubic feet.
- **Enhanced Grassed Swales.** Form vegetated swales with infiltration and filter zones (sand and topsoil areas 1 – 2 feet deep and 10 – 15 feet wide) that filter pollutants as stormwater moves through the site. These swales carry the water around the ball field and through the lower part of the park. They are the main treatment method for water from sub-watershed 2 (an area of 23 acres), and have a hydraulic treatment capacity of 20,000 to 30,000 cubic feet.
- **Disconnected Roof Rainwater Leaders.** The residential areas in the upper portion of the watershed and along Coal and Swissvale Streets will have a program to disconnect the roof leaders from the CSO system.
- **Intercept Street Runoff.** Some of the roof runoff and most of the street runoff is conveyed through curb and gutter and inlets to the drainage/CSO system. This component will include disconnecting the streets from the drainage/CSO system and conveying them to the park BMPs for treatment. Natural stone energy dissipaters will be used to prevent erosion problems at the outlet of the conveyance systems, or natural swales will be used with small check weirs.

Methodology. The water quality volumes were calculated using EPA's simple method and were based on a 2-year, 24-hour storm. A groundwater recharge volume was calculated using the methodology suggested in the Pennsylvania Handbook of Best Management Practices for Developing Areas.

Stream Restoration

- **Stream daylighting.** Daylight the stream at Hunter Square and repair the inlet and pipe at James Street. The restored stream will convey stormwater and will provide an opportunity to recreate the native stream habitat. The stream also serves as an amenity and focal point for the park, revealing long-buried hydrological cycles.
- **Investigate and rectify sanitary sewage problems** in the area of Hunter Park. Substantiate location of, and resolve, any existing illegal sanitary line connections into the main storm culvert. Assess the condition of sanitary and combined sewers, and repair as necessary.

Methodology. A bioengineering approach was used to size the stream meanders and to protect the banks. The peak discharges were computed using a Corps of Engineers hydrologic model and verified by using the rational method. Manning's equation was also used to verify that the channel will convey the flows from a 2-year and 10-year storm. These calculations are preliminary in nature and should be verified as the projects moves to implementation. In addition, the capacity of the downstream drainage system needs to be determined, and the interaction of the sanitary sewer systems with the drainage system needs to be defined.

Urban Landscape Improvements

- **Work with culturally-related patterns of the site**. Embrace and strengthen the wonderful spatial qualities of the park. Enshrine the sequence of sub-spaces that give the park its inherent logic: intensely social landscape at the south end, recreationally-expansive mid-terrace area, and naturalistic zones of the north, west and east valley walls. Re-cast old pathways (such as the cart path traversing the north valley slope), and tell the stories that go with these special features.
- **Incorporate local materials** that elicit linkages to the site's cultural and natural history. For example, use red

sandstone as building material for gateways and path edging. Sturdy and simple iron hardware would fit well into the park's architectural palette.

- **Reduce road widths and detain/infiltrate runoff**. The road width on Coal Street will be reduced along the park and parallel parking will be incorporated. The road width reduction will reduce the overall impervious area. The parking stalls will have a permeable paving system that will collect and treat/infiltrate the runoff from the streets and upstream residential areas. Ground water recharge and pollutant removal will be enhanced with the use of this component.
- **Plant street trees and add a new public square to the park**. In addition to the air/water quality benefits of trees, the square will provide opportunities for enhanced cultural interactions.
- **Reduce paved areas.** Reduction of impervious areas will increase groundwater recharge, slowing storm surges and enhancing water quality down-gradient.

Habitat Enhancements

Aquatic and terrestrial habitat will be greatly enhanced by the implementation of hydrologic strategies. However, the park's ecology should not be considered just a hydrological spin-off. As the preeminent open space in Wilkinsburg, situated at the height of land between the Monongahela and Allegheny Rivers, the park has great ecological value, serving as a sink for biological diversity to the surrounding area. Following are some strategies to enhance the ecological integrity of the park.

- **Ecological Inventory**. A detailed and long term study of the wooded portion of Hunter Park will more clearly assess levels of ecological integrity and will provide a basis for ecosystem management approaches. Consider the approaches and resources that may be available from the Carnegie Museum of Natural History.
- **Woodland Management**. A strategy to control invasive species, build soil resources, and restore indigenous vegetation communities is vital to the long term ecological health of the park. A multi-disciplinary approach should be instigated, drawing from both science (forestry, ecology) and design disciplines.
- **Maximize habitat contributions of all installations**. Hydrologic and infrastructural improvements should be multi-faceted in terms of cost-benefit, and should seek to create ecologically-functional habitat wherever possible.
- **Minimize energy and chemical inputs**. Adopt BMPs relating to sustainable park management practices. Keep manicured turf to a minimum, and select organic maintenance methods. Restrict the use of fertilizers and pesticides. Plant native species that suit the conditions on site and require minimal watering and tending.

Cultural History and Public Involvement/Education

The above strategies were developed using natural and cultural history as a framework to identify structural and biophysical opportunities for park and watershed enhancement. Equally as important to the residents of Wilkinsburg, the following strategies help preserve and celebrate the rich history of the area, and provide opportunities for public involvement and education.

- **Enhance the safety of users**. Incorporate lighting in high-use areas, and install other safety measures. Monitoring and security of the park is essential in ensuring that it become a cherished, well-used facility serving a diversity of residents.
- **Locate existing cultural events and watershed festivals in Hunter Park.** Besides the obvious community benefit of coming together in a central green space, special events and programs can be used to promote ecosystem stewardship and help citizens to identify with the watershed. The improved access to the park will promote its use and further enhance opportunities to learn about the hydrologic strategies through interpretative signs and guided tours.
- **Engage local skilled and unskilled labor***, and use volunteers* in regenerating and managing the park. Nearby residents who not only gain some income from park projects and program, but also invest time and sweat, will undoubtedly be concerned about its future well-being. The Citizens' Advisory Committee for Shade Trees may wish to take on some role in revegetating the park, under professional guidance.
- **Take advantage of existing agency and non-profit group programs**. Inquire into the ability of Economic Development Group East (EDGE) and similar organizations to assist in the park's improvement. Consider win-win propositions such as the Youth Build program, part of the AmeriCorp initiative. Youth involved in the park's built projects receive not only on-the-job construction training, but in turn receive scholarships to attend college.

"The Hunter Park Story"

There once was a stream that flowed quick and clear. It linked the hills of its place with the mighty river meandering far below. Through time the stream bit deeper into its native earth, forming a sharp incision which invited the trees to bend inward. Peaceful people came to live and pass through the valley floor.

The Weinman brothers saw the black slice along its banks and lived for many years off the resources that the land offered. Coal became king, and the stream disappeared. Workers swung picks and dogs pulled coal. The land was stripped of its cloak.

With the loss of form and mineral substance, the land lay fallow. The detritus of profit and greed would forever alter the stream's place. Economic decline and mobility brought both despair and opportunity to this place. Who knew that it would be a baseball and bat in the hands of Black people that would make this place resound with life?

The Negro League thrived for years, and reclaimed the altered

landscape, proving its worth for the people. With the vanishing of the league the place was remade; kids haunted its young woods above a stream long buried. Authorities answered the landscape's unmet potential with redevelopment.

A team of specialists came to town and saw a stream as local leaders promoted new life for the park in the guise of a new baseball park. In partnership with the pro league, they envisioned a place where ball, stream and wood merged.

Hunter Park, Hunter Wood and Hunter Square together formed a place of past, present and future.

Edgewood Crossroads Team Narrative Summary

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Following is the main written material handed in by the team at the conclusion of the charrette, lightly edited and reformatted for consistency with other sections of this appendix.

Introduction

The land planning community across the U. S. is quite taken with the concept of the "village"—creating new mixed use communities at every roadway intersection, while preserving the surrounding land. Edgewood is just such an "urban village." Formed in the later part of the 19th century and centered not on a roadway intersection but a rail line right of way, this village evolved as a reversal of the current planning model. The village, complete with community features such as schools, government centers, markets and transportation, was well separated from the then-distant urban center.

The train station is a focal point of the village, and while the relationship to current stormwater management is somewhat unclear, the structure and surrounding space is clearly the heart of Edgewood, and therefore the symbolic heart of the study community.

The study area known as the "Edgewood Crossroads" is in fact much greater (and more complex) than the immediate vicinity of the referenced building. The specific structure, the station, is of both historic and cultural interest, and is located at a low point in a small catchment where stormwater has impounded during recent storm events. Local people identify this flooding as impacting the potential restoration of the train station. Many are also deeply troubled by planned improvements to the railway corridor which the building originally served. That set of issues, while not directly related to stormwater management or the associated water quality issues of stormwater discharges to the municipal sewer system, is nevertheless perceived as a part of the problem and must be addressed in this site analysis.

This analysis deals with stormwater in the larger contexts of Pittsburgh and the complex social, environmental, economic and historic determinants that have shaped the city. Our approach is accordingly based on the following principles that provide an understanding of the interrelationships between water systems, urban design, and social values and how these can provide Edgewood with appropriate and integrated solutions.

Principles of Stormwater Design

- Water systems are an integral part of community affairs and should be a part of the life and built environment of Edgewood.
- Alternatives to stormwater systems should be a visible and tangible part of the urban design framework of the town.
- Every solution to a stormwater problem should have three or four potential benefits.

Town of Edgewood

The Borough of Edgewood has a rich history and strong sense of community pride, and is comprised of some 600 families who occupy a portion of the Nine Mile Run watershed. The original settlement was separated from the city of Pittsburgh, and connected by the rail system which still bisects the community. In a regional context, the Borough is located in the east-central portion of Nine Mile Run, and includes several sub-watersheds which were originally formed as perennial open channels, draining west to the stream. Major sections of these small streams have long since been placed in pipes and culverts, with the low areas filled and graded. In virtually all of Edgewood, little remains of original stream channels or riparian areas, with the exception of a few pockets of wetlands and remnant streams.

For the location of concern, the area adjacent to the train station receives stormwater runoff from an upland catchment of some 73 acres. All of this drainage area is within the northeastern portion of Edgewood, and is almost totally built, with the higher grounds comprising a community of relatively large, single-family Victorian-era homes. The lower portion of the small drainage area is occupied primarily by institutional and a limited group of commercial buildings, centering on the train station. In fact, the station provides a real center to the community, and links all quadrants of the community in a political sense. The topography is steeply sloping, and virtually all roadways are sloped greater than 8%. In fact, the residences, like most of the Nine Mile Run watershed and the entire Pittsburgh region, are situated on steeply sloping parcels. These specific homes are of much larger size, both in terms of structure and lot size, than most of the balance of Nine Mile Run. They comprise the more upscale portion of the area, both economically and demographically. The following reflects those community values that are relevant to our study.

Community Values

- Maintain social and physical sense of community;
- Preserve, maintain and expand green spaces;
- Reinforce pedestrian connections; and
- Utilize rail station as a point of community focus and pride.

Wastewater Conveyance System (Sewers)

All of the 73 acres which drain to the train station location are served by a sanitary sewer system, which conveys wastewater down the valley to the regional collection system. In fact, some residences situated outside the topologic boundaries are included in this service area. While stormwater from road inlets are not added to this separate sanitary system, a number of roof drains from individual residences have been connected to the sanitary sewer lines, and produce what is known as illegal inflows to the wastewater system. This problem is well documented throughout the watershed, and occurs on many homes, both large and small. Given the age of these residences, the practice of connecting roof drainage to the sewer line in the street was quite common, long before the current wastewater treatment system was constructed at the downstream end of the pipes. Early development practices thought nothing of discharging both household sewage and unwanted runoff down the slope to the nearest stream, usually in the same pipe. For the purposes of this analysis, it is assumed that approximately 50% of the residences include at least partial roof runoff discharge to the sanitary sewers.

Stormwater System

Storm sewers serve some portions of the catchment, with inlets located along much of the roadway network. Most of the current roadway runoff includes lot and rooftop runoff discharges, which are conveyed to the curb line or run overland to the street. The actual surface area which drains to the train station location is reduced by the diversion of some storm drains to the adjacent watershed, and it is unclear exactly how well the surface waters follow this pattern or bypass surface inlets to run directly downhill, especially along the curbs of Maple Avenue. For the purpose of this analysis, the full 73-acre area is analyzed as a single problem, even though the boundaries vary with both sewage and stormwater drainage areas.

The catchment is comprised of about 10.1 acres of rooftop impervious surface (about evenly divided between residential and institutional rooftops), with an additional 6.4 acres of roadway, for a total GIS-estimated impervious surface of 16.5 acres, or 22.5% of the catchment. Adding a roughly and conservatively estimated 2 acres of private drives, parking lots, and sidewalks brings the total impervious surface to 18.5 acres, or 25% of the drainage. The remaining pervious area of 54.9 acres is largely in trees, lawn and assorted ground covers within the residential portion, and in maintained lawns or recreational fields in the institutional lands. In both cases, the landscape reflects a significant amount of land alteration over the period of occupation, especially grading of flatter areas for public spaces or private patio or lawn areas.

Design Goals and Investigation

The primary design goal is to provide stormwater recharge for the 2-year frequency storm event, which for the Pittsburgh region is 2.5 inches of rainfall in 24 hours. This is a fairly straightforward criteria with new development on soils which have reasonable drainage properties, and sufficient site space is available to integrate such a stormwater management system with site demands and constraints. In a catchment which is totally built and any solution must be retrofit within the existing framework of buildings and surface features, it is no simple task. For this specific area, the relatively steep slopes, and the positioning of structures on the landscape further complicate the criteria. In fact, it is apparent that any stormwater recharge/infiltration system proposed would be quite different on the residential parcels than what might be feasible on the institutional parcels. In addition, the physical properties of the soil mantle are far more favorable at the lower end of the catchment, on the ancestral Monongahela River terrace, with thinner soils on the upland residential area.

Following field investigation and examination of topographic conditions, it was concluded that the open spaces in the lower portion of the area, surrounding the institutional buildings, offered significant potential for groundwater recharge beds. These potential beds cover some 6.2 acres, not including any grassed or open areas directly surrounding the buildings themselves. With the installation of sub-surface storage and groundwater recharge beds, these beds could provide a significant reduction in stormwater runoff from the catchment. If a bed depth of 18 inches were provided in a uniformly-graded aggregate bed (40% storage volume)—or an equivalent storage volume provided by pre-formed chambers—the entire rainfall runoff of a 2-year frequency storm collected from an area of 18 acres could be infiltrated. (This assumes that 0.5 inches of precipitation are infiltrated by these beds during the course of the 2-year, 24-hour storm.) Thus the potentially available lands could provide for infiltration of much of the runoff from impervious surfaces uphill. As this stored runoff slowly percolated into the soil mantle beneath the play filed or lawn, it would recharge the groundwater and slowly drain down-gradient beneath the surface toward the valley.

It is unlikely that all of the potential beds could be made available, but the areas surrounding the structures could also serve this infiltration purpose, if trenches and beds were carefully configured. The dimensional area of this land is not developed here, but clearly would be tied to specific design solutions for individual buildings.

Within the residential area, the proposed recharge solutions take the form of specific designs for each lot or residence. It is possible to develop several generic solutions, based on typical configurations identified in the area. For the larger residences, fairly large front lawns and rear yards are common, although slope constraints may limit recharge opportunities, especially in

rear yards. The design criteria applied in all cases is to store and infiltrate the total rooftop runoff for the 2-year rainfall (2.5 inches), and without estimating the specific infiltration capacity of the soil, a required bed storage of 2 inches per roof area is used. It is also assumed that the typical large residence has a footprint (and corresponding roof area) of 2,500 square feet, and that half of this area drains to the front and rear yards, respectively. Thus a volume of 208 cubic feet of runoff would need to be stored in a bed or trench, or in a surface depression if necessary, for each side of the house. The actual sub-grade volume would depend on the use of a stone bed or a manufactured void chamber (Infiltrator or equivalent) installed in the bed area.

Drawings from the charrette team illustrate examples of these designs. If we are successful in infiltrating the rooftop runoff from all residences, we will not only create a significant reduction in runoff, but will also reduce the inflow of this stormwater to the regional sewer system. If the inflow is estimated to be from 50% of the residences, or 2.5 acres of rooftop impermeable surface, the annual precipitation of 41 inches on these surfaces will be removed, or a total of about 372,000 cubic feet per year (2.78 MGY). The net economic benefit of this removal of inflow translates into a potential annual cost savings of some $5,500—based on unit treatment cost of $2 per 1,000 gallons.

In terms of the total wastewater flow from this service area, the estimated existing sewage flow is about 54,000 GPD, or 19.7 MGY. Thus our removal of inflow represents about a 14% reduction in flow.

Concept Plan

The Concept Plan provides a design solution to the impact of stormwater on the region, community, and individual by responding to the following community issues while respecting the design principles and upholding community values defined earlier.

Community Issues

- Storm flooding of the train station intersection.
- Impact of runoff on residential sandstone basements.
- Town non-compliance with Federal Water Quality Standards.
- Lack of public consciousness regarding the value of water.
- Increase of non-pervious surfaces is occurring without impact analysis and public input.
- Public inspection and disconnection of downpipes from sewer system is imminent and without a plan for resident remediation.
- Street tree removal for overhead utilities is occurring without regard to multiple impacts on community.
- Threat of losing train station as a community symbol of pride and focal point.

Stormwater issues and potential solutions can be expressed with urban design, integrated within the social focus of the community. The station area is a natural gathering place and park, and the proposed site design integrates these functions with a form that offers a stormwater management demonstration facility as an inconspicuous part of the design. The central space will be a depressed bowl, with a porous bottom which will both retain and infiltrate stormwater. The surrounding wall will be both sitting space and berm, serving as a gathering place during dry weather.

During rainfall, the depression (more a forum with a tiled geometric or paver block bottom) would collect surface runoff from the surrounding plaza, filling and then slowly draining over a one or two day period into the sub-surface by an infiltration bed beneath the site. This would only take place some 30 days a year, and for the balance the space would provide communal gathering and play, as a celebration of both the village and the transportation connection, as well as a working example of stormwater management. In this context, the site would serve as the gateway to the Transit Greenway and Trail, to be developed within and as part of the new transit corridor. The recharge system would continue the educational role of the village center, almost as a celebration of stormwater, rather than just a problem solution. It would become a part of the urban fabric, illustrating how to manage runoff while preserving the form and function of the village.

The concept of the urban village should also be reinforced by re-introducing the urban forest, which provides a number of related environmental and aesthetic benefits, as a modifier of urban climate, improving air quality and reducing noise (especially train and bus background noise). In a very practical sense, this new woodland will also reduce the amount of rainfall runoff generated from the landscape, and is totally consistent with the original mission statement for the Nine Mile Run stormwater management design charrette.

Sterrett School Team Narrative Summary

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Following is the main written material handed in by the team at the conclusion of the charrette, lightly edited and reformatted for consistency with other sections of this appendix.

Sterrett School Site

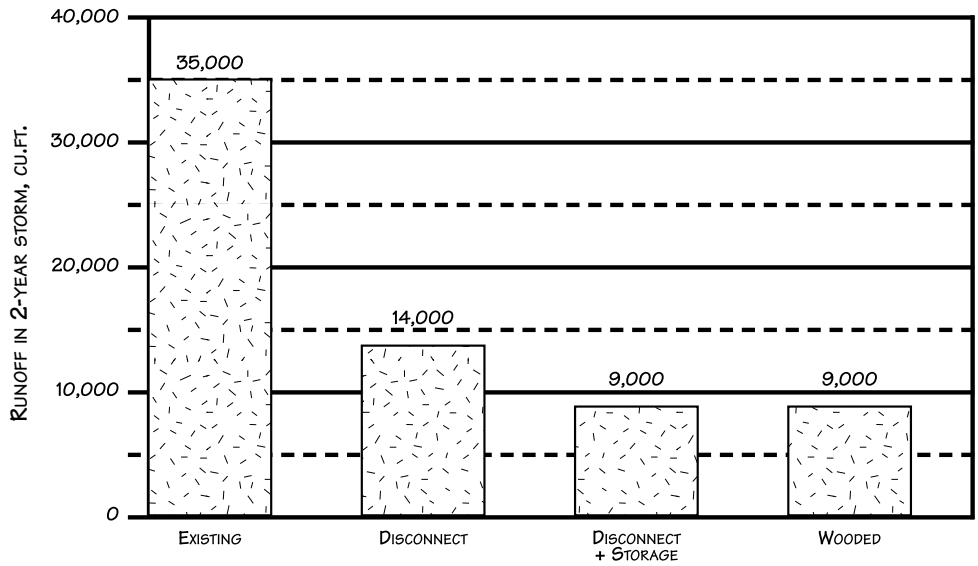
The study site of Sterrett School and eight residences is 5.1 acres, and sits at the headwaters of Fern Hollow. This headwater sits upon ancient, elevated sand and gravel deposits. A geologic finger of sandstone juts into the study site. It is in this area that the original headwater stream, formerly known as Salamander Creek, fed into Fern Hollow. This channel was subsequently filled and houses constructed. The lowest grade on the study site is an alley servicing 3 homes and 3 garages, with adjacent stormwater inlets that occasionally back up and flood. A 36" combined sewer traverses underneath the alley, following the course of the original streambed. The main drainage issue is that some of the homes experience problems with water in their basements.

The school and the surrounding residential area consist of impervious surfaces such as roofs, sidewalks, and roads, together with more pervious areas such as lawns, bare ground, gardens, etc. The majority of our time and effort was directed to the school property. The project goal is to retain or eliminate the volume generated by a 2-year, 24-hour storm event (2.5 inches) from entering the combined sewer system.

Summary of Hydrologic Results

Using the rainfall/runoff relationships from TR-55, 1.8 inches of runoff are now generated from the grass and residential areas, and 2.5 inches are now generated from the impervious areas. The resultant volume that now enters the combined sewer system is approximately 35,000 cubic feet. The estimated runoff from the site prior to development was 9,000 c.f. The major strategy proposed to reduce the 35,000 c.f. volume to 9,000 c.f.s. is disconnectivity from the sewer system. Using this principle, the volume of water entering the sewer system would be 14,000 c.f. This would be primarily accomplished by restoring the natural drainage, then disconnecting the roof leaders, and encouraging infiltration through sheet flow. In order to reduce this volume of water closer to the pre-development level, an additional 5,000 c.f. of water need to be retained or infiltrated (14,000 c.f. – 9,000 c.f. = 5,000 c.f.). BMP practices are proposed to approach this reduction. Figure 1.0, Summary of Runoff Volumes, is a summary of the amount of runoff for each site condition.

Figure 1.0 – Summary of Runoff Volumes



The hydrologic result of "disconnects" and stormwater storage at the Sterrett School during a 2-year, 24-hour storm.

Recommendations

A summary of our ideas and recommendations is presented below.

Retention/Reuse/Infiltration on Site.

A. The roof of the school represents a major impervious area (16,000 square feet). Our plan is to collect this water in a ganged series of tanks or cisterns and then develop a cascading system of priority usage such as:
   1. Irrigation of the gardens and ball field;
   2. Indoor use to flush toilets, for cleaning, etc., and
   3. Retention in bladders in the attic of the school to help moderate temperatures in the building.

   We estimate that approximately 3,000 c.f. of water from the roof would be retained using these techniques. Overflow from the cistern system would flow along an "art

creek," into a infiltration/bioretention swale, and eventually into Fern Hollow.

B. Replace current impervious paved surfaces with more pervious/porous pavement surfaces. Possible areas include the parking lot, the asphalt playground area and the sidewalks.

C. Improve the permeability/retention of the lawn and ball field area. Ideas include bioretention areas under the field, wetland or swale areas around the field, and terracing all or part of the area where the cobblestone wall currently exists between the ball field and the lawn/asphalt playground.

D. A tree planting program would reduce runoff by encouraging infiltration, capturing rainfall, and modifying area air quality and temperatures.

Re-Introduction of Water to Frick Park.

A. Remnants of the original stream system running into Fern Hollow cross a portion of the study area east of the ball field, where private homes are located near the intersection of South Homewood Avenue and Edgerton Avenue. Long-term residents were interviewed who remembered a creek, called Salamander Creek, with a bridge. At the present time the road acts as a barrier to the movement of water across the road and into the ravine of Fern Hollow. Historic maps show the pre-existing water flows and geology. Serious consideration should be given to enhancing the movement of water into Fern Hollow to restore some of the water which now passes through the park in combined sewer lines and is not available to the park ecosystem. This water causes flooding problems in the basements of the homes in the low areas. The origin of this water is not clear and there seems to be some confusion among the neighbors and a tendency to blame each other or the school for the water problems.

A range of solutions was considered. Our preferred solution would be to close off South Homewood Avenue and re-grade the existing raised area to reestablish the natural drainage at the site. A pedestrian bridge would be built to allow access between Frick Park and Homewood Cemetery. The water would enter the ravine via a cascade outfall with a terraced slope, geotextile and boulders. This outfall is fed by a infiltration/bioretention swale which collects drainage and cistern overflow from the school site. The length of the infiltration/bioretention swale is approximately 500 feet. Using a width of 4 feet, a depth of 4 feet, and a storage ratio of 0.35, the resultant gravel storage is 2,800cf. An additional channel space created by gently sloping banks above the gravel surface would fill up to 6 inches deep and 12 feet across during large storms, providing an additional 2,000 c.f. of storage during flow. Ideally, we could combine this concept with the "art creek" on the Sterrett School property. The stream could flow above ground on the school property and then connect to above ground or underground flow across the residential area. A short term solution would be to develop a system which would allow water to drain under the existing road and into the ravine.

Residential Areas

A. The surrounding residential/commercial area consists largely of homes and small businesses (estimated 20% impervious surfaces). Less discussion was given to these areas; however, it is suggested that the school could serve as a model or demonstration area for techniques to retain/infiltrate water that could be applied or modified for residences. Suggestions include the following:

1. Disconnect the roof leaders so that water is retained in cisterns or water barrels, used to water lawns and gardens or create water features on individual properties.
2. Increased planting of trees in this area.
3. Replace sidewalks, driveways, etc. with pervious surfaces.

Education

We believe that education is a key feature of any plan for this area. Our broad goals are to educate (provide environmental education to students and neighbors) and emulate (set an example/model for actions to address the problems).

A. Sterrett School

1. Connect educational objectives/curriculum of Sterrett School to the Nine Mile Run watershed. According to the "Proposed Academic Standards for Environment and Ecology," developed by the Pennsylvania Department of Education (9/1/98), applicable standards for 7th grade (Sterrett is a middle school) include "acquire the knowledge and skills needed to: ... explain the role of the water cycle and understand the role of the watershed."
2. The "art creek" is envisioned as a mosaic, student-designed project which would provide artistic expression, and information on the watershed and native flora and fauna. The flow-way would carry water during rainfall events and remain dry at other times. This feature could be used to teach about watersheds, impacts of urbanization, etc.
3. The home economics teacher who oversees the herb garden and the school's student "green team" expressed great interest in having a greenhouse on the school property as an important teaching tool. The greenhouse could utilize water collected from the impervious surfaces. In addition, the greenhouse could be shared by the Studio for Creative Inquiry at Carnegie Mellon University which is also interested in greenhouse space.

B. Community

1. It is critically important to educate and inform the general public, using some education goals set forth by the EPA. We support the following:
   a. Environmental, economic and social/cultural benefits and burdens are distributed fairly among all members of the community;
   b. Community members have equal access to an opportunity to participate in community decision-making processes;

c. Community activities do not unfairly impact people or the environment in other communities near or far, nor are these impacts passed on to future generations;
d. Terrestrial landscapes range from the smallest mapable landscape or ecotope (biotope) to the ecosphere, the largest tangible global landscape system of our total human ecosystem, which can be viewed as the highest organizational level of the ecological hierarchy, integrating human society and its total natural and physical environment.

2. We also believe that people living in the upper portions of the watershed should understand the concept of a watershed and the impact of their activities on the lower portions of the watershed. We hope that these people will take ownership of the watershed.

Hydrology and Hydraulics

The following section details the procedures and results of the hydrologic and hydraulic analysis. The project goal is to reduce the loads on the combined sewer by retaining or eliminating the volume generated by the 2-year 24-hour storm event (2.5 inches) from entering the combined sewer system. The hydrologic analysis includes the site before development as a school and residential area, the existing conditions, and the proposed improvements. The site area is defined as the Sterrett School, the residential area to the east, and one-half section of the surrounding streets. The site area is approximately 220,000 sq. ft. Due to the time constraints, nomographs from Technical Release 55, Urban Hydrology for Small Watersheds (TR-55) were used to analyze the runoff depth (volume) for each condition.

Pre-Development Hydrologic and Hydraulic Conditions

The pre-development land cover condition was assumed to be woods in fair condition. Due to the lack of soils information, "C" soils were used in the analysis. This is justified due to the stony conditions, clay content, and shallow soil depth described in the project conditions. This represents a Runoff Curve Number (RCN) of 70. The resultant runoff depth, based on a 2.5 inch storm event, would have been approximately 0.5 inches. The total runoff volume for the site would have been approximately 9,000 c.f. (0.5 inches x 1/12 feet per inch x 220,000 sq. ft.). The geologic maps of the area indicate that a stream channel traversed the site. This channel was located in sandstone, with surrounding alluvial soils.

Existing Hydrologic Conditions

The site is divided between a school and single family residential land use. To be conservative the RCN values were modified to account for wet (ARC 3), or saturated conditions. The composite RCN values for the school site were based on the impervious area and grass in fair condition. The RCN used for the residential area was 90. Using the rainfall/runoff relationships from TR-55, 1.8 inches of runoff are generated from the grass and residential areas, and 2.5 inches are generated from the impervious areas. The resultant volume is approximately 35,000 cubic feet.

Existing Hydraulic Conditions

The channel which traversed the site has been filled in and houses have been built on top of the fill. A 36" combined sewer now runs along the channel. The site is surrounded by a series of inlets, which drain to the combined sewer system. This system becomes very deep as it outfalls into a collector sewer in Fern Hollow. A small trench drain is found in the alley that connects to South Homewood Avenue. This inlet and the inlets along the low point in South Homewood Avenue frequently clog, as they are undersized for the existing flows from the site and from contributing areas uphill. The roof drains from the school are connected to an underground system that feeds into the storm drains. The front of the school sheet flows to South Lang Avenue. The parking lot drains to an inlet that outfalls into the drainage system in Edgerton Avenue. One-half of the rear of the school drains to Edgerton Avenue by a concrete channel. The other half drains to a concrete channel and outfalls to the drainage system in Reynolds Avenue. The northern half of the ball field drains to a channel that runs along the east school property and then down the alley to the trench drain. The rear of the residential area drains to the trench drain. The front of the residential areas drains to the streets.

Retrofit Program Hydraulic Elements.

The key element of the retrofit is the disconnectivity of impervious areas to the combined sewer system. The two major mechanisms for accomplishing this are the termination of South Homewood into two cul-de-sacs, and the incorporation of cisterns around the school building. The termination of the street allows for sheet flow and channel flow from the school and residential areas to flow into Fern Hollow Creek. The swales that collect water from the school and residential areas would be modified as dry swales, with infiltration trenches. This will allow for additional recharge into the groundwater. The cisterns will be used for greywater in the building and irrigation of the ball fields. Overflow from the cisterns during events greater than the 2-year event will drain into the infiltration/bio-swale. Additional bioretention cells will be used on-site at the terminus of the parking areas and to capture sheet flow from the sidewalks and outdoor asphalt play areas. The runoff potential will also be reduced by a tree planting program.

Retrofit Program Hydrologic Analysis

By restoring the natural drainage pattern, only about 10% of the site will drain into the current storm drainage system (the combined sewer). This includes one-half of the remaining street section, the parking area, and the northwest portion of the school site. The resultant runoff, using ARC 3 is approximately 14,000 cubic feet. The estimated difference in runoff volume that will enter the combined sewer from the wooded condition

to the retrofit condition is approximately 5,000 cubic feet (14,000 c.f. – 9,000 c.f.).

Structural BMPs Control Analysis

The length of the infiltration/bioretention swale is approximately 500 feet. Using a depth of 4 feet with a width of 4 feet and a storage ratio in the gravel of 0.35 the resultant storage is 2,800 cubic feet for the infiltration area. Above the gravel, an additional 6 inches of "ponding" during flow in a vegetated, gently sloped trapezoidal channel averaging 12 feet in width provides 2,000 cubic feet of additional storage. Because of the sandstone substrate, infiltration is assumed. An underdrain system, which releases the discharge past the peak of the storm, could be utilized if infiltration is infeasible. The infiltration/bioretention swale decreases the volume another 14%, to meet the 9,000 c.f. requirement for pre-development runoff.

The above calculations do not account for additional reductions due to reforestation, mulching, impervious pavements, and bioretention cells.

Summary of Hydrologic and Hydraulic Analysis

By incorporating features into the retrofit that utilize disconnectivity, the load to the combined sewer has been significantly reduced. Additional techniques to encourage infiltration will increase the potential for groundwater recharge, which has been significantly depleted. By using bioretention the water output of the system is at a lower temperature than with pond technologies and there are significant water quality benefits.

Summary of measures to be applied at the Sterrett School site

	Function or benefit						
Feature	Recharge of ground water	Reuse of captured runoff	Disconnection of storm drainage from sewers	Reduction in storm runoff volume	Improvment in runoff quality	Watershed quality	Habitat creation and maintenance
Separate sewers				x			
Cul-de-sac creation			x	x	x		x
Regrading	x		x				
Greenhouse		x	x	x	x	x	x
Cisterns	x	x	x	x	x	x	x
Bioretention	x		x	x	x	x	x
Bioswale	x		x	x	x	x	x
Habitat landscaping	x			x	x	x	x
Restore channel	x		x	x	x	x	
Sheet flow	x		x	x	x		x
Bioretention cells	x		x	x	x		x
Playground surfacing	x			x	x		x
Planting	x			x	x		x
Pervious parking	x			x	x		x
Green islands	x			x	x		x
Porous paving	x			x	x		x
Afforestation	x			x	x		x
Art Creek mosaic						x	x
Brochures						x	x
Watershed curriculum						x	x
Tours						x	x
Paint storm drain inlets						x	x
Demonstration project						x	

Regent Square Gateway Narrative Summary

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Following is the main written material handed in by the team at the conclusion of the charrette, lightly edited and reformatted for consistency with other sections of this appendix.

Statement of Design Problem

The "Gateway" site is at the low end of the urban portion of the Nine Mile Run watershed. A densely developed residential neighborhood (a 60-70 ace catchment within the much larger watershed) contributes to overland flow of stormwater runoff at the site. Storm volumes of 2.5 inches in a 2-year, 24-hour storm (estimated to peak at 1.2 inch per hour) result in overland flow down Old Braddock Avenue of perhaps as much as 50-60 cubic feet per second. These flows have caused significant erosion where they tumble into Nine Mile Run, just where the main culvert from the upper watershed first opens up into Frick Park. Runoff from the watershed also carries pollutants into Nine Mile Run.

The project site encompasses a number of design issues including:

- Stormwater/stream culvert outlet for a large portion of the watershed;
- Transition from piped to open channel flow;
- Erosion of the natural stream channel;
- Water quality;
- Recreation/educational opportunities;
- Adaptive reuse of underutilized commercial building and drainage facilities;
- Reuse of local "waste" materials where possible (such as slag for constructed soil);
- Pedestrian/vehicle circulation from Braddock Avenue and from residential neighborhoods;
- Upstream trail connections;
- Trail/park gateway design;
- Uphill urban watershed contributing overland flow to project site.

Gateway Site Context in the Nine Mile Run Watershed

The Regent Square Gateway site is in the lower portion of the Nine Mile Run watershed. A watershed master plan has not been developed, however it is reasonable to assume that stormwater detention should not be encouraged in the lower portions of the watershed. During a storm event, rainfall in the upper portions of the watershed collects and drains along streets and through storm sewers and eventually makes its way to the outfall at the east end of Frick Park. Stormwater that is generated in the lower portions of the basin such as the Gateway study area should be conveyed to Nine Mile Run as soon as possible so that it does not combine with the peak flows from the upper portions of the basin; in other words, the goal is not to detain stormwater in this area.

While stormwater detention should not be encouraged, filtering of stormwater, especially the "first flush" of stormwater generated in small storm events, should be effected to prevent sediment, trash, and other pollutants from entering the stream. This can be accomplished in selected areas by constructing small retention ponds (500-3,000 square feet) to intercept storm flows prior to entering into the collection system and being conveyed to the stream.

The emphasis in this portion of the Nine Mile Run watershed is then on enhancement of water quality prior to entering the stream rather than detention to reduce peak flows in the collection system. Additionally, percolation into the groundwater is a resulting tangible benefit that will help to increase base stream flows in Nine Mile Creek.

Trail Connections

The Regent Square Gateway project is the gateway to the eastern end of the Nine Mile Run trail and the connection to Frick Park. There is also an excellent opportunity to connect further to the east to the Edgewood Crossroads project site. The overland trail connection from Gateway to Edgewood is very urban in nature, with five at-grade road crossings and one bicycle/pedestrian under crossing. In addition to making a trail connection with the Edgewood site, significant portions of adjacent neighborhoods can more easily access the Frick Park trail and take advantage of the recreation opportunities.

Regent Square Gateway Catchment

The Regent Square Gateway catchment is an assumed "watershed" that encompasses natural topography and the stormwater collection system. The estimated boundaries of this catchment were developed based on the knowledge of the existing stormwater sewer systems upslope of the site. It was assumed that all of the known inlets adequately capture the runoff from

the storms with the exception of the inlets located on South Braddock Avenue. Stormwater bypasses these inlets due to the steep slopes on the road. This condition has been observed during storm events. Stormwater flowing along Braddock Avenue drains directly to Old Braddock Avenue just below the former Foodland upper parking lot entrance. The catchment contains approximately 64 acres. The peak flow for a two year storm is approximately 60 cfs.

The asterisks (*) located on the GIS map of the catchment (in the main report) indicate places where infiltration basins could be located. These basins are designed to filter the stormwater runoff that occurs during low intensity storms and the runoff that occurs during the first flush of higher intensity storms. These systems should be located where there is adequate open space and appropriate soil for infiltration, and should include a reasonable amount of catchment area. The infiltration basins are not designed to detain significant amounts of storm runoff, just to provide a measure of scrubbing or clean-up during small storms and incidental runoff. Suitable locations for infiltration basins are generally within the permeable soil areas noted on maps of local soil/geologic conditions.

Design Issues And Approaches

Terraced Underdrained Basins (TUBs)

Currently most of the watershed drains through the "Foodland" site. No water quality enhancement is being performed on this runoff. The proposed terraced underdrained basins are designed to act as a water quality control to filter the first flush of the storm. Water enters the site off of Braddock Avenue. Instead of the current condition of flowing down Old Braddock Avenue, the runoff will flow through the terraces, located in the underutilized strip of land between Old Braddock Avenue and the Parkway on-ramp. These terraces will be formed from local slag aggregate which will act as a filter for water quality measures. The aggregate will be overlain with soil to allow for planting. The terrace steps will be constructed of clean fill. This will allow for a good foundation for the pathways that will be located on top of them. A perforated underdrain will be located under the terraces and will discharge directly to the channel. Low flow runoff will infiltrate the system and be filtered. The higher flows will flow over the terraces. The terraces will reduce the velocity of the runoff before it enters the overflow spillway. The overflow spillway starts at the end of the terraces, runs along the side of the stream past the headwall (the outfall) of the main Nine Mile Run culvert, and enters the stream via a side channel spillway. The spillway will consist of a concrete lined bottom and the existing side wall of the stream channel. A concrete block at the end of the side channel spillway will be erected to stop the forward motion of the water. The stormwater will then build up in the channel until it spills over the side wall. This will decrease the hydraulic energy in the stream and lower the erosion potential of the stream.

Energy Dissipation in Channel

Adjacent to the "Trailhead/East Park Entrance" is the Nine Mile Run culvert outfall. This is the place where Nine Mile Run emerges after being culverted for at least three miles. Also emerging to the open air here is a 60 inch storm drain and a 54 inch storm drain which together provide drainage for a large portion of the upstream watershed. Also emerging at the site is a 24 inch pipe that drains a portion of the Regent Square neighborhood directly above the site. During heavy storm conditions, this site, where all of the outfalls converge, provides a wonderful opportunity to view the power of nature through the medium of water.

The design of this area addresses the need for erosion control, dissipation of water flow energy, recreational access to water during low flow periods and an overall celebratory approach to provide people with safe views of severe water conditions during storm events.

Water will move through the area in various configurations depending upon weather conditions. During base flow periods there will be a small flow from the Nine Mile Run culvert and other discharging pipes. This will increase over the years as upstream area aquifers become recharged. Seepage from the terraced infiltration system will trickle along the underdrain channel, flow through the culvert headwall and drip onto the streambed below. During high flow periods a side channel spillway will convey runoff from the terraced basins into the channel from its south side.

A series of sculptural elements are proposed for the stream channel itself that refer visually to fluid forms and will interrupt and manipulate flows during high water periods. These fluid forms will dissipate energy and will create dynamic water conditions just below the outfall. Additional stone and concrete elements will be located along stream banks to further mitigate erosion.

Downstream Erosion Protection—Methods & Materials

There is a large amount of erosion downstream of the culvert outfall. In order to protect the proposed trails in Frick Park, the erosion, especially the side bank erosion, should be controlled. Erosion control measures should range from conventional structural methods to bioengineering methods.

Parking Lot Filter Bank

Stormwater runoff from the upper parking lot will flow across the asphalt, onto grass filter strips. The filter strips will perform a low level of water quality enhancement for the runoff. The excess runoff enters inlets, located within the filter strips. The inlets will contain trash racks to filter the larger objects. The water is piped from the inlets into constructed soil located next to the existing retaining wall. The soil is composed of slag aggregate, with a topsoil top to allow for vegetation and trees to be planted. Perforated pipes are located in the topsoil area. Stormwater percolates though the pipes and saturates the top-

soil. Once the topsoil is saturated, the remaining runoff filters through the slag aggregate and is collected by an underdrain.

Planting on Site

Planting can accomplish many functions in the watershed. Foliage on trees and shrubs can intercept a portion of rainfall so that it doesn't fall directly on pavement and pick up additional pollutants. Trees, shrubs and grasses also absorb water through their roots, hold water and transpire it through their leaves, use carbon dioxide and create oxygen. We recommend hardy, non-invasive species of trees and shrubs, and low-maintenance native prairie grasses.

Gateway Trail Entrance

There has been a recognized need for a second entrance to Frick Park since 1932, though the need has never been realized. We propose this point—already an "unofficial" entry for joggers and walkers—as an obvious gateway to the east side of the park. As a trail head, it is located adjacent to where Nine Mile Run emerges from a culvert that encloses the creek for three miles upstream. The entrance is designed to accommodate hikers, joggers, bicyclists and maintenance vehicles. As an understated gathering place at the trail head, it provides wayfinding information, trash disposal and restroom facilities in the adjacent building. The remnants of an old set of trolley tracks mysteriously disappear here under an embankment, marking a former era of the site. As a viewing area of the emerging stream, tranquil during low flow but a dramatic event during heavy rainfall, this site also offers a place to celebrate and learn from the stream.

Traffic Mitigation—Pedestrian, Bicycle & Automobile Access/Circulation

Traffic on Braddock Avenue is a major design constraint for easy access to the building space and the trail gateway. One of the goals of the project is to provide safer and better opportunities for pedestrians, bicyclists and motorists to access the site. A traffic signal at the entrance to the site will provide a safe route for neighborhoods to the east to walk or bicycle to the site. Pedestrians from the Regent Square neighborhood on the hill above the site would benefit from stairway access to the trail, probably downstream of the outlet structure. There is potential for a trail connection to the Transit Parkway and Edgewood Crossroads site. This connection would open up several more neighborhoods and trail access points for the Nine Mile Run Trail.

Adaptive Reuse of Existing Building (Program Opportunities)

The site contains a currently underutilized building, the upper 16,000 square foot level of which was once a Foodland grocery store. The building also has two lower partial floors, some of which are currently occupied by various businesses. The large upper story is under consideration for redevelopment as another single occupant retail store. The parking layout depicted to the north of the building would accommodate that function.

We recommend that the lower levels of the building be adapted to service users of the park, possibly including the following options. The local municipalities' parks & recreation departments could use the space to offer watershed/ecological education, research space for hydrologists, biologists and ecologists, and public recreation facilities. In addition, private retailers could offer bicycle rentals and food services.

Further Considerations and Opportunities

Fixing Culvert Leaks

Approximately two hundred feet before the culvert daylights at the site, there is a hole located within the culvert. All of the base flow and some of the stormwater runoff that flows through the culvert disappears in this hole. The water falls into either an abandoned sewer pipe or mine. The hole was patched, but approximately 15 feet upstream, a new hole developed. A permanent solution to the disappearing water as well as determining where the water goes, is required prior to the development of this site.

Retention at Highway Interchange

The Interstate 376 Interchange, located to the east of the site, contains an open space. This open space is a possible location for a retention pond. A geological study needs to be performed for the site to determine the feasibility for a retention system there.

Residential Programs

The following is a list of alternative techniques to deal with wastewater at the residential level. These measures could either be included in a pamphlet delivered to homeowners, or they could be promoted in some other way.

- low flow fixtures
- dry wells and infiltration trenches
- rain barrels for garden watering
- rain-filled flex hose sprinkler system

Policy Team Results

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Following is the main written material handed in by the team at the conclusion of the charrette, lightly edited and reformatted for consistency with other sections of this appendix.

Goal, Objectives, and Conclusions

The policy team recommends the following goals and objectives for managing the infrastructure and improving the human and natural environment of the Nine Mile Run watershed. These statements reflect our understanding of the purposes of the charrette, the possibilities illustrated by the design teams, and the long-term desires of the people of the watershed.

Goal

Restore the Nine Mile Run human and natural ecosystem to sustainable health.

Objectives

1. Establish coordinated planning, maintenance, and management of infrastructure to improve efficiency, reduce costs, and achieve "lighter, greener, cheaper, smarter" infrastructure.
2. Restore the watershed to a more natural hydrology and healthy aquatic and riparian ecosystems.
3. Enable community economic development and revitalization in a manner that is consistent with Objectives 1 and 2.

Conclusions

The charrette has considered a range of stormwater management options for the Nine Mile Run watershed. We have identified essential steps that may be taken in order to address current problems and issues facing the communities and municipalities within the Nine Mile Run watershed.

A vision of improved human and ecosystem health for the future begins with change in the present. A renewed stormwater and sewer infrastructure integrated into the neighborhoods and landscape of the watershed is needed. This infrastructure must use natural ecological processes to maximum advantage. In this way we can improve the infrastructure and simultaneously beautify the city and improve social and economic conditions. The ultimate goal is to restore the Nine Mile Run human and natural ecosystem to sustainable health.

Any initiative of this size requires ambitious long term objectives and realistic, affordable short term steps. Substantial thinking and planning on the part of the citizens and elected representatives of the watershed is a prerequisite to achieving the goal and objectives.

A key step in successful watershed management will be the establishment of a coordinating body authorized to pursue the objectives. Planning and implementing the recommended systems requires an entity with the authority, long term purview, and fundraising ability to coordinate and maintain actions throughout the watershed.

The first objective must be the elimination of existing human health hazards. This will be achieved through the eventual removal of all sanitary sewer overflows and management and reduction of combined sewer overflows. Investment in the present will produce a multi-purpose and cost-effective infrastructure in the future. Current short term fixes which require large expenditures and result in flawed systems must be replaced by long term thinking and solutions based on lighter, greener, cheaper, safer engineering, leading to reduced spending on the infrastructure over time.

An equally important objective is the restoration of the hydrological and biological systems to health. This means restoring the stream, wetland, and upland habitat of the watershed as well as eliminating the additional pollutants now flushing during storms from roads, parking lots, and yards into Nine Mile Run. Part of the plan to obtain this objective includes understanding, revealing, and utilizing the natural systems of the watershed. Monitoring water quality and stream biota over time will be important to measuring our success, because Nine Mile

Run integrates all that is happening in the watershed, good and bad.

A third objective is to devise long term economic development strategies, cognizant of current economic realities, which will attract new forms of employment to the region. These new employers would be attracted by the region's visual, recreational, and ecological amenities. Healthy environments will invite environmentally sound residential and commercial redevelopment. The involved communities can develop many reinforcing linkages between economic and social development and the implementation of more effective stormwater and sewer infrastructure.

The result of innovative changes like the ones described above is the creation of natural amenities which are at the doorstep of all citizens. These amenities are treasures to the area because they function to sustain the regional watershed and allow the community to reap the health and economic benefits of such changes now, and long into the future.

The charrette policy team has developed general recommendations and suggested action items for cooperative management which focus on infrastructure, ecology, and community development. Separate groups within the policy team addressed each of these three objective areas. Their reports follow.

Agencies, Programs, And Terminology In Watershed Restoration And Community Redevelopment

The following acronyms and names are used in the presentations of the policy teams results in the following pages.

ACT 167	Pennsylvania Stormwater Management Act (1978)
AIA	American Institute of Architects
ALCOSAN	Allegheny County Sanitary Authority
Allegheny Conference	Allegheny Conference on Community Development, a regional economic development organization comprised of Pittsburgh's major industry leaders.
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASLA	American Society of Landscape Architects
BAMP	Builders' Association of Metropolitan Pittsburgh
CDBG	Community Development Block Grant (U.S. Department of Housing and Urban Development)
DCED	Pennsylvania Department of Community and Economic Development
DEP	Pennsylvania Department of Environmental Protection
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GSPIA	Graduate School of Public and International Affairs, University of Pittsburgh
Heinz School	Heinz School of Public Polity and Management, Carnegie Mellon University
NGO	Non-Governmental Organization
NPDES	National Pollution Discharge Elimination System
NRCS	U.S. Natural Resources Conservation Service
Pennvest	Pennsylvania Infrastructure Investment Authority. Provides grants and low-interest loans to communities for improvements to drinking water, sewage treatment and stormwater management facilities.
PRA	Pittsburgh Regional Alliance. Coordinates economic development efforts among six regional organizations: the Greater Pittsburgh Chamber of Commerce, Penn's Southwest, the Regional Industrial Development Corporation, the World Trade Center, the Pittsburgh High Technology Council and the Southwestern Pennsylvania Industrial Resource Center.
PPA	Pennsylvania Planning Association
QAQC	Quality Assurance/Quality Control
SOP	Standard Operating Procedure
TMDL	Total Maximum Daily Load. TMDLs are site specific water quality discharge criteria required by the Clean Water Act for bodies of water that are failing to become "fishable, swimmable" even with the application of effluent standards.
TRWWDP	Three Rivers Wet Weather Demonstration Program
USGS	U.S. Geological Survey
WA	Watershed Authority (proposed in this report; also referred to as the "Watershed Management Entity")

Infrastructure Group Summary

Watershed Management Entity

The centralized management of stormwater infrastructure would prove most efficient. Some form of authority, utility, or district is needed to address the infrastructure and ecosystem issues that occur throughout the watershed, across municipal boundaries. Here, we use the term authority. The affected communities will have to establish the proper legal form and powers of this watershed management entity.

A watershed authority would not only reduce cost, it would maximize benefits to citizens and the ecosystem as it corrects inadequate infrastructure. A steward to the ecosystem, an authority would also interact with other levels of government, opening the lines of communication between the different players, while providing maximum support of the infrastructure. The ultimate plan is to meet the ecological goals, both short- and long-term.

Elected officials will work with a citizen's board to develop and implement action plans to achieve restoration goals for the watershed and its people. A general manager will oversee the authority's efforts. The representative group will approve plans for infrastructure construction and reconstruction submitted to the authority. They will set base rates for stormwater infrastructure user fees, publish codes and/or evaluate and recommend modifications to municipal and county codes, and describe the relevant devices, such as Best Management Practices (BMPs), for parcel development and redevelopment. The board will also oversee design of an incentive plan based on cost reductions from increased infiltration of stormwater. The authority will be staffed and funded to effectively manage the system, and will have the authority to contract out necessary work.

During the first and second year, the watershed authority will act as a model of inter-municipal watershed cooperation. After a couple of years, the authority will become a more formal entity enabled by legislation. In the long term, 50 years and more, the ecological goals will be fulfilled.

Infrastructure

Sewer and stormwater infrastructure includes not just catch basins and pipes and treatment plants. It should also take advantage of the natural capacities of soil and vegetation to absorb water and treat urban runoff pollutants. We call this larger conception "green infrastructure." The charrette's design teams have illustrated many of the strategies and techniques that could be applied. Green infrastructure can be encouraged and implemented at several levels: the watershed, the community, and individual properties.

At the watershed scale, the objectives include reducing Combined Sewer Overflows (CSOs) and stopping Sanitary Sewer Overflows (SSOs). All players, including citizens and elected officials, take part in achieving this goal. Leadership from the watershed authority will assist in the reduction of CSOs and the abatement of SSOs. These short-term objectives must be achieved before the long-term goals can be tackled. The long-term objective at the watershed scale is the green engineering of the whole system, leading to restoration of the watershed's natural and human ecosystem. To support achievement of this goal, the authority would implement "regional" (larger scale) retention and recharge projects where appropriate, and assist in implementation of green infrastructure at the community and property levels.

The objectives at the community scale are to implement green infrastructure on city streets, parks and other public properties, and to encourage actions on private properties. It is important that the responses for different communities be calibrated to the varying needs, desires, and capacities of the different communities. At the community scale, the municipalities, with some assistance from the authority, will lead the implementation of green infrastructure measures on their streets, parks, schools, and other public properties. These measures will improve civic landscapes, recreation facilities, wildlife habitat, and other amenities. It is important that the municipalities and the watershed authority educate citizens and property owners about the techniques and benefits of green infrastructure. The time frame for the implementation of these tasks varies from medium- to long-term.

At the individual parcel scale, maximum infiltration of runoff to the soil and minimum contribution to the CSO and SSO problems is crucial. As implementation of green infrastructure spreads to larger numbers of properties, the cumulative value of the green infrastructure will increase. The individual parcel owners are responsible at this level of implementation. They could be incentivized through infrastructure user fees, with fee reductions for high rates of on-site stormwater infiltration and treatment. At this scale, the time frame is continuous and varies from medium- to long-term.

The following page summarizes the above discussions of the watershed authority and the management of the infrastructure.

Infrastructure Action Plan

I. Establish a Coordinating Body			
Action Steps	**Performance Objectives**	**Who**	**Time Frame**
1. Communities form the co-ordinating body, authorize it to obtain funding, manage infra-structure, manage the stream system, hire staff, contract out work. 2. Approve plans for infrastructure construction and reconstruction submitted by municipalities. 3. Set base rates for use of storm-water infrastructure, publish codes, describe recommended practices for redevelopment. 4. Design incentive plan based on cost reductions for increased infiltration (reduced runoff).	Efficient central management Protect citizens Reduce costs Maximize benefits to citizens and ecosystem Steward the ecosystem Interact effectively with other levels of government Meet human health and ecosystem goals!	Elected municipal officials, public board of the WA General manager, staff, and contractors of the WA	1-2 years: start out to be a model of watershed co-operation 2 years+: lead to more formal utility/authority entity enabled by legislation Near to long-term: meet infrastructure, human health, and ecosystem goals/objectives

II. Manage the Infrastructure			
Action Steps	**Performance Objectives**	**Who**	**Time Frame**
Watershed Scale: 1. Lead SSO/CSO solutions. 2. Implement regional retention and recharge, coordinated with recreation, where feasible. 3. Encourage infiltration at community and property scales.	Reduce CSOs Stop SSOs Green engineer the watershed's infrastructure (including natural systems)	WA, with municipalities	Short to long-term
Community Scale: 1. Implement infiltration in streets, parks & schools. 2. Improve habitat. 3. Improve recreational amenities.	Reduce CSOs Stop SSOs Implement "green streets" Calibrated responses for different community types	Municipalities with assistance from WA	Medium to long-term
Individual Parcel Scale: 1. Establish user fees & incentives for infiltration.	Maximum infiltration, minimum contribution to sewer overflows	Parcel owners	Medium to long-term

Natural and Human Ecology Group

Summary

The objectives of the Ecology Group's recommended action plan recognize both the immediate ecological monitoring needs and the long-term vision of sustainable urban landscape—a landscape that may take as many as 100 years to emerge. These include restoration of the hydrologic cycle and biological integrity of the stream in a way that produces a quality human environment.

The basis of any deep understanding of the Nine Mile Watershed must begin with inventory and assessment. We have attempted to outline the immediate and long-term monitoring programs necessary to provide sound environmental input for the redevelopment and planning process.

Redevelopment is a long-term process with many immediate focal areas. We have outlined priorities for protection and preservation of watershed lands, keeping ecosystem health and function as the framework for our recommendations.

The results of the monitoring and assessment process will be communicated to community residents, municipalities, and the watershed authority. Based on recommendations from this communication loop, monitoring goals, environmental priorities, and attainable conditions will be modified to ensure and measure success of watershed restoration programs on human health and the environment.

The action plan of the Ecology Group is designed to:

- Provide the community and watershed authority an understanding of the existing natural and human ecological conditions.
- Involve the community in the environmental inventory. We also suggest that a percentage of all research and capital dollars be simultaneously invested in revitalizing watershed communities in an equitable manner.
- Develop inventory, analysis and modeling tools that make it possible to both understand and manage the watershed now and in the future. The system must be able to evolve with technology and changing community goals.
- Provide an ecological basis to identify critical areas and use this information to set priorities and develop attainable goals and redevelopment criteria.
- Define the existing baseline ecological conditions as a measure for assessment of the watershed ecological function and how well the watershed restoration actions are working.

The tasks of the action plan, detailed in the following pages, are:

I. Restore the hydrologic regime.
II. Improve the stream channel and flood plain.
III. Conserve urban watershed habitat.
IV. Monitor water quality and biology.
V. Integrate and acquire feedback.

I. Restore the Hydrologic Regime					
Action Steps	**Performance Objectives**	**Who**	**Time Frame**	**Funding Sources**	**Potential Challenges**
1. Implement a long-term basin-wide hydrologic monitoring program.	Network of gauges and monitoring stations operating in best locations. QAQC and SOPs	USGS and WA	1 year and continuing	WA, Boroughs, USGS	Lack of coordination between agencies or lack of regulatory driver
2. Develop a hydrologic and hydraulic watershed model.	Calibrate to existing condition, then to level necessary to detect a significant flow change	WA and consultants	2 years	WA, Boroughs, EPA	Lack of coordination between agencies or lack of regulatory driver
3. Update flood plain maps.	Use FEMA-approved models to update maps to existing conditions; extend upstream into culverted areas	FEMA and WA	3 years	WA, Boroughs, EPA	FEMA regulations not geared to closed urbanized systems No requirement to update
4. Identify flood prone structures and areas and develop strategies to address them.	Quantify location and extent of flooding	Municipalities and WA	1 year after flood plain study	WA, Boroughs, FEMA	FEMA regulations not geared to closed urbanized systems No requirement to update
5. Establish attainable redevelopment criteria for stormwater hydrology.	Develop criteria for duration, flow rate, timing, volume and velocity	WA	Immediate and update in three years	WA	Lack of existing regulatory form Consistency and integration with economic development Lack of incentives
6. Perform watershed infiltration, detention, retention opportunities analysis.	Complete map of opportunity areas and priorities based on soils, geology, conservation areas and economic development	WA, urban redevelopment authorities, municipalities, community development corporations	1 year	EPA, State, watershed organizations and foundations	None

II. Improve the Stream Channel and Flood Plain

Action Steps	Performance Objectives	Who	Time Frame	Funding Sources	Potential Challenges
1. Inventory stream channel and flood plain geomorphology.	Collect material necessary for geomorphic analysis; monitor over time Prepare conceptual plan QAQC and SOPs	WA, municipalities, and consultants	1 year, and following flow modification and restoration projects	WA, Boroughs, EPA, NRCS, Army Corps of Engineers	Lack of coordination between agencies or lack of regulatory driver
2. Perform geomorphic analysis and sediment transport modeling.	Determine critical velocity, bank full flow, channel-forming flow, 10 yr and 100 yr water surface elevations & flows, watershed erosion rates, stream bank and channel stability	WA, municipalities, and consultants	2 years	WA, Boroughs, EPA, NRCS, Army Corps of Engineers	Lack of coordination between agencies or lack of regulatory driver
3. Identify existing and future channel stability problems.	Locate, describe and prioritize restoration sites	WA, municipalities, and consultants	2 years	WA, Boroughs, EPA	Lack of coordination between agencies or lack of regulatory driver
4. Fix critical stream bank erosion problems.	Stabilize critical areas Ensure public safety	WA and consultants	3 years	WA, Boroughs, EPA	Lack of coordination between agencies or lack of regulatory driver
5. Create long-term channel restoration plan for new watershed flow regime.	Create channel equilibrium, consistent with targeted flows and bio-engineering standards targeted to ecosystem restoration goals	WA and consultants	3 years	WA, Boroughs, EPA	Lack of coordination between agencies or lack of regulatory driver
6. Develop a buffer policy.	Stabilize channel and reduce non-point source pollutant loads Width based on land use, physical setting and habitat value	WA, County, and consultants	1 year	WA, EPA	Consistency with existing local buffer codes
7. Implement a greenway program.	Promote greenway connectivity, recreation stewardship	WA and consultants	2 years	WA, Boroughs, EPA	Consistency with existing local buffer codes

III. Conserve Urban Watershed Habitat

Action Steps	Performance Objectives	Who	Time Frame	Funding Sources	Potential Challenges
1. Inventory watershed and establish natural resources GIS database.	Establish tiered baseline data for planning and programming QAQC and SOPs	WA, TRWWDP, and consultants	2 years	WA, County, State, EPA	None
2. Perform critical areas analysis.	Based on integrated, multi-level analysis of restoration potential, redevelopment potential and ecosystem value	WA and consultants	2 years	WA, Boroughs, EPA	None
3. Develop short-term and long-term strategies for land management and protection. (i.e. criteria for development: create linkages between ecosystems, protect critical areas, prioritize enhancement).	Achieve a predetermined level of ecosystem enhancement	WA, County, State, and consultants	3 years	WA, EPA	Lack of coordination between agencies or lack of regulatory driver
4. Implement a land acquisition and easement program.	Achieve physical linkages	WA	4 years	WA	Consistency with existing redevelopment program and Allegheny County Greenway Programs
5. Develop natural resources redevelopment criteria such as open space requirements, banking, and fee in lieu of on-site program.	Increase watershed habitat by 12 percent (suggested goal) Provide ecosystem restoration options that can be realized either on-site or in priority areas Increase connectivity and renew ecosystem function	WA	1 year and revised in 3 years	WA	Consistency with existing redevelopment program and Allegheny County Greenway Programs

IV. Monitor Water Quality and Biology

Action Steps	Performance Objectives	Who	Time Frame	Funding Sources	Potential Challenges
1. Implement a long-term chemical and biological monitoring program which reflects the impact of failing infrastructure.	Network of monitoring stations in best locations Data quality adequate to calibrate the model Biological modeling to establish reference conditions QAQC and SOPs	WA and consultants	1 year	WA, County, State, EPA	Will be required by Clean Water Act (NPDES, TMDLs) Must be consistent with state programs
2. Model existing and future water quality.	Model must be adequate for provided baseline loads and efficacy in predicting load reduction strategies	WA and consultants	3 years	WA, EPA	Will be required by Clean Water Act (NPDES, TMDLs) Must be consistent with state programs
3. Perform attainability and alternatives analyses.	Based on integrated, multi-level analysis of watershed load reduction requirements, efficacy of alternatives, and potential to restore ecosystem value Provide flexibility options	WA and consultants	4 years	WA, EPA	Options must be consistent with County and State programs
4. Revise redevelopment criteria.	Encourage impervious surface reduction, rooftop drain disconnection, and permeable paving Require passive treatment of first-flush runoff from impervious areas	WA	1 year	WA	Lack of coordination between agencies or lack of regulatory driver
5. Implement pollution prevention program.	Set municipal operations standards and commercial and residential maintenance guidelines	WA and consultants	2 years	WA, Boroughs, EPA	Lack of coordination between agencies or lack of regulatory driver

V. Integrate and Aquire Feedback					
Action Steps	**Performance Objectives**	**Who**	**Time Frame**	**Funding Sources**	**Potential Challenges**
1. Communicate results to public in an understandable way.	100% accessibility for all studies, reports and documents Simple language Internet access Provide a public information gateway for questions and comments	WA, Municipalities, local NGOs	2 years and update as needed	WA, Boroughs, EPA	None
2. Involve public in monitoring, storm drain stenciling, stream cleanups, naming, adopting, planting, riparian restoration, and roof drain disconnects.	Build consensus and stewardship through experiences in the field and participation in monitoring and strategizing Develop volunteer programs, educational materials and access to laboratory testing for urban streams with likely health impacts	WA, Municipalities, local NGOs	2 years and update as needed	WA	None
3. Develop environmental curricula for schools and watershed.	Enable children's sense of ownership, responsibility and voice in issues of environmental consequence	WA, Municipalities, Board of Education	2 years	WA	Must be consistent with County and State school education program requirements.
4. Coordinate existing programs within the watershed.	Require information exchange Analyze and rank the results of actions, for multiple benefits and community understanding Each stakeholder addresses the results WA facilitates, and provides QAQC	WA, Municipalities, local NGOs	Continuous and ongoing	WA	None

Community Development Group Summary

This subgroup of the policy team examined ways community development* policies, programs, and activities can bolster efforts to rehabilitate the sewer and stormwater infrastructure and restore the ecosystem. Many beneficial linkages between development activities and infrastructure/ecosystem improvements are available.

The following principles can guide creation and elaboration of these linkages:

- Development should be cognizant of watershed issues and impacts, especially cumulative impacts.
- Coordinate the planning of development that has multi-municipal impacts to stormwater and sewage infrastructure, ecosystems, traffic, zoning, land use, citizen input & outreach.
- Assure development occurs as planned and agreed upon to enhance and fit with existing and pending development.
- Develop coordination and oversight processes to effectively accommodate unplanned private initiative and new opportunities.

The following action plan will enable the communities to take advantage of the mutually reinforcing linkages between improved infrastructure and desirable development:

I. Reconcile zoning and land use ordinances of the watershed communities—Pittsburgh, Wilkinsburg, Swissvale, and Edgewood—for compatibility with watershed objectives and goals.
II. Review local codes (e.g. building, street design, drainage, plumbing, property maintenance) and procedures for consistency with watershed objectives and green infrastructure measures.
III. Identify and correct existing development constraints (legal, physical, and financial) caused by inadequate infrastructure.
IV. Develop a coordinating mechanism for municipal development plans, to assure projects do not contradict each other or overall ecosystem/development objectives.
V. Enhance the existing stormwater management program (Act 167 plan) to reflect watershed needs, enable green infrastructure, and facilitate community, social, and economic benefits.
VI. Educate citizens, officials, and developers that good development and a healthy environment are compatible and reinforcing.

The following pages present an initial elaboration of this action plan. Further below, the team presents some comments and recommendations on local codes and policies, and an initial list of resources and strategies that could assist communities in developing and implementing the suggested actions.

*Development includes all redevelopment activities as well as new development on unbuilt-upon land.

Community Development Action Plan

I. Reconcile Zoning and Land Use Ordinances of the Watershed Communities for Compatibility with Watershed Objectives and Goals					
Action Steps	**Who**	**Time Frame**	**Estimated Costs Funding Sources**	**Outreach and Education**	**Potential Challenges**
1. Establish technical review panel. 2. Convene planning commissions to approve reconciliations. 3. Elected bodies adopt recommendations.	Municipal planning commissions and staff, governing bodies, WA DCED could facilitate Resources: PPA	12 Months	$20,000 Municipalities, DCED, State Planning Assistance Grants, County	News media, public meetings, public hearings	Turf issues Justification Lack of County Planning Department

II. Review Local Codes and Procedures for Consistency with Watershed Objectives and Green Infrastructure Measures					
Action Steps	**Who**	**Time Frame**	**Estimated Costs Funding Sources**	**Outreach and Education**	**Potential Challenges**
1. Establish technical review panel. 2. Make recommendations to governing bodies. 3. Adopt recommendations.	Municipal engineers, attorneys, governing bodies, WA Resources: APWA, AIA, ASCE, ASLA, PPA, Brandywine Conservancy	12 months	$40,000 Municipalities, DCED	News media, public meetings, public hearings, BAMP	Reactions of builders and developers Overcoming implementation inertia (e.g. building inspectors)

III. Identify and Correct Existing Development Constraints (legal, physical, and financial) Caused by Inadequate Infrastructure					
Action Steps	**Who**	**Time Frame**	**Estimated Costs Funding Sources**	**Outreach and Education**	**Potential Challenges**
1. Identify economic development problems related to infrastructure. 2. Prepare inventory and evaluation of existing infrastructure systems.	Municipal Engineers, Departments of Public Works, Community Development Depts/Economic Development Authorities, Governing bodies, ALCOSAN, WA Resources: Pennvest, CDBG State Revolving Fund, DCED, Heinz School, GSPIA, Chamber of Commerce	12 Months	$100,000+	Early citizen notice, public processes	Inter-municipal cooperation Obtaining seed money
3. Develop corrective action plan. 4. Develop capital budget.		24 Months	$100,000+		
5. Implementation of capital budget.		72 Months	$1,000,000+		

IV. Develop a coordinating mechanism for municipal development/ redevelopment plans, to assure projects do not contradict each other or overall ecosystem/development objectives					
Action Steps	**Who**	**Time Frame**	**Estimated Costs Funding Sources**	**Outreach and Education**	**Potential Challenges**
1. Obtain and review current plans.	Municipal planning commissions, governing bodies, WA Resources: DCED, Allegheny Conference, Pittsburgh Regional Alliance, Universities	12 Months	Small Amount	Local officials, business community, public, entrepreneurs	Turf issues Who convenes? Differing development priorities
2. Establish periodic joint planning commission meetings to negotiate inter-municipal issues. 3. Governing bodies incorporate items into development plans, and if desired, establish intergovernmental cooperation agreements.		Ongoing			

V. Enhance the existing stormwater management program (Act 167 plan) to reflect watershed needs, enable green infrastructure, and facilitate community, social, and economic benefits

Action Steps	Who	Time Frame	Estimated Costs Funding Sources	Outreach and Education	Potential Challenges
1. Identify existing plan shortcomings and watershed needs. 2. Update existing ordinances & regulations.	Municipal officials and governing bodies, County, WA Resources: TRWWDP	12 months	$25,000	Public, municipal officials, state legislators, DEP, economic development agencies, property owners	Politics at municipal, county, and state levels Reactions of developers
3. Amend Act 167.		10 years	Unknown		

VI. Educate citizens, officials, and developers that good development and a healthy environment are compatible and reinforcing

Action Steps	Who	Time Frame	Estimated Costs Funding Sources	Outreach and Education	Potential Challenges
1. Identify communication media.	Municipalities, WA, environmental groups, Chambers of Commerce, ALCOSAN, County Health Dept., WQED, League of Women Voters, public relations firms Heinz School, Environmental City Initiative, Schools, Hosanna House, Redevelopment agencies, TRWWDP, Green Building Alliance	6 months	$60,000	Public officials, citizens, developers Media to include: TV, radio, public service announcements, public schools, stenciling program, workshops, newspapers	Apathy Obtaining money Politics
2. Develop and implement a marketing strategy.		6 months	$100,000		
3. Develop and implement integrated demonstration results.		2 years	$200,000		
4. "Export" results of demonstration projects, and continue outreach.		Ongoing	Some		

Land Use Ordinances and Other Regulatory Recommendations

In order to implement short and long-term watershed restoration and stormwater management objectives and projects, a number of changes are needed to existing municipal, county, and state regulatory requirements. Some specific recommendations developed in the limited time of the charrette are listed below. Note that several of these recommendations address items I and II in the community development action plan presented above.

Establish a long-term, sustainably funded, multi-municipal, watershed-wide environmental management entity.

To ensure that the goals and objectives of maintaining and preserving human health and ecological integrity are met throughout the watershed, it is necessary to establish a watershed-wide entity with the authority to work across municipal boundaries.

1. Immediately after the charrette, participants will send a joint letter to the Pennsylvania DEP Southwest Regional Director requesting a meeting to discuss the pending DEP Order requiring municipalities to comply with the Sewage Facilities Act and the Clean Streams Law. We should recommend that DEP use this opportunity to broaden the requirements for municipalities subject to the order to undertake cooperatively a broader range of watershed management activities, including forming a management authority.
2. Create a long-term, sustainably funded, multi-municipal, watershed-wide environmental management entity.
3. Create a stormwater banking system within the watershed using the East Hills Shopping Center and similar sites to create mitigation opportunities for smaller sites.
4. Provide a mechanism for Wilkinsburg to receive financial incentives to adopt "green zoning."

Municipalities review existing ordinances and revise to incorporate stormwater requirements into existing zoning ordinances.

1. Deconflict requirements for curb cuts, catch basins, and street design with stormwater management considerations.
2. Allow landscaping for water retention as well as aesthetics and other traditional purposes.
3. Existing vegetative cover should be retained as much as possible during development.
4. Stormwater management should be considered in the placing of erosion and sedimentation basins during construction to ensure that erosion & sedimentation and stormwater objectives are adequately met.
5. Minimize impervious surface for new development and reduce or mitigate impervious surface during redevelopment.
6. Require better than one-for-one mitigation of equivalent ground water recharge for impervious surface.
7. Require that parking lot and all other impervious surface designs must include infiltration of stormwater, unless it is proven impossible for the site.
8. Require that redevelopment cannot be approved without compliance with stormwater management/infiltration/impervious surface reduction requirements. Modify Redevelopment Authority policies, as well as land use ordinances.
9. Increase fines for noncompliance to eliminate the economic benefit of noncompliance or establish effective deterrence levels.
10. Examine municipal building codes and county plumbing code to identify barriers to individual stormwater retrofits such as cisterns.

Municipalities create new environmental zoning ordinance provisions.

1. Incorporate Federal Flood Insurance Program provisions in local ordinances to achieve higher ratings for lower flood insurance premiums.
2. Create "official map" for zoning ordinance.
3. Create an "environmental overlay zone" for zoning ordinance.
4. Create policy for acquisition of tax delinquent properties within the overlay zone, resulting in increased green space and stream daylighting.
5. Develop comprehensive environmental sections for zoning and subdivision and land development ordinances.

Improve effectiveness of erosion and sedimentation and stormwater control requirements.

1. Raise enforcement of Allegheny County Conservation District to highest level to improve effectiveness.
2. Allow county health department and conservation district enforcement of Clean Streams Law (requires change in state law).
3. Revise state erosion and sediment control regulations (Chapter 102) to require higher standards.
4. DEP/Allegheny Co. should require changes to local ordinances to incorporate "green" provisions, and give priority for financial grants to communities which adopt "green" zoning.

Comments on Existing Codes and Ordinances

The policy team spent a short time at the charrette examining local codes and ordinances. There was not time for a comprehensive review. The following selected items indicate some of the barriers that may exist to implementation of the stormwater management techniques illustrated by the charrette's design teams. No doubt there are others barriers in the codes. As indicated by the community development action plan items I and II, local governments should undertake comprehensive reviews of codes and ordinances and reconcile them with watershed and infrastructure restoration objectives, strategies, and techniques.

Municipal Codes and Ordinances

Wilkinsburg's Zoning Code does not refer to the Borough's Stormwater Management Ordinance. It should require compliance with the stormwater ordinance before a permit is issued for building/land use changes, development, or redevelopment.

Wilkinsburg's Stormwater Management Ordinance has a good 'trigger' for stormwater management, i.e. any "development of land which may affect stormwater runoff." However, the ordinance does not address restoration of existing channels, streambed conditions, etc. The ordinance has special standards for the Turtle Creek Watershed; analogous standards, unique to the human and natural ecosystem needs of Nine Mile Run, should be developed and implemented.

Section 7.707 of Edgewood's Planned Commercial Development Ordinance imposes landscaping requirements based on aesthetics. The scope of the section needs to be expanded and provide for greater flexibility to include hydrological objectives.

Section 609.5 of Edgewood's Subdivision Land Ordinance requires connection of storm drains to paved gutters. It should allow use of on-site retention/infiltration systems.

BOCA Codes

The municipalities in the watershed refer to the BOCA codes for building inspection and property maintenance. (BOCA stands for Building Officials Code Administrators.) These codes include provisions which dampen visionary stormwater techniques.

BOCA Property Maintenance Code

Section 303.2 —*All premises shall be graded and maintained to prevent the erosion of soil and to prevent the accumulation of stagnant water thereon, or within any structure located thereon. (Exception: water retention areas and basins approved by the code official.*)

Depending on implementation, this could discourage shallow surface infiltration basins and other techniques that allow or create short-term ponding of water.

Section 303.4—*All premises and exterior property shall be maintained free from weeds or plant growth in excess of 10 inches.... Weeds shall be defined by grasses, annual plants, and vegetation, other than trees or shrubs; provided, however, this term shall not include cultivated flowers and gardens.*

This should be revised so as not to deter grass swales, vegetated drainage channels, native species landscaping (native plants have more robust root systems that increase infiltration, as compared to standard turf grass), etc.

Section 304.7—*Roof water shall not be discharged in a manner that creates a* public nuisance.

Section 508.0—*Drainage of roofs and paved areas, yards and courts, and other open areas on the premises shall not be discharged in a manner that creates a* public nuisance.

Section 302 defines a **public nuisance** by referring to common law and also as "*any physical condition ... considered an attractive nuisance to children.*" This is a vague definition that could freeze innovation. The communities should carefully define what conditions are actually dangerous or undesirable and disallowed.

Implementation Resources and Approaches

Following is an initial, brainstormed list. No doubt many other resources and strategies exist.

Funding

Resources

- Community Development Block Grants
- Community Facilities Grants
- PennVEST
- Army Corps of Engineers (3 Rivers Wet Weather Demonstration Project)
- Environmental Protection Agency
- TEA-21 (Enhancements & Restoration)
- Foundations
- DCNR - Rivers Conservation Program
- DCNR – Greenways Planning (Key 93)
- Variable Rate Bond Pools (3 Rivers Wet Weather Demonstration Project)
- Developers
- DCED – Economic Development and SPAG
- State Capital Budget
- Water Resources Development Act
- USDA – Farmers Home Administration
- HUD – (Sanders Task Force and Empowerment Zones)
- Tax Increment Financing
- Low Income Relief from Taxation
- Regional Asset District
- Municipal Capital Budgets

Strategies

- Access fundraising technical assistance from some of the following resource agencies:
  - Department of Community and Economic Development
  - Governor's Task Force
  - Army Corps of Engineers
  - Allegheny County Dept. of Economic Development
  - PennVEST
  - Council of Governments
  - Universities
  - 3 Rivers Wet Weather Development Project
  - Department of Conservation and Natural Resources
  - Department of Environmental Protection
- Municipalities work together for funding
- User fees
- In lieu of "fees"
- Mass bidding

Technical/Planning

Resources

- Resources listed under funding plus:
- Natural Resources Conservation Services
- United States Geological Survey
- Allegheny County Health Department
- Pittsburgh High Technology Council
- Environmental Business Network
- Green Building Alliance
- Penns Southwest
- Pennsylvania Economy League
- Pennsylvania Department of Environmental Protection
- Southwest Pennsylvania Commission
- Southwest Pennsylvania Industrial Resource Center
- SPEDD
- Professional Organizations (WEF/APWA/AIA/ASCE/APA/AICP/AWRA)
- Universities – Heinz/GSPIA/Bayer School
- Fish and Boat Commission
- Environmental Organizations – Allegheny Land Trust, Western Pennsylvania Conservancy and others
- ALCOSAN
- Department of City Planning

Strategies

- Ordinances, policies, and regulations
- Curative amendments
- Drainage and development easements
- Eminent domain
- Comprehensive planning
- Tax delinquent properties

Legal

Resources

- Municipal attorneys
- 3 Rivers Wet Weather Demonstration Project
- Pennsylvania Environmental Defense Foundation
- Pennsylvania Environmental Council
- Environmental Law Institute
- University Law Schools (law clinic)
- Pro bono law firm services
- Bar Association
- Department of Environmental Protection
- Legislators

Strategies

- All the strategies listed under technical/planning plus:
- Acquisition
- Legal strategies in support of development
- Legislation
- Litigation
- Incorporation strategies; e.g. land trust

Management

Resources

- Department of Community and Economic Development
- Governor's Task Force
- Allegheny County Department of Economic Development

- PennVEST
- Council of Governments
- 3 Rivers Wet Weather Development Project
- Department of Conservation and Natural Resources
- Department of Environmental Protection
- Natural Resources Conservation Service
- Allegheny County Health Department
- Pennsylvania Economy League
- Professional Organizations (WEF/APWA/AIA/ASCE/APA/AICP/AWRA)
- Universities – Heinz/GSPIA/Bayer School
- Environmental Organizations – Allegheny Land Trust, Western Pennsylvania Conservancy and others
- ALCOSAN
- Department of City Planning
- Allegheny League of Municipalities/PSATS/PSBA
- Local Government Academy
- Accounting and business consulting firms
- Community Technical Assistance Center

Strategies

- Joint Municipal Authority
- ALCOSAN
- County Authority
- Environmental Improvement Compact
- Stormwater District (County wide or watershed based)
- Allegheny County department
- Privatization
- Contract operation
- Management Committee/Joint Management Agreements
- Council of Governments
- Nonprofit corporation
- Environmental Advisory Committee

Letter to the Pennsylvania Department of Environmental Protection

The following letter was composed at the charrette, signed by the persons indicated below, and forwarded to the Pennsylvania DEP. The requested meeting took place December 15th, 1998.

ECOSYSTEMS AND INFRASTRUCTURE
NINE MILE RUN
Site-Specific Stormwater Management Options Charrette
October 14-17

October 17, 1998

Mr. Charles Duritsa
Director, SW Regional Office
Department of Environmental Protection

Dear Chuck:

We are participants in a multi-disciplinary planning activity focussing on Nine-Mile Run called the Site-Specific Stormwater Management Options Charrette. We have developed an exciting series of options, recommendations, and design alternatives to address the stormwater, sewage collection, and ecological restoration needs of this degraded watershed. As a result of our work, we have determined that DEP has an immediate and important role to play in implementing these recommendations.

We are aware that the Department has drafted an Order to the Nine-Mile Run communities requiring them to begin an assessment of the watershed sewer system to eliminate violations of the Clean Streams Law. We request the opportunity to discuss with you in the very near future the results of our Charrette and how its findings could relate to your Order and address a broader range of watershed management activities.

Sincerely,

Bruce Ferguson, Charrette Facilitator

Tim Collins, Studio for Creative Inquiry
Carnegie Mellon University

Caren Glotfelty, Goddard Professor of
Forestry and Environmental Resource
Conservation, Penn State

John Stephens, Friends of the Riverfront

Richard Pinkham, Rocky Mountain Institute

John Schombert, 3 Rivers Wet Weather
Demonstration Program

John Childe, Pennsylvania
Environmental Defense Foundation

cc: James Seif, Secretary of Environmental Protection
Terry Fabian, Deputy Secretary for Field Operations
Dr. Hugh Archer, Deputy Secretary for Water Management
Dr. Bruce Dixon, Director, Allegheny County Health Department
Tim Drier, Regional Water Manager

Base Maps for the Four Sites

Each of the design teams at the charrette worked off a line drawing base map of its site, provided at a scale appropriate for trace-overs, measurements, and other design tasks. The detail included streets, sidewalks, buildings, topography, sewers, storm drains, other utilities, and other features. Information for the base maps came from a variety of sources, and site inspections.

Chris Leininger of Sustainable Home Design, Beaver, Pennsylvania, produced these maps.

The base maps are available for inspection at the STUDIO for Creative Inquiry, Carnegie Mellon University, Pittsburgh.